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An Investigation into English Language Learning Strategies Employed by First Year English Major Students at School of Foreign Languages, Thai Nguyen University

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Abstract- The study investigates the language learning strategies (LLSs) employed by first year English major students at School of Foreign Languages (SFL), Thai Nguyen University (TNU) and to find out differences in the use of LLSs among the students of different language learning experiences measured by years of learning English. Two data collection instruments used are a questionnaire adapted from the Strategy Inventory for Language Learning (SILL) (Oxford, 1990) and an interview. The study was conducted with the participation of 100 first year English major students at SFL, TNU. The results of the study indicate that all the LLSs were used by the 100 participants. In addition, there were a number of variations in the employment of LLSs among students of different language learning experiences. It was found that the more experienced students used LLSs much more frequently than the less experienced ones.

Index Terms- language learning, language learning strategies, language learning experiences

I. INTRODUCTION

In the era of integration and globalization English has become an international mean of communication in all over the world. English has been the dominant language in the fields of education, commerce, tourism and many other aspects of life. In the field of education, English has been taught as one of the compulsory subjects at all levels of education in most countries. Due to the importance of English, a plenty of research on English language teaching and learning has been conducted.

In Vietnam, English has always affirmed its important position in different fields especially in education. However, most Vietnamese students learn English with the aim of finishing the course or passing examinations. Few students find English interesting and learn English because their interest because English is so difficult for them to learn and to love. One of the main reasons for this is their lack of English language learning strategies. An abundance of research on language learning strategies, therefore, has been carried out and a number of suggestions have been given. However, none of them was done at School of Foreign Language (SFL), Thai Nguyen University

(TNU). This study is, therefore, aimed at answering two following questions:

1. *What English language learning strategies are frequently employed by the first year English major students at School of Foreign Languages, Thai Nguyen University?*
2. *What are the differences in the students' use of English language learning strategies due to English learning experience?*

II. LITERATURE REVIEW

2.1. Definition of language learning strategies

There have been numerous definitions of language learning strategies by different researchers. According to Oxford (1990), language learning strategies are “mental steps or operation that learners use to learn a new language and to regulate their effort to do so” (p.7). O’Malley and Chamot (1990) defined language learning strategies as “special thoughts or behaviours that individuals use to help them comprehend, learn or retain new information” (p.1). Language learning strategies are “operations employed by the learner to aid the acquisition, storage, retrieve and use of information...; specific actions taken by the learner to make learning easier, faster, more enjoyable, more self-directed, more effective and more transferable to situation” (Oxford, 1990, p.1).

2.2. Classification of language learning strategies

In Rubin’s (1987) viewpoint, there were three types of language learning strategies which are learning strategies, communication strategies, and social strategies. These types of learning strategies make direct or indirect contribution to learner’s learning process.

The most notable classification of language learning strategies was given by Oxford (1990). According to Oxford, there are 62 strategies which are divided into two main categories, direct and indirect. Direct strategies consist of three subtypes of strategies: memory strategies, cognitive strategies and compensation strategies. Indirect strategies include metacognitive strategies, affective strategies and social strategies. Direct and indirect strategies work together and assist language learners in different ways. While direct strategies help learners store, recover

information and even produce language, indirect strategies support and manage language learning strategies without direct engagement.

2.3. Studies on language learning strategy

2.3.1. Studies on language learning strategy employment

Bremner (1999) conducted a study in order to study the language learning strategy use by a group of Hong Kong learners. The study was participated by 149 students who were sitting in a language and communication skill course at the City University of Hong Kong. The researcher used a fifty-item questionnaire adapted from Oxford's Strategy Inventory for Language Learning as a data collection instrument. The result showed a medium level of strategy use by learners. In addition, compensation and metacognitive strategies were used most frequently while memory strategies were least frequently used.

Ratana (2007) investigated the English language problems and learning strategies used by thirty Thai students of Mahidol University. A questionnaire modified from Oxford's (1990) SILL was used as the instrument to collect the data of the research. The study result showed a medium frequency use of strategies among participants. The thirty Thai students used metacognitive most frequently but in medium range, and compensatory strategies least frequently.

Dhanapala (2007) explored the differences of language learning strategy use between Japanese and Sri Lanka advanced English language students. The three data collection instruments were a sixty-item strategy questionnaire modified from Oxford's SILL, a background questionnaire, and an English proficiency test. It was indicated from the study result that Sri Lanka students employed strategies more often than the Japanese ones. The Sri Lanka students gave the most preference to metacognitive strategies followed by cognitive strategies and memory strategies. On the other hand, the Japanese students used compensation strategies most frequently and affective strategies least frequently, followed by social strategies.

2.3.2. Studies on the relationship between language learning experience and language learning strategy use

Purdie and Oliver (1999) carried out an investigation on language learning strategies employed by bilingual-aged children from three main cultural groups: Asian ((predominantly Vietnamese or Chinese dialect speakers), European (children who spoke Greek and those who identified themselves as speakers of Macedonian), and speakers of Arabic. The instrument for collecting the data was a written questionnaire. The results pointed out that students who had been in Australia for a longer period of time (three or less year and four or more) obtained significantly higher mean scores for Cognitive strategies and for Memory strategies. From the findings of the study, it could be concluded that experience in studying a language can affect the language learning strategy use.

Khamkhien did a research on the factors affecting language learning strategy used by Thai and Vietnamese EFL learners in 2010. The two main objectives of the study were to determine three factors (gender, motivation and experiences in studying English) affect the choices of language learning strategies and to compare the roles of these factors and the pattern of language learning strategy used Thai and Vietnamese students. The study was conducted with the participation of 136 undergraduate

students (84 Thai and 52 Vietnamese students). All the participants had no more than 4-month experience abroad and had at least 6 years of experience of learning English. The researcher used the 80-item Strategy Inventory for Language Learning as the instrument of data collection. The result noted that along with motivation and gender, language learning experiences had significant effects on the learners' language learning employment. With regard to Thai students, cognitive and metacognitive categories were used more frequently by the ones with additional experiences in studying English in the language center and/ or of going abroad than by the ones with no additional experiences. For Vietnamese students, the t-test showed that the participants without additional experience reported higher use of memory category than the additional experience group.

III. METHODOLOGY

3.1. Participants

The participants of the research were 100 first year English major students at SFL, TNU. At the time gathering the date for this study, they were in the second semester of the school year 2017 – 2018. Most of them are from 18 to 20 years old and have learned English for 8 to 12 years. They have never been given any training in language learning strategies. The 20 students for the face-to-face interview were chosen from the 150 participants.

3.2. Instruments

The questionnaire consists of two parts. Part I designed by the researcher collects the participants' background information. This part includes questions about name, age, gender, class, major, years of studying English. Part II is the "Strategy Inventory for Language Learning" (SILL) devised by Oxford (1990) with a five point Likert-scale: (1) "never or almost true for me", (2) "usually not true of me", (3) "somewhat true of me", (4) "usually true of me", (5) "always or almost always true of me".

The purpose of the interview is to have deeper understanding about the students' use of language learning strategies. The interview asked the students questions about name, age, major, English learning duration and their perceptions about language learning strategies.

3.3. Procedure

Firstly, the questionnaire was distributed to the students by the researcher after English lessons. The researcher was with students during the time they filled the questionnaire to give any necessary help. It took about 15 minutes for the participants to complete the questionnaire.

Secondly, based on the result of the questionnaire, the researcher chose 20 students to interview. Then the researcher compared their answer to the interview questions to their response in the questionnaire.

IV. FINDINGS AND DISCUSSIONS

4.1. Discussion on the result of the questionnaire

4.1.1. Use of overall strategies

Table 4.1 reveals that the 100 participants used most strategy categories at “medium” level. As can be seen from the chart 4.1, social strategies were the most frequently used among the six categories ($M = 3.49$). The second highest rank was compensation strategies ($M = 3.09$), followed by memory strategies ($M = 2.90$), affective strategies ($M = 2.88$), metacognitive strategies ($M = 2.86$) and cognitive strategies ($M = 2.69$). It is easily recognized that all the strategy categories were in the same frequency level. No great disparity, therefore, could be seen among the columns representing the six strategy categories in the chart.

Strategy Category	Number of students	Mean	Rank order of the usage
A: Memory	100	2.90	3
B: Cognitive	100	2.69	6
C: Compensation	100	3.09	2
D: Metacognitive	100	2.86	5
E: Affective	100	2.88	4
F: Social	100	3.49	1

Table 4.1. The subjects' responses to the use of the six strategy categories

4.1.2. Use of individual language learning strategies

Individual Strategy	N	MEAN	SD
1. I think of relationships between what I already know and new things I learn in English.	100	2.35	.828
2. I use new English words in a sentence so I can remember them.	100	3.55	.835
3. I connect the sound of a new English word and an image or picture of the word to help me remember the word.	100	2.33	.930
4. I remember a new English word by making a mental picture of a situation in which the word might be used.	100	2.13	.994
5. I use rhymes to remember new English words.	100	2.83	.821
6. I use flashcards to remember new English words.	100	3.67	.876
7. I physically act out new English words.	100	3.22	.851
8. I review English lessons often.	100	3.81	.884
9. I remember new English words or phrase by remembering their location on the page, on the board, or on a screen sign.	100	2.25	.882

Table 4.2. Memory category descriptive statistics

Table 4.2 shows that there were significant differences in the use of memory category (items 1 to 9). The strategies used the most often were “I review English lesson often” ($M = 3.81$), “I use flashcard to remember new words” ($M = 3.67$), and “I use English words in a sentence so that I can remember them” ($M = 3.55$). Five strategies were found to be in low use, item 1 ($M = 2.35$), item 3 ($M = 2.33$), item 4 ($M = 2.13$), item 9 ($M = 2.25$) and item 5 ($M = 2.83$).

Individual Strategy	N	MEAN	SD
10. I say or write new English words several times.	100	3.34	1.022
11. I try to talk like native English speakers.	100	2.67	.998
12. I practice the sounds of English.	100	3.55	.833
13. I use the English words I know in different ways.	100	2.13	.927
14. I start conversations in English	100	3.14	.948
15. I watch English language TV shows spoken in English or to go to movies spoken in English.	100	3.23	.834
16. I read for pleasure in English.	100	2.42	.838
17. I write notes, messages, letters, or reports in English.	100	1.88	.934
18. I first skim an English passage (read over the passage quickly) then go back and read carefully.	100	2.25	.875
19. I look for words in my own language that are similar to new words in English.	100	3.11	.933

20. I try to find patterns in English.	100	1.25	.987
21. I find the meaning of an English word by dividing it into parts that I understand.	100	3.01	.998
22. I try not to translate word-for-word.	100	3.67	.911
23. I make summaries of information that I hear or read in English.	100	2.05	.841.

Table 4.3. Cognitive Category descriptive statistics

Table 4.3 describes the means and standard deviations of cognitive strategies (items 10 to 23). As can be seen from the table, the most frequently used strategy was item 22 - "*I try not to translate word for word*" ($M = 3.67$) followed by item 12 - "*I practice the sound of English*" ($M = 3.55$). The least frequently used strategies were item 20 - "*I try to find pattern in English*" ($M = 1.25$), item 17 - "*I write note, messages, letter and reports in English*" ($M = 1.88$), item 13 - "*I use the English words I know in different ways*" ($M = 2.13$), item 18 - "*I first skim an English passage then go back and read carefully*" ($M = 2.25$). The other strategies were used at medium level.

Individual Strategy	N	MEAN	SD
24. To understand unfamiliar English words, I make guesses.	100	3.23	.765
25. When I can't think of a word during a conversation in English, I use gestures.	100	3.55	.898
26. I make up new words if I do not know the right ones in English.	100	3.12	.875
27. I read English without looking up every new word.	100	2.87	.987
28. I try to guess what the other person will say next in English.	100	2.07	.766
29. If I can't think of an English word, I use a word or phrase that means the same thing.	100	3.67	.834

Table 4.4. Compensation Category descriptive statistics

Table 4.4 gives the means and standard deviations of compensation strategies (items 24 to 29). Remarkable differences are found in the use of compensation strategies among the first year students. Four out of six items got mean scores higher than 3 while two others got mean score lower than 3. Item 29 - "*If I can't think of an English word, I use a word or phrase that means the same thing*" got the highest mean score ($M = 3.67$) followed by item 25 - "*When I can't think of a word during a conversation in English, I use gestures*" ($M = 3.55$). The two items with lowest mean scores were item 28 - "*I try to guess what other person will say next in English*" ($M = 2.07$) and item 27 - "*I read English without looking up every new word*".

Individual Strategy	N	MEAN	SD
30. I try to find as many ways as I can to use my English.	100	2.09	.785
31. I notice my English mistakes and use that information to help me do better.	100	2.67	.899
32. I pay attention when someone is speaking English.	100	3.89	.874
33. I try to find out how to be a better learner of English.	100	2.86	.866
34. I plan my schedule so I will have enough time to study English.	100	3.25	.932
35. I look for people I can talk to in English.	100	3.45	.957
36. I look for opportunities to read as much as possible in English.	100	3.21	.923
37. I have clear goals for improving my English skills.	100	2.23	.982
38. I think about my progress in learning English.	100	2.05	.910

Table 4.5. Metacognitive Category descriptive statistics

Table 4.5 describes the use of metacognitive strategies in learning English by the 100 participants. "*I pay attention when someone is speaking English*" ($M = 3.89$) was used the most frequently. "*I look for people I can talk to in English*" ($M = 3.45$) ranked the second place followed by "*I plan my schedule so I will have enough time to study English*" ($M = 3.25$) and "*I look for opportunities to read as much as possible in English*" ($M = 3.21$). The least exploited strategy was "*I think about my progress in learning English*" ($M = 2.05$) and "*I try to find as many ways as I can to use my English*" ($M = 2.09$).

Individual Strategy	N	MEAN	SD
39. I try to relax whenever I feel afraid of using English.	100	3.88	.900
40. I encourage myself to speak English even when I am afraid of making a mistake.	100	2.67	.909
41. I give myself a reward or treat when I do well in English.	100	2.56	.800

42. I notice if I am tense or nervous when I am studying or using English.	100	2.07	.887
43. I write own my feelings in a language learning diary.	100	2.56	.857
44. I talk to someone else about how I feel when I am learning English.	100	3.52	.861

Table 4.6. Affective Category descriptive statistics

As can be seen from table 4.6, item 39 – “I try to relax whenever I feel afraid of using English” received the highest mean score ($M = 3.88$). Item 44 – “I talk to someone else about how I feel when I am learning English” got the second highest mean score ($M = 3.52$). The strategy with the lowest mean score was item 44 – “I notice if I am tense or nervous when I am studying or using English” ($M = 2.07$). The other strategies got mean scores from 2.56 to 2.67.

Individual Strategy	N	MEAN	SD
45. If I do not understand something in English, I ask the other person to slow down or say it again.	100	3.79	
46. I ask English speakers to correct me when I talk.	100	3.27	
47. I practice English with other students.	100	3.85	
48. I ask for help from English speakers.	100	3.28	
49. I ask questions in English.	100	3.72	
50. I try to learn about the culture of English speakers.	100	3.05	

Table 4.7. Social Category descriptive statistics

As can be seen from table 4.7, mean scores of all social strategies were higher than 3. The most frequently exploited one is item 47 – “I practice English with other students” ($M = 3.85$) followed by item 45 - “If I do not understand something in English, I ask the other person to slow down or say it again” ($M = 3.79$) and item 49 – “I ask questions in English” ($M = 3.72$). The mean scores of the other strategies ranged from 3.05 to 3.27.

4.1.3. Difference in the use of language learning strategies due to language learning experiences

The participants' language learning experience is measured based on numbers of years of learning English. From the students' answer in the questionnaire, they are divided into two groups. The first group consisted of 62 students who have learned English for 8 – 9 years. The second one included 38 students who have learned English for 10 – 12 years. The first one was classified as “less experienced” students while the second one was classified as “more experienced” students. Due to the time limitation, the researcher pointed out the effects of language learning experience on the overall use of language learning strategies by the less experienced and more experienced students.

Strategy category	Less experienced students		More experienced students	
	Number of students	Mean	Number of students	Mean
A: Memory	62	3.19	38	2.60
B: Cognitive	62	2.58	38	2.80
C: Compensation	62	2.96	38	3.22
D: Metacognitive	62	2.77	38	2.95
E: Affective	62	2.80	38	2.96
F: Social	62	3.15	38	3.83

Table 4.8. Overall strategy use by the less experienced and more experienced students

As can be seen from table 4.8, there were a number of differences between the use of language learning strategies by the more experienced and the less experienced students. The clearest difference is that the mean scores of 4 out of 5 categories by the more experienced students were higher than those by the less experienced ones. Therefore, it can be concluded that the more experienced employed language learning strategies more frequently than the less experienced students. Second, for more experienced students, the social strategies ranked the first place ($M = 3.83$) followed by compensation strategies while for less experienced students, the

memory strategies ranked the place ($M = 3.19$) followed by social strategies.

4.2. Discussion in the result of the interview

The purpose of the interview with 20 students was to confirm their answer to the questionnaire survey. The result of part 1 of the interview showed that all students participating in the interviews were present in the questionnaire. In addition, all students provided adequate information about themselves. Based on the analysis of the student answer to interview questions, the author concluded that the background information of the participants was

accurate and reliable. There was no difference between the results of the questionnaire and those of the interview.

In the second part of the interview, the participants were asked questions about frequency of language learning strategies. The results of the interview then were compared to those collected in the questionnaire. It was found that students' answer to the interview questions matched the questionnaire's result. With regard to the often used strategies, most of the interviewees stated that English was really challenging to them, so they often reviewed English lessons to memorize and understand the lessons better. In addition, flashcards with lively and eye-catching pictures combining with the sentences with the new words were really useful for them to remember English words. Besides, due to their lack of vocabulary, they usually used words or phrases with the same meaning to regulate the flow of their talk. Especially, they paid a lot attention when listening to other people such as teachers or friends with the purpose of learning English from the speakers. Additionally, they did their best in finding methods that help their English better by asking for teachers' and friends' help, searching information on the Internet. Moreover, they were really into talking with other students in English to get peer correction. Whenever they felt stressed because of using English, they stopped and relaxed.

V. RECOMMENDATION AND CONCLUSION

The present research was carried out with the aim of finding out the language learning strategies applied by the first year English major students. The findings, therefore, could provide teachers with students' learning strategy preference so that the teachers could have suitable teaching methods and build up an effective plan to help them improve their English.

Firstly, as mentioned in the findings, the participants used language learning strategies at medium level. As the result, it was necessary for teachers to acknowledge their students, especially the first year ones to determine their strengths and weaknesses in learning English. Secondly, depending on the results of the current study, teachers can decide if there is a need for providing their students with language learning strategies so that they can become more independent in learning English. Thirdly, the more experienced students had better knowledge of language learning strategies and students were rather fond of group practice, so it is suggested for teachers to organize a forum in which students can share their learning strategies and learn their friends' strategies as well. Fourthly, teachers should have good knowledge of their students' background such as learning style, learning experience, learning difficulties in order to choose the most effective teaching methods as well as language learning strategies. Finally, teachers should also evaluate the textbooks and other teaching materials used in the institution to see whether there are plenty of language learning strategies included so that appropriate addition can be made.

APPENDICES

APPENDIX 1: Questionnaire

PART I: Background Information

Please answer the following questions or check the appropriate response. This is for research purposes only and your responses will be kept confidential at all times.

1. Name: 2. Age: 3. Gender: Male/Female
4. Class: 5. How many years have you studied English?

PART II: Strategy Inventory for Language Learning (SILL) (Version 7.0)

Adapted from Oxford (1990)

This form of the STRATEGY INVENTORY FOR LANGUAGE LEARNING (SILL) is for students of English as a second or foreign language. You will find statements about learning English. Please read each statement. Next to each statement, select the response (1, 2, 3, 4, or 5) that tells

HOW TRUE OF YOU THE STATEMENT IS.

1. Never or almost never true of me
2. Usually not true of me
3. Somewhat true of me
4. Usually true of me
5. Always or almost always true of me

Answer in terms of how well the statement describes you. Do not answer how you think you should be, or what other people do. There are no right or wrong answers to these statements.

Circle your answers next to each statement. Work as quickly as you can without being careless.

This usually takes about 20-30 minutes to complete. If you have any questions, let the teacher know immediately.

A	1. I think of relationships between what I already know and new things I learn in English.	1	2	3	4	5
	2. I use new English words in a sentence so I can remember them.	1	2	3	4	5
	3. I connect the sound of a new English word and an image or picture of the word to help me remember the word.	1	2	3	4	5
	4. I remember a new English word by making a mental picture of a situation in which the word might be used.	1	2	3	4	5
	5. I use rhymes to remember new English words.	1	2	3	4	5
	6. I use flashcards to remember new English words.	1	2	3	4	5
	7. I physically act out new English words.	1	2	3	4	5
	8. I review English lessons often.	1	2	3	4	5
	9. I remember new English words or phrase by remembering their location on the page, on the board, or on a screen sign.	1	2	3	4	5
B	10. I say or write new English words several times.	1	2	3	4	5
	11. I try to talk like native English speakers.	1	2	3	4	5
	12. I practice the sounds of English.	1	2	3	4	5
	13. I use the English words I know in different ways.	1	2	3	4	5
	14. I start conversations in English.	1	2	3	4	5
	15. I watch English language TV shows spoken in English or to go to movies spoken in English.	1	2	3	4	5
	16. I read for pleasure in English.	1	2	3	4	5
	17. I write notes, messages, letters, or reports in English.	1	2	3	4	5
	18. I first skim an English passage (read over the passage quickly) then go back and read carefully.	1	2	3	4	5
	19. I look for words in my own language that are similar to new words in English.	1	2	3	4	5
	20. I try to find patterns in English.	1	2	3	4	5
	21. I find the meaning of an English word by dividing it into parts that I understand.	1	2	3	4	5
	22. I try not to translate word-for-word.	1	2	3	4	5
	23. I make summaries of information that I hear or read in English.	1	2	3	4	5
C	24. To understand unfamiliar English words, I make guesses.	1	2	3	4	5
	25. When I can't think of a word during a conversation in English, I use gestures.	1	2	3	4	5
	26. I make up new words if I do not know the right ones in English.	1	2	3	4	5
	27. I read English without looking up every new word.	1	2	3	4	5
	28. I try to guess what the other person will say next in English.	1	2	3	4	5
	29. If I can't think of an English word, I use a word or phrase that means the same thing.	1	2	3	4	5
D	30. I try to find as many ways as I can to use my English.	1	2	3	4	5
	31. I notice my English mistakes and use that information to help me do better.	1	2	3	4	5
	32. I pay attention when someone is speaking English.	1	2	3	4	5
	33. I try to find out how to be a better learner of English.	1	2	3	4	5
	34. I plan my schedule so I will have enough time to study English.	1	2	3	4	5
	35. I look for people I can talk to in English.	1	2	3	4	5
	36. I look for opportunities to read as much as possible in English.	1	2	3	4	5
	37. I have clear goals for improving my English skills.	1	2	3	4	5
	38. I think about my progress in learning English.	1	2	3	4	5
E	39. I try to relax whenever I feel afraid of using English.	1	2	3	4	5
	40. I encourage myself to speak English even when I am afraid of making a mistake.	1	2	3	4	5
	41. I give myself a reward or treat when I do well in English.	1	2	3	4	5
	42. I notice if I am tense or nervous when I am studying or using English.	1	2	3	4	5
	43. I write down my feelings in a language learning diary.	1	2	3	4	5
F	44. I talk to someone else about how I feel when I am learning English.	1	2	3	4	5
	45. If I do not understand something in English, I ask the other person to slow down or say it again.	1	2	3	4	5
	46. I ask English speakers to correct me when I talk.	1	2	3	4	5

	47. I practice English with other students.	1	2	3	4	5
	48. I ask for help from English speakers.	1	2	3	4	5
	49. I ask questions in English.	1	2	3	4	5
	50. I try to learn about the culture of English speakers.	1	2	3	4	5

APPENDIX 2: Interview

Dear students,

In this interview I would like you to share your opinions on language learning strategies in your regular practice. You will be given a list of interview questions in advance and 5 minutes for your preparation.

Thank you for your kind help.

Interview questions:

1. What's your name? What class are you in?
2. How many years have you learned English?
3. What memory strategies do you use the most/ the least frequently?
4. What cognitive strategies do you use the most/ the least frequently?
5. What compensation strategies do you use the most/ the least frequently?
6. What metacognitive strategies do you use the most/ the least frequently?
7. What affective strategies do you use the most/ the least frequently?
8. What social strategies do you use the most/ the least frequently?

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The Uses of Project-Based Learning for Language Acquisition in EFL Context

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Abstract- The old-fashioned, teacher-centered language classrooms have long been dominated in most EFL teaching contexts. Materials are based on imaginary characters, reading and listening texts revolve around pre-selected topics which may have little interest or even demotivate learners. It is time for us to choose an appropriate approach through which we can motivate, inspire learners by letting them do whatever they want to do instead of what they are told to do. Project-based learning might be the solution. The introduction of projects into the curriculum is not a new or revolutionary idea in education. During the past decade, however, the practice has evolved into a more formally defined teaching strategy. Project-based learning has gained a greater foothold in the classroom as researchers have documented what teachers have long understood: Students become more engaged in learning when they have a chance to dig into complex, challenging, and sometimes even messy problems that closely resemble real life. Project-based learning goes beyond generating student interest. Brain research underscores the value of these learning activities. Students' abilities to acquire new understanding are enhanced when they are connected to meaningful problem-solving activities, and when students are helped to understand why, when, and how those facts and skills are relevant they can personalize their learning and become more self-motivated.

Index Terms- Project-based learning, personalization, language learning

I. INTRODUCTION

T1.1. The need for personalization

The teaching and learning of foreign languages in general and English language in particular attract more attention today. However, it is a fact that students of English sometimes get fatigue and even stress coping with textbooks, boring delivery, teacher-centered methods of teaching. As language teachers, we are well aware that learners need to be motivated in order to be successful. Personal involvement is a very effective way of enhancing motivation. By this we mean making language learning content becomes personally meaningful. If learners feel that what they are asked to do is relevant to their own lives, and that their feelings, thoughts, opinions and knowledge are valued, and crucial to the success of the activities, then they will be fully engaged in the tasks and more likely to be motivated to learning the target language. In order to avoid disengagement when learning English language, learners should be given tasks that they are really

interested in the topics reflects their real-life experiences. Laur (2013, p5) states "students in today's classroom must be presented with complex problems and challenges to solve. These challenges are action oriented in nature and leave the philosophical questions to be contextualized within the process of the challenging investigation". The contextualization, motivation, or personalization of the learning process can be done through what we call project-based learning because of the flexibility, authenticity, and practicality that project-based learning (PBL) might bring.

A REVIEW OF RELATED LITERATURE

2.1. The development of project-based learning

First reference to project-based learning (PBL) was mentioned in the work of Kilpatrick (1918), who believed that using literacy in meaningful contexts provided a means for building background knowledge and for achieving personal growth. He suggested that projects be interdisciplinary math, science, and social studies to provide learners with a rich array of concepts and ideas. He intended that topics come from students' interests, maintaining that group projects, proposed, planned, executed, and evaluated by students, would help learners develop an understanding of their lives while preparing to work within a democracy.

Project-based learning also reflects a Vygotskian perspective. Vygotsky theorizes that learning occurs through social interaction that encourages individuals to deal with the kind cognitive challenges that are just slightly above their current levels of ability. He posits that concepts develop and understanding happens when individuals enter into discussion and meaningful interaction with more capable peers or teachers. These individuals can model problem solving, assist in finding solutions, monitor progress, and evaluate success.

The term project based-learning was then developed by John Dewey in the late nineteenth century (Dewey, 1938). He believed that students learned by doing rather than by only listening to information given by a teacher, moving the student to the center, rather than the teacher. As time goes, there have been many attempts defining what PBL is. According to the definitions found in PBL handbooks for teachers, projects are complex tasks, based on challenging questions or problems, that involve students in design, problem-solving, decision making, or investigative activities; give students the opportunity to work relatively autonomously over extended periods of time; and culminate in realistic products or presentations (Jones, Rasmussen, & Moffitt, 1997; Thomas, Mergendoller, & Michaelson, 1999). Other

defining features found in the literature include authentic content, authentic assessment, teacher facilitation but not direction, explicit educational goals, (Moursund, 1999), cooperative learning, reflection, and incorporation of adult skills (Diehl, Grobe, Lopez, & Cabral, 1999). To these features, particular models of PBL add a number of unique features. Definitions of “project-based instruction” include features relating to the use of an authentic (“driving”) question, a community of inquiry, and the use of cognitive (technology-based) tools (Krajcik, Blumenfeld, Marx, & Soloway, 1994; Marx, Blumenfeld, Krajcik, Blunk, Crawford, Kelly, & Meyer, 1994); and “Expeditionary Learning” adds features of comprehensive school improvement, community service, and multidisciplinary themes (Expeditionary Learning Outward Bound, 1999a).

More recently, PBL has become even more refined in its characteristics by some educators. The Buck Institute for Education (BIE) is a leader in PBL and has been instrumental in defining high-quality PBL. They define project-based learning as a “teaching method in which students gain knowledge and skills by working for an extended period of time to investigate and respond to an authentic, engaging and complex question, problem, or challenge”. Approximately three years ago, the BIE adopted what they call gold standard PBL in order to help educators realize that just because the students do a project in the classroom, it does not mean that true project-based learning is occurring. They claim that there are essential components for effective, gold-standard, project-based learning, which include the following: 1) student-oriented goals, 2) a challenging problem or question to solve, 3) sustained student inquiry, 4) authenticity, 5) student voice and choice, 6) reflection, 7) critique and revision, and 8) a public product. When a project includes those essential pieces, engaged learning becomes optimal”. Soleimani, Rahimi and Sadeghi (2015) state that PBL is a means of using language to learn, rather than learning language. However, when learners listen, speak, read, and write the target language in finding information, discussing, consulting experts or reference and presenting findings, they learn language in real-world context” (p. 3)

2.2. Characteristics of project-based learning

Project based learning is a student-centered form of instruction based on three constructivist principles: learning is context-specific, learners are involved actively in the learning process, and they achieve their goals through social interactions and the sharing of knowledge and understanding (Cocco, 2006). It is considered to be a particular type of inquiry-based learning where the context of learning is provided through authentic questions and problems within real-world practices (Al-Balushi and Al Aamri, 2014) that lead to meaningful learning experiences (Wurdinger, Haar, Hugg and Bezon, 2007). The uniqueness of PBL is the construction of an end product, a ‘concrete artefact’ (Helle et al., 2006) which represents pupils’ new understandings, knowledge, and attitudes regarding the issue under investigation - often presented using videos, photographs, sketches, reports, models, and other collected artefacts (Holubova, 2008).

It is argued that the freedom and challenge that pupils experience as a result of solving the problems that arise in designing and building their projects result in high levels of student engagement (Wurdinger et al., 2007). It is also said to foster self-regulated learning and promote pupils’ conceptual

knowledge within a systematic process of documenting and reflecting on learning (Barak, 2012). Within project based learning, pupils learn to be self-reliant through goal-setting, planning, and organization; they develop collaboration skills through social learning; they also become intrinsically motivated by being encouraged to exercise an element of choice while learning at their own level (Bell, 2010).

In addition, learners typically have more autonomy over what they learn, maintaining interest and motivating learners to take more responsibility for their learning (Tassinari, 1996; Worthy, 2000). Project-based learning and the construction of artifacts enable the expression of diversity in learners, such as interests, abilities and learning styles (Grant, 2002)

The concept of project-based learning has a certain similarity with the notion of knowledge building (Bereiter, 1996). These authors define “learning” as an activity that is directed to improve mental structures, whereas “knowledge building” is directed at improving knowledge objects such as explanations and models. Project-based learning can be described as involving both vertical learning (i.e., cumulating of subject matter knowledge) and horizontal learning (i.e., generic skills such as project management).

2.3. Benefits of project-based learning

Research indicates that PBL brings advantages for both learners and teachers. For learners, it increases attendance, growth in self-reliance, and improved attitudes toward learning (Thomas, 2000). Academic gains equal to or better than those generated by other models, with students involved in projects taking greater responsibility for their own learning than during more traditional classroom activities (Boaler, 1999; SRI, 2000). Opportunities to develop complex skills, such as higher-order thinking, problem-solving, collaborating, and communicating (SRI, 2000) access to a broader range of learning opportunities in the classroom, providing a strategy for engaging culturally diverse learners (Railsback, 2002). For many students, the appeal of this approach to learning comes from the authenticity of the experience. Students take on the role and behavior of those working in a particular discipline. Whether they are making a documentary video about an environmental concern, designing a travel brochure to highlight sites of historical significance in their community, or developing a multimedia presentation about the pros and cons of building a shopping mall, students are engaged in real-world activities that have significance beyond the classroom. For teachers, additional benefits include enhanced professionalism and collaboration among colleagues, and opportunities to build relationships with students (Thomas, 2000). Additionally, many teachers are pleased to find a model that accommodates diverse learners by introducing a wider range of learning opportunities into the classroom. Teachers find that students who benefit the most from project-based learning tend to be those for whom traditional instructional methods and approaches are not effective (SRI, 2000).

II. A CHANGE FOR A BETTER APPROACH

The language teaching methodologies have seen many innovations aiming provision for the best and most effective ways for language learners. Those include psychologically, cognitively and textbooks design perspectives. The changes are not always

bring positive outcomes as expected. However, it is true that in terms of centrality, the shift from teacher-centered to learner-centered motivates learners better. The learning becomes contextualized and purposeful than simulated teaching activities. Laur (2013) indicates the difference between simulation teaching and learning and authentic learning experience as followed;

SIMULATION TEACHING AND LEARNING (STL)	AUTHENTIC LEARNING EXPERIENCE (ALE)
Let's pretend	Purpose driven
Activity based	Extended learning
Content-knowledge application is limited	Promote depth of knowledge through the process
Read about experts	Experts involvement
Replication	Innovation
Classroom production	Community or global audience
Focus on teacher assessment	Focus on audience assessment
Engagement often limited to grade outcome	Increased engagement due to purpose, need, and meaning

Table 1: The difference between STL and ALE

As seen in the figure 1, the artificial teaching situations and activities more or less demotivate learners' enthusiasm and hardly ever help to transform what they learn to what they actually use. By comparing simulation teaching and learning (STL) and authentic learning experience (ALE) to Bloom's taxonomy, it is assumed that STL can reach the basic level, while ALE helps learners build critical thinking and reflex ability in language learning

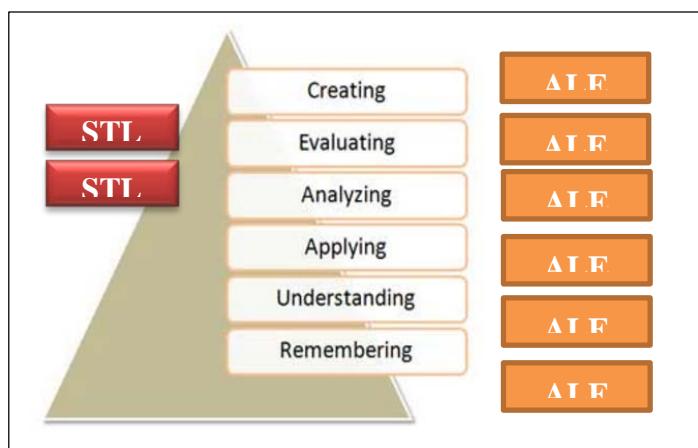


Figure 1: A comparison between STL and ALE to Bloom's taxonomy

III. CHALLENGES OF PROJECT BASED LEARNING

4.1. Administration aspects

Like two sides of a coin, each approach has its drawbacks. It is easy to see the challenges when conducting project-based learning in an English language teaching context. In second

language pedagogy, Stoller (2006) specifies the conditions for PBL to be effective in her attempt to "build a defensible theoretical framework for project work" (p. 20). She noted that PjBL should:

- (a) have a process and product orientation;
- (b) be defined, at least in part, by students, to encourage student ownership in the project;
- (c) extend over a period of time (rather than a single class session);
- (d) encourage the natural integration of skills;
- (e) make a dual commitment to language and content learning;
- (f) oblige students to work in groups and on their own;
- (g) require students to take some responsibility for their own learning through the gathering, processing, and reporting of information from target language resources;
- (h) require teachers and students to assume new roles and responsibilities
- (i) result in a tangible final product; and
- (j) conclude with student reflections on both the process and the product.

4.2. Assessment aspects

When conducting project-based learning and teaching approach, instructors are advised to take assessment into consideration. R.A.F.T is great teaching strategy that many teachers use project-based learning. In it, students are given a topic (T) and must make a few selections. They choose a role (R) that they will take on individually and as a group, such as marketer, author, blogger, campaign manager, etc. They choose an Audience (A) obviously related to the role. It could be a student, a parent, a voter, a CEO, or even a doctor. Students also choose the format (F) that they will use, such as webpage, press release, letter, museum exhibit, or podcast. Again the possibilities are endless. This strategy is a great technique to use when figure out the culminating product for PBL. You as the teacher can decide the aspects of R.A.F.T they will and also allow for student voice and choice. It helps to ensure that the product they create is real world, targeting real content and for authentic purpose and audience. This leads to student engagement.

IV. CONCLUSION

With an aim of enriching teaching and learning approach, the paper attempts to suggest some changes to help personalizing English language learning by applying the project-based learning approach. Benefits of project-based learning and challenges of the approach have been mentioned in the paper with a hope that teachers, language instructors and practitioners may find it helpful for real teaching practice.

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Effect of Magnetic Fields on the Boundary Layer Flow of Heat Transfer with Variable Viscosity in the Presence of Thermal Radiation

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ABSTRACT

The effect of Magnetic fields on a steady two dimensional boundary layer flow of heat transfer with three different streams of variable viscosity electrically conducting fluid at T_∞ in the presence of thermal radiation was considered. The governing equations which are partial differential equations were transformed into ordinary differential equations using similarity variables, and the resulting coupled ordinary differential equations were solved numerically using collocation method iterated with the aid of MAPLE 18 software. The effect of space variable viscosity and temperature profiles were studied and presented graphically for different values of physical parameters.

Key Words: Magnetic Fields, Boundary Layer Flow, heat Transfer, Variable Viscosity, Thermal Radiation, and Collocation Method.

INTRODUCTION

The boundary layer of heat and mass transfer in magnetic fields has attracted the interest of myriads of researchers due to its numerous applications in engineering, industries, space science and aviation and also in Agriculture, to study the water transport in plants and the likes. If the temperature of the surrounding fluid is high, radiation effects plays an important role in and this situation does exists in space technology. When radiative heat transfer takes place, the fluids involve can be electrically conducting since it is ionized due to high operating temperature. Thus, examining the effects of magnetic field on the flow becomes more relevant. Radiation heat transfer becomes more significant with rising temperature levels and may be totally dominant over conduction and convection at very high temperature. Thus, thermal radiation is pertinent in combustion applications (furnaces, rockets, nozzles, engines etc.) in nuclear reactors. Ajala *et al.*, [1] studies a boundary layer flow and heat transfer with variable viscosity in the presence of magnetic field and then concluded after testing the effect of some physical parameters that the velocity profile increases as the boundary layer thickness increases.

Idowu and Falodun, [6] investigated the influence of magnetic field and thermal radiation on steady free convective flow embedded in a porous medium with soret effects and the transformed coupled nonlinear ordinary differential equations are solved using the Spectral Homotopy Analysis Method. Jagadha *et al.* [7] considered a steady laminar viscous incompressible nanofluid flow of mixed convection and mass transfer about an isothermal vertical flat plate embedded in Darcy porous medium in the presence of magnetic field and viscous dissipation, see also [4, 7, 10]. Lavanya and Ratnam [8] investigated the effects of thermal radiation and chemical reaction a steady two dimensional laminar flow of a viscous incompressible electrically conducting micropolar fluid past a vertical isothermal stretching surface embedded in a non-Darcian porous medium in the presence of viscous dissipation and heat generation. The impact of variable properties on heat and mass transfer over a vertical cone filled with nanofluid saturated porous medium with thermal radiation and chemical reaction was analyzed by Chandra Babu *et al.*, [11] and the transformed governing equations were solved numerically using an optimized, extensively validated, variational Finite element method.

The concern of Makinde [9] was the inherent irreversibility in hydro magnetic boundary layer flow of variable viscosity fluid over a semi-infinite flat plate under the influence of thermal radiation and Newtonian heating. In the study carried out by Reddy *et al.* [12] on MHD boundary layer flow of a non-newtonian power-law fluid on a moving flat plate. Ghara *et al.* [5] in their study observed the effect of radiation on MHD free convection flow past an impulse moving vertical plate with ramped wall temperature. Butt *et al.* [3] carried out investigation on irreversibility

effects in magneto hydrodynamic flow over an impulsively started plate. Barik's [2] analysis was based on the combined effects of magneto hydrodynamics and thermal radiations on unsteady flow of an electrically conducting fluid past an impulsively started infinite vertical porous plate with variable temperature.

MATHEMATICAL FORMULATION

In this study, the effect of magnetic fields on a steady two-dimensional boundary layer flow of heat transfer with different stream of variable viscosity electrically conducting fluid at temperature T_∞ in the presence of thermal radiation were considered. It is assumed that the lower surface of the plate is heated by convection from a hot fluid at temperature T_f which provides a heat transfer coefficient h_f . A uniform transverse magnetic field B_0 is imposed along the y-axis. The induced magnetic field due to the polarization of charges are assumed to be neglected.

Under the usual boundary layer approximations, Makinde [9] stressed that the flow is governed by the following equations:

$$\frac{\partial u}{\partial x} + \frac{\partial v}{\partial y} = 0 \quad (1)$$

$$u \frac{\partial u}{\partial x} + v \frac{\partial v}{\partial y} = \frac{1}{\rho} \frac{\partial}{\partial y} \left(\mu \frac{\partial u}{\partial y} \right) - \frac{\sigma B_0^2}{\rho} (u - U_\infty) \quad (2)$$

$$u \frac{\partial T}{\partial x} + v \frac{\partial T}{\partial y} = \alpha \frac{\partial^2 T}{\partial y^2} - \frac{1}{\rho c_p} \frac{\partial q_r}{\partial y} + \frac{\mu}{\rho c_p} \left(\frac{\partial u}{\partial y} \right)^2 + \frac{\sigma B_0^2}{\rho c_p} (u - U_\infty)^2 \quad (3)$$

Where equation (1) is the continuity equation; (2) is the momentum equation; and (3) is the energy equation; with $\mu = \frac{1}{\mu_0 e^{1+y}}$

U_∞ = free stream velocity; c_p = specific heat at constant pressure; α = thermal diffusivity; σ = fluid electrical conductivity; ρ = fluid density, μ = dynamic viscosity. The fluid variable dynamical viscosity μ is assumed to be a non-linear function.

$$\mu = \mu_0 e^{\frac{1}{1+y}} \quad (4)$$

Where μ_0 is the cold fluid viscosity and y is the space variable.

Following the Roseland approximation for radiation, the radiative heat flux is simplified as:

$$q_r = -\frac{4\sigma^*}{3k^*} \frac{\partial T^4}{\partial y} \quad (5)$$

where σ^* is the Stephan-Boltzmann constant and

k^* is the mass absorption coefficient.

The temperature differences within the flow are assumed to be sufficiently small so that T^4 may be expressed as linear function of temperature T using a truncated Taylor series about the free stream temperature T_∞ i.e.

$$T^4 \approx 4T_\infty^3 T - 3T_\infty^4. \quad (6)$$

The boundary condition at the plate surface and far into the free stream may be written as:

$$u(x,0) = 0, \quad v(x,0) = 0, \quad -k \frac{\partial T}{\partial y}(x,0) = h_f [T_f - T(x,0)] \quad (7)$$

$$u(x,\infty) = U_\infty, \quad T(x,\infty) = T_\infty$$

Where, k is the thermal conductivity coefficient. The stream function ψ satisfies the continuity equation (1) automatically with:

$$u = \frac{\partial \psi}{\partial y} \text{ and } v = -\frac{\partial \psi}{\partial x} \quad (8)$$

A similarity solution of equations was obtained by defining an independent variable η and a dependent variable f in terms of the stream function ψ as:

$$\eta = y \sqrt{\frac{U_\infty}{\nu x}}, \quad \psi = \sqrt{\nu x U_\infty} f(\eta), \quad \nu = \frac{\mu}{\rho}, \quad \theta(\eta) = \frac{T - T_\infty}{T_f - T_\infty}. \quad (9)$$

After introducing equation (9) into Equations (1)-(8), we obtained

$$\frac{\partial u}{\partial x} + \frac{\partial v}{\partial y} = -\frac{1}{2} y \sqrt{\frac{U_\infty^3}{\nu x^3}} \cdot f''(\eta) + \frac{1}{2} y \sqrt{\frac{U_\infty^3}{\nu x^3}} \cdot f''(\eta) = 0. \quad (10)$$

$$e^{\frac{1}{1+y}} f''' + \frac{1}{2} f f'' - \frac{1}{(1+y)^2} e^{\frac{1}{1+y}} \delta f'' - Ha(f' - 1) = 0. \quad (11)$$

$$\theta'' + \frac{1}{2} \beta \text{Pr} f \theta' + \beta Br e^{\frac{1}{1+y}} (f'')^2 + \beta Ha \cdot Br (f' - 1)^2 = 0. \quad (12)$$

$$f(0) = 0, f'(0) = 0, f'(\infty) = 1. \quad (13)$$

$$\theta'(0) = Bi[\theta(0) - 1], \quad \theta(\infty) = 0. \quad (14)$$

Where the prime denotes differentiation with respect to η and the flow is in y-direction. ν is the kinetic viscosity, Ha is the local magnetic field parameter, δ is the boundary layer thickness, Ra is the thermal radiation parameter, $\frac{1}{\kappa}$ is the thermal conductivity, Pr and Br is the Prandtl and Brinkman number respectively. Hence, these parameters and dimensionless numbers are defined as follows:

$$\beta = \frac{3Ra}{3Ra + 4}, \quad \nu = \frac{\mu_0}{\rho}, \quad Ha = \frac{\sigma B_0^2 x}{\rho U_\infty}, \quad \delta \approx \sqrt{\frac{\nu x}{U_\infty}}, \quad \text{Pr} = \frac{\nu}{\alpha}, \quad \frac{\text{Pr}}{\mu_0 c_p} = \frac{1}{k}, \quad Ra = \frac{kk^*}{4\sigma^* T_\infty^3},$$

$$Br = \frac{\mu_0 U_\infty^2}{k(T_f - T_\infty)}$$

Numerical procedure

An efficient Collocation Weighted Residual method was devised in solving couple of ordinary differential equations (10)-(12) with boundary conditions (13)-(14) for different values of controlling parameters. Taking $\infty \approx 5$ and imposing boundary condition on a polynomial.

Assuming the trial function residual is defined as $f = a + b\eta + c\eta^2 + d\eta^3 + \dots$

$$\theta = a + b\eta + c\eta^2 + d\eta^3 + \dots$$

and substituting the trial function into the resulting differential equation, we have the Residual:

$$R := 336\eta^5 C_8 + 210\eta^4 C_7 + 120\eta^3 C_6 + 60\eta^2 C_5 + 24\eta C_4 + 6C_3 + 0.5(C_0 + C_1\eta + C_2\eta^2 + C_3\eta^3 + C_4\eta^4 + C_5\eta^5 + C_6\eta^6 + C_7\eta^7 + C_8\eta^8)(56\eta^6 C_8 + 42\eta^5 C_7 + 30\eta^4 C_6 + 20\eta^3 C_5 + 12\eta^2 C_4 + 6\eta C_3 + 2C_2) + 14\eta^6 C_8 + 10.50\eta^5 C_7 + 7.50\eta^4 C_6 + 5.00\eta^3 C_5 + 3\eta^2 C_4 + 1.50\eta C_3 + 0.50C_2 - 0.8C_8\eta^7 - 0.7C_7\eta^6 - 0.6C_6\eta^5 - 0.5C_5\eta^4 - 0.4C_4\eta^3 - 0.3C_3\eta^2 - 0.2C_2\eta - 0.1C_1 + 0.1. \quad \text{The}$$

residual above was collocated at various points within the domain and after collocating, the residual within the points $\eta = 0.5, 2.0, 2.5, 5.0 \dots$, were chosen arbitrarily. This gives system of non-linear equation in C_0 to C_8 , which were solved simultaneously in order to obtain the value of the constants as follows: $C_0 = 0$, $C_1 = 0$, $C_2 = 0.2654771707$, $C_3 = -0.03256433016$, $C_4 = 0.003696748910$, $C_5 = -0.001143783758$, $C_6 = 0.0002466764944$, $C_7 = -0.0002471358822$, $C_8 = 0.000000946187656710$.

Following the above stated procedures, the subsequent residuals were generated and the corresponding collocations were executed with the aid of Maple 18 software pseudo code.

Result and discussion

The non-linear ordinary differential equations (10)-(12) subject to the boundary conditions (13)-(14) were solved numerically by an inbuilt pseudocode computer software MAPPLE 18. Following the process of numerical computations, the plate surface temperature, the local skin-friction coefficient and the Nusselt number in proportionality to $\theta(0)$, $f''(0)$ and $-\theta'(0)$, were analyzed and their respective numerical values were represented in the table 1 below:

Table 1: Computation showing $f''(0)$, $\theta(0)$, and $-\theta'(0)$ for various values of key parameters.

Bi	Y	Br	Ra	Pr	Ha	$f''(0)$	$-\theta'(0)$	$\theta(0)$
0.1	0	0.1	0.7	0.72	0.1	0.39556967	0.059697304	0.403026965
1.0	0	0.1	0.7	0.72	0.1	0.41360353	0.150591663	0.849408337
10	0	0.1	0.7	0.72	0.1	0.44669845	0.166022899	0.983397710
0.1	0.5	0.1	0.7	0.72	0.1	0.52697089	0.056049908	0.439500915
0.1	1.0	0.1	0.7	0.72	0.1	0.55237890	0.051115131	0.488848687
0.1	0	1.0	0.7	0.72	0.1	0.64903194	0.004640636	0.953593635
0.1	0	10	0.7	0.72	0.1	0.66691220	0.539383019	6.393830197
0.1	0	0.1	5.0	0.72	0.1	0.47201485	0.060894110	0.391058897
0.1	0	0.1	10.0	0.72	0.1	0.47200510	0.060955826	0.390441735
0.1	0	0.1	0.7	3.0	0.1	0.46925141	0.076048970	0.283711183
0.1	0	0.1	0.7	7.10	0.1	0.47879905	0.077897764	0.221022358
0.1	0	0.1	0.7	0.72	0.5	0.68805234	0.053319518	0.466804824
0.1	0	0.1	0.7	0.72	1.0	1.02755678	0.046165161	0.538348381
0.1	0	0.1	0.7	0.72	2.0	1.34986477	0.031856450	0.681435496

Below is the graphical representation of physical parameters involved on the flow and thermal field.

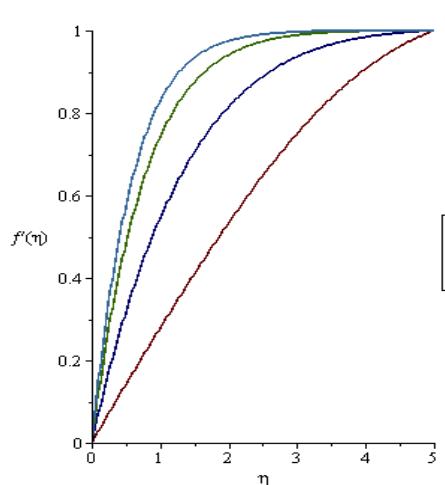


Figure 1 Effect of magnetic field parameter, Ha , with $Ha = 0.1$, $\delta = 0.25$.

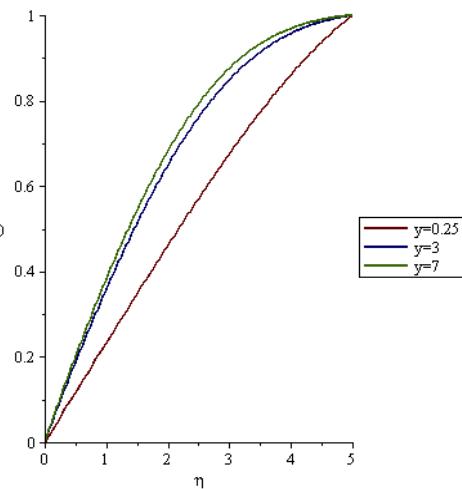


Figure 2: Effect of space variable, y , on the velocity profile $f'(\eta)$ on the velocity profile with $y = 0$, $\delta = 0.25$

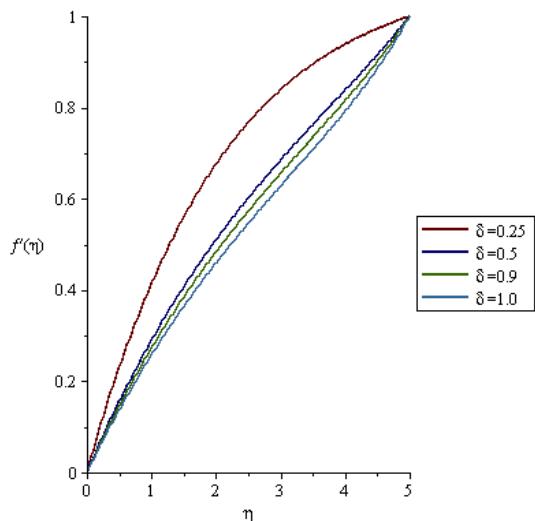


Figure 3: Effect of boundary layer thickness, δ , on the velocity profile with $y = 0$, $Ha = 0.1$

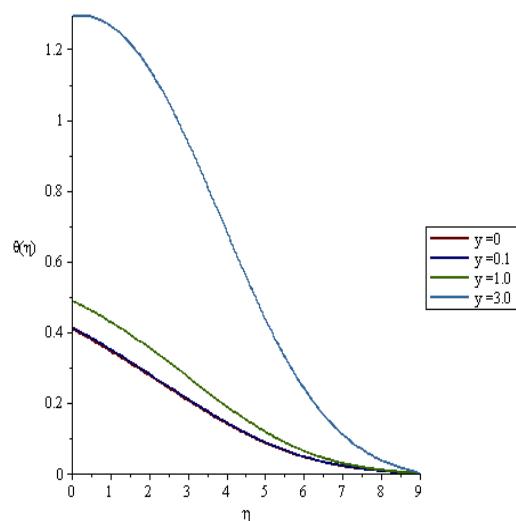


Figure 4: Temperature profiles for $Pr = 0.72$, $Ha = 0.1$, $Bi = 0.1$, $Ra = 0.1$, $Br = 0.1$

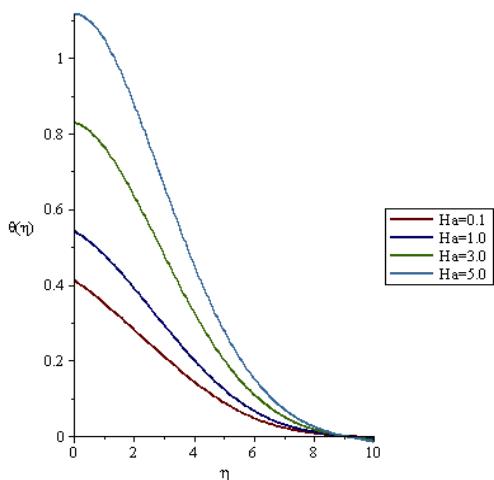


Figure 6: Temperature profiles for $Pr = 0.72$, $Br = 0.1$, $Ra = 0.7$, $y = 0$, $Bi = 0.1$.

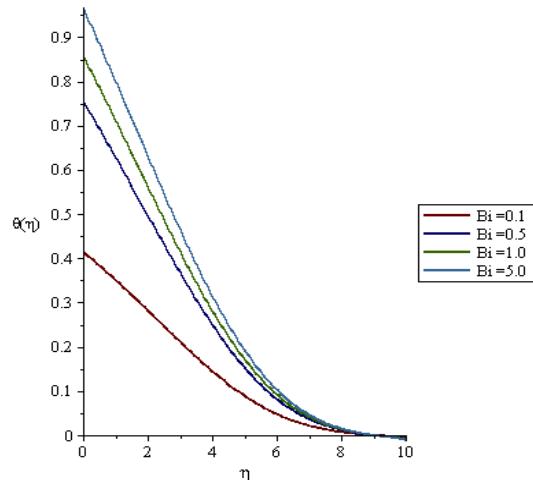


Figure 5: Temperature profile for $Pr = 0.72$, $Ha = 0.1$, $y = 0$, $Ra = 0.7$, $Br = 0.1$.

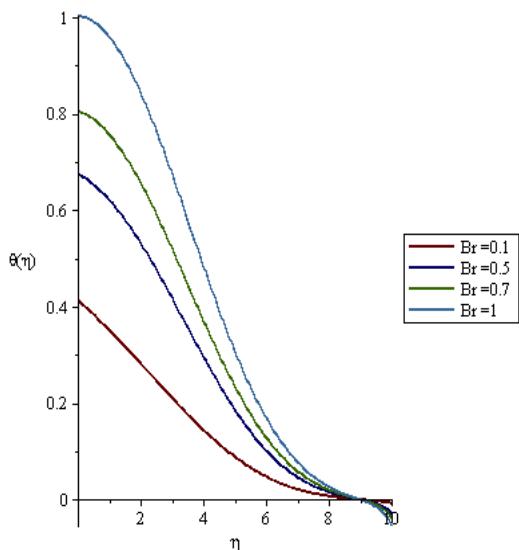


Figure 7. Temperature for $Pr = 0.72$, $Bi = 0.1$,
 $Ra = 0.7$, $y=0$ $Ha = 0.1$

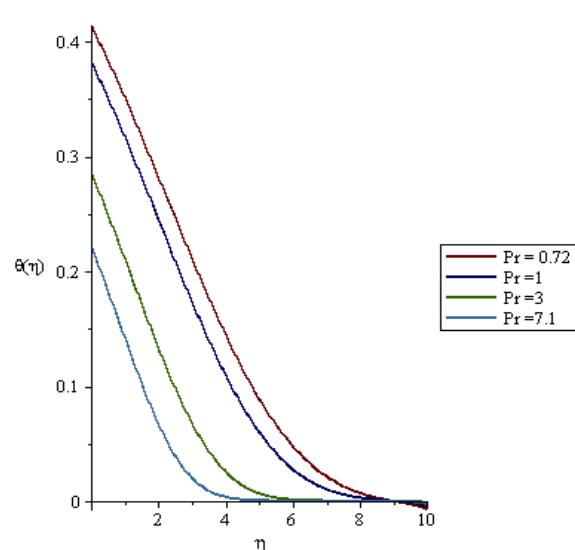


Figure 8 .Temperature profiles for $Bi = 0.1$,
 $Ha = 0.1$, $Br = 0.1$, $Ra = 0.7$, $y=0$

Discussion of Results

In figure 1, the fluid velocity is lowest at the plate surface and increases to the free stream value, satisfying the far field boundary condition. Application of the magnetic field creates a resistive force similar to the drag force that acts in the opposite direction of the fluid motion, thus causing the velocity of the fluid to overshoot towards the plate surface. Figure 2 shows the variation of the velocity profile as a function of η at different values of space variable, y and as y increases, the velocity profile increases. Figure 3 shows that as boundary layer increases, the velocity profile decreases. Figure 4 shows that the thermal boundary layer decreases due to a decrease in the fluid viscosity thereby causing decrease in the temperature of the fluid. It was observed from figure 5 that the fluid temperature increases with increase in Ha accordingly leading to an increase in thermal boundary layer. The transverse magnetic field gives rise to a resistive force known as the Lorentz force of an electrically conducting fluid. This force makes the fluid experience a resistance by increasing the friction between its layers and thus increases its temperature. Figure 6, shows that the thermal boundary layer increases as The Bi increases, and this leads to an increase in fluid temperature. From Figure 7, it was shown that as Br increases, thermal boundary layer also increases thereby causing increment in the temperature of the fluid. Figure 8 shows that the temperature profiles for different values of the Prandtl number. The fluid temperature decreases with increase in Prandtl number, consequently the thermal boundary layer decreases. Hence, prandtl number can be used to increase the rate of cooling.

Conclusion

In this article, a mathematical and theoretical pattern was presented for the effect of magnetic fields on the boundary layer flow of heat and mass transfer with variable viscosity in the presence of thermal radiation. The partial differential equations were nondimensionalized using suitable similarity terms and the resulting non-linear equations were solved using collocation method in MAPLE 18. The velocity and temperature profiles were studied graphically for different physical parameters of space variable, y , Biot number, Bi , Brankmann number, Br , Radiation parameter, Ra , Prandtl number, Pr , and Hartmann number, Ha . It was shown that the skin friction, $f''(0)$, increases as Biot number, Bi , Brankmann number, Br , Space variable, y , and Hartmann number, Ha increase, the skin friction, $f''(0)$ decreases with increase in Radiation parameter, Ra , and Prandtl number, Pr . Also, Nuselt number increases as Biot number, Bi , Brankmann number, Br , Radiation parameter, Ra , and Prandtl number, Pr , increases, Nuselt number decreases as Space variable, y , and Hartmann number decreases. The plate surface temperature $\theta(0)$ increases as Biot number, Bi , Brankmann number, Br , Space variable, y , Hartmann number, Ha increases, plate surface temperature $\theta(0)$ decreases as Radiation parameter, Ra , and Prandtl number, Pr , increases.

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Factors Associated with Uptake of Measles Rubella Vaccine Among Children Age 9-18 Months in Eastleigh North Ward Nairobi County

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Abstract- Globally, 535 000 children died of measles in 2000. By 2010, there was a global push to improve vaccine coverage which resulted in a 74% reduction in deaths. These efforts contributed to 23% of the overall decline in under-five deaths between 1990 and 2008. However, in several countries in Africa, measles is still a major public health problem. Rubella remains a threat to pregnant women and their fetus, with more than 100 000 children born each year with congenital rubella syndrome (CRS). (World Health Organization 2012). Kenya in May 2016, introduced Measles-Rubella (MR) combined vaccine in its nationwide supplementary immunization activities (SIA) campaign. However, since its introduction, the coverage has been very low especially in urban areas.(SAGE,2016).

This study aimed at assessing factors associated with uptake of measles rubella vaccine among children age 9-18 months in Eastleigh North Ward Nairobi County.

This was a descriptive cross sectional study where data was collected from 186 caregivers of children age 9-18 months in Eastleigh North Nairobi County using semi-structured questionnaires and key interviewers guides. Analysis involved descriptive statistics such as frequencies and proportions. Test of association of study variables was done using Pearson's Chi-square test. Level of significance was fixed at 0.05 ($p<0.05$) with a 95% Confidence interval and P value less than 0.05 was considered significant. Majority of respondents were mothers to the children 83.3%. Most were between the ages of 26 to 30 years (40.3%). Approximately 52.2% caregivers had secondary education and majority were self-employed 58.1%. About (60.8%) were muslims while (32.3%) were Christians. Of the 186 caregivers interviewed 85.5% (159) had their children vaccinated with MR1 and 27% with MR2. Awareness about MR vaccine was high 90.3% (168) among the caregivers; however, knowledge of child ever being diagnosed with measles or rubella was low 44.6%. There was a strong correlation between level of education and MR vaccine uptake, ($P=0.007$). This study also identified that there was a relationship between awareness of MR vaccine and uptake ($P=0.05$). The factors associated with uptake of MR vaccine were birth order, the level of education, lack of being attended at the health facility and awareness of existence of MR vaccine. Others included, hospital delivery, communication, health system related factors like availability of vaccine and vaccinator. Barriers identified for not receiving the vaccine,

negative attitude (66.7%) and religion (15%). Most care givers obtained information about MR vaccine from health care personnel 58.1% (108). Among the children, 18.3% (34) had been diagnosed with measles or rubella.

The uptake of MR2 is relatively low according to the findings suggesting that majority of the caregivers rarely bring their kids for the second dose (MR2). The result established a low correlation between the awareness of MR vaccine doses and implication of the results demonstrates the importance of instituting strategies that involves, aggressive awareness campaigns and education programs that focus on increasing caregiver awareness of MR vaccine dosing and risk factors for none vaccination.

The Ministry of Health and other non-state actors to come up with ways of improving immunization program, increase uptake of MR and consequently reducing the disease burden. Finally, findings of the study will benefit scholars as source of literature on the factors associated with uptake of MR vaccine.

Index Terms- measles rubella, vaccine, uptake, awareness

I. INTRODUCTION

Measles is a deadly and highly infectious virus that has affected mankind for centuries. Despite the existence of a highly effective measles vaccine since 1963, and although vaccination reduced the number of deaths from measles, it still remains one of the leading causes of vaccine preventable deaths in the world.

Globally, it's estimated that 535 000 children died of measles in 2000. By 2010, there was a global push to improve vaccine coverage which resulted in a 74% reduction in deaths. These efforts, supported by the Measles and Rubella Initiative, contributed 23% of the overall decline in under-five deaths between 1990 and 2008. However, in several countries in Africa, South-East Asian, European, Eastern Mediterranean and Western Pacific Regions, measles is still a major public health problem. Rubella also remains a threat to pregnant women and their fetus, with more than 100 000 children born each year with congenital rubella syndrome (CRS), like includes heart defects, blindness and deafness. (Global measles and rubella strategic plan WHO 2012)

World Health Organization (WHO) created a strategic framework for vaccination with the Measles Rubella Immunization (MRI) goals in 2008, which were achieved by most countries (UNDP, 2014). At the 2010 World Health Assembly (WHA), member states certified the plan for accelerated control of measles through national vaccination campaigns, in order to reduce mortality among children, in line with the Millennium Development Goal 4 (UNDP, 2014). In 2001, the Measles & Rubella Initiative was formed by American Red Cross, the United States' Centers for Disease Control and Prevention (CDC), the United Nations Foundation, UNICEF, and WHO, with the goal of reducing measles mortality by 90% by 2010, compared to 2000 baselines (WHO, 2015). In 2015, the global measles coverage was at around 85% and the decline in mortality from measles at around 79%, compared to the 2000 baseline estimates. Both the figures were short of the WHA targets and at risk of missing the 2020 GVAP objectives. At the 2012 World Health Assembly, the Global Vaccine Action Plan (GVAP) was adopted, with the mission of massively reducing vaccine-preventable deaths, which includes eliminating measles from 5 of the 6 WHO regions, and increasing vaccination coverage even further to 95% by 2020 (Kitamura et al. 2013). With all but one region likely to miss the GVAP target for regional measles elimination.

In 2016, the Strategic Advisory Group of Experts (SAGE) gave a recommendation for the introduction of routine second dose vaccine in all countries, regardless of their fulfillment of the 80% coverage criterion for introduction of the two-dose schedule (SAGE, 2016). In the African region, progress in immunizing children against measles has increased to 85% coverage in 2010 from 56% in 2001 (Gastañaduy, Redd, Fiebelkorn, Rota, Bellini & Seward, 2014). Despite the progress, Africa has experienced measles outbreaks and stagnation in vaccination coverage. The outbreaks came as a result of conflicts in the region disrupting the immunization activities by resistance religious groups, and from the epidemiological shift in measles cases towards older age groups (Parker et al, 2017).

Kenya shares borders with the conflict countries of Somalia and South Sudan, leading to a large influx of refugees and immigrants, many not vaccinated against measles. This has led to several outbreaks in the past few years, either in refugee camps or in informal settlements communities and neighboring counties. (GOK, 2012).

Kenya has been a strong follower of the set protocols to ensure reduced cases of measles. However, the delay in the 2006 SIA resulted in massive outbreak of measles, which was a setback in achievement of national and international goals (GOK, 2012). In 2013, a second dose measles vaccine was introduced in routine immunization schedule, but has not had high MCV1 or MCV2 coverage in recent years (Makokha, Wanjala, Githuku & Kutima, 2014). In May 2016, the Kenyan government launched an under 15 measles and rubella campaign to increase its coverage and introduce a combined measles-rubella (MR) vaccine to the country. It was also announced that MR vaccine will be formally introduced into the routine immunization schedule in early 2017 (Mbabiazi, Collins & Chemirmir, 2017). It remains to be seen whether the addition of second dose vaccine and MR vaccine into the routine schedule has led to an improvement in measles coverage and incidence decline in the country. This necessitated a study to determine the level of uptake of MR among children 9-

18months. The Nairobi county health records shows Eastleigh North Ward is leading in terms of incidences of measles rubella infections. This is despite optimal efforts to ensure adequate vaccination coverage (Anecdotes, Nairobi County Ministry of Health, 2017). Presence of an immigrant community in Eastleigh North Ward in Nairobi County has been cited as a predisposing factor owing to the failure to adhere to the vaccination regimes by the affected populations. The need to carry out the study and determine the other predisposing factors is of paramount importance.

II. METHODS

This study was a descriptive cross-sectional study carried out in Eastleigh North Ward in Nairobi County. Approval to conduct the study was granted by Kenyatta National Hospital/University of Nairobi-Scientific and Ethics Review Unit and the division of disease surveillance response unit. Permission to conduct the study was also sought from local community leaders. The study population comprised of caregivers of children age 9-18months who lived in Eastleigh North Ward in Nairobi County and consented to participate. The ward is one of the five wards of Kamukunji Constituency in Nairobi County. The area is home to immigrants Somali population. It has a total population of 21450. Population of less than 5 years is 8903, while under 24 months is 3349. Eastleigh North ward has two main boundaries National Government and political boundaries 2nd avenue from 12th street to Juja Rd, Right side Airbase left side Muratina Rd to Juja Rd is Eastleigh North. A sample size of 186 was calculated as a representative of the population. Kamukunji was purposively selected due to the fact that it had the most current and recurrent outbreaks of measles rubella outbreaks in Nairobi. Multistage sampling was done in which three (3) out of five sublocations in Eastleigh North Ward were randomly sampled. From the 3, the households were determined by sampling roads used by polio campaign 2018 method. Through purposive sampling, all the 9 health facilities in the sampled sub-locations were interviewed using the key informant guide

Data was collected using a semi-structured questionnaire that was available in both English and

Swahili languages by trained enumerators. Each questionnaire was cross-checked before the respondent left so as to ensure completeness of data. Through purposive sampling, all the 9 health facilities in the sampled sub-locations were interviewed using the key informant guide. All the analyses were done using SPSS version 19.0. Descriptive statistics were used in analysis for proportions and frequencies. Pearson's chi square (χ^2) tests were used to determine the association between uptake of MR vaccine and individual factors, awareness and health system factors. Differences were considered significant at $p \leq 0.05$. Qualitative data was analyzed using thematic analysis.

III. RESULTS

Individual characteristics of the caregivers of children age 9-18months in Eastleigh North Ward Nairobi County

The socio-demographic/economic characteristics of the respondents are shown in Table 1. One hundred and eighty six

caregivers from 3 sub-locations, Garage 2(33.3%), Eastleigh north 1(33.3%) and Eastleigh North 3(33.3%) were involved. Majority of the respondents were mothers to the children 83.3%. Most were between the ages of 26 to 30 years (40.3%). Approximately 52.2% caregivers had secondary education and majority were self-employed 58.1%. Most participants (60.8%) were Muslims while (32.3%) were Christians.

Uptake of measles rubella vaccine among children age 9-18months in Eastleigh North Ward Nairobi County

The overall uptake of measles rubella vaccine (Table 2) was MR1 85.5% (159/186), MR2 (32.5%) . Table 4.3 shows MR uptake by sub-location,most children who had been vaccinated with both MR one and two respectively resided in Garage2 sub-location (34.6% MR1 and MR2 33.3%).

Eastleigh North 3 had the most children who hadn't received MR1 and MR2 44.4% and 42.9% respectively.

Awareness about MR vaccine among Caregivers of Children 9-18months in Eastleigh North Nairobi County

Majority of the respondents 90.3% had heard about MR Vaccine. More than half heard from health workers (58.1%), 16.1% from religious and local leaders. A high proportion of respondents (81.7%) were aware that children received MR vaccine at 9 and 18months. A quite a number of respondents were not aware if their child had been diagnosed with measles or rubella (44.6%), while 18.3% claimed their children had been diagnosed with measles or rubella. A hundred and twenty-four of the participants reported that low uptake of MR vaccine was attributed to Myths/ negative attitudes towards many vaccines

Health System factors in Eastleigh North ward Nairobi County

Majority of the respondents 181/186 of caregivers had Mother/child booklet. More than half of the children were vaccinated in government facility (54.3%), 39.2% in faith-based organizations.

Table: 5 we find that 83.9% of the caregivers indicated that at no time had they taken their child for MR vaccine and were not vaccinated. Figure:1 Majority of the health workers interviewed were from private hospitals (34%), 22% o were from the government hospitals and dispensaries and 11% were from the private clinic and health centers. Figure 4.1 shows that 67% of the health care workers who participated in the study were nurses, 22% of the health workers were clinical officers and 11% of the health workers were doctors.

MR vaccine uptake in relation to caregiver's Individual characteristics in Eastleigh North ward Nairobi County

There was a statistical significant association between measles rubella vaccine uptake and level of education of the caregivers ($P = 0.007$). Proportion of care givers who had secondary education seemed to be the majority compared to other categories. There was significantly higher proportion of children receiving MR vaccine among caregivers who had secondary education (MR1,56%;MR2, 48.1%) as the highest level of education compared to those who had tertiary level (MR1,10.7%; MR2,11.1%).

Children who were within the birth order of first to third had a significant relationship with MR1 uptake ($P=0.01$).As compared to later births >7th born (MR1; 2.5%).Further on, there was no

statistically significant association among the other demographics with measles rubella vaccination uptake.

MR vaccine uptake in relation to caregiver awareness in Eastleigh North ward Nairobi County

Although the respondents were aware of availability of MR vaccine, 168(90.3%) majority did not know if their child has ever been diagnosed with measles or rubella(44.6%)

There was a relationship between caregivers who had heard about MR vaccine for children ($p=0.05$). At least 132/186 of those care givers knew the timing of two doses of the MR vaccine, a positive association to the uptake ($P=0.07$). For MR2 there was a strong relationship to MR uptake ($P=0.00$) due to the fact that majority of children who had attained the age of 18months had been vaccinated. Although the source of information had a weak relation to the uptake of MR vaccine, health workers seemed to play an important role in communicating to mothers, MR1 was 56.6% MR2 70.4%. Together this suggests that these named factors affect the uptake of the MR vaccine.

MR vaccine uptake in relation to health System factors in Eastleigh North ward Nairobi County

There was a statistically significant association between MR vaccine uptake and the place of the child's immunization ($P = 0.008$).This was attributed to the vaccinator being absent (5%) and long waiting time (2.5%) though the margin was small. The caregivers who attended government facilities were more likely to complete MR doses 63%. Large number of children received MR vaccine 88.9% in the facility without problems.

IV. DISCUSSION

Maternal education has been highlighted in most literatures as a predictor of childhood immunization owing to changes in attitudes and traditions brought about by education, In the current study, it confirms this argument as the level of education was found to influence the uptake of the MR vaccine. Thus mothers with higher education levels are more likely to have children who are fully immunized (Abuya *et al.*, 2011). Education level was found to determine immunization coverage in Nigeria (Olumuyiwa *et al.* 2008). This study established that the age of mothers was a predictor in the uptake of the MR vaccine 26-30year olds were the majority. Maternal age has been underscored to influence immunization completion with studies indicating that younger mothers are more likely to immunize children than older mothers (Fatiregun and Okoro, 2012, Bondy *et al.*, 2009 and Etana and Deressa, 2012).

The results of this study concur with the findings of W.H.O (2009) that children staying within 30 minutes' walk to the immunization center had 3.3 higher chance of receiving MCV2 than those who walk longer. The immunization facilities in this study were in close proximity to the respondents with majority of them indicating they were less than 30 minutes to their places of residence with an average of 24.3 minutes access time and this consequently affected the uptake of the MR vaccine. The same has been proven in another study which demonstrated that distance to the health facility is likely to affect the uptake of the vaccine and schedule completion (Serpell *et al.*, 2006).

Studies have been able to demonstrate a strong correlation between place of delivery and the ability of the child to complete immunization (Antai (2009). Similarly, this study was able to show that the place of delivery and uptake of the MR vaccine had a relation 100% for MR2. Children delivered in a health facility from households with higher wealth status were associated with higher uptake of the MR vaccine. Similar results have been documented in other studies done in Kenya (Egondi *et al.*, 2015; Mutua *et al.*, 2011), and India (Lauridsen *et al.*, 2011) where health outcomes are better off among the wealthier in the community compared to the less wealthy households.

Caregivers who attended ANC clinic during pregnancy had their children vaccinated with MR1 at 95% and 100% for MR2. A study by Mutua (2017) on epidemiology and impact of vaccination coverage and delays in informal settlements in Nairobi, indicated that only 67% of the children had been immunized and post-natal care; and health facility delivery were identified as the determinants of being fully immunized

The findings indicate that about 85.5% of the children had received MR1 vaccine and 14.5% of the children had received MR2 vaccine. A study done on the risk factors for non-vaccination against measles among children below five years in Eastleigh, Nairobi Kenya, found that routine measles vaccination coverage in the area had remained below 75% (Omolo 2007).

The proportion of the children who received vaccine by gender was high in female 54.3% compared to 45.7% in male. Generally, there were more girls receiving MR vaccine compared to boys. Being a female child has been shown to have a marginal positive effect on vaccination, though its effects are statistically insignificant. Sex discrimination exists in the rural areas of Bangladesh where female children are 30 % are less likely to be fully immunized compared to the male children (Jamil *et al.*, 1999; KRCS, 2011). Contrarily, this study showed that there was no relationship between the gender of the child and uptake of MR vaccine. The study however, did not clearly illustrate whether more preference was given to the female than male gender.

Awareness of MR vaccine for children (90.3%) and timings of doses (81.7%) of the MR vaccine were positively related to the uptake of MR vaccine. These findings are in conformity with previous studies that reported that knowledge on vaccination significantly influenced vaccination coverage (Mapatano *et al.*, 2008). The children of mothers or caretakers who were aware of MCV2 were 15 times more likely of receiving MCV2 than those whose caretakers had no knowledge of MCV2 (Makhoha, 2016). These results were similar to a study conducted by Sheikh *et al.* (2014) that showed that the caretaker's knowledge of the immunization increased the uptake of OPV and IPV during immunization campaigns.

Child suffering from measles or rubella (18.3%) had no relation to the uptake of MR vaccine suggesting that previous infection of the child with measles or rubella may not affect the uptake of the MR vaccine. Similar results were obtained in the study done by Mutua (2017) that showed no significant relationship between childhood immunization patterns and hospitalization cases even though the statistical estimates direction indicated children who miss at least one of the recommended vaccines had higher hospitalization rates. However in this study, quite a significant number (44.6%) of caregivers did not know

whether their child has ever been diagnosed with measles or rubella.

Findings from this study found that sources of information for most caregivers were mainly health worker(58.1%), religious and local leaders(16.1). Contrary to Eboreime, Abimbola and Bozzani (2015) in a study done in Nigeria sources of information entailed the media, friends and social networks. However on distribution of nurses, showed no regional disparity in the human resources trained to deliver immunization services. As is in most developing countries, in Nigeria, immunization services at PHC centres are delivered mostly by mid-level health workers. In this study too, nurses were the main providers of vaccination services. Parents mentioned limited time at the health care clinics as a reason for the low uptake. They felt they do not have enough time and therefore they are not getting enough information and explanations to the questions in their minds, which seemed to shape the fear towards vaccinations. In this study, health care workers stated that they were burden with lots of other responsibilities hence not much time to explain to caregivers in details

V. CONCLUSIONS

Caregiver's level of education influences uptake of MR vaccine. This study concludes that MR1 uptake as compared to slightly low uptake of MR2 among children aged between 9 to 18 months in Eastleigh North Ward. Awareness on availability of MR vaccine for children and knowledge on double dosage of the MR vaccine influences uptake .In the face of measles rubella outbreak resurgence and increasing measles' rubella related infant and child morbidities and mortalities .The government should therefore increase its efforts in increasing awareness among the population on the importance of timely child-hood vaccination against measles and rubella through mass media, social mobilization and health education.

There is need to strengthen strategies to reach the hard-to-reach areas. Ministry of health needs to educate the community on recognition of measles rubella symptoms. Health education and sensitization on the importance of child vaccinations Health workers need to be encouraged to use the missed opportunities in capturing children could who have missed MR2 and other vaccines. The low vaccine uptake can easily be improved through strategies such as door-to door outreach services. For scholars, consider studying factors associated with MR2 uptake in ages above 18months for those who come for late vaccination.

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Table: 1 Individual Characteristics of the Caregiver of Children aged 9-18 months in Eastleigh North Ward Nairobi County

Variable	N	%
Sub-location of caregivers		
Eastleigh North 1	62	33.3
Eastleigh North 3	62	33.3
Garage 2	62	33.3
Interviewee Relationship		
Mother	155	83.3
Father	15	8.1
Grandparents	5	2.7
Aunt/Uncle	9	4.8
Siblings>18yrs	2	1.1
Care giver's Age (Years)		
15-20	11	5.9
21-25	60	32.3
26-30	75	40.3
31-35	27	14.5
36-40	9	4.8
>40	4	2.2
Level of Education		
No formal education	31	16.7
Primary	32	17.2
Secondary	97	52.2
Tertiary and above	26	14
Caregiver's Religion		
Christian	60	32.3
Muslim	113	60.8
Others	13	7

Caregiver's occupation

Employed	24	12.9
Self-employed	108	58.1
Unemployed	54	29

Caregiver's monthly income (KSH)

1,000-5,000	25	13.4
5,001-10,000	64	34.4
10,001-20,000	68	36.6
20,001-50,000	29	15.6

Marital Status of the caregiver

Married	143	76.9
Single	34	18.3
Separated	1	0.5
Divorced	6	3.2
Widowed	2	1.1

Children born by the caregiver

1-3	119	64
4-6	56	30.1
>7	11	5.9

No. of Children alive

1-3	119	64
4-6	56	30.1
>7	11	5.9

ANC attendance during pregnancy

Yes	178	95.7
No	8	4.3

Place of Delivery

Home by skilled birth attendant	9	4.8
Health facility	177	95.2

Child's age in Months

9-17	103	55.4
18 months	83	44.6

Child's birth order

1-3	133	71.5
4-6	45	24.2
>7	8	4.3

Child's gender

Male	85	45.7
Female	101	54.3

Time Taken to reach nearest immunizing facility (Min)

0-10	39	21
11-20	62	33.3
21-30	50	26.9
31-40	21	11.3
>40	14	7.5

Table 2: Uptake of measles rubella Vaccine among Children 9-18months in Eastleigh North Ward Nairobi County (N=186)

Vaccine	Vaccinated		Not Vaccinated	
	No.	%	No.	%
MR1	159	85.5	27	32.5
MR2	27	14.5	56	67.5

Table 3: Uptake of measles rubella Vaccine by Sub -location among Children 9-18months in Eastleigh North Ward Nairobi County (N=186)

Sub-location	MR1		MR2	
	Given	Not Given	Given	Not Given
	No.(%)	No. (%)	No. (%)	No.(%)
Eastleigh North-1	54 (34)	8 (29.6)	7 (25.9)	16 (28.6)
Eastleigh North-3	50 (31.4)	12 (44.4)	11 (40.7)	24 (42.9)
Garage2	55 (34.6)	7 (25.9)	9 (33.3)	16 (28.6)

Table: 4 Awareness about measles rubella vaccine among caregivers of children age 9-18 months Eastleigh North Ward Nairobi County

Variable	N=186	%
Ever heard of Measles-Rubella Vaccine for children		
Yes	168	90.3
No	18	9.7
If yes, source of information		
Health workers	108	58.1
Religious and local leaders	30	16.1
Neighbors	7	3.8
Other sources (Radio, T.V, Megaphone)	23	12.4
Knowledge of the doses of Measles-Rubella Vaccine		
Yes	152	81.7
No	34	18.3
Knowledge of the timing for the Measles-Rubella Vaccination		
At 9 months	68	36.6
At 18 Months	31	16.7
Both at 9 and 18 months	53	28.5
Has your child ever been diagnosed with measles or rubella		
Yes	34	18.3

No	69	37.1
Don't Know	83	44.6
If Yes, What Age		
<18 months	28	14
18 months	6	3.2
Reasons for mothers/caregivers' low uptake of Measles-Rubella vaccination for their children in your neighborhood		
Religion not encouraging vaccination	28	15
Myths/Negative attitude towards many vaccines	124	66.7
Unavailability of mothers to take children for vaccination	24	12.9
Some of their friends' children have not been vaccinated and were not sick	10	5.4

Table: 5 Health system factors in Eastleigh North ward Nairobi County

Variable	N=186	%
Mother/Child Booklet available		
Yes	181	97.3
No	5	2.7
Facility for Immunization (Type)		
Government	101	54.3
Faith Based organization	73	39.2
Private	11	5.9
Other	1	0.5
Ever experienced lack of attendance for Measles-Rubella Vaccine in a facility		
Yes	30	16.1
No	156	83.9
If yes, Reason for non-attendance*		
Long waiting time	4 (2.5)	1 (3.7)
Vaccinator absent	8 (5)	-

Vaccines not available	-	-
Child ill	5 (3.1)	1 (3.7)
Health facility closed	-	-
Other	1 (0.6)	-

Table: 6 MR Vaccine uptakes in relation to Caregiver's Individual Factors with in Eastleigh North ward Nairobi County(N=186)

Variables	Measles-Rubella1		P	Measles-Rubella2		P		
	Given			Not Given				
	n=159 No. (%)	(%)		n=27 No. (%)	(%)			
Interviewee Relationship								
Mother	133 (83.6)	22 (81.5)	0.69	23 (85.2)	47 (83.9)	0.88		
Father	13 (8.2)	2 (7.4)		2 (7.4)	5 (8.9)			
Grandparents	4 (2.5)	1 (3.7)		-	1 (1.8)			
Aunt/Uncle	8 (5)	1 (3.7)		2 (7.4)	3 (5.4)			
Siblings>18yrs	1 (0.6)	1 (3.7)		-	-			
Mother/ Care giver's Age (Years)								
15-20	9 (5.7)	2 (7.4)	0.46	-	3 (5.4)	0.3		
21-25	51 (32.1)	9 (33.3)		10 (37)	14 (25)			
26-30	67 (42.1)	8 (29.6)		8 (29.6)	25 (44.6)			
31-35	20 (12.6)	7 (25.9)		8 (29.6)	10 (17.9)			
36-40	8 (5)	1 (3.7)		1 (3.7)	4 (7.1)			
>40	4 (2.5)	-						
Level of Education								
No formal education	25 (15.7)	6 (22.2)	0.007	5 (18.5)	8 (14.3)	0.71		
Primary	28 (17.6)	4 (14.8)		6 (22.2)	8 (14.3)			
Secondary	89 (56)	8 (29.6)		13 (48.1)	31 (55.4)			
Tertiary and above	17 (10.7)	9 (33.3)		3 (11.1)	9 (16.1)			
Mother/Caregiver's Religion								

Christian	49 (30.8)	11 (40.7)	0.45	9 (33.3)	14 (25)	0.78
Muslim	99 (62.3)	14 (51.9)		17 (63)	38 (67.9)	
Others	11 (6.9)	2 (7.4)		1 (3.7)	4 (7.2)	
Mother's/Caregiver's occupation						
Employed	22 (13.8)	2 (7.4)	0.79	6 (22.2)	4 (7.1)	0.1
Self-employed	93 (58.5)	15 (55.6)		17 (63)	37 (66.1)	
Unemployed	44 (27.7)	10 (37)		4 (14.8)	15 (26.8)	
Mother/Caregiver's monthly income (KSH)						
1,000-5,000	20 (12.6)	5 (18.5)	0.7	2 (7.4)	3 (5.4)	0.49
5,001-10,000	57 (35.8)	7 (25.9)		9 (33.3)	18 (32.1)	
10,001-20,000	58 (36.5)	10 (37.0)		9 (33.3)	27 (48.2)	
20,001-50,000	24 (15.1)	5 (18.5)		7 (25.9)	8 (14.3)	
Marital Status of the mother						
Married	125 (78.6)	18 (66.7)	0.79	18 (66.7)	47 (83.9)	0.04
Single	26 (16.4)	8 (29.6)		6 (22.2)	8 (14.3)	
Separated	1 (0.6)	-		-	-	
Divorced	5 (3.1)	1 (3.7)		3 (11.1)	-	
Widowed	2 (1.3)	-		-	-	
Children born by the mother						
1 -3	100 (62.9)	19 (70.4)	0.1	18 (66.7)	33 (58.9)	0.35
4 -6	51 (32.1)	5 (18.5)		9 (33.3)	19 (33.9)	
>7	8 (5)	3 (11.1)		-	4 (7.1)	
No. of Children alive						
1-3	100 (62.9)	19 (70.4)	0.1	18 (66.7)	33 (58.9)	0.35
4-6	51 (32.1)	5 (18.5)		9 (33.3)	19 (33.9)	
>7	8 (5)	3 (11.1)		-	4 (7.1)	
ANC attendance during pregnancy						
Yes	151 (95)	-	0.61	27 (100)	52 (92.9)	0.3

No	8 (5)	27 (100)	-	4 (7.1)		
Place of Delivery						
Home	9 (5.7)	-	0.36	-	5 (8.9)	0.17
Hospital	150 (94.3)	27 (100)		27 (100)	51 (91.1)	
Child's age in Months						
9-17	84 (52.8)	19 (70.4)	0.1	-	-	
18 months	75 (47.2)	8 (29.6)		27 (100)	56 (100)	
Child's Birth order						
1 st -3rd	115 (72.3)	18 (66.7)	0.01	20 (74.1)	36 (64.3)	0.4
4 th -6th	40 (25.2)	5 (18.5)		7 (25.9)	17 (30.4)	
>7th	4 (2.5)	4 (14.8)		-	3 (5.4)	
Child's gender						
Male	72 (45.3)	13 (48.1)	0.27	16 (59.3)	25 (44.6)	0.25
Female	87 (54.7)	14 (51.9)		11 (40.7)	31 (55.4)	
Time Taken to reach nearest immunizing facility (Min)						
0-10	34 (21.4)	5 (18.5)	0.87	4 (14.8)	9 (16.1)	0.31
11-20	51 (32.1)	11 (40.7)		13 (48.1)	17 (30.4)	
31-35	43 (27)	7 (25.9)		5 (18.5)	16 (28.6)	
36-40	18 (11.3)	3 (11.1)		5 (18.5)	9 (16.1)	
>40	13 (8.2)	1 (3.7)		-	5 (8.9)	

Table: 6 MR vaccine uptake in relation to caregiver awareness in Eastleigh North ward Nairobi County(N=186)

Variable	Measles-Rubella 1		P	Measles-Rubella 2		P
	Given	Not Given		Given	Not Given	
	n=159(No.%)	n=27 No. (%)		n=27 No. (%)	n=56 No. (%)	
Ever heard of Measles-Rubella Vaccine for children						
Yes	142 (89.3)	26 (96.3)	0.48	27 (100)	48 (85.7)	0.05

No	17 (10.7)	1 (3.7)	-	8 (14.3)		
If yes, source of information						
Health workers	90 (56.6)	18 (66.7)	0.8	19 (70.4)	29 (51.8)	0.2
Religious and local leaders	26 (16.4)	4 (14.8)		4 (14.8)	10 (17.9)	
Neighbors	6 (3.8)	1 (3.7)		2 (7.4)	2 (3.6)	
Other sources (Radio, T.V, Megaphone)	20 (12.6)	3 (11.1)		2 (7.4)	7 (12.5)	
Knowledge of two doses of Measles-Rubella at 9 and 18 months						
Yes	132 (83)	20 (74.1)	0.11	27 (100)	44 (78.6)	0.007
No	27 (17)	7 (25.9)		-	12 (21.4)	
Timing of doses for Measles Rubella Vaccine						
At 9 months	55 (34.6)	13 (48.1)	0.03	2 (7.4)	31 (55.4)	0.00
At 18 months	31 (19.5)	-		11 (40.7)	-	
At 9-18 months	47 (29.6)	6 (22.2)		14 (51.9)	13 (23.2)	
Has your child ever been diagnosed of measles						
Yes	31 (19.5)	3 (11.1)	0.27	9 (33.3)	13 (23.2)	0.62
No	57 (35.8)	12 (44.4)		7 (25.9)	17 (30.4)	
Don't Know	71 (44.7)	12 (44.4)		11 (40.7)	26 (46.4)	
If Yes, What Age						
<18 months	25 (15.7)	1 (3.7)	1	8 (29.6)	11 (19.6)	1
18 months	6 (3.8)	-		1 (3.7)	2 (3.6)	
Reasons for mothers/caregivers' low uptake of Measles-Rubella vaccination for their children in your neighborhood						
Religion not encouraging vaccination	22 (13.8)	6 (22.2)	0.61	5 (18.5)	9 (16.1)	0.24
Myths/Negative attitude towards many vaccines	108 (67.9)	16 (59.3)		16 (59.3)	35 (62.5)	

Unavailability of mothers to take children for vaccination	20 (12.6)	4 (14.8)	3 (11.1)	11 (19.6)
Some of their friends' children have not been vaccinated and are not sick	9 (5.7)	1 (3.7)	3 (11.1)	1 (1.8)

Table: 7 Association between MR vaccine uptake and health System factors

Variables	Measles Rubella-1		P	Measles Rubella-2		P
	Given	Not Given		Given	Not Given	
	n=159 No. (%)	n=27 No. (%)		n=27 No. (%)	n=56 No. (%)	
Mother/Child available Booklet						
Yes	157 (98.7)	24 (88.9)	0.1	26 (96.3)	56 (100)	0.33
No	2 (1.3)	3 (11.1)		1 (3.7)	-	
Facility for Immunization (Type)						
Government	86 (54)	15 (55.6)	0.59	17 (63.0)	26 (46.4)	0.11
Faith Based organization	64 (40.3)	9 (33.3)		9 (33.3)	25 (44.6)	
Private	8 (5)	3 (11.1)		-	5 (8.9)	
Other	1 (0.6)	-		1 (3.7)		
Ever experienced lack of attendance for Measles-Rubella Vaccine in a facility						
Yes	23 (14.5)	7 (25.9)	0.008	3 (11.1)	11 (19.7)	0.49
No	136 (85.5)	20 (74.1)		24 (88.9)	45 (80.4)	
If yes, Reason for intendance						
Long waiting time	4 (2.5)	1 (3.7)	0.79	-		0.2
Vaccinator absent	8 (5)	-		3 (11.1)	2 (3.6)	
Vaccines not available	-	-		-	-	
Child ill	5 (3.1)	1 (3.7)		-	5 (8.9)	
Health facility closed	-	-		-	-	
Other	1 (0.6)	-		-	1 (1.8)	

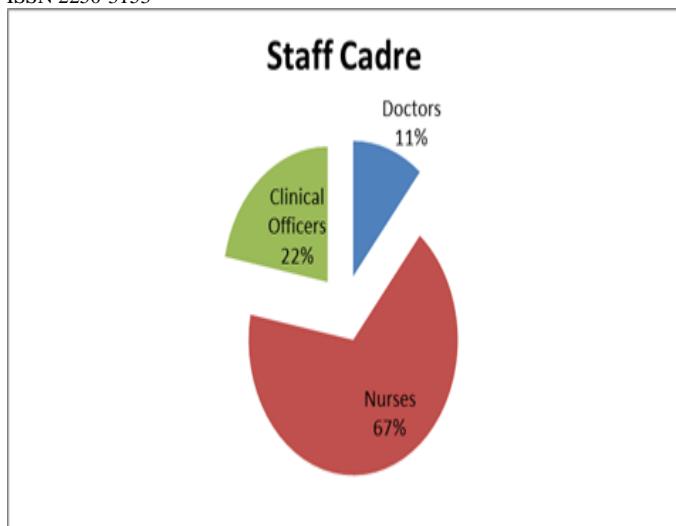


Figure: 1 Health System factors in Eastleigh North ward Nairobi County (N=9)

Platelet-Rich Fibrin Membrane – as a Novel Local Autologous Blood Tissue Graft Stimulating Granulation Tissue Growth in Pressure Injury of a Spinal Cord Injury patient: A Case Report

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Abstract: Pressure injury (PI) is such a common complications that impair quality of life and become the source of sufferings for the patients and care-givers in spinal cord injury (SCI) patients. Management of PI in SCI population is also expensive specially in developing nations. Autologous Platelet-Rich Fibrin (PRF) is simpler, cost-effective, safe new approach towards pressure injury managements. As second-generation Platelet Rich Plasma (PRP), PRF contains more growth factors than PRP. There are no studies on PRF membrane use in PI management in SCI population. Following PRF use there was improved granulation tissue formation in this patient. Here for the first time PRF membrane use in PI management in SCI population has been reported in this case.

Index Terms- Platelet-Rich Fibrin, Pressure Injury, Spinal cord injury

I. INTRODUCTION

“Healing is a matter of time, but it is sometimes also a matter of opportunity.” - Hippocrates

Pressure injuries (PI) are the second most frequent secondary complication in people with spinal cord injury (SCI) from acute stage to chronic stage.¹ It affects quality of life, length of stay during hospitalization and also increases mortality and morbidity. The prevalence of PI during the first year after SCI is 8%, and it even rises to 33% in resident-community cases.² It is estimated that 50% to 80% of subjects with SCI can develop PI at least once in their lives.^{2,3} PI are expensive and at the same time difficult to heal as SCI causes physiological deficits that delay wound healing.

Autologous PRP has been considered as a cost-effective approach for wound therapy.⁴ Growth factors from platelets here has the capabilities to accelerate wound healing. But there are no studies on Platelet-rich fibrin (PRF) membrane in

PI in SCI populations. PFR has recently been considered as a new generation platelet concentrate.⁵

II. CASE REPORT

Case: A case of SCI with paraplegia, neurogenic bowel and bladder and PI in ischial tuberosity came for rehabilitation care. This PI was a chronic non-healing one with full thickness skin loss which did not show improvement on normal saline dressing for past 1 year.

Intervention: A 10 ml blood sample was taken under aseptic precautions from patient’s antecubital vein without anticoagulant which was immediately (within 2 minutes) centrifuged at 3000 rpm (approximately 400g) for 10 minutes using REMI (R-8C Plus) centrifuge. After centrifugation a gel-like natural fibrin matrix was obtained at mid-portion of the tube with a separator and RBC’s below and a platelet-poor plasma at the top. Gel was converted to membrane by compressing it, then it was kept over the ulcer base and it was covered with a dressing under sterile precautions (Figure 1) and PRF dressing was left in for 7 days. PRF dressing was done at 0 week and at 1 week under all aseptic precautions. Routine rehabilitation care simultaneously was also followed. There were no any adverse events or complications during and after intervention.

Outcome measures: Granulation tissue formation. Assessments were done at baseline (0 week), at 1st week, 2nd week.

Results: Improvement was seen after 1 week of PFR membrane dressing. Granulation tissue formation was noticed and was also noticed at 2nd week as well (Figure 2). There were very little exudates formation after 1 week, but there were no changes in size of PI. There was a change in volume (from baseline, 1.3 cm³ to at 2nd week, 0.7 cm³). There were no adverse reaction after of PRF membrane application.

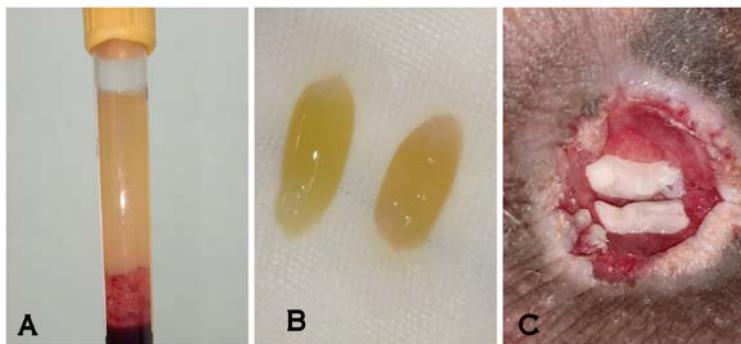


FIGURE 1: A: PRF PREPARATION, B: PRF MEMBRANES, C: PRF MEMBRANE DRESSING



FIGURE 2: BEFORE (0 WEEK) AND AFTER (1ST AND 2ND WEEK) PRF MEMBRANE DRESSING

[RED ARROW INDICATING GRANULATION TISSUE FORMATION]

(SIZE DID NOT CHANGE: 2 CM X 1 CM)

III. DISCUSSION

Risk for developing pressure injury is relatively more in people with SCI.⁶ The most common areas like sacral area and ischial tuberosities are prone to develop pressure injury in these patients. Delayed healing of a pressure ulcer causes deconditioning that is difficult to restore and can lead to serious, and even life-threatening, medical conditions. Management of Pressure injury is always challenging in elderly, neurological impairment, chronic hospitalization, or in chronic spinal cord injury (SCI). Cost is often high due to need of multiple hospitalizations, surgeries etc. Chronic condition and decreased sensation makes SCI patients more susceptible to develop recurrent pressure ulcers.

PRF is known as second-generation platelet concentrate in a fibrin matrix gel which polymerized to form a tetra molecular architecture. It incorporates platelets, leucocytes, cytokines, and many circulating stem cells. PRF has many advantages over PRP. PRF preparation is simple and it does not require anticoagulant or a thrombin activator. Furthermore, PRF gel is easy to apply on a wound compared to a liquid PRP. Studies have also shown that growth factors concentration is significantly more in PRF compared to PRP and whole blood. Along with growth factors there are many factors of healing that all act in a complex synergy, such as leukocytes, fibrin matrix structure, and circulating progenitor cells. The growth factors along with stiffness of fibrin mesh formation show a different architecture that has specific biomechanical and physiological advantage to the healing process.

This case showed improvement in the condition of the ulcer. Previous study on PRF membrane was in leprosy⁷ neuropathic ulcer, but there were no such studies of PRF membrane use in SCI populations.

IV. CONCLUSION

To the best of our knowledge, this is the first case report of PRF membrane use in PI of SCI patient and results are promising. Pressure injury management in developing nations is very expensive many a times hence autologous PRF membrane graft may be a safe and effective promising agent in PI management SCI population. Future research on randomized controlled trials

are needed on these PRF membrane graft in Pressure injury management in SCI population to give more conclusive results.

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Food Security of the Schedule Tribe (ST) Households: A Case Study of Lakhimpur District of Assam

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Abstract- Food self-sufficiency, food security and nutrition security are the essential components of food and nutrition security. Therefore, food security should ensure both adequate food availability and desired nutrition. Food security is a major problem of the state like Assam, because of shortage of food grain production, poverty and lack of nutritional knowledge. In this study, an attempt has been made to assess the status of food security among the ST community of Lakhimpur district of Assam. For finding out the level of food security Per Capita per day Calorie Intake (PCCI) has been employed. Calculated calorie intake of sample households have been compared with 2730 kilocalories, which is recommended by Indian Council of Medical Research for an adult man doing moderate activity (NIN, 2010). For obtaining final sample, multistage mix-sampling technique has been used. It has been found that out of 152 sample households only 50.66 percent household has been found as food secure and another 49.34 percent is found as food insecure.

Index Terms- Food Security, ST Community, Per Capita per day Calorie Intake, Lakhimpur.

I.INTRODUCTION

Ensuring the food security continues to be a challenging issue of vital importance for the developing countries like India. The Millennium development goals provide us with the starting point to assess the level of food security and prioritize our efforts to achieve it. Removal of malnutrition and hunger from the country is not only socially desirable but also necessary for improving overall economic development, as healthy people contribute more to the economy with their relatively higher level of productivity and efficiency. Hunger and malnutrition put enormous cost burden on the society. A World Bank Report states that malnutrition brings down three percent of countries GDP annually. The Indian planners, right from the beginning, realized the need to attain self-sufficiency in food grains as one of the important goals of planning (Singh, 2013).

Food security refers to a household's physical and economic access to sufficient, safe and nutritious food that fulfills the dietary needs and food preferences of that household. The Universal Declaration of Human Rights in 1948 recognized right to food as a core element of an adequate standard of living. Following this, and more especially from world food crisis of 1972-74, food security became an important "organizing principle" in development. Following are the some important definitions of food security:

World Development Report (1986) defined food security as "access by all people at all times to enough food for an active, healthy life."

The 1996 World Food Summit redefined food security as "Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life."

In 2001, the FAO Expert Consultation on Food Security gives a working definition of food security: Food security exists when all people, at all times have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life.

Food insecurity exists when people do not have adequate physical, social or economic access to food as defined above. Food insecurity, thus, is just an opposite situation of food security.

Worldwide around 852 million people out of 6.35 billion are chronically hungry due to extreme poverty, while up to 2 billion people lack food security intermittently due to varying degrees of poverty (FAO, 2003). At the global level, the South Asian region is home to more chronically food insecure people than any other region in the world and Global Hunger Index (2008) placed India in 94th rank among 119 countries.

As like national scenario, the situation of Assam is almost similar. Hence the level of food security among different section of the society of Lakhimpur district is found not satisfactory. Most of the ST population of the district inhabits on river banks and their educational level is also very poor. Agriculture is the main livelihood source, but due to heavy flood frequently coming to the district, the agricultural productivity is not sufficient. It is a major supply side challenge of food security of the community. According to BPL census 2002, the percentage of poverty in Assam is very high (Handique, et. al 2016). On the other hand, food grain production of the state is not self-sufficient. Although, the Public Distribution System of the country is a large food security mechanism and it covers a huge portion of the population. But its performance is still to be questioned, especially the level of food security of the BPL families are not satisfactory.

II. OBJECTIVES

The present study has its general objective is to assess the level of food security of the ST population of Lakhimpur district of Assam and to identify and assess the factors effecting the level of food security and its challenges. The specific objectives of the study are-

- (1) To assess level of household food security among ST households of the Lakhimpur district.
- (2) To recommend suitable policy measures for improvement of the level of food security on the basis of findings of the study.

III. AREA OF THE STUDY

Lakhimpur District is located in the north-east corner of Assam and lies between 26°45' and 27°53' northern latitude and 93°42' and 94°20' east longitude (approx). The district lies on north bank of the mighty river Brahmaputra. It is bounded by Siang and Papumpare district of Arunachal Pradesh on the north and on the east by Dhemaji district and Subansiri river, Majuli district, the largest river-island is on the southern side and Gahpur subdivision of Sonitpur district is on the west. As per 2011 census, the district covers an area of 2277 sqkm out of which 2257 sqkm is rural and 20 sqkm is urban.

According to the Population Census in 2011, the total population of Lakhimpur district is 1,042,137; out of which 529,674 are male 512,463 are female population. The population of the district constituted 3.34 percent of total population of Assam. Sex ratio of the district is 968. Child population in the age group of (0-6) years is 1,56,739. Again, in terms of rural-urban division, 950,804 are rural and 91,333 are urban population. Percentage of urban population of the district is 8.76 and it is almost half of the all Assam average (14.1 percent). Density of population of the district is 458 persons per sq/km. Decadal growth rate of population is 17.22 percent. Out of total population ST and SC population of the district are 23.93 percent and 7.85 percent respectively. The literacy rate of the district is 77.20 percent, among this male literacy rate is 83.52 percent and female literacy rate is 70.67 percent. The total literates in Lakhimpur District were 697,526 of which male and female were 383,026 and 314,500 respectively. The literacy rate of females are found to be lower that the male counterpart.

IV. DATABASE AND METHODOLOGY

The information regarding the present study has been collected from both primary and secondary sources of data. The main sources of secondary data are the publications of government agencies such as National Sample Survey Organization; Office of the Census of India, Directorate of Food and Civil Supplies; Agriculture and the Economic and Statistics; Government of Assam and Government of India; District Census Handbook of Lakhimpur. Beside the information collecting from above secondary source, unpublished statistics has been gathered from office of agriculture; Lakhimpur district, office of the three development blocks of Lakhimpur, which has been selected purposively from 9 blocks of the district, office of co-operative societies located in these three blocks.

Since the study area is Lakhimpur district, the micro level analysis has been made mainly based on primary data collected by carrying out field survey from the district. The sample has been selected through a process of multistage mix-sampling. As per 2011 census, there are 9 development block in the district. Among these 9 blocks, 3 have been selected purposively on the basis of BPL households and one ST village from each block has been taken for household survey. Lastly, a number of representative families, 15 to 20 percent (depending upon the population of the villages) of total households has been selected randomly from

each village and finally 152 households have been surveyed. A structured schedule has been used to collect the necessary information on household food security level. For finding out the level of food security from primary information the Per Capita per day Calorie Intake (PCCI) has been employed. The survey has been conducted as per the guideline prepared by Smith and Subandoro (2007) of International Food Policy Research Institute. For analyzing the level of food security per consumer per day calorie intake has been calculated for each household, based on average nutritive value of Indian food (Gopalan, et al, 2000). Calculated per capita calorie intake of sample household has been compared with the 2730 kilocalories, which is recommended by Indian Council of Medical Research for an adult man doing moderate activity (NIN, 2010). The households' calorie intake above the recommended level has been considered as food secure and food insecure otherwise.

V. DISCUSSION AND FINDINGS

5.1 Level of Food Security among Schedule Tribe (ST) Households:

By using Pere Capita per day Calorie Intake (PCCI), the detail analysis of level of food security among ST households has been shown in Table 5.1. It is clear from the table that across the area 50.66 percent households are found with intake above the recommended level, i.e. they are food secure and another 49.34 percent households are found with intake below the recommended level, hence they are food insecure. Per Capita per day Calorie Intake across the area has been found 2443 kcal, where the same is found as 3012 kcal for the food secure households and 1855 kcal for the food insecure households. Among the three blocks, highest (2455 kcal) per capita per day calorie intake has been found in Narayanpur block and lowest (2408 kcal) per capita per day calorie intake has been found in Dhakuakhana block. Again, highest percentage (56.90 percent) of food secure households has been found in Dhakuakhana block and lowest, i.e., 44.64 percent food secure households have been found in Ghilamara block.

Table 5.1 Level of Food Security among Schedule Tribe (ST) Households.

Blocks		Food Secure Households	Food Insecure Households	Overall
Dhakuakhana	Per capita per day calorie intake	2993	1822	2408
	Number & Percentage	33(56.90)	25(43.10)	58(100)
Narayanpur	Per capita per day calorie intake	3014	1896	2455
	Number & Percentage	19(50.00)	19(50.00)	38(100)
Ghilamara	Per capita per day calorie intake	3028	1846	2437
	Number & Percentage	25(44.64)	31(55.36)	56(100)
Overall	Per capita per day calorie intake	3012	1855	2443
	Number & Percentage	77(50.66)	75(49.34)	152(100)

Source: Calculated from primary data, (Figures in the bracket indicates percentage to total).

5.2 Level of Food Security among different Occupational Categories of ST Households: Table 5.2 reveals that the level of food security is different among the sample household with different occupation of the household head. From the table it is clear that the level of food security among daily wage labour is lowest, i.e. 29.17 percent, with compared to it, the level of food security is slight better among the agricultural labour (36.36 percent). The highest level of food security has been found among government service holders, i.e. 88.89 percent followed by Trading and self-employment (77.78 percent). Although, more than 60 percent of the sample households have been involve with cultivation as their primary occupation, but among them only 52.75 percent households are food secure, another 47.25 percent households are food insecure. It is a severe problem for economic efficiency and productivity.

Table 5.2: Level of food security among sample ST households of different occupational categories.

Occupation	No. & percentage of food secure households	No.& percentage of food insecure households	Total
Cultivator	48(52.75)	43(47.25)	91(100)
Agricultural labour	4(36.36)	7(63.64)	11(100)
Animal Husbandry	2(66.67)	1(33.33)	3(100)
Other daily wage labour	7(29.17)	17(70.83)	24(100)
Service	8(88.89)	1(11.11)	9(100)
Trading and self-employment	7(77.78)	5(41.67)	12(100)
Retired	1(50.00)	1(50.00)	2(100)
Total	77(50.66)	75(49.34)	152(100)

Source: Calculated from primary data, (Figures in the bracket indicates percentage to total).

5.3 Level of Food Security among Households with Different Level of Education of ST

Households:

The following Table 5.3 shows that incidence of food security is different among household with different educational level of household head. From this Table 5.3, it is clear that there is a positive relationship between level of food security and level of education. In all the three blocks household head with below primary and primary to high school level education shows low level of food security. On the other hand, household head having graduate, post graduate or professional degree has shown high level of food security. But some of the households having higher degree also have found to be food insecure because of underemployment. In all the three blocks, some post graduates and most of the graduates are involved with agriculture for their livelihood.

Table 3: Level of food security among sample household's with different level of education of the household's head.

Blocks	Education level	No. & percentage of food secure households	No. & percentage of food insecure households	Total
Dhakuakhana	Below Primary	1(20.00)	4(80.00)	5(100)
	Primary to High School	11(55.00)	9(45.00)	20(100)
	Matriculates and undergraduates	14(58.33)	10(41.67)	24(100)
	Graduate	4(66.67)	2(33.33)	6(100)
	Post graduate	2(100.00)	0(00.00)	2(100)
	Professional degree	1(100.00)	0(00.00)	1(100)
Naraya npur	Below Primary	1(25.00)	3(75.00)	4(100)
	Primary to High School	4(40.00)	6(60.00)	10(100)

Ghilamara	Matriculates and undergraduates	9(56.25)	7(43.75)	16(100)
	Graduate	4(57.14)	3(42.86)	7(100)
	Post graduate	1(100.00)	0(00.00)	1(100)
	Below Primary	0(00.00)	4(100.00)	4(100)
	Primary to High School	9(39.13)	14(60.87)	23(100)
	Matriculates and undergraduates	9(47.37)	10(52.63)	19(100)
Ghilamara	Graduate	6(75.00)	2(25.00)	8(100)
	Post graduate	1(50.00)	1(50.00)	2(100)

Source: Calculated from primary data, (Figures in the bracket indicates percentage to total).

SOME SUGGESTIVE MEASURES

For improvement of the level of food security, following recommendations can be considered-

- For increasing food-grain production in the rural areas of the district, the farmers should try to modernize the agriculture sector by adopting modern implements, using high yielding variety of seed, applying adequate quantity of organic fertilizers, by adopting scientific rotation of crops and careful crop planning and finally through intensifying agricultural research and percolating the fruits of research to the farmers.
- Government should provide better storage facilities to the farmers, and thereby prevent from selling grains just because of loss during storage. It has been found that due to lack of storage facilities made the marginal poor farmers to sell their grains immediately after harvest. It will ensure the availability of food- grains at affordable price to the general consumer.
- Agricultural extension services are needed to disseminate knowledge on the income generating potential of rural people. They need to be advised on low labour requirement crops, and crops need minimum land preparation, weeding techniques and sources of irrigation.
- For increasing economic accessibility of food, employment guarantee schemes should be implemented successfully.
- Micro-credit facilities should be examined as an effective and sustainable strategy for supporting livelihood, which would have direct bearing on the nutritional status of the family.
- Community afforestation programmes could be an important policy measure to increase the availability of traditional food as well as firewoods.
- Edible oil and more amount of sugar should be made available under PDS like other states of the country.
- Moreover, problem of irregular supply, supplying bad quality PDS items in remote areas should be addressed properly.

VI. CONCLUSION

Food security is described as the state when people have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. Hence, a healthy and well-nourished population is imperative for building a strong nation. In the present study, it has been found that the food security status of the ST households of the study area is not good, i.e. only 50.66 percent ST households are food secure. The level of food security among agricultural labour and other daily wage labour has been found very poor. Although government of India as well as state government initiated

the special scheme for the ST community by providing livelihood security and for enhancing agricultural productivity, still due to wrong implementation of the schemes the household food security is far away from the satisfactory level.

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Shariah-related Information Disclosure and Characteristics of Enterprise among SMEs in Malaysia

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Abstract

Introduction: In Malaysia, SMEs are the potential and future growth to the economy of the country. However, they have not been given enough attention as the various researchers have been biased towards larger and listed enterprises in Malaysia.

Objective: to examine the extensiveness of Shariah-related information disclosure among SMEs in Malaysia and to evaluate the relationship between Shariah-related information disclosure and Performance of SMEs.

Methods: The study involved a self-developed questionnaire that was personally distributed to employees. In total, 150 questionnaires were distributed and 120 employees who work in various positions in different types of industries from North and East Malaysia participated as respondents of this study.

Keywords: Shariah-related information disclosure, Performance of SMEs, Characteristics of enterprise, Product and service, Financing, Earnings and expenditure, Social functions.

I. INTRODUCTION

The current trend of economic growth and the rapid industrial development has made Malaysia as one of the most open economies in the world. In conjunction with the Ninth Malaysia Plan (2006-2010), the government is devoting and designing the Small Medium Enterprise (SME) development plan to assist the SMEs to meet the new business challenges in the competitive global business environment (Zulkifli and Corresponding, 2010). According to Hashim (2000), the SMEs are expected to contribute 50 percent of the gross domestic product (GDP) in 2020. The exporters in SMEs are mainly located in the manufacturing sector (57.6%), services (40.6%) and agriculture (1.8%). Based on the statements made by various organizations and ministries over the past decades, the total SMEs could be in the range of 10,000 to 30,000. Recognizing the SMEs potential and future growth to the economy of the country, the government of Malaysia has initiated greater efforts in encouraging SMEs involve in international business (Chelliah, Sulaiman, and Yusoff, 2010). In recent years, the Malaysian annual national budgets have also given considerable allocations to the development of SMEs. Various efforts were implemented to facilitate financing and market access for small businesses. Focus was also given to capacity building and talent development. Performance of SMEs plays a vital role on the development of the industry. Information disclosed from the characteristics of the industries effect the performance of SMEs.

When an organization disclose their information to customers such as in the category of products and services, financing, takaful, stocks, and hotel business they have the trust to involve in it. Information disclosed must be based on mandatory disclosure and voluntary disclosure. According to Ousama & Fatima, 2010, it has stated that mandatory disclosures are items that companies must disclose because of statutory regulations therefore; it is the minimum level of information to be disclosed in the annual reports. Meanwhile, voluntary disclosure is defined as that which is not mandated, thus it constitutes information additional to statutory requirements (Ousama and Fatima, 2010). As such, an organization voluntarily disclosed information to guarantee stakeholders that it is a decent organization.

Knowing whether the information disclosed is implemented according to the shariah principles, stakeholders and the manager should take action according to the Shariah Supervisory Board. The Shariah is the Islamic law of human conduct that regulates all matters of Muslims' lives. The Qur'an prescribes mankind to engage in activities that are lawful and good and also prohibit those that can harm and dispute in the society (Mohd-Sanusi, Ismail, Hudayati, and Harjito, 2015). Most organizations that depend on Islamic concept must take after the shariah principles with a specific end goal to persuade Islamic clients on the product itself.

The Shariah approved companies are those whose activities are in compliant with the principles of Shariah. On the other hand, the non-approved companies entail those involved in activities that contradict with the principles of Shariah for instance, gambling (maysir), debt interest (riba) and producing or selling prohibited products or services (Mohd-Sanusi, Ismail, Hudayati, and Harjito, 2015). This research is to study the importance of information disclosure based on Shariah Compliance among SMEs in Malaysia and the effect towards performance of SMEs.

II. LITERATURE REVIEW

2.1 Product and services and performance of SMEs

Shariah-related information disclosure on products and services are based on the information on the content, the quality of each product, the safety and the usefulness of the products. When disclosing information on these items, it is to ensure that the related information does not contradict with Shariah principles where it should not have any non-halal ingredients and the services should not have interest (riba'), uncertainty (gharar) or gambling (maysir). One of the effects of the disclosure towards the financial performance is when the content is not thoroughly disclosed, it will bring a feel of uncertainty towards the product as so it will reduce the amount of demand from Muslim customers. Therefore, it should be that the more extensive the information is being disclosed, the stronger the financial performance of SMEs.

SMEs consumers' confidence on the product and service is dependent on the criteria as in the operations of the business must fully comply with Shariah principles and the consequential wealth and financial progress of the SMEs operators need to be disclosed.

According to Ousama & Fatima, (2010), as to when an SMEs is not offering any products and services prohibited by Shariah, all products and services should be in a good quality and condition. Thus, SMEs are expected to disclose information about the quality. Usefulness and safety of their product and services to show their accountability and transparency to the society. Therefore, their results show that they had the highest mean of disclosure which indicates that Shariah-approved Companies prefer to disclose information on products and services as their findings were similar to Kin's, (1990).

H1: There is a significant relationship between Shariah-related information disclosure of products and services and performance of SMEs.

2.2. Financing and Performance of SMEs

For SMEs to survive and to prolong their business, having a strong financial position is a must as it helps in strengthening the business activities. Shariah-related information disclosure on the source of financing must be disclosed as to whether the source is from Shariah financing or non-Shariah financing. These disclosure of information financing are to show that the capitals of the industry are from halal and legal financing as it will avoid any gain of interest and doubtful activities. Therefore, disclosing on Shariah-related information does effect the performance of SMEs.

According to Azmi, Ab Aziz, & Muhamad, 2016, it is only recently that the literature started to focus on the Shariah disclosures of Shariah-compliant companies which can be related to SMEs. For a Shariah-compliant company, Ullah et al. (2014) listed the items in the required category that are similar to the screening requirements, adopted by users of the Shariah screening method to determine the Shariah-compliant status of companies. Interest paid for loans and received from the savings are not allowed from a Sharia perspective. From reports on Che Azmi et al., 2016, study, they define accounting-related disclosures as disclosures that will affect the way items in the financial statements are presented, such as a distribution of the profit/revenue of the company that is based on halal and haram activities. From their interviews, it shows that managers from Shariah-compliant companies are willing to disclose information related to Shariah as their specific purpose of informing readers about their involvement in Islamic financial practices

H2: There is a significant relationship between Shariah-related information disclosure of financing and performance of SMEs.

2.3. Earnings and Expenditure and Performance of SMEs

Earnings and expenditure are the cash flows of an enterprise. Information on the earnings and expenditure must be disclosed as when it involves in screening the annual reports, the auditor must know on to whether it is disclosing according to Shariah or not.

H3: There is a significant relationship between Shariah-related information disclosure of earnings and expenditure and performance of SMEs.

2.4. Social functions and performance of SMEs

Social functions are the social act from the industry as in terms of donations, giving zakat as part of their financial cleansing and waqaf to those in need. Some industry may not have any waqaf as some had just started their business. Donations can be given as to when there are asked for and zakat must be paid at every year as in cleansing of their financial. For zakat, there are calculations in calculating the amount of zakat to be given. For example, the payable zakat is 2.5% time by the percent owned by the zakat times the net current asset.

H3: There is a significant relationship between Shariah-related information disclosure of social functions and performance of SMEs.

III. RESULTS

Based on the sample collected through the distribution of questionnaires, most of the respondents are the owner of the enterprise. The majority of the respondents are Owner (53.5%) followed by Manager (17.8%), Executive Officer (10.9%), CEO (3.0%) and director (3.0%).

From Education Level, the respondents' education is most likely lower than Diploma which is SPM with (41.6%) followed by Degree Holder (28.7%), Diploma (24.8%), PHD (3.0%) and Post-graduate (2.7%). This indicates that the level of studies of the respondents are average.

In terms of working experience, most of the respondents have work 5 years or less (57.4%), followed by 6 to 10 years (22.8%), 11 to 15 years (15.8%), 21 years and above (3.0%) and the least is 16 to 20 years with (1.0%).

As for the years of operation for the company, most of the company have just been operated within 5 years or less with (54.1%) followed by years been operated 6 to 10 years with (25.7%), 11 to 15 years with (10.8%), 21 years and above with (6.8%) and the remaining (2.7%) is 16 to 20 years.

The results of the survey also showed that 58.6% of the company have employee less than 5. While 31.1% have employee between 5 to 20. The company that have employee between 21 to 40, between 41 to 60 and more than 80 is 5.4%, 1.4% and 5.4% respectively.

Results from the respondent for industry shows that those under Agro-based industries is the majority with (53.5%) followed by Manufacturing industry and Primary agriculture with (13.90%), Services (11.90%), Manufacturing related services (5.0%) and Information & Communication Technology with (2.0%).

		Frequency, N	Percentage, %
Position	Owner	54	53.5
	Director	3	3.0
	CEO	3	3.0
	Manager	18	17.8
	Executive officer	11	10.9
	Other	12	11.9
	Total		
Education	PHD	3	3.0
	Post-graduate	2	2.0
	Degree Holder	29	28.7
	Diploma	25	24.8
	Others	42	41.6
	Total		
Working experience	21 years and above	3	3.0
	16-20 years	1	1.0
	11-15 years	16	15.8
	6-10 years	23	22.8
	5 years or less	58	57.4
	Total		
Operation	21 years and above	6	5.9
	16-20 years	3	3.0
	11-15 years	14	13.9
	6-10 years	25	24.8
	5 years or less	53	52.5
	Total		
Employees	More than 80	4	4.0

	41-60	4	4.0
	21-40	4	4.0
	5-20	31	30.7
	Less than 5	58	57.4
Total			
Industry	Manufacturing	14	13.9
	Manufacturing related services	5	5.0
	agro-based industries	54	53.5
	Services	12	11.9
	Primary agriculture	14	13.9
	Information & Communication Technology	2	2.0
Total			

1. Measures of Central Tendencies and Dispersion.

Descriptive statistic of mean and standard deviation for independent and dependent variable of the study is obtained and the results are shown in the table below.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Product and Service	99	1.75	5.00	4.2020	.84642
Financing	99	1.00	5.00	3.7197	1.11476
Environment	99	1.33	5.00	3.9293	.83879
Earnings and expenditure	99	1.00	5.00	3.7828	.99914
Social Functions	99	1.00	5.00	3.8552	1.14401
Performance of SMEs	99	1.00	6.00	5.1313	.97453
Valid N (listwise)	99				

From the Table above, based on the results, the mean value of all the independent variables in the study falls between 3.0 and 5.1. In general, we can say that, the mean for the entire table are about or more than the average. The mean of Shariah Information Disclosure indicates that most of the industries are disclosing information related to Shariah Information. The minimum of 3.00 on the other hand indicates that some of the respondents in the industries does not disclose information related to Shariah; while the maximum value of 5.10 show that the industries disclose information related to Shariah.

Standard deviation shows how scattered your sample from the mean or the variability in the data (Sekaran, 2003). Generally, a standard deviation of 0 indicates that every data point is equal to the mean sample. Hence standard deviation value that is close to zero indicates that the data is very close to the mean value thus making it more reliable. In other words, there is very little volatility in the sample. Based on the survey conducted, the standard deviation score falls between 0.8 to 1.2, indicate that there is little dispersion of data and that the data is much reliable and concentrated.

Correlations

	Product and Service	Financing	Environment	Earnings and expenditure	Social Functions	Performance of SMEs

Product and Service	Pearson Correlation	1					
	Sig. (2-tailed)						
	N	99					
Financing	Pearson Correlation	.196	1				
	Sig. (2-tailed)	.052					
	N	99	99				
Environment	Pearson Correlation	.468**	.476**	1			
	Sig. (2-tailed)	.000	.000				
	N	99	99	99			
Earnings and expenditure	Pearson Correlation	.193	.652**	.416**	1		
	Sig. (2-tailed)	.055	.000	.000			
	N	99	99	99	99		
Social Functions	Pearson Correlation	.163	.451**	.433**	.435**	1	
	Sig. (2-tailed)	.107	.000	.000	.000		
	N	99	99	99	99	99	
Performance of SMEs	Pearson Correlation	.066	.240*	.061	.164	.049	1
	Sig. (2-tailed)	.513	.017	.546	.105	.632	
	N	99	99	99	99	99	99

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table. Correlations statistics

From the results, based on Cohen's (1992) interpretation of correlation coefficient, we see that all the independent variables (Products and Service, Financing, Environment, Earnings and expenditure, Social Functions) are positively correlated to dependent variable (Performance of SMEs). However, not all of the independent variables are significant towards the dependent variables. Financing is reported to have the highest Pearson's value at $r = 0.240$. This analysis demonstrates that only financing have a significant relationship towards the performance of SMEs. While the other four independent variables (Products and Service, Environment, Earnings and expenditure, Social Functions) give less influence on the disclosure of Performance of SMEs.

IV. CONCLUSION

Shariah-related information disclosure of the characteristics of SMEs effects the performance of the industry. Given the information disclosure is transparent and this suggests a reliable commitment to improve its practices regarding the issue. Insights drawn from this study suggest the need to enhance Shariah-related information disclosure in the annual reports and to further strengthen the performance of SMEs in Malaysia. Therefore, this study is adapted from previous research on the

transparency of relevant disclosure of Shariah compliance information in the annual report of Shariah compliance companies. It also raises concern that the more extensive the information is disclosed the more it affects the performance of SMEs.

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The Practice of the Political Economy Discourse of Media Industry on the *Sindo* Newspaper through the Development of Headlines for the 2014 Presidential Election Campaign

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ABSTRACT

Research Title: "the Practice of the Political Economy Discourse of Media Industry on the *Sindo* Newspaper through the Development of Headlines for the 2014 Presidential Election Campaign". The research aim is to analyze the political economy discourse in the headline of the 2014 Republic of Indonesia President's election campaign, in *Media Indonesia* and *Sindo* Newspapers. This type of research is qualitative. The research method is content analysis with Norman Faitclough's version of Critical Discourse Analysis. Research paradigm; critical paradigm with critical theory. Furthermore, the data collection techniques used in this research are text Analysis, Indonesian-interview, literature study and documentation, and observation. Based on the results of descriptive analysis at the text/ micro level, interpretive analysis at the level of discourse practice/ mezzo, and explanatory analysis at the level of sociocultural practice/ macro, the results of the research that the political economy practice of the *Sindo* Newspaper in the headline of the 2014 presidential and vice presidential election campaign were interpreted as prioritizing interests owner of capital or similar capitalism. Therefore the author calls this media anomaly because on the one hand the media claims to end the Pancasila democracy by giving space to the opposing parties. But on the other hand this media practices dominance in the practice of media management by capital owners. But even though the *Sindo* newspaper is pro capitalism but its excess can cover it with populist issues and professionalism.

Keywords: Political Economy, Mass Media, *Sindo* Newspaper, and Presidential Election Campaign

1. INTRODUCTION

One of the things that might have happened and at the same time became the source of our fear as the Pancasila community was that in the process and management problems of the 2014 presidential election campaign report on *Media Indonesia* and *Sindo* newspaper there was an escalation of the influence of the information flow liberalization process, which influence had dragged the national press system away into the values of liberalism.

The 2014 presidential election campaign which was reported in two newspapers namely *Media Indonesia* and *Sindo* Newspaper is certainly the result of the construction of press personnel on both media. They also worked in the situation of advancing information technology as rapidly as an influential factor from the outside to the process and management issues of news that they could not avoid. All of that is based on the issue of transparency in the news management process in disclosing facts in the news to the public. The advancement of information technology is a new civilization which means information. According to Muis, the flow of information from the outside will be more intense and increasingly difficult to filter because the obstacles of space and time are getting thinner. Finally the world becomes more transparent.

For developed countries, the process of information liberalization is a natural thing because they have consciously entered the stage of global change with the values of modernization as the main factor. Globalization in the field of information in the world of mass media cannot be separated from globalization in the economic field, which of course the development of information is highly dependent on the ability of the power of the capital class. Of course these conditions have an influence up to the world of mass media in Indonesia. Therefore, the phenomenon reported in the newspaper of *Sindo* tends to display information about the presidential candidate with his reporting face containing more positive elements and negative elements as an inevitable issue of reporting. On the one hand, the pressure of various interests that come from the investor (owner) media into the news management process is getting bigger.

The globalization is currently penetrating the walls of the national mass media system boundaries increasingly depleting in each country. In the case of many new values presented by social change, it is considered to be rejected because the delivery of information through the mass media is not in accordance with the personality of the nation or is not in accordance with Pancasila democratic norms (Muis: 2000, p. 8).

In Muis's view, it emphasizes more on the behavior of the mass media that appear in two faces, where the state through the national press system requires the press to deliver the news must fulfill the applicable ethical values and press law. But on the

other hand, the behavior of the press tends to adhere to the principle of freedom which is more nuanced to the interests of the intended media owner. This assumption can be seen clearly in the practice of reporting management in the newspaper of *Sindo*.

In two newspapers editions of *Sindo*, according to the author, this is similar to what has been assumed by Subiakto and Ida. It is part of media politics and popular culture. Media and popular culture which are presented as capitalist commodities, ultimately build popular cultural narratives for politics in the country. Media or newspapers reverse passive audiences, the media become interactive participants who are no longer just spectators, but are part of the "story". Politics is no longer seen as a serious event and is related to the interests of the masses, including citizens. But politics becomes a "spectacle" and even used as a driver to increase the rating of programs on television stations and in other newspapers and the rubric brings benefits to the world of the press, (Subiakto & Ida, 2015: 155).

In the habit of election events, for example, the political campaign process as carried out in the presidential election process can be interpreted as a practice of discourse (discourse practice). In the process of the political campaign, the construction of the discourse carried out by candidates and newspapers certainly contained or directed the interests of the candidates and the newspaper. The construction process is certainly carried out with various interests for the party who made the discourse.

Sindo is part of MNC Group, whose largest share is owned by Harry Tanoe Sudibyo who is known as an activist for the Red and White Coalition (KMP) supporting Prabowo-Hatta presidential candidate. The reporting of the *Sindo* Newspaper was alleged to have been influenced by the media's political economy interests.

Based on the description of the problem above, the researcher considers the importance of making the focus of research so that researchers avoid various forms of concentration bias during the research process until the preparation of research reports. It can be affirmed that this research focuses on the discourse of media economy in the news of printed mass media related to the 2014 presidential election campaign, by taking the research corpus on the newspaper headline of *Sindo* Newspaper.

Thus, the title of this research can be formulated as "the Practice of the Political Economy Discourse of Media Industry on the *Sindo* Newspaper through the Development of Headlines for the 2014 Presidential Election Campaign".

2. LITERATURE REVIEW

2.1. Political Communication

According to Steven Foster, political communication is a way and implication of where politicians try to communicate their messages through various media instruments for skeptical and unrestricted voters. Foster considers that political communication occurs in relation to elections, when there is a political campaign process involving politicians and voters. The other side of Foster explained that political communication is not limited to the election, but occurs all the time. In contrast to the views expressed by Damsar, political communication is the process of transferring messages in the form of data, facts, information or images, which contain a purpose or meaning of sending to recipients which involves the process of interpreting power, authority, political life, government, state, policy, decision making, and the distribution or allocation of power that is running or not yet running (Darmawan, 2015: 115-116).

The emergence of political communication as a special forum for the transmission of political messages is a response to the needs from time to time because communication is no longer dominated by interpersonal communication and direct oral or face-to-face interaction but oriented to communication technology (Ahmed and Ansari, 2012: 181).

According to the author, there are several elements of political communication that are quite important in the context of this research i.e. (a) Political communicators. They are persons or group of people who act as sources of political information, such as political professionals (political lecturers, political observers, etc.), activists in the political field, and politicians representing political parties who commonly voice criticism of executive policy or country at a certain time. (b) Political messages. It is a set of information that is politically charged related to the development of political dynamics in the electoral process (c) Political media. It is a set of means or instruments commonly used as a tool to convey political messages in the electoral process. (d) Political communication. It is a person or group of people who receive or follow political messages in the electoral process. (e) Political effects. They are the effects arising from the presence of political messages in the electoral process.

Participation is an important part of democracy, where Huntington & Nelson (1976: 3) put forward his views as follows: "By political participation we mean activity by private citizens designed to influence government decision-making." Based on this definition, political participation is interpreted as a private activity of citizens carried out to influence government decisions. Then Dahrendorf (2003) stated "Political participation affords citizens the opportunity to communicate information to government officials about their concerns and preferences and pressure on them to respond."

In the context of political communication, a constructor or political leader is a political communicator. According to Nimmo that:

Political communicators play a major social role, especially in the process of forming public opinion. Politicians communicate as representatives of a group and the politicians' messages are to propose or protect the objectives of political interests. This means that political communicators represent the interests of the group, so that if summarized, politicians seek influence through communication (Nimmo, 2003: 73).

Thus, political communicators are also opinion leaders, as stated by Rosenau, in Nimmo, that occupying a position that allows them, with certain order, to express opinions about policy issues to strangers. Roger and Shoemaker in Nasution (1986: 98) describe opinion leaders as "certain individuals who have the ability to influence others in opinion behavior through ways or paths favored by those affected".

To play a bigger role than others, political communicators work through opinion. Karl Popper asserts that leaders create public opinion because they “succeed in making some ideas first rejected, then considered, and finally accepted (Nimmo, 1999: 74).

Each democratic process in the Presidential Election will always have efforts to gain public support from the public, especially those who have the right to vote. Democracy itself comes from the words *demos* and *kratos*. That is, the pattern of governance originating from the people. It could also be that the government (President) was elected by the people's representatives. It means, the highest power is in the hands of the people. Democracy is developed to foster people's participation, not someone or group participation. The role of the people (read: public) is more valued because it plays an important role in making decisions in the public interest. Just say, in determining a Regional Head, Regent, Governor, and President as head of state in a democratic system must be chosen by the people (Irawan, 2018: 91). The introduction of political figures as personal and institutional and or political coalitions will be built along with the introduction of political ideas, to get acceptance in the eyes of the voter public. Through a democratic system, each individual has the same political rights “‘one person’, ‘one vote, ‘one weight’” depends on the majority of the people who have the right to vote and come to the election by legally choosing the presidential candidate. The presidential candidate pair will compete over the same target, namely the voting community (Rahman, 2018: 167).

2.2. Thinking Underlying Discourse Analysis.

As we have seen, there are several scientists who have based the theoretical concepts of discourse analysis. What can be stated here, *Firstly*, Althusser. This scientist combines narcissistic theory and psychoanalysis. Althusser's important idea of “interpellation” is related to the formation of the subject of ideology in society. Interpellation is related to how individuals are placed as subjects in social order. The basic argument is an organ that indirectly reproduces the conditions of production in society. The second idea of “consciousness” is related to individual acceptance of these positions as awareness. They accept that as a reality, a truth.

The second scientist that underlies discourse analysis is Foucault. According to him, how the discourse is produced, who produces it, and what are the effects of discourse production. One of the highlights of the concept is his thesis regarding the relationship between knowledge and power. Power of attorney according to him is not owned but practiced in a scope where there are many positions that are strategically related to each other. Power does not come from outside but determines the arrangement, rules, and relationships from within. Power is always accumulated through knowledge, while knowledge always has the effect of power. The organization of power produces knowledge as the basis of that power. It is almost impossible for power without being supported by a political economy of truth. Every power is compiled, established, and realized through certain knowledge and discourse. Certain discourses produce certain truths and knowledge which give effect to power. Truth is not an abstract one, but it is produced, every power produces and produces its own truth through which audiences are led to follow the prescribed truth. Power is not subjective and does not work negatively and repressively, but in a positive and productive way. The power strategy works through normalization and regulation, punishes and forms a disciplined public. The public is not controlled through physical powers but is controlled, regulated and disciplined through discourse. Power is channeled through social relations, which produce forms of behavior categorization as good or bad, as a form of behavioral control more than simply described as a form of restriction.

The third scientist underlying the discourse analysis was Roger Fowler's group, Robert Hodge, Gunter Kress, and Tony Trew. Roger Fowler's group, which based the discourse on Halliday's explanation of the structure and function of language. According to this group, the function and structure of this language forms the basis of a grammatical structure, where the grammar provides a tool to be communicated to the public. What Roger et al has done is to lay down the grammar and practice of its use to find out the practice of ideology which became the focus of analyzing the news text by using a framework made by Fowler, et al. is on the practice of using the language used. In this case, two important things are considered i.e. “words” and “the word order/ sentence”. The word in the practice of discourse as well as a marker or identity is also associated with the meaning of a particular ideology that is communicated by the media to the audience in terms of profit and loss for certain parties. While the arrangement of words/ sentences is related to how the pattern of arrangement, merging, compilation of words into sentences that contain certain effects on the sentence intended to construct a positive or negative image on certain parties directed by the media.

The fourth scientist who underlies discourse analysis is Theo Van Leeuwen. Leeuwen uses discourse analysis to analyze how the media positions a particular group or someone marginalized by the dominant group that holds control in a discourse, while other groups whose positions are lowered, how parties and actors are constructed in the news.

2.3. The Concept of Political Campaign.

In the course of politics in Indonesia there has been a lot of experience that can be learned from political events that have taken place, some are fun and some are painful. Both of these conditions always occur because the political nuances of a country are strongly influenced by the style and nature of the leadership of the rulers as political actors of their time. Since the reforms began, the people of Indonesia have become more democratic compared to the previous era. The community seems very free, open, independent, and egalitarian in dealing with all forms of persuasion and information. Efforts that try to influence or empower the people by coercive means become unpopular. Campaign is one of the important instruments in democracy as a form of voluntary and voluntary persuasion activity for a common goal in the life of the state. Therefore, the campaign will be able to produce interest/ participation in having a peaceful and open people's politics.

Although campaign activities have advantages in persuading the community with the aim of achieving goals more broadly, but most campaigns in practice have not run on the principles/ ethics, the campaign has not yet proceeded in the concept of scientific campaigns as developed in the science of communication. Most campaigns carried out in this country rely more on feeling and habits that have been practiced for generations (Syaifuddin, 2013: 14).

The question is, what is meant by the campaign? Venus (2004) defines "campaign as a series of threatened communication actions with the aim of creating certain effects on a large number of audiences that are carried out sustainably in a certain period of time" (Venus, 2004: 7).

Based on the above view, the point is that the nature of the campaign according to Syaifuddin (2013) is a goal-oriented communication process, because any form of campaign, including political campaigns, always has goals to be achieved by the implementing party. To be able to reach the goal, the implementation of the campaign absolutely requires a management system that is systematic, tactical and strategic. The campaign implementation requires a serious handling of the hands of solid and professional team members (Syaifuddin, 2013: 87-88).

From the point of view of communication science, according to Syaifuddin (2013), every campaign activity in any field is basically a communication process. Campaign activities containing political messages which were then called "political campaigns" included one study of political communication. Practically, political communication activities that often attract the attention of many people are political campaigns carried out by certain parties in the lead up to legislative elections such as the election of the President, Governor, Mayor/ Regent (Syaifuddin, 2013: 87).

2.4. The Theories of Media and Society

The use of theories in this research is needed as a tool or analysis and as a guideline to be able to focus more on the object of research and sharper in the process of carrying out the analysis and discussion of the data that has been obtained in the study. The three basic theories used in this study are Habermas's Critical Theory, the Mass Society Theory of Charles Wright Mills, and Graham Murdoch's Media Political Economic Theory.

By referring to the typical character of critical theories, criticizing ideology in the process of changing society in a system, for example, criticism must be done comprehensively and holistically with all the advantages and disadvantages inherent in the system if, for example, there is a process of slavery, life not independent of their social reality, there is injustice and irrationality in humans. Critical theory aims to open up the slavery process, liberate humans, create a life of justice and rationality. That is, the creation of a better and balanced human life for their life needs (Ardial, 2009: 191).

The critical theory view is directed at creating more just and human social change through efforts to sensitize humans critically in their lives. The critical dimension of human consciousness and the inspiration of Karl Marx's social thinking which became the human starting point in understanding social change is an important dimension in creating social change, even though it has exceeded the context of Marxism by means of interpreting the traditions of industrial society with reliable creativity. For this reason, Neo Marxists are a school that is seen as a group with critical theory. Critical theory asserts about how human responsibility in their own lives so that they can live freely without pressure, exploitation, oppression or domination by any party. Nevertheless, critical theory rejects the practice of revolutionary pragmatism.

In this context, Habermas uses the emancipatory communication paradigm which emphasizes the communication process that is argumentative / communicative dialogue that is the communication process that "enlightens" to humans in their lives. What Habermas means through critical theory is to build life through a just struggle to achieve a "consensus" in the process of a just and radical democracy. Only in this way can the creation of a more free process of communication in people's lives. This is called "rational conversation" in fighting for the interests of the class who are victims because of the dominance of power from a particular class. Habermas's thinking can be understood as a combination of three main types of interests: Work, Interaction, and Power.

Next, the theory of Mass Society emphasizes the interdependence of institutions that exercise power and also the integration of media to the sources of social power and authority. Content often serves the political and economic interests of power holders. Media cannot be expected to offer a critical or alternative definition to the world and they tend to form accommodation in public dependence on their destiny (Suseno, 2005: 103).

The theory of mass society gives priority to the media as a causal actor. The basic idea is that the media offer a view of the world, a false environment or substitute which is a potential tool for manipulating the community, but also helps them survive in difficult situations (Suseno, 2005: 103).

Based on the above assumptions, the theory of the Mass Society regarding this media contains several main propositions i.e. (a) Communities are organized centrally and on a large scale. (b) The public becomes divided. (c) The media is centralized, with one-way broadcasting. (d) Communities become dependent on the media to find out their identity. (e) Media is used for manipulation and control.

2.5. The Theory of Political Economy of Media

The political economy of the media will influence the standards of democracy in a country. A democratic media system is an indicator of whether or not a democratic country because the essence of media political economy is a set of values that has a correlation with the prevailing socio-political system in the country where the media operates. Although politics and economics have always been significant factors that have an effect on media operations. While the political and market interests are equally forward, the people as the audience or media consumers in this case are both easy targets as well as commodities in the media industry.

Graham Murdoch explained that electronic media and other print media operated by private institutions actually use viewers as commodities to be sold to marketers. They are competing to make the program as interesting as possible to attract as many viewers as possible. The more viewers they will automatically be sold to advertisers, and of course the results can be felt by the media institutions themselves (Subiakto & Ida, 2015: 157-158)

The study of media political economy can be understood from the beginning of its development. This can be traced from the classical to the critical view. The focus of attention for this media political economy study is on what can be the causal factors and the consequences of economic, financial and political problems on culture, especially media culture.

The political economy of the media is actually a battle of how economic and political aspects have influenced the production and reproduction of culture as a commodity of mass media. This approach looks more at how the conception of materialism is distributed and circulated in the practice of implementing cultural production. As the view of Babe also writes that the roots of media political economy stems from views and conceptions born of experts in cultural studies, such as Theodore, Adorno, Richar Hogart, Raymond William, and E.P. Thompson. These people introduced the theory of cultural materialism. The efforts of adherents of critical theory to explain that culture or culture are the results of production and reproduction that are caused or become consensus of economic logic.

Culture has become a commodity produced by the particular interests of its makers in the interests of purely financial gain (Subiakto & Ida, 2015: 160-161). This is actually the main reason why the *Sindo* Newspaper claims social truth about the Prabowo-Hatta pair in the 2014 presidential election through reporting in the newspaper.

The political economy approach focuses on the study of the relationship between political-economic structures, the dynamics of the media industry, and the ideology of the media itself. The attention of political economy research is directed at the ownership, control and operational strength of the media market. From this point of view, mass media institutions are considered as economic systems that are closely related to the political system. The critical political economy perspective also analyzes fully on public interference as a process of legitimacy through public disagreement over forms which must be due to the efforts of the capitalists to narrow the space for public discourse and representation.

In this context it can also be called a distortion and imbalance between the community, the market and the existing system. While the criteria possessed by critical political economy analysis consist of three criteria. The first criterion is the capitalist bureaucrats who dominate the class. The second, media is seen as part of ideology in which classes in society do battle, even in the context of the domination of certain classes. The final criterion, media professionals enjoy the illusion of autonomy that is socialized into dominant cultural norms.

The critical political-economic perspective has three main variants. The three variants are instrumentalism, cultural, and structuralism. In this study, the variant used is the instrumentalism perspective. This perspective places emphasis on economic determinism, where everything will ultimately be directly related to economic forces (Sudibyo, Hamad, & Qodari, 2001: 5).

This perspective sees the media as an instrument of class that dominates. In this case the capitalist is seen as a party that uses its economic power for any interest in the commercial market system to ensure that the flow of public information is in accordance with its interests.

The political economy approach of the media argues that the content of the media is more determined by economic and political forces outside of media management. Factors such as the owner of the media, capital, and media income are considered to be more decisive in the form of media content. These factors determine what events can or cannot be displayed in the news, and in which direction the tendency of news coverage to be directed towards the economy (Sudibyo, Hamad, & Qodari, 2001: 2). In the political economy approach of media, media ownership has an important meaning to see the role, ideology, media content and the effects that media has on society.

The content of the meaning of political economy terminology above is related to a study of the existence of power relations between the media and the stakeholders who are symbiotic mutualism. That is, in the process of making a news of a certain event about power there are special considerations on the media by giving emphasis and scale-priority by placing the "interests" of both parties (the interests of the media and stakeholders) as something important especially concerning various aspects such as questions sources of production, consumption and distribution as sources of news that can benefit both parties.

It can be understood the meaning of political economy in a simpler way, namely the relationship of power (politics) in the economic resources that exist in society. The media 'political economy' perspective is a perspective that can dismantle an essential problem related to the way the media views in understanding the business aspects of media companies that they do in the news management routine. This kind of thing certainly has a logical impact on the management of market and political aspects in constructing an event that is reported.

The study and approach of political economy in the study of mass media has three initial concepts, namely commodification, spatialisation, and structuration. In mass media three interrelated things are: media content, audience number and advertisement. What is meant by commodification is an effort to convert anything into commodities or merchandise as a means of gaining profit. News as mass media content is positioned as a commodity that has economic value as a way of maintaining target audiences as well as advertisers who have become customers, as well as to increase the number of audiences/ sales circulation to obtain and increase the amount of profit at the same time. Big profits from the sale of news or advertisements are very much needed by mass media companies in order to survive and more important is to carry out large-scale expansion to be able to master economic resources on a large scale. While the notion of spatialisation is ways to overcome the obstacles of distance and time in social life

With the advancement of communication technology, distance and time are no longer obstacles in the practice of political economy. Spatialisation relates to the process of transforming boundaries of space and time in social life. It can also be said that spatialisation is a process of institutional media extension through the form of the corporation and the size of the media business entity. The output of commodification and spatialisation in mass media management is in the form of structuration, namely the uniformity of ideology as an interest applied in the structure of mass media organizations. An example in the practice of news management in *Sindo* Newspaper as a subordination of such a large media corporation, in a structured manner the newspaper implements efforts to uniform the ideological values of the owners in news content that will be disseminated to the public.

In addition, the content of the media is the accumulation of influences from various factors that influence the decision-making process for related parties in the editorial room. These factors can come from, among others: *Firstly*, the individual/media worker itself such as the media manager's professional background, gender, age, or religion, in terms of professionalism of the media manager, educational background or tendency of journalist orientation to political parties. *Secondly*, the media routines

that takes place every day and become standard procedures for media managers such as the mechanism and process of determining/ making news, the form of delegation of tasks, etc. *Thirdly*, organizational structure factors where foreign components in a media organization may have their own interests such as editorial, marketing, advertising, circulation, general, and so on that have different goals, targets, strategies, and philosophies own organization. *Fourthly*, environmental factors outside the media such as news sources, external parties such as the government and the business environment. Fifth, ideological factors used by individuals / media owners to see the reality and how they deal with it.

3. RESEARCH METHODS

The research used a critical paradigm. In a critical approach, the aim of research was not just to study the social world but to change it. Social reality for critical approaches was as a form consisting of various layers: empirical, real, and actual. Observation and experience with empirical reality are not purely neutral, and immediately, on the contrary ideas, beliefs and interpretations color or influence the things observed and how to observe them. Thus in observing social reality there is a set of beliefs that precede it. This is because there is a deeper reality that was previously formed (pre-structured), not created by humans (Hamad, 2004: 125).

The type of research was included in qualitative research using the Content Analysis Method. The analytical approach was the Norman Fairclough version of Critical Discourse Analysis. Therefore, this research was in the realm of the critical paradigm. In this stage, inductive thinking was used and eventually becomes a theory through the process of forming new concepts (conceptual formation) and theory formation (grounded theorizing) (Hamad, 2004: 46).

The subject of this study is the headline of political campaign news in two newspapers i.e. *Media Indonesia* newspaper was as many as six news and *Sindo* Newspaper was as many as nine news, owners/ actors (editors) of the two media as well as representation of the audience of media readers. While the object of research was political ideology and economics reporting on the news headlines of the 2014 Indonesian Presidential election campaign published during the Presidential Candidate's campaign period.

Furthermore, data collection techniques that used in this research were:

- a. *a. Text Analysis*, which is collecting data on the dimensions of the text/ structure of the text by utilizing linguistic analysis of vocabulary, sentences, propositions, and paragraphs to explain a language text (micro level analysis).
- b. *Indepth-interview*, which is a technique of collecting data by interviewing in-depth the relevant parties as key informants to complete primary data at the mezo level (discourse practice), i.e. 1 Chief of editor and 3 Senior reporters/ reporters of *Sindo*, and 1 Chief of editor and 2 senior journalists from *Media Indonesia* newspaper. In addition, at the level of sociocultural practice or macro level, the author also conducted interviews with 6 resource persons who are professionals/ scientists in the field of communication, researchers, national political observers, former Chair of the Constitutional Court and members of the DPR-RI as representatives of the public readers to analyze the discourse of the two media on their social context.
- c. *Literature and documentation studies*, it is a technique of data collection carried out by collecting written materials, reading books (literature), documents, references (references), and others in certain places, in the library, to obtain various theories, concepts, etc. that have relevance to the purpose of this research. This technique is to complement the primary and secondary data at the Sociocultural practice level.
- d. *Observation*, which is a technique of data collection carried out by direct observation and recording on research subjects in order to obtain primary and secondary data in both newspapers (Syaifuddin 2013: 124).

4. FINDINGS AND DISCUSSION

This discussion reveals more about the *Sindo* newspaper's political economy discourse in the 2014 Republic of Indonesia Presidential Election Campaign. The researcher found two headlines related to political economy discourse. The construction of a discourse on Prabowo's ideals for Indonesia to be able to enter the World Cup is inseparable from the aspect of the availability of nutritious food, all of which are produced by farmers. From the construction of this idea Prabowo has also touched on various other aspects as his campaign material, such as issues regarding health and malnutrition, issues concerning children, sports issues, and issues of Indonesian labor abroad. In the discourse practice, Prabowo was constructed while building emotional bonds with prospective voters from farmers and fishermen when he said that he was 'indebted' to farmers and fishermen, while the important role of farmers and fishermen as food producers was still ruled out.

Here it can be understood the reason of *Sindo* included groups of farmers and fishermen in the construction of the headline. The ST2013 results show that the number of farmers in Indonesia is 31.70 million. Male farmers are still dominated by 24.36 million people (76.84 percent); while the number of female farmers is 7.34 million or 23.16 percent. East Java Province is listed as the province with the highest number of agricultural business households, which is 4.98 million households (Central Statistics Agency, 2013). The number of fishermen in 2014 was 2,210,000 people. 59.86 percent of fishermen are full, 26.20 percent are primary part-time fishermen and the remaining 13.94 percent are additional part-time fishermen. East Java Province has the highest number of fishermen, namely 227,888 people or 10.31 percent of fishermen in Indonesia in 2014 Indonesia (Central Statistics Agency, 2016).

The data above explains the construction of texts that highlight certain facts on an event and include certain groups in a discourse practice. In the direct presidential election system with the mechanism of "one man one vote", the construction of the text by including groups of farmers and fishermen is of course aimed at gaining the support of 31.70 million farmers' votes plus 2.2 million votes of fishermen. Especially in the news, the head of a non-party political organization, such as the Mainstay

Farmers and Fishermen Group (KTNA), was presented with its chairman Wiharto Tohir, who called Prabowo an honorary member of KTNA. Wiharto Tohir's statement builds a bond between farmers and fishermen with Prabowo because it is considered to have similar interests, namely as a member of KTNA. Another fact that is highlighted in the headline text construction is the place where the events took place, namely in the Supreme Opinion of Malang Regency where it is part of the East Java Province with the largest number of agricultural and fishing businesses in Indonesia.

Sindo wanted to construct a neutral and independent impression by displaying the opposite group in a news discourse. On the 7 June 2014 headline, the *Sindo* Newspaper presented the Chair of the Mindo Sianipar Farmer Field Development Team and Chairperson of Rieke Dyah Pitaloka who organized the Nusantara Farmers Declaration to win the presidential and vice-presidential candidate pair Joko Widodo - Jusuf Kalla in the Satriyan Field in Kanigoro Sub-District, Blitar Regency. But the researcher found that the marginalization process was carried out in the practice of the *Sindo* Newspaper's discourse on the support group of the presidential and vice-presidential candidate Joko Widodo - Jusuf Kalla. The marginalization process is done through the vocabulary used, "But the event is quiet supporters". This process of argumentation is in accordance with the basic argument put forward by Roger Fowler that certain linguistic choices of words, sentences, propositions, carry certain ideological values. In Fowler's view, the word is not something neutral, but contains certain ideological content.

On the headline of June 8, 2014, 'Realistic Prabowo Program', Koran *Sindo* constructed a discourse on Prabowo-Hatta economic program as a realistic program where the couple plans to allocate state expenditure funds of Rp. 3,400 trillion in 2015 and Rp. 1,400 trillion for infrastructure development for five years. The allocation of funds contained in the APBN is used for development to encourage economic growth. APBN and economic growth are two important indicators in determining the level of prosperity of the people. The indicators that are the assumptions in the preparation of the APBN are macroeconomic indicators which are indicators in the process of economic growth.

The use of the word 'realistic' in headline construction contains a charge of positive ideas. The word 'realistic' means: real (real); reasonable (<https://kbbi.web.id/realistik>). Some words or phrases in the text when political contestation is often used to provide guarantees to the public as seen in headline reporting: "not just promises or niceties", "realistic", "measurable", "rational" "ready to implement". This shows that certain linguistic choices of words, sentences, propositions, carry certain ideological values as Fowler believes; because the word is not something neutral, but contains ideological content. Meanwhile, the neutral and independent impression was again carried out by *Sindo* by presenting the pair Joko Widodo - Jusuf Kalla in the same discourse but with a sentence that gave a negative impression as follows, "On the contrary the Jokowi-JK pair in their campaign set a 9% economic growth target assessed unrealistic."

The conflict between the two parties in a discourse as shown above shows that, the process of construction of reality is a process of engineering an event carried out by the mass media where language in the form of words in the text becomes the main tool. The process of framing, discourse, compilation of sentences through text that is directed to bring a certain meaning according to the interests of the media is actually an activity of construction of an ideologically charged reality.

The economic power is associated with control over ideology which leads to the policy of allocating resources to a group of people who become winners in political battles. The study of critical discourse analysis in the field of mass communication presents discourse as an entity that is open and constantly undergoes transformations because of contact with other discourses. This process requires a discourse struggle as carried out by the *Sindo* newspaper.

If we pay attention to the reporting practices in *Sindo* Newspaper, it appears that the treatment of political news, especially in this case is the 2014 Presidential Election, is considered a commodity of economic value. Its placement as a headline has shown the main function as a storefront, which will attract readers to buy *Sindo* Newspapers.

The dynamics in the newsroom have shown, at least from the results of interviews, that all editorial staff were expected to have the same view of events/ issues to be raised as news. The structure in the editor determines the behavior of journalists.

5. CONCLUSIONS AND SUGGESTIONS

Based on the findings of the descriptive analysis, there were a number of things that can be concluded that the political economy of the *Sindo* newspaper in the headline of the 2014 presidential and vice presidential election campaign coverage, can be explained as follows; (a) *Sindo* newspaper was pro capitalism but was covered with populist issues, (b) *Sindo* Newspaper as a subordination of the economic system of capital owners related to their political interests, (c) *Sindo* newspaper contained exchange rates that impose market expansion for capital owners as policy makers and other businesses that were still within the corporate sphere with the media. This was a monopolistic strategy in their business empires. Therefore, it could be ascertained that the ideological independence of the two media lied in economic power, (d) *Sindo* newspaper tended to depend on the common interests of capital owners and journalists who were played through a political approach to penetration in media management by capital owners, (e) *Sindo* newspaper concentrated on the macro market, only in this case the *Sindo* newspaper was strong enough to play the issue of populist economy, (f) The tendency of the *Sindo* Newspaper media to both serve the interests of political and economic power with political tactics reporting put the audience free in accepting its existence.

Based on the two conclusions above, the author can provide several recommendations (suggestions) as a solution to the current conditions in the newspaper *Sindo* as follows: 1) To accelerate the ideals of reform in national democratization, it is better to avoid hypocritical attitudes while avoiding the attitude of hypocrisy towards the public of readers (audiences) in the business of reporting. The idealism of the media capital of *Sindo* Newspaper is very much needed and anticipated by all Indonesian people, while media institutions continue to survive through the management of media business in a professional, rational and proportional manner, not through capitalistic business management. The attitude of the media as intended by the author is very important in order to provide positive energy for the future of Indonesia that is better than the present condition, 2) This media with its abundance of material/ wealth, it is appropriate for the media owner to prioritize humanitarian interests as a form of dedication to the nation, both for employees and the wider community. We hope that all media conglomerates and other business

sectors can think that way, and 3) The reader's (audience) attitude and critical power towards all media needs to be built by the media themselves, from the media and for the morality of society. Because technology cannot operate on its own without humans, human beings are at the same time as means of controlling the technology so that neither media actors nor the public are enslaved by the technology, but use technology for the benefit of national benefit.

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Influence of Season and Leaf Development on Foliar Nutrient Elements Compositions of *Parkia biglobosa* (Jacq) R. Br. Ex G. Don in Sudano - Sahelian Ecosystem of Nigeria

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Abstract: Young, matured and mixed leaves samples randomly collected from the wild stands of *Parkia biglobosa* tree species at the Dundaye district area of Wamakko Local Government of Sokoto state were analyzed for mineral compositions as influenced by seasons and leaf development (age of leaf). Analysis of variance (ANOVA) and Duncan's Multiple Range Test (DMRT) were used at 5% to analyze the data and separate the means. Results showed that leaf developments (age), rainy and dry subseasons were found to influence mineral elements concentrations with few exceptions. Specifically, P (0.27 – 8.20ppm), K (138.73 – 6.01.10ppm), Ca (1.55-417.49ppm), Mg (1.29 – 145.02ppm), Mn (0.75-1.87ppm), Fe (1.64 – 7.68ppm), Zn (0.09 – 2.35ppm) and Cl₂ (0.47 – 0.50ppm) were influenced by season in the leaves of the tree; while young leaves significantly contained higher Cu (0.45-0.95ppm), Fe (3.35-6.48ppm) and Cl₂ (0.56-0.86ppm) mineral elements than both matured and mixed leaves samples of the tree. Therefore, for better supply of the mineral elements studied, young leaves of the tree were highly recommended than the other leaf samples studied during rainy subseasons or dry subseasons based on specific major findings of this research to the users.

Keywords: Season, Leaf Development, Foliar Nutrient, Element Composition, Sudano-Sahelian Ecosystem

INTRODUCTION

The North-Western Nigeria is ecologically recognized as Sudano-Sahelian ecosystem characteristically known to be rich in biological resources of flora and fauna, *Parkia biglobosa* inclusive. *Parkia biglobosa* (Jacq. Benth.) R. Br. Ex G. Don. Synonym: *Parkia clappertoniana* (used by Keay) is a tree that belongs to the family mimosaceae. The plant is known mostly by its Hausa vernacular name as Dorowa in the zone. It is a deciduous tree growing up to 20m in height with spreading branches and often a buttressed trunk. Pinnae 6 –11 pairs, leaflets glabrous, 14-30 pairs, oblong, the middle ones larger. The branches are cut for making pestle and mortar (Ghazanfar, 1989). This and other plants are known to be subjected for various uses ranging from medicinal to nutritional in nowadays. The seeds are used in preparing seasoning (Daddawa in Hausa) utilize in soup making. The leaves are cooked for medicinal uses and the concoction as well. They are also used as fodder consumed by animals and the stalks as firewood. The wood is equally used for making agricultural and kitchen utensils for man's use. Also, the leaves, and the stalks or wood are used as litter for enriching poor soils with nutrients and the thorny branches for fencing agricultural lands and stalks. Umar (2007) had reported that almost every part of any plant (root, stem, leaves, bark, flower, fruits and seeds) is known to have some uses.

The savanna or sudano-sahelian areas of Nigeria are characterized by low but torrential rainfall, high evapotranspiration and strong winds. The region is further characterized by vegetation dominated by grasses with varying densities of scattered trees and annual herbs. This region is thus faced with extinction of the available indigenous trees whose leaves could supplement the nutritional requirements of both the poor soils and the animals in the region without their nutrient elements composition investigated (African Locust Bean Tree inclusive). Leaves of plants are known to support human and animals life in various ways. Green leaves are the major world largest source of food and principally protein (Umar, 2007). Hassan *et al*, (2002) have reported the following values with respect to mineral compositions of *C. occidentalis* leaves: Ca - 0.68mg, Fe – 0.15mg, Magnesium – 0.58mg, K – 2.25mg, P – 0.25mg, Na – 0.50mg and Zn – 0.05mg. They further stated that of all the fourteen (14) elements known as essential, the seven (7) determined elements in the study are the most important and the values obtained were within the ranges of their daily allowance and in conformity with findings of other similar plants of similar habitat in Sokoto and Northern Nigeria.

Umar (2007) and Gent (2002) had reported that differences in nutrient compositions found in plant species are due to changes in plants caused by some factors e.g. light, temperature, season, time of day, climate, genetic factors, edaphic factors, type and level of utilization, management and stage of growth of the leaf or plant, crown of the tree, tree age, position of leaves in the crown, habitat of the plant, age of foliage, natural between tree or plant variation and effect of diseases. Gent (2002) had also noted that differences among plant species on leaf nutrient composition possibly suggest that some other environmentally sensitive processes within the plant were responsible for the differences in leaf nutrient concentration. Similarly, George *et al.* (2002) had reported that leaf concentrations of Ca, Mg, Mn and B generally increased and N, P, Cu, and Zn decreased with leaf age. They added that movement of the more mobile elements (i.e. N, P, K, Cu and Zn) from the older into the young leaves was more rapid when trees were flushing compared with trees that had completed flushing. Irrespective of the state of flushing, higher concentrations of the less mobile elements – Mg, Ca, B and Mn were recorded in the older (matured) leaves compared with the younger leaves, indicating that their movement in to younger leaves is relatively slow.

Umar (2007) has also remarked that, the nutrients value of forage plant is individually and collectively affected by various factors and varies from time to time and location to location. Similarly, Osonubi and Chukwuka (1999) have commented that analysis of plant parts have revealed the presence of a large number of mineral elements but the amount and number of elements present in many also differ from plant to plant and from place to place depending on the habitat and season. In the same vein, Sina and Traore (2002) had noted that browse plants are good sources of forage during the dry season and good enough for survival but despite their relatively good protein content their quality is usually not sufficient for optimum productivity.

Gent (2002) had reported that plant species differed in elemental composition due to seasonal variation. Seasonal nutrient variation is related to changes in light and temperature that affect metabolism in leaves and roots, and the rate of chemical transformations of nutrients in soil. Also variation of day to night temperature, may exaggerate seasonal variation in nutrient concentration in the leaves of plants. Similarly, Ajakaiye *et al.* (1995) working on the effect of leaf position /age on the foliar nutrient concentration of cabbage and lettuce, had reported that the plant species showed preference for certain ions over others, that a cat ion of higher preference could replace one of the lower preference in plant cells, and that many of the macro-elements are more directly involved in physiologically mature tissue than in younger ones. In such tissues they took part in chlorophyll synthesis (e.g. Mg and N), stomata opening and solute accumulation (e.g. K) and cell wall formation (e.g. Ca).

It is believed that the knowledge of the nutrient composition of plants helps to make choosy the different variety of foods or feeds to be consumed by an organism or to be utilizing as source of organic manure to the soil by farmers. Literature search revealed that there are lots to be done on the study of nutrient elements of the indigenous tree species of Savanna. Umar (2007) reported that there is little literature on the indigenous species despite their adaptability and multipurpose nature in the semi-arid environment of Sokoto State. Muhammad (2001) reported that much still need to be done especially on the establishment, management, biology, productivity and seasonal variation in the nutritive values of browses in Nigeria. However, the different variety of parts of plant contained varying amounts of food of different nutritional values. Therefore, research into the food value of plant parts not to talk up leaves of *Parkia biglobosa* need special emphasis to reveal the potentialities of those parts for economic development. The study was important as it provide the quantitative data on nutrient levels that are of most significant to the nutritional requirement of the humans, micro-livestock and other wildlife especially herbivores e.g. deer, grass cutters, elephant, etc. It was also significant to the dietary needs of carnivores which depend on herbivores for the supply of their nutritional needs. The results were relevant in the areas of animal production and savanna soils fertilization via fresh and dry leaves. The research became imperative for more meaningful quantification of its nutritional potentials in the area.

The general objective of the study is to determine the minerals composition of young, matured and mixed leaves of *P. biglobosa* as influenced by season and stage of leaf development in Sudano – Sahelian ecosystem of Nigeria. The study was limited to the determination of phosphorus, Potassium, Calcium, Magnesium, Manganese, Copper, Iron, Zinc and Chloride contents of the leaves of the tree species and hence the need for its conservation. The findings may serve as an insight to the realization of the nutritional values of the leaves of the plant under study and other related species from similar habitat and hence for their conservation. The research output may serve as a baseline data for all similar subsequent researches.

METHODOLOGY

The study area is Dundaye district of Wamakko Local Government area of Sokoto State, where samples were collected from the standing scattered stands of the study species. The Tree from which samples were collected for this study is *Parkia biglobosa* (African Locust Bean Tree in English and Dorowa in Hausa) with the following sample treatments: Young leaves of the tree during early and late dry and rainy subseasons; Matured leaves of the tree during early and late dry and rainy subseasons; Mixed leaves of the tree during early and late dry and rainy subseasons.

Parameters investigated in each of the above sample treatments are nine (9) and they include: Phosphorus By calorimetric measurement method as described by Thakur and Dwivedi (2015), Potassium By flame photometry method as described by Bagel

(2015); Calcium and Magnesium By versenate titration method (EDTA Titration method) as described by Udo and Ogunwale (1986); Manganese, copper, iron, zinc; and Chloride by spectrophotometry method as described by Sharma (2015) and Association of Official Analytical Chemists (1990). Two days were used to collect sample for all treatments of the plant under study. The duration for this research is one year. The research was conducted according to the seasons as follows: Early Dry Season: November- January; Late Dry Season: February- April; Early Rainy Season: May- July; Late Rainy Season: August- October.

Data generated based on the information obtained in the laboratory work or chemical analysis was analysed statistically using SAS computer system using ANOVA and DMRT statistical tools.

RESULTS

The result of mineral compositions of *P. biglobosa* obtained in this study across the subseasons and stages of leaf development are as follows:

Table 1: Influence of Season and Leaf Development (Age) on Mineral Composition in the leaves of *P. biglobosa*

Treatment	Composition (PPM)			
	P	K	Ca	Mg
Subseasons:				
Early Dry	0.46 ^b	138.73 ^b	351.79 ^a	67.88 ^b
Late Dry	0.27 ^b	601.10 ^a	1.55 ^c	1.29 ^c
Early Rainy	8.20 ^a	223.96 ^b	191.09 ^b	145.02 ^a
Late Rainy	6.96 ^a	240.96 ^b	417.49 ^a	98.93 ^b
S.E	1.42	57.40	36.91	15.64
Significance	S	S	S	S
Age:				
Young	4.19	304.49	247.89	79.55
Matured	3.72	263.95	251.63	80.21
Mixed	4.01	335.13	221.91	75.08
S.E.	1.23	49.71	31.96	13.55
Significance	NS	NS	NS	NS

Within a treatment group, means in a column with the same letter(s) in superscript are not significantly different using Duncan's multiple range test (DMRT) at 5% level.

S = Significant; NS = Nonsignificant; S. E = Standard Error; PPM = Part per million

Table 2: Influence of Season and Leaf Development (Age) on Mineral Composition in the leaves of *P. biglobosa*

Treatment	Composition (PPM)				
	Mn	Cu	Fe	Zn	Cl ₂
Subseasons:					
Early Dry	1.61 ^b	0.50	3.94 ^b	0.11 ^b	0.50
Late Dry	0.75 ^c	0.44	1.64 ^c	0.09 ^b	0.81 ^b
Early Rainy	1.79 ^{ab}	0.96	7.68 ^a	0.17 ^b	0.94 ^a
Late Rainy	1.87 ^a	0.64	5.24 ^b	2.35 ^a	0.47 ^c
S.E	0.08	0.08	0.56	0.33	0.04
Significance	S	NS	S	S	S
Age:					
Young	1.68	0.95 ^a	6.48 ^a	1.11	0.86 ^a
Matured	1.35	0.51 ^b	4.05 ^b	0.52	0.62 ^b
Mixed	1.44	0.45 ^b	3.35 ^b	0.42	0.56 ^b
S.E.	0.07	0.07	0.49	0.28	0.03
Significance	NS	S	S	NS	S

Within a treatment group, means in a column with the same letter(s) in superscript are not significantly different using Duncan's multiple range test (DMRT) at 5% level.

S = Significant; NS = Nonsignificant; S. E = Standard Error; PPM = Part per million

From the results of the foregoing Table 1 above, it was generally observed that season and leaf development (age of leaves) have influenced the concentrations of some nutrient elements studied in the tree leaves. Specifically, P, K, Ca, Mg, Mn, Fe, Zn and Cl₂ were influenced by season in the leaves of the tree. Young leaves significantly contained, Cu, Fe and Cl₂ elements than both matured and mixed leaves samples of the tree.

DISCUSSION

The phosphorus concentrations generally observed to be significant in the leaves of the tree (*P. biglobosa*) for the effect of season with the concentration of rainy sub-seasons being higher than in the dry sub-seasons but the rainy and dry sub-seasons concentrations were not statistically different (Table 1) had agreed with an observation of Gent (2002) that differences in leaf nutrient concentration due to season often occurred in early rainfall and it could be related to high availability of this nutrient in the root zone of the soil during the rainy season. This finding indicated that phosphorus concentration is more in the rainy than in the dry sub-seasons of the year in the leaves of *P. biglobosa*. Effect of leaf development (age of leaves) did not show any significant effect on the content of phosphorus in the leaves of the tree (Table 1).

The potassium concentrations between the seasons were only significant in dry sub-season than all the other sub-seasons which were statistically the same (Table 1). This result was observed to decrease steadily from the late dry through the rainy sub-seasons to early dry sub-season. This finding was in close agreement with the result of George *et al.* (2002), who reported that nutrient showed a general decline in concentration in leaves with time, notably potassium and phosphorus concentrations. . Effect of leaf development (age) did not show any significant effect on the concentration of potassium in the tree (Table 1).

The observation that calcium concentration between the seasons in the leaves of the tree were significantly higher during the late rainy and early dry sub-seasons than during the early rainy sub-season, and late dry sub-seasons (Table 1) had agreed with report of Gent (2002) that differences in leaf nutrient concentrations often occurred in a particular species and at a particular time of the year, such occurrences were true for concentrations of N and Ca. This observation is evidently in consonance with this finding from the pattern of the results. Similar observation was made by George *et al.* (2002) that seasonal patterns of leaf nutrient concentrations as influenced by season and leaf position showed an overall increase in concentration of Ca and Mg (Ca, 0.4 – 1.4% and Mg, 0.3 – 0.54%) in the leaves of *Annona spp.* with time. Also, Gent (2002) had reported that plant species differed in elemental composition due to seasonal variation and this could be related to changes in light and temperature that affect metabolism in leaves and roots, and the rate of chemical transformations of nutrients in the soil. Also, variation of day to night temperature, may exaggerate seasonal variation in nutrient concentration in the leaves of plants. Effect of leaf development (age of the leaves) showed non-significant effect in the content of calcium in the leaves of the tree (Table 1).

The concentrations of magnesium between the seasons in the leaves of the tree observed to be significantly higher in the early rainy sub-season than late rainy and early dry sub-seasons, but the latter were significantly higher than that of the late dry sub-season (Table 1) had agreed with the finding of Gent (2002) that differences in leaf nutrient concentrations due to season often occurred in early rainfall. Similar observation was made by Turner and Barkus (2002), who reported that season was important for magnesium than all the other less mobile nutrients. This observation indicated that the leaves of this tree contained more of magnesium during the early rainy sub-season than in the other sub-seasons during the period of study. Effect of leaf development (age) did not show any significant effect on the content of magnesium in the leaves of the tree studied (Table 1).

Manganese concentration was generally observed to be significant in *P. biglobosa* leaves for the effect of season and the concentrations were significantly higher during the rainy sub-seasons than in the dry sub-seasons but the concentrations of the former two sub-seasons were not statistically different (Table 2). This observation had agreed with the observation of Gent (2002) who reported that differences in leaf nutrient concentration due to season often occurred in early rainfall and it could be related to high availability of this element in the root zone of the soil during that time of year. Effect of leaf development (age of the leaves) did not show any significant effect on the content of manganese in the leaves of the tree (Table 2).

The concentration of Copper was generally not significant between the seasons in the leaves of the tree for the effect of season and the concentration was numerically higher during the early rainy sub-season than all the other sub-seasons (Table 2). This finding had agreed with report of Gent (2002) that differences in leaf nutrient concentration due to season often occurred in early rainfall. George *et al.* (2002) noted that in *Annona spp.* nutrients showed overall increase with time. In this case, there was an increase in the concentration of this element from early rainy to late rainy through the dry sub-seasons. This observation may be accounted for by the influence of rainfall, its absence during the dry sub-seasons or change in temperature and availability of this element at the root zone of the soil as also noted by Umar (2007), and Umar (2015). Effect of leaf development (age of the leaves) show significant effect on the content of copper in the leaves of *P. biglobosa* and the concentration was significantly higher in the young leaves than the matured and mixed leaves, which were statistically the same (Table 2). Similar observation was made by Ajakaiye *et al.* (1995). This finding

could be attributed to the need of this nutrient to the younger tissues of the tree than in the other treatments due to its significance in many of the metabolic activities associated with younger actively growing tissues.

Iron concentration observed to be significantly different between the seasons in the leaves of the tree and the concentrations were significantly higher during the early rainy sub-season than all the other seasons (Table 2). This finding had agreed with the report of Gent (2002) that differences in leaf nutrient concentration due to season often occurred in early rainfall. This could also be related to a high availability of iron (Fe) in the root medium of the tree. This finding indicated that early rainy sub-season favours high concentration of iron in the leaves of this tree than all the other sub-seasons. Effect of leaf development (age of the leaves) show significant effect on the content of iron in *P. biglobosa* and the concentration was statistically higher in the young leaves than the matured and mixed leaves, but the later two were statistically not different (Table 2). Similar observation was noted by Ajakaiye *et al.* (1995) working on cabbage and lettuce, and this observation could be attributed to the need of this element in the younger tissues of the tree than in the other treatments due to its significance in many of the metabolic activities associated with younger actively growing tissues.

Zinc concentration was significantly different between the seasons in the leaves of the tree and the content was significantly higher during the late rainy sub-season than all the other sub-seasons (Table 2). This finding indicated that leaves of this tree were richer in zinc concentration during the late rainy sub-season than all the other sub-seasons. This observation had agreed with report of Umar (2007) that nutrient composition of forages varies from time to time and could be attributed to genetic factors, climatic, edaphic and stage of growth of the forages. Effect of leaf development (age of the leaves) did not show any significant effect on Zinc concentration for the leaves of the species (Table 2). This indicated that the leaves or treatments were richer in concentration of this element and the result may be attributed to the significance of this element to the metabolic processes going on within the leaves of the tree hence zinc is essential for the transformation of carbohydrates, regulates consumption of sugars and is part of enzyme systems which regulate plant growth. It deficiency leads to chlorosis, mottle leaf and little leaf production by trees.

The observation that chloride concentration was significant between the seasons in the leaves of the tree and the concentration was higher during the early rainy sub-season than in the late rainy and early dry sub-seasons (Table 2) had agreed with the finding of Gent (2002) that differences in leaf nutrient concentration due to season often occurred in early rainfall and the result could be related to the influence of other factor than season, that influence nutrient concentration. *P. biglobosa* had been reported that it is moisture requiring plant species (Sina and Traore, 2002). Effect of leaf development (age of the leaves) show significant effect on chloride content in the leaves of *P. biglobosa* and the concentration was statistically higher in the young leaves than in the matured and mixed leaves and the latter two were statistically the same (Table 2). Similar observation was noted by Ajakaiye *et al.* (1995) working on nutrient concentration in the leaves of *Brassica oleracea* and *Lactuca sativa*, and this observation could be attributed to the need of this element in the younger tissues of the tree than in the other leaves or treatments due to its significance in many of the metabolic activities associated with younger actively growing tissues.

To augment the gains of this research on nutrients elements concentrations, the leaves of *P. biglobosa* were recommended for better supply of P, Mg, Mn, Fe, Zn and Cl₂ during rainy subseasons but K and Ca, during dry subseasons. Young leaves were similarly recommended for the supply of Cu, Fe and Cl₂ as well as matured and mixed leaves for the supply of them than all other elements investigated. For general recommendations, young leaves were recommended during rainy subseasons for the specified elements than matured and mixed leaves during dry subseasons to the users from the humans, livestock and wildlife. Similar research should be conducted on interaction effects of season and leaf development (age of leaves) on this tree as well as similar research on other indigenous trees to bring out their nutritional potentials and full utilization in the zone and hence for their conservation.

CONCLUSION

The nutritional values of the leaves of the tree examined in this study revealed that elements were variously influenced by rainy and dry subseasons with few exceptions. The concentrations were mostly and favourably higher during the early followed by late rainy, early dry and late dry subseasons. Young leaves samples of the tree studied stand to be the best particularly as they contained high concentration of these essential elements than the other leaf samples studied. Season and leaf development (age of leaves) were two independent factors affecting the process of tree growth and development that has affected the concentration of elements studied.

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Factors Affecting the Implementation of Procurement Policies and Procedures in Public Entities in Kenya, A Case of Trans-Nzoia County

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Purpose:

Explore on the factors affecting implementation of public procurement policies and procedures in public entities in Kenya. The specific objectives of the study were staff competency, compliance strategies, role of management style and Information and communication Technology.

Keywords: staff competency, compliance strategies, management style and Information and communication Technology.

1.1introduction

Procurement Policies and procedures are crucial in all procurement activities including leasing and hiring, and may where suitable include other activities accompanying the life cycle of goods or service contracts and the end-of-life disposal of goods which have been procured (Arminas, 2013). These are extremely huge figures compared to the global average of 12-20%. The competitiveness of the government at both the central and in the devolved structure has affected the procurement guideline (Brynjolfsson & Smith, 2012). Procurement policies applies to and binds all directors, managers and employees of the organization in any situation where they are involved in a purchasing process, whether as requisiteness, purchasers or negotiators, or those who validate or authorize payment. Procurement laws and rules lead to procurement efficiency or inefficiency depending on the type of government and environment within which the system is operated. In a country where no government democracy exists, the procurement system cannot be transparent and integral (Basheka & Bisangabasiija, 2010).

A legal framework encompasses the laws, regulations and policies that are put in place to govern an organization or an activity (Arminas, 2013). The public procurement legal framework clearly covers the whole scope of public procurement (PP), all stages of the procurement process, methods of procurement, ethics and transparency, states that a good PP legal framework is based on the principles of openness and transparency, fair competition, impartiality, and integrity. According to American Bar Association (2000), a sound PP system needs to have good procurement laws and regulations. In practice and theory, PP laws and rules have been considered as one of the most important pillars of a sound procurement system (Brynjolfsson & Smith, 2012).

The procurement function donates to this competitiveness through the reduction of the operational costs and as a tactical function to a reengineering function within the organization to vicissitudes in the environment (Arminas, 2013). In the same study , xxx) notes that efficient procurement process is vital to the success of government's programs as it offers a link between policy and delivery. Public procurement policies and procedures plays a critical role in the formation and service delivery processes as public entities must source

the resources they need to role from third parties. The effectiveness of the public procurement plays a significant role in the quality of services provided by government institutions and in the receptiveness of the government to the public needs (Basheka & Bisangabasiija, 2010).

The public procurement has become under intense inspection due to the amount of the civic money involved which is estimated to be between 9-13% of the Gross Domestic Product (GDP).The intense scrutiny is affected through various statutes, regulations, policies and directives. Also according to Brynjolfsson and Smith, (2012), noted that the public procurement environment is of increasingly intense scrutiny and augmented changes driven by technology, program reviews, and public and political expectations for service improvements. Despite the numerous policies and regulations, Basheka and Bisangabasiija, (2010), notes that tax payers' money goes to waste every year due to unproductive and ineffective procurement structures, policies and procedures as well as failure to impose sanctions for desecration of procurement rules thus resulting in poor service delivery.

1.1 Background of the Study

Procurement Policies and procedures are crucial in all procurement activities including leasing and hiring, and may where suitable include other activities accompanying the life cycle of goods or service contracts and the end-of-life disposal of goods which have been procured (Arminas, 2013). These are extremely huge figures compared to the global average of 12-20%. The competitiveness of the government at both the central and in the devolved structure has affected the procurement guideline (Brynjolfsson & Smith, 2012). Procurement policies applies to and binds all directors, managers and employees of the organization in any situation where they are involved in a purchasing process, whether as requisiteness, purchasers or negotiators, or those who validate or authorize payment. Procurement laws and rules lead to procurement efficiency or inefficiency depending on the type of government and environment within which the system is operated. In a country where no government democracy exists, the procurement system cannot be transparent and integral (Basheka & Bisangabasiija, 2010).

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1.2 Staff Competency

The practical competence refers the demonstrated ability to perform a set of tasks while the foundational competencies show the demonstrated ability of what and why to carry out tasks. According to Chirchir (2013), competency refers to the specified skills, knowledge, attitudes and behavior necessary to achieve a task, activity or career. The reflexive competence explains the ability to integrate actions with an understanding of action while applied competence shows a demonstrated ability to perform a set of tasks with understanding and reflexivity. Organizations may sometimes distinguish between competencies and competences with the former representing the desired personal attributes and behaviors while the latter referring to the knowledge and skill required to bring about improved performance (Arminas, 2013). Within the context of the technical competencies, they are divided into practical competence, introductory competence, reflexive competence and applied competence.

The human capital competence can be assessed through the level of education (diploma, degree, post graduate etc.), education specialization, procurement knowledge, professional experience and the technical skills (Chirchir, 2013). The human capital competency affects the performance of the public procurement within the county government procurement officials. The efficiency of the staff on the public performance is enhanced by the superior and specialized level of education qualification. In this context, it's

argued that the possibility of the increase in motivation and subsequent performance lies with having staff with superior level of education which is an aspect of staff competency (Arminas, 2013).

According to Barrett (2012), professional familiarity is paramount in enhancing the performance and competitiveness of an organization. This is because the public procurement officials who have the mandatory procurement and supply skills are able to execute their duties in a knowledgeable, empowered and motivated to carry out their duties. The technical skills are an important element in getting things right first time in the quest towards Total Quality Management that ensures efficiency and effectiveness of the purchasing function (Basheka & Bisangabasiija, 2010). It can be inferred that purchasers getting things right first time for continuous enhancement characterize the performance of the procurement function.

2.2.2. Compliance Strategies

Effective enforcement is vital to the successful implementation of social legislation, and legislation that is enforced rarely fulfills its social objectives (Arminas, 2013). This chapter examines the question of how the enforcement task might best be conducted in order to achieve policy outcomes that are effective (in terms of reducing the incidence of social harm) and efficient (in doing so at least cost to both duty holders and the regulator), while also maintaining community confidence use purchase leverage, negotiation, and supplier segmentation among others (Barrett, 2012)

The firms that utilize the public funds in the public procurement such as the county governments must embrace compliance strategies and other strategies to ensure that the public procurement policies and principles are adhered to (Basheka & Bisangabasiija, 2010). The procurement principles include value for money, open and fair opposition, accountability and due process, fair dealing and non-discrimination (Barrett, 2012). To ensure the value for money, there is need to uphold a delicate balance between the bidding administrative costs and the value of the goods being procured. Therefore, the concept of protecting the cost building and the minimization of costs is of integral importance to the public procurement. One of the major strategy used in public procurement include the use of the Kraljic supplier positioning model that group items dependent on the procurement difficulty and relative expenditure (Barrett, 2012).

A compliance strategy seeks to prevent harm rather than punish an evil. Its conception of enforcement centers upon the attainment of the broad aims of legislation, rather than sanctioning its breach (Arminas, 2013). Recourse to the legal process here is rare, a matter of last resort, since compliance strategy is concerned with repair and results, not retribution. And for compliance to be effected, some positive accomplishment is often required, rather than simply refraining from an act. The public procurement officials have the potential to get massive discounts if the procurement process is well managed. The methods suitable for the public procurement include open tendering, restricted tendering and request for projects. The group 3 category has the potential to sabotage the work that need be achieved thus requiring open tendering, restricted tendering, direct procurement and requests for quotations. The group 4 items require open tender or prequalification tender on the account of the difficulties in procurement (Barrett, 2012). These may be emergency items or highly specialized items.

2.2.3. Management Style.

Management has been defined as the process of social influence in which one person is able to enlist the aid and support of others in the accomplishment of a common task. There are different types management styles such as the autocratic, paternalistic, laissez-faire, democratic, informal, participatory and supervisory. On the other hand Boraya (2013), argues that management is the art or process of influencing people so that they strive willingly and enthusiastically towards achievement of group goals. The role of the management on the implementation of the public procurement actions is linked to the wider concept of the role of the management on organizational performance (Barrett, 2012).

Autocratic managers make decisions unilaterally, without much (or any) input of subordinates (Barrett, 2012). This unilateral format can be perceived as a good management technique if the right decisions are made, and it can lead to faster decision-making, because only one person's preferences need to be considered. However, this style of management can drive away employees who are looking for more ownership of decisions, and more autonomy. In times of crisis where time is limited, use of autocratic management is permissible, but extended periods could lead to high turnover (Basheka & Bisangabasiija, 2010).

Consultative; this form allows for more discussion than an autocratic method, but is essentially dictatorial (Barrett, 2012).. As the name suggests, a leader in this form consults his or her employees, but ultimately the leader makes the final decision. Decisions attempt to take the best interests of the employees in account but also focus on the business. This type of management style often leads to loyalty from employees included in decision-making processes, but those who are left out are more likely to move on. It can also lead to a dependency of the employees on the leader (Arminas, 2013).

Persuasive; also similar to autocratic management styles, a persuasive leader maintains the final decision-making control. However, he or she makes choices based on the persuasion of subordinates (Barrett, 2012). Employees will convince their manager of the benefits of a decision and the manager will make the final decision. This is a great option for managers who need input from experts, but still can keep the final decision-making up to them. This does not work when employees do not support management and choose not to provide input or do not trust decisions that have been made.

Democratic; as its name suggests, democratic managers offer employees an opportunity to engage in decision-making. This means all decisions are agreed upon by the majority. The communications go from both the manager down to employees and from the employees up to the managers (Arminas, 2013). This style works when complex decisions must be made that have a variety of outcomes. However, democracy does slow down decision-making and could be inefficient at times.

Laissez-faire, this style is the complete opposite of autocracy; employees are allowed to make the majority of decisions, with management providing guidance when needed. The manager in this case is considered a mentor rather than a leader. This style of management is popular in startups and technology companies, where risk taking is encouraged. However, it can lead to difficulties in making decisions (Basheka & Bisangabasiija, 2010).

2.2.4. Information and Communication Technology.

A good ICT system helps a firm categorize its interactions with its most essential suppliers (Basheka & Bisangabasiija, 2010). It provides those who use it with a set of built-in monitoring tools to help control costs and assure maximum supplier performance. It provides an organized way to keep an open line of communication with potential suppliers during a business process (Alatas, Banerjee, Chandrasekhar, Hanna & Olken, 2016). The system allows managers to confirm pricing, and leverage previous agreements to assure each new price quote is more competitive than the last. It appears that during the past few years purchasing has begun to play an ever more important role in the strategy of the firm. In order to survive, managers have begun to rethink their competitive priorities and their value chain. Increasing numbers of organizations have recognized that ICT holds the potential to transform their competitive performance for the better Implementation of Procurement Policies.

Effective public procurement systems are systems that are defined as offering a high level of transparency, accountability and value for money in the application of a procurement budget. They are critical to poverty reduction and AID effectiveness. Hence, all parties in the development process must have a vested interest in promoting this critical pillar of good governance: and to do so, in the context of an open macroeconomic framework that promotes open competition, functioning of markets and the allocation of resources based on comparative advantages. According to Osoro et al.(2015) they revealed that many county governments lose huge amounts of funds annually as result of implementation of ineffective procurement function which are not in tandem with the public and disposal regulations. According to Basheka and Bisangabasiija (2010) notes that low level of compliance with procurement regulations, lack of transparency and accountability of procurement funds lowers the level of effectiveness in procurement practices in county government. According to Kulundu, (2014), established that the major factors that determine the extent to which effective procurement system are employed in County government in Kenya include; the level of compliance with procurement regulations, minimization of procurement expenditure, transparency and accountability of procurement funds and quality of procured goods and services.

2.1.5. Public Procurement Policies and Procedures.

Procurement and disposal of public assets and services is guided by the Public Procurement and Asset Disposal Act of 2015 (PPADA) as published in the Kenya gazette supplement. The act provides guidelines in all matters pertaining to procedures that must be followed by all directorial organs in the public service. The act presents bodies that are involved in the regulation of public procurement and provides these bodies with well-defined powers and their respective jurisdictions (Kulundu, 2014). Among the bodies reputable in this act include; the Public Procurement Oversight Authority, the Public Procurement Oversight Advisory Board, and the Public Procurement Administrative Review Board. The act clearly defines the composition of each of these bodies, their respective roles, as well as their powers and jurisdictions (Oluoch, 2015).

The act further defines the internal society of public entities in relation to procurement, and the general rules that must be complied with by public entities through their procurement processes. The act further provides a step by step guide in relation to open tendering and alternative procurement measures by all public entities (Osoro et al.,2015). Moreover, the act specifies procedures in administrative review of procurement proceedings and the powers of the review board in ensuring amenability with laid down procedures. The act thus acts as a guideline for procurement and disposal procedures in public entities with repercussions clearly specified for any deviations with these requirements (Kulundu, 2014).

County governments in Kenya were established under the County Governments Act 2015. The act was legislated in line with requirements of the current Kenyan constitution promulgated in the year 2010, after approval through a popular vote by the Kenyan public (Muange, 2013). The act defines; county governments, county assemblies, electoral wards, county executive, decentralized units, county public service, citizen participation, public communication and access to information, civic education and county planning, and procedures in suspension of county staff. The implementation of public procurement policy and procedures. All these factors depends on the Public Procurement and Disposal Act 2015, Public Procurement and Disposal regulation 2016, Procurement and Asset Disposal Act 2016, Legal Notices and Circulars from the National Treasury (Kulundu, 2014).

The act clearly demarcates the composition, functions, and roles of both the county executive and the county assembly which are ideally independent arms of the government with different roles. The act segregates the counties into wards which are represented by a member of the county assembly elected by the public (Mbae, 2014). The act further specifies units in the public service that are decentralized to the county governments such as health and some sections of infrastructural development with the rest remaining under the national government. The act further requires that the public must be involved in allocation of county funds into the various projects established with consultation with the public. This in essence makes the county governments have the responsibility to procure and dispose public assets thus making the counties be subject to the public procurement and disposal act (Kulundu, 2014).

2.1.1 Research Design

A research design is the set of methods and procedures used in collecting and analyzing measures of the variables specified in the problem research (Kothari, 2011). This study utilized the descriptive design. The survey descriptive design involves posing a series of questions to willing participants, summarizing their responses with percentages, frequency counts, and other statistical indexes and then drawing inferences about a particular population from the responses of the sample (Osei-Tutu, 2016). This research design is ideal for this study as the researcher is interested in gaining knowledge on the factors affecting the implementation of procurement policies and procedures in county government of Trans-Nzoia.

2.1.2 Target Population

Target population refers to the larger population to which the researcher ultimately would like to generalize the results of the study (Kothari, 2011). It is thus the entire group of individuals, events or objects having common observable characteristics. The target population for this study was 800 the county Government employees of Trans-Nzoia. This was our unit of observation. The population of this study consists of the staff working in the procurement and user department.

2.1.3 Sampling Frame

A sampling frame is a list of all the fundamentals in the population from which the sample is drawn. According to Kothari (2011), it is a list of all those within a population who can be sampled, and may include individuals, households or institutions. A sampling frame is needed so that everyone in the population is identified so they will have an equal opportunity for selection as a subject (element).

In a sampling frame, all of the units are listed in a way that makes it easy to identify them in some kind of order, and the frame is organized in a clear and consistent way (Kothari, 2011). By using a sampling frame, there is sufficient information about each of the units to be able to access them for the purposes of the study. Using a sampling frame, there is sufficient information about each unit to be able to make more advanced sampling selections (Osei-Tutu, 2016). The sampling frame of this study will be all the 207 staff working in the supply chain from procurement department in the county government from Trans Nzoia.

2.1.4 Sample and Sampling Techniques.

A sample is portion or part of the population of interest. This study used stratified random sampling techniques (Kothari, 2011). The respondents were picked from each stratum. This technique gave a chance to all respondents to be picked, hence no biasness. The purpose of sampling is to gain an understanding about some features or attributes of the whole population based on the characteristics of the sample. The Yaro Yamane's simplified formula as provided. was used for the calculation of the sample size (Osei-Tutu, 2016). The proportionate random sampling was utilized for the study.

2.2 Regression Analysis

To establish the degree of influence of implementation of procurement policy and procedures in public entities 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. The regression model was as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon$$

Policy and procedures in public entity = $\alpha + \beta_1$ (Staff Competency) + β_2 (compliance strategy) + β_3 (management style) + 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.

2.2.1 Model Goodness of Fit

Regression analysis was used to establish the strengths of relationship between the implementation of procurement in policy and procedures in public entities (dependent variable) and the predicting variables; staff competency, compliance strategy, management style 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 Ogoye (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 Muthike (2014), who observed that analysis of variance statistics examines the differences between group means and their associated procedures

Table 4.14 Model Goodness of Fit

R	R ²	Adjusted R	Std. Error of the Estimate
0.754	0.727	0.756	0.056

a. Predictors: (Constants), Staff, compliance , management, and ICT

b. Dependent Variable: policy and procedures in public entity

With an R-squared of 0.727, the model shows that Staff competency , compliance strategy, management style, and ICT 72.7% of the variations on implementation of procurement policy and procedures in public entities while 27.3% is explained by other indicators which are not inclusive in study or model. A measure of goodness of fit synopses the discrepancy between observed values and the values anticipated under the model in question. This finding is in line with the findings Simbiri (2010).

2.2.2 Analysis of Variance (ANOVA)

From the results in table 4.15, 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 0.05 implies that implementation of procurement policy and procedures have a significant relationship with Staff competency, compliance strategy, management style, and ICT which is significant at 5 % level of significance.

Table 4.15 ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	4.157	1	1.059	.431	.001
Residual	6.463	99	.494		
Total	10.610	100			

2.2.3 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:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon; \text{ where,}$$

Y= Public Entities

α = Constant; $\beta_1 - \beta_4$ = Beta coefficients; X_1 = staff competency X_2 = compliance strategy; X_3 = management style; 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.

Table 4.23 Regression Coefficient Results

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-.137	.060		-1.143	.003
Staff competency.	.624	.132	.838	5.471	.001
Compliance strategy	.541	.068	.162	2.471	.001
Management style.	.329	.059	.587	4.386	.000
ICT	.231	.115	.321	2.654	.004

a. Predictors: (Constants), Staff, compliance , compliance strategy management style , and ICT

b. Dependent Variable: policy and procedures in public entities

A unit change in staff competency would thus lead to a .624 effect on implementation of policy and procedures in public entities ceteris paribus; while a unit change in compliance strategy would have an effect of .541 change in implementation of procurement policy and procedures in public entities, also a unit change in management style would have an effect of .329 change in on procurement in : policy and procedures in public entity and finally a unit change in ICT would have an effect of .231 change procurement in : policy and procedures in public entities. This finding is in line with the findings of Ogoye (2013). This implies that among other factors, staff competency, compliance strategy, management style and information and communication are significant determinants of implementation of procurement: policy and procedures in public entities.

Conclusion

Therefore from the foregoing, this study concludes that public-private partnerships have broadly impacted the implementation of policy and procedures in public entities in Kenya. The findings conclude that modern institutions should drive to embrace the best procurement implementation of policy and procedures in public entities in Kenya. When public-private partnerships is embraced through staff competency, compliance strategy, modern management style and information and communication technology then the implementation of policy and procedures in public entities in the Trans Nzoia county would be perform. That from the foregoing, this study recommends that the best procurement policy and procedures in the public entities in Kenya should strive to be proactive on how to perform better to retain integrity and improve transparency and accountability in Trans Nzoia county. The study has now filled the existing gap after the creation of new knowledge. That from the foregoing, this study recommends that the best procurement policy and procedures in the public entities in Kenya should strive to be proactive on how to perform better to retain integrity and

improve transparency and accountability in Trans Nzoia county. The study has now filled the existing gap after the creation of new knowledge.

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Leadership Styles of Head Teachers' and their Impact on Students' Academic Performance in all Public Schools In Kenya a Case of Bungoma County

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Purpose:

This study intended to explore how Leadership styles of headteachers' have an impact on students' academic performance in all public schools in Kenya. The specific objectives of this study were: examine how leadership style, induction of teachers, the motivation of teachers, and organizational culture affected students' academic performance in Bungoma County.

Keywords: leadership style, induction of teachers, the motivation of teachers, and organizational culture

1.1 Introduction

Schools establishments are basic points where the students come to learn and acquire knowledge. Therefore school headteacher bears a substantial role in regarding organizing their institutions. Headteachers in institutions of learning foundations are equivalent to leaders in different organizations and have the challenge of keeping up the organizations' purpose (Northhouse, 2007). School leadership is a procedure to enable and support teachers and students to work with harmony in the realization of school goals. The leadership style and the student's performance appear to go hand in hand. (Ghamrawi, 2015) Found out that the leadership style of a school head is the basic factor that influences and impacts the viability of the school. Leadership is a procedure of interaction among subject and those in the authority where those in the position of authority attempts to impact followers to accomplish a shared objective

In Mozambique, a study was carried out on an examination which was entitled "Transformational authority in grade schools in Mozambique." The main purpose was to inspect the relationship between transformational leadership and organizational learning. The findings uncovered that three transformational practices of the school headteachers, that is, objectives, vision and performance expectation desires were directly connected with individual learning of the teacher. (Bazo, 2011)

In Ghana, for example, from 1996 it had used up to 40% of the total budget in the education sector. This vast spending allocation is an acknowledgement of the fact that education is the bloodstream of the economy of a country (Carmen R. Giebelhaus & Connie L. Bowman, 2002). In spite of the huge investment made by governments, in education, the outcome is very low. A few factors have caused, including the student-teacher relationship, the absence of inspiration from teachers, parental attitudes, students' mentalities towards learning. Research has shown that leadership is the second powerful fact after classroom affecting performance. Leadership styles are a lot more prominent in schools that have problematic circumstances. This suggests, before a school with difficulties becomes stable, an incredible leader is required to change the school. (Lightfoot, 2014). The best headteachers concentrate on school work, by coming up with a reasonable and applicable vision, mission or objectives for the school. They impart the objectives, vision, and mission in a clear and straightforward manner with the aim of informing key players of the organization expectation from them (Northhouse, 2007). There is a relationship between students' academic improvement and leadership.

Leadership in institutions has been widely contemplated in different structures and has advanced (Northouse, 2007). Different leadership styles have been applied to different circumstance. Leadership in the 21st century is unique. According to the circumstance, Korean leaders address their answers and choices in like manner. The actions of the Koreans are viewed as inconsistent, and Numerous Koreans see Western reliance on logical as being inflexible, and unjustifiable because for them everybody must be flexible when change comes knocking (Schein, 2007).

Finland is a little country, whose education is respected by numerous country clubs everywhere throughout the world. (Lawler,2003) There are numerous purposes behind progress, and a section has been attributed to teachers and headteachers. Education is of an extraordinary asset in Finland; teachers and principals are extremely instrumental (Välijärvi, 2002). This is one reason why teachers' training is done at the college and university level to keep up the high standards and nature of teachers and to address the difficulties or challenges in the education sector. In the new concept, mutual respect and understanding are required between the Headteacher and teachers. The headteachers must develop a method involving teachers in decision making (Andrew & Kent, 2007) It likewise implies that the relationship between headteachers and teachers must change. The new idea suggests common regard and comprehension among teachers and principals by working together in the improvement of the school. Therefore headteachers in Denmark currently have established partnership with stakeholders for proper consultation and correct leadership (Davis, 2003). This infers a blend of administration and the management collaborates with the capacity to build, enhancing the way of life and instilling a feeling of self-confidence and self-satisfaction to the classrooms. As per research that was done in Florida in the United States of America for driving school, students gain leadership skills through learning while purposely furnishing independently and enlightened society with adults (Moos, 2006). The leadership procedures that bring improvement must be important to the school culture and should be addressed through fitting administration activities (Lazaridou A. , 2006) Noted the developing proof of the significance of leadership to accomplish the change required to expand the level of academic achievement and accomplish great academic excellence. A few examinations, for example, (Ghamrawi, 2015) demonstrated that law based and participatory leadership styles exist in some private school situations, basically in international schools, even though there is little proof of their adequacy. Indeed, even countries like Qatar and the United Arab Emirates, where there are open doors for headteachers to assume a total influential position, there are a couple of intercessions to set them up for this job. Educational leadership is uncommon, although principals have once been a teacher before proceeding onward to positions of authority. Leaders then again, in general stress over daily schedule, bureaucratic and administration activities, shunning designating errands and engaging their groups. This denies their schools of improvement in teaching and learning processes. Finally results in examinations end up dropping (Baker, 2011)

1.2 Leadership Style

Leadership plays a key role in improving school results by influencing the teachers' inspiration and skills, just as the school environment (Baker L.M, 2011). The leader must use a kind of comprehensive skills in which other partners are included as a group. This group has the deliberate chance to contribute to the school's vision, culture and goals and like this, the vital must make open doors for this to occur, and teachers partly decide the headteacher's styles (Mutula, 2006). As a leader, the headteacher can impact job satisfaction among teachers who comprehend them.

The style of leadership the way to deal with giving direction, actualize designs and persuade individuals. Lewin led a gathering of specialists to differentiate leadership styles. This first research was powerful and built up three principle styles of Leadership. The three principle styles of Leadership are Autocratic or Authoritarian, Democratic (participatory) and Laissez Faire. A good leader utilizes each of the three styles, with one typically dominating, while the awful leader will, in general, stay in one leadership style (Oluremi, 2013).

(Njuguna, 1998) Noticed those directors who utilized the democratic style of had very high outcomes. No significant relationship was found between the autocratic style and school academic performance in public secondary schools in the Maragua district of Kenya. studies on the impacts of leadership styles on students accomplishment in KCSE by both (Okoth, 2000) found that the directors considered higher than normal rate of return than autocratic leaders. Even though (Muli, 2005)affirmed that the leadership style affected KCSE's performance they noticed that autocratic Principals had higher scores on KCSE than their Democratic counterparts

2.2 Induction of Teachers

As indicated by (Musau, 2004)an effective mentoring system can convey numerous advantages to teachers. A necessity for an effective program is to set up an organized coaching program that recognizes and reacts to the individual needs of beginner teachers. As per (Ganser, 2002) mentorship programs for teachers have been created to accomplish objectives, for example, giving showing help, helping newly employed teachers explore through the educational modules rules and helping with control issues. (Wong, 2002)said that once a relationship of trust and backing is built up with a coach, new teachers can concentrate on their skills

advancement amid the main period of their vocations. In the early period, the mentees have the chance to improve their teaching abilities. New teachers should likewise be set up to deal with numerous parts of training that college courses don't address.

(Simatwa, 2010) likewise uncovered that the induction procedure has not been settled in schools; that there did not appear to be any very much planned acceptance program for the New Teachers and there is nobody specifically in charge of observing the advancement of acceptance in the recently named Teacher Primary Schools. The study additionally revealed that induction does not precisely address the teachers requirements for classroom teaching and relational connections. This disclosure indicated how the management of recruited teachers in schools in Kenya does not been well coordinated or programmed. The acceptance projects to the calling offered in essential Kenyan schools don't address the issues of the recently selected teachers. The new teachers induction programs help teachers move to the classroom and adjust them to the particular school condition in which they will work. The mentors set a model and aides the follower to end up a fruitful individual in his appearance (Patrick, 2008).

2.3 Motivation of Teachers

A study led by (Mwangi, 2002) on elements related with the morale of teachers in the rural area of Machakos, found that the components that impact teachers assurance include: disappointment with school specialists, low turnover and steady deficiencies, deficient pay, poor profession structure, absence of promotion poor career structure insufficient school disciplinary arrangements, dispositions and practices of the school central and different educators, and poor demeanors to understudy work and absence of enthusiasm for school

(Andrew, D.P.S. and Kent, A., 2007)concluded that representative commitment depends on recognition. (Lawler E. , 2003) contended that the success and survival of associations are controlled by how they treat their Human Resource. (Ajila C.and Abiola, A, 2004) inspected the characteristic prizes are remunerated in work and the fulfilment of achieving an undertaking, the chief's gratefulness, and self-sufficiency, while extraneous prizes are unmistakable rewards, for example, pay, rewards, incidental advantages, and advancements. As per a study directed in Pakistan by (Mohammad, 2008), he uncovered that inspiration is one of the mainstays of the instructing and learning process.

2.4 Organizational Culture

(Saari, 2014) inferred that schools keep on being complex associations in which institutional elements profoundly affect the lives of the general population who live there. (Salili, 2001) in their investigation expected that qualities and social practices impact students' inspiration and resulting accomplishment. In an examination to research the impact of school culture on the performance of Kenya's optional training authentication in the Homa Bay area, (Nyambuoro, 2012)found that the important had better information and applicable scholastic capabilities than improving working and execution of the school. An association must be in contact with its way of life to check its performance. This implies an organisation must assess its structure, convictions, values, and speculations that illuminate the association's method for getting things done. This won't just enable the organisation to stay pertinent; however, will likewise distinguish the hurried elements inalienable in its way of life that are divine for execution and those that performance So also, (Schein, 2007) contends that, in situations where the organizational culture of life is lined up with the organization's central goal and targets, representatives are bound to embrace the culture.

2.5 Academic Performance in Public School

The UNESCO report (2010) featured training as a major right and a necessity that is essential for accomplishing the second objective of the Millennium Development Goals. This is because great academic performance in instruction ensures talented and dynamic natives. Besides, one of the parts of the Kenya Vision 2030 social column is instruction. Kenya Vision 2030 recognizes instruction and preparing as the implies that will lead Kenya to be a centre pay economy. All through the area of Kericho, there was poor scholastic execution in practically all KCSE subjects (Musau, 2004). Around 90.5 percent of schools in Kericho County in 2010 KCSE got normal C and D scores. From KCSE from 2006 to 2011, just about 63 percent of KCSE competitors scored scores in Grade C and D-. There was likewise a lessening of 0.080 in the 2012 KCSE results (Kizito, 2005)In all actuality, this is a poor act in scholastics. Execution in KCSE in Kenya is inadmissible. A few schools reliably get lower scores in national examinations (State-funded schools in the waterfront district of Kenya have (Mobegi, 2010). decreased exhibitions contrasted with tuition-based schools. This is because of the absence of education among guardians who don't value their youngsters' training (Armstrong, Michael, 2006)

3.1 Research Design

A descriptive survey design was used. The main advantage of this type of design was that it allowed the researcher to evaluate the situation within the study area at the moment of the study. The researcher used the project to evaluate the leadership styles of

principals and their impact on academic performance in public schools in Bungoma County. (Kothari C. R. and Gaurav Garg, 2014) Along these lines, the scientist thought about the fitting plan for the examination, as it permitted exploring how the leadership styles of the headteachers impacted the academic performance in Bungoma County.

3.2 Sampling Frame

(Mugenda, O.M. & Mugenda, A.G., 2008) Define a sample as a small group obtained from the accessible population. Each member of the sample is called the subject. Sampling means identifying a certain number of individuals from a population defined as representative of the total population. Any statement made in the sample represented the population (Orodho, 2014) The sample size of 10% was considered adequately represented the target population as was confirmed by (Mugenda, O.M. & Mugenda, A.G., 2008)

3.3 Sample and Sampling Techniques

The technique used was stratified random sampling to sample the number of secondary schools. The goal of stratified sampling is to obtain the desired representation of different subgroups of the population (Mugenda, 2003) The Sub-Counties were the strata. Therefore, the population was divided into homogeneous subgroups of the population of schools for boys only, schools for girls only and mixed schools and then a simple random sample will be taken from each subgroup (Kombo, D.K., 2014). From the public 350, 105 secondary schools were sampled for this study because for descriptive studies, 10% of the accessible population was sufficient (Mugenda, O.M. & Mugenda, A.G., 2008) of which 20 schools only for boys, 20 only for girls and 65 of mixed schools.

3.4 Pearson Correlation Analysis

The study further conducted inferential statistics entailing both Pearson and regression analysis with a view to determine both the nature and respective strengths of associations between the conceptualized independent variables and dependent variable as shown in table 4.14 below

Table 3.1 Model Correlations of all Variables

		Leadership style	Induction	Motivation	Org. Culture	Performance
Leadership style	Pearson Correlation	1	.241	.231	.214	.305
	Sig. (2-tailed)	-.212	-.134	.245	.413	.251
	N	430	430	430	430	430
Induction of Teachers	Pearson Correlation	-.111	1	.112	.131	.121
	Sig. (2-tailed)	.266	.002	0.003	.005	.008
	N	430	430	430	430	430
Motivation of Teachers	Pearson Correlation	-.111	-.341	1	.123	-.110
	Sig. (2-tailed)	.266	.002	.052	.612	.212
	N	430	430	430	430	430
Organisational Culture.	Pearson Correlation	.453	-.230	-.321	1	.352
	Sig. (2-tailed)	.231	.149	.367	.267	.256
	N	430	430	430	430	430
Performance	Pearson Correlation	.384**	-.073	.226	-.135	.306
	Sig. (2-tailed)	.000	.660	.156	.399	.157
	N	430	430	430	430	430

**. Correlation is significant at the 0.01 level (2-tailed).

xx Correlation is significant at the 0.05 level (2-tailed).

From the outcome, a positive correlation is seen between each variable and academic performance. The strongest of all in the correlation was established between motivation of teachers and academic performance ($r = 0.352$) and the weakest correlation was established between induction of teachers and academic performance ($r = -0.110$). Organizational Culture and leadership style were

strongly, positively correlating with academic performance correlation coefficient of .306 and 305 respectively. This is in relation with the (Kombo, 2014) who concluded that all the independent variables were found to have a statistically significant association with the dependent variable at over 0.05 level of confidence.

3.4 Regression Analysis

To establish the impact of leadership style on academic performance, a regression analysis was carried out, an assumption was made that: variables were normally distributed to avoid distortion of associations and significance tests, which was achieved as outliers were not identified; from the linear relationship between the independent variables and dependent variable for accuracy of estimation, which was established as the standardized coefficients were used in interpretation. The regression following regression model was used:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon$$

Academic Performance in Public Schools = $\alpha + \beta_1$ (Leadership Style) + β_2 (Induction of Teachers) + β_3 (Motivation of Teachers) + β_4 (Organizational Culture) + 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 independent variables and dependent variables. The ANOVA was conducted at 95% confidence level.

3.6 Model Goodness of Fit

Regression analysis was used to establish the strengths of relationship between academic performance in public schools and the independent variables; leadership style, induction of Teacher, motivation of teachers and organizational culture (independent variables). The results showed a correlation value (R) of 0.844 which depicts that there is a good linear dependence between the independent and dependent variables. This is shown in table 4.15

Table 3.2 Model Goodness of Fit

R	R ²	Adjusted R ²	Std. Error of the Estimate
0.844	0.712	0.725	0.069

Independent : (Constants), leadership style, induction of teachers, motivation of teachers and organizational culture
b. Dependent Variable: Students Academic performance in public Schools

With an R-squared of 0.712, the model shows that leadership style, induction of teachers, motivation of teachers and organizational culture explain 71.2% of the variations on students academic performance in public schools while 28.8% is caused by other indicators which are not inclusive in study or model. A measure of goodness of fit synopses the discrepancy between observed values and the values anticipated under the model in question (Orodho, 2014)

3.7 Analysis of Variance (ANOVA)

The results analysis of variance statistics was carried out to measure the differences in the means of the independent variables and dependent variables to illustrate whether a relationship exists between the two. The P-value of 0.05 shows that students academic performance has a significant relationship with leadership style, induction of teachers, motivation of teachers and organizational culture which is significant at 5 % level of significance.

According to findings of (Kothari C. R. and Gaurav Garg, 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 independent and dependent variables. According to research findings of (Muia, 2017) who observed that analysis of variance statistics examines the differences between group means and their associated procedures. The analysis of variance for this study is as shown in table 4.16

Table 3.5 ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	4.24	1	1.059	.441	.002
Residual	6.433	429	.495		
Total	10.673	430			

3.8 Regression Coefficients of Determination

To determine the relationship between the dependent variables and the independent variable the regression analysis produced coefficients of determination. Findings in table 4.23 shows a positive relationship between students academic performance for and all the independent variables. Taking model of regression:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon; \text{ where,}$$

Y= Students academic performance;

α = Constant; $\beta_1 - \beta_4$ = Beta coefficients; X_1 = Leadership style X_2 = induction of teachers; X_3 = motivation of teacher; X_4 = Organizational culture and ε = Error term, from the result shown below, it is well illustrated that the independent variables are regressed against the dependent variable the constant gives a negative result meaning there is a strong relationship and how each independent variable has an effect on the dependent variable.

Table 3.6 Regression Coefficient Results

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-.183	.059		-1.149	.023
Leadership style	.724	.112	.838	5.471	.000
Induction of trs.	.150	.069	.163	2.479	.042
Motivation f trs.	.346	.059	.588	4.387	.000
Organization Cul.	.250	.116	.323	2.655	.018

Dependent Variable: students Academic Performance,

Constant: Leadership Style, induction of teachers, Motivation of teachers, organizational culture.

A unit change in leadership style would lead to a .724 influence; students academic performance while a unit change in induction of teacher had an effect of .150 change on students academic performance, whereas a unit change in motivation of teachers could have an effect of .346 change in on students academic performance. Last but not least one unit change on organizational culture would have an effect of .250 change on students academic performance. This indicates that together with other factors, leadership

styles, induction of teachers, motivation of teachers and organizational culture are significant determinants of students' academic performance in public schools.

Conclusion

From the findings of the study, several conclusions were arrived at: Leadership style of headteachers affects academic performance through non participatory decision making. A good induction program for teachers is good for academic performance. A mentorship program and coaching of the posted or new teachers in the school increases their efficiency and effectiveness hence increases academic performance. The motivation of all the stakeholders is essential to academic performance. Good organizational culture is important in academic performance. It creates an environment for academic excellence. There is low academic performance at KCSE in the county. Finally the study recommended that all stakeholders to work together and find a lasting solution to the low academic performance. It recommended a change in the strategy and devise a better strategy that can yield better academic performance. It also recommended sharing of knowledge between headteachers in good performing schools and those in lowly performing school with a view of transferring some programs

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Under-nutrition and its association with psychosocial and academic performance in pre-school children in Asembo, Siaya County, Kenya

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Abstract- Nearly half of all deaths in children under 5 are attributable to under-nutrition. This translates into the unnecessary loss of about three million lives a year. Under nutrition puts children at risk of dying from common infections, increases the frequency and severity of such infections, and contributes to delayed recovery. Under-nutrition has been associated to poor cognitive development, poor academic performance and adversely affects social skills in children.

This study sought to establish the prevalence of under nutrition in children 3-5 years of age enrolled in nursery schools within Asembo in Siaya County, to assess factors associated with under nutrition and to establish the association between under-nutrition and the psychosocial and academic performances of the children.

This was a school-based cross-sectional study. The dependent variables were stunting, wasting and underweight. The independent variables included: Demographic status, socio-economic status, immunization status and child morbidity and WATSAN practices. Association was sought between under-nutrition and psychosocial and academic performance of the children.

Anthropometric measurements were obtained by use of standardized weighing scale and height board. Interviews were conducted using a structured questionnaire to obtain child and household data from the care givers. Data on the school characteristics of interest was obtained through a one on one interview with the nursery school head teachers and also through observation. The psychosocial performances of the children were obtained from the teachers and scores entered in a 5 point likert item and were later collapsed into fail or pass. The academic performances were obtained from end of term examinations categorizing the scores into pass or fail, while children school attendance data was obtained from class registers.

Univariate and Bivariate logistic regression analyses were used to determine factors associated with under-nutrition while Poisson regression, reporting prevalence ratios was used to determine association between under-nutrition and psychosocial and academic performance.

The combined prevalence for under-nutrition was 15.13%. The prevalence of wasting, stunting and underweight was 2.63%, 9.21% and 3.29% respectively. Children who had had diarrhea 2 weeks prior to interview, had 8.72 more odds of being wasted and 7.38 more odds of being underweight than those who did not have diarrhea 2 weeks prior to interview. Children from the richest quintile had 0.67 less odds of being stunted than children from the poorest wealth quintile. Wasting was found to have statistical significant association with comprehension and absenteeism from school. None of the other parameters were significantly associated with either psychosocial or academic performance.

Index Terms-Academic performance, pre-school children, psychosocial performance, under-nutrition

INTRODUCTION

According to the WHO classification of child under nutrition, children with a Z-score below -2 SD of the Weight for Height (WHZ), Height for Age (HAZ) and Weight for Age (WAZ) are classified as wasted, stunted and underweight respectively. [1]

Stunting represents past or chronic malnutrition or illness, but is less sensitive to temporary food shortages. Wasting is sensitive to temporary food shortages and episodes of illness and commonly used as an indicator of current nutritional status. Underweight reflects the cumulative and acute exposures. [2]

Malnutrition is one of the major public health problems all over the world. Worldwide, 165 million children below five years of

age are affected by under-nutrition. Currently it is associated with more than 41% of the deaths that occur annually in children from 6 to 24 months of age in developing countries, which is approximately 2.3 million deaths, and an estimate of 60% of 10.9 million annual deaths among children under 5 years old in low-income and middle income countries. Out of the 165 million children affected with under-nutrition worldwide, 26% were stunted. Stunting was at 36% in Africa and 27% in Asia. More than 90% of stunted children in the world have been living in Africa and Asia. An estimated 80% of world's stunted children live in just 14 countries including Kenya. [3] The burden of child under-nutrition is unsurprisingly greatest in the world's poorest countries, especially in SSA and Asia. This is a highly salient issue in Kenya, which is among the 20 countries that account for 80% of the world's chronically undernourished children. [4]

Malnutrition among Kenya's children is a serious problem and exists throughout the country. Annually, more than 70,000 Kenyan children die before their 5th birthday; malnutrition contributes to about half of these deaths. According to the Kenya Demographic Health Survey (KDHS) of 2014, 26% of children under five were stunted in Kenya. 11% of children did not weigh enough for their ages while 4% were wasted. [5]

The causes of childhood malnutrition are diverse, multidimensional and interrelated. An analytical framework suggested by the United Nations Children's Fund (UNICEF) categorizes the cause into a) immediate causes: inadequate dietary intake and illness b) underlying causes: insufficient access to food in a household; inadequate health services and unhealthy environment; and inadequate care for children and women at the household level and c) basic causes: insufficient current and potential resources at social level. In sub-Saharan Africa, various indicators of social economic status have been associated with children's nutritional status such as maternal and paternal educational level, parental income, and family assets. [6]

Malnutrition among children in developing countries is a major public health concern since it places a heavy burden on already disadvantaged communities. [7] Disease and malnutrition are closely linked; sometimes disease is the result of malnutrition, sometimes it is a contributing factor. Malnutrition prevents children from reaching their full physical and mental potential. Health and physical consequences of prolonged states of malnourishment among children are: delay in their physical growth and motor development, lower intellectual quotient (IQ), greater behavioral problems, deficient social skills and increased susceptibility to contracting diseases. [8]

Adequate nutrition is essential during childhood to ensure healthy growth, proper organ formation and function, a strong immune system and neurological and cognitive development.

Nutritional status has a major impact on children's survival mainly due to the synergistic relationships between malnutrition and diseases. Linear growth retardation (stunting) is frequently associated with repeated exposure to adverse economic conditions, poor sanitation, and the interactive effects of poor nutrient intake and infection. [1]

Nutrition is an endogenous factor that affects the learning ability and skills of children at school. The relationship between nutrition and school performance has been an interest to many researchers due to the frequent observation of poor school performance among malnourished students. Cognitive development and brain physiology among children requires access to sufficient and nutrient rich foods. Malnutrition adversely affects school attendance, academic performance and social skills among children. [9]

Stunted children are about 20% less likely to read a simple sentence by age of 8; they are about 15% less likely to be in their right grade for their age and go on to earn 20% less as adults compared to those who were well-nourished. [10] Children with a history of stunting are at risk of cognitive and learning delays. Many cross sectional studies of high risk children have noted associations between concurrent stunting and poor preschool progress or cognitive ability. Stunted children, compared with non stunted children were less likely to be enrolled in school, more likely to enroll late, to attain lower achievement levels or grades for their age and have poorer cognitive ability or achievement scores. [11] In a study conducted in Southeast Asian children, children with low weight for age were 3.5 times more likely to have a non-verbal IQ<89. The chance of having non-verbal IQ<89 was also doubled with low height for age. [12]

Causes of child malnutrition are diverse and change in space and time. Investigating the current determinants of malnutrition remains a vital process in designing effective intervention strategies.

One of the challenges faced in trying to implement policies which have been put in place to curb malnutrition in Kenya is the low understanding of linkage between national food security, basic education, water and sanitation strategies on one hand and nutrition on the other. As a result, there is need to sensitize policy makers and programmers on the causal factors of malnutrition and influence them to address malnutrition in a holistic approach and broad manner. [13] More so, many studies done major on home characteristics and none have explored the facts that many of the preschoolers spend most of their time in school and some of the characteristics that contribute to malnutrition in the home environment may also be present in the school environment.

There is little empirical evidence on the effect of childhood malnutrition on children's cognitive achievements in low income

countries. This study aimed to establish the association between under nutrition and psychosocial development and academic performance and thus build up on the knowledge bank of the topic in low income countries.

METHODS

Study site

The study was a school-based cross-sectional study conducted within Asembo in Siaya County in Kenya.

Study variables

The study variables were: **Demographic characteristics**; Age of household members, gender and marital status of caregiver, **socioeconomic status**; education level of caregiver, main source of income and a wealth index(livestock ownership, house ownership, types of wall, types of roof, types of floor, types of toilet, main source of fuel and main source of drinking water, **child morbidity and immunization status**; Diarrhea incidence and other morbidities in the last two weeks prior to interview and child immunization status, **WATSAN**; Drinking water treatment practices, presence of a latrine/WC and availability of hand washing facilities, **nutritional status**; WHO Z-scores, **academic performance**; school attendance and examination scores for language and arithmetic, **psychosocial performance**; comprehension levels, attentiveness in class and child interaction with others.

Sample size calculation and sampling procedure

The study population included all children with 3-5 years of age in nursery schools within Asembo, care givers, class teachers and school heads were also targeted. All children 3-5 years enrolled in nursery schools and who had been in the particular school for at least 3 months prior to the interview were included. Children who were ill or disabled were excluded from the study. The Cochran's sampling formula was used in the calculation of the sample size $n = \frac{t^2 * p * (q)}{d^2}$. The critical value (1.96) for a 95% confidence level was used and the prevalence of under-nutrition used was 10.9%; an average of wasting stunted and underweight prevalence as reported for Siaya County in the KDHS report of 2014. The sample size came to 149 and an additional 11 children were added for non-response hence total targeted sample size was 160 children.

There were 42 government nursery schools in Asembo. Asembo is divided into two administrative units namely, Asembo East and Asembo West locations. The two locations formed the two stratas for the study. Asembo East had 22 schools, while 20 were in Asembo west. The study purposively picked 20% of the schools from each stratum. The total number of schools picked was 9; 5 from Asembo East and 4 from Asembo West. A list from the Rarieda Early Children Education office served as the sample frame, having considered distance of a school from the

other, to avoid picking schools that were very close to each other. A sample interval of 5 was used for both Asembo East and Asembo West. The number of (3-5) year old children in the schools selected was fairly same; 5 schools had a target of 18 children each, 3 schools had a target of 17 children each and 1 school had a target of 19 children. The sample frame was a list made by the class teachers, of all the children who met the study's criteria. Random sampling was used to pick children from each school; numbers were written up to the last number of children required per school on well-folded pieces of paper and mixed in a box together with blank pieces of paper. The children were asked to pick a piece each and those who picked papers with numbers written on them were selected.

Informed consent forms were then sent to the principal care givers of the children selected to participate in the study. Response was obtained from 95% of the care givers. The distribution of children per school who participated in the study was 16 children each in 5 schools, 17 children in 1 school, 18 children each in 2 schools and 19 children in 1 school.

Invitation letters were sent to all the principle care givers who gave consent to participate in the study and all the 152 principle care givers participated in the study.

Data collection tools

A researcher administered questionnaire was used to collect data from the care givers. The questionnaire had a section where the teachers filled the arithmetic and language test scores and also filled in the pupils' psychosocial scores. School registers were used to obtain data on the school attendance of the pupils.

A calibrated digital weighing scale and a vertical height board were used to measure weight and height respectively.

Pretesting of the questionnaires, weighing scale and height board was done in a nursery school in Asembo; whereby 5% of the sample size was targeted.

Data collection

Data was collected with the help of trained research assistants.

Care givers were invited to the schools where interviews were conducted through a structured questionnaire. Data collected from care givers included: Demographic and socio-economic characteristics, water and sanitation characteristic and child morbidity and immunization data.

The school attendance of the children was established by checking through the class registers with the help of the class teachers.

The academic performance (arithmetic and language skills) of the children was assessed by use of scores from the end of term examinations. The scores were entered into a likert scale tool ranging from very poor to very good; 0-20% very poor, 21-40% poor, 41-60% average, 61-80% good and 81-100% very good. The scores were then categorized into pass; for those with good

and very good and fail; for those with average, poor and very poor.

Psychosocial aspects of the children were assessed through interviewing the class teachers on how the child interacted with other children, comprehension of the children and their attentiveness in class and recorded on a 5-point likert scale ranging from very poor to very good. The scores were then categorized into pass; for those with good and very good and fail; for those with average, poor and very poor performance.

The research assistants obtained data about the school characteristics of interest from the head teachers and also used observation skills for the same. These included: availability of toilets, availability of hand washing facilities and water treatment practices.

Anthropometric measurements were taken following WHO standard anthropometry guidelines. Height was measured to the nearest 0.1 cm by use of calibrated vertical boards, while weight was measured to the nearest 0.1kg by use of calibrated digital weighing machines.

Data management and analysis

Descriptive and inferential statistics were used to analyze and report findings of the study. Data entry was done using excel and analysis was done using STATA.

Weight and height measurement were converted to weight for age z-scores (WAZ), height for age z-scores (HAZ) and weight for height z-scores (WHZ) using the WHO Anthro software. The resulting indices were used to determine the levels of malnutrition. Underweight was defined as WAZ less than -2SD, stunting as HAZ less than -2SD and wasting as WHZ less than -2SD.

Wealth index was computed using principal component analysis using key variables that included; ownership of own house, ownership of livestock, types of walls, types of roofs, types of floors, main source of cooking fuel, types of toilets and main source of drinking water. The resulting wealth index variable was categorized into five quintiles; very poor, poor, medium, rich and very rich.

The association between the indicators of under-nutrition and the dependent variables was determined using univariate and multivariate logistic regression. In the univariate model, all variables with a p-value of < 0.25 were considered to proceed to the multivariate model. The variables were then tested by use of stepwise, backward and forward multivariate models separately. The model which retained most of the variables with p-value of <0.05 significance was used in the final multivariate model.

Association between malnutrition indices and psychosocial and academic performances was tested by the Poisson regression model. Prevalence of under nutrition, odds ratios and prevalence ratios were reported.

Ethical approval

The study protocol was reviewed and approved by a NACOSTI approved Ethical Review Board in Kenya. Permission was sought from the Siaya County Early Childhood Education office to allow the study to be conducted. The protocol and objectives were discussed with the school heads and nursery school teachers for clarification and acceptance. Written and signed informed consent forms were sought from the parents of the sampled children before commencement of the study.

FINDINGS

Demographics and socio-economic characteristics

Age and gender of children

Children in the 48-60 months age category were 96 (63.2%) and males in the age group were 52 (54.2%). Children in the 36-47 months age category were 56 (36.8%) and males and females in the group were 28 (50%) each.

Demographics and socio-economic status of caregivers

Care givers between 20-25 years of age were the majority (38.82%). Care givers aged between 36-40years and over 40 years were at 9.21% and 9.87% respectively. The mean age of the care givers was 29.9 ± 8.49 with a range of 20-62 years. Majority (82.2%) of the care givers were married; 7.9% were single, 7.9% widowed and 2.0% were separated. Majority (76.97%) had primary school education only, with 1.97% only, having reached the tertiary level of education.

Table 1: Demographics and socio-economic characteristics of care givers

	N=152	
	n	%
Age in years		
20-25	59	38.82
26-30	37	24.34
31-35	27	17.76
36-40	14	9.21
over 40	15	9.87
Marital status		
Married	125	82.24
Single	12	7.89
Separated	3	1.97
Widowed	12	7.89
Education level		
Primary	117	76.97
Secondary	32	21.05
Tertiary	3	1.97
Occupation		
Unemployed	59	38.82
Farmer	50	32.89
Small business	30	19.74
Formal employment	7	4.61
Casual worker	4	2.63
Fishing	2	1.32

Prevalence of under-nutrition

The prevalence of wasted among the study participants was 2.63%, stunting was 9.21% and underweight was 3.29%. Among children of 48-60 months, wasting prevalence was 4.17% and there was no wasting in 36-47months. In male children, prevalence of wasting was 1.3% and in females, prevalence was at 4.2%. In children 36-47 months, prevalence of stunting was 8.93%, while in 48-60 months, prevalence was 9.38%. Prevalence of stunting in males was 7.5% while in females was 11.1%. Prevalence of underweight in 36-47 and 48-60 months was 3.57% and 3.13% respectively. The prevalence of underweight in male participants was 3.8% and in females was 4.2%.

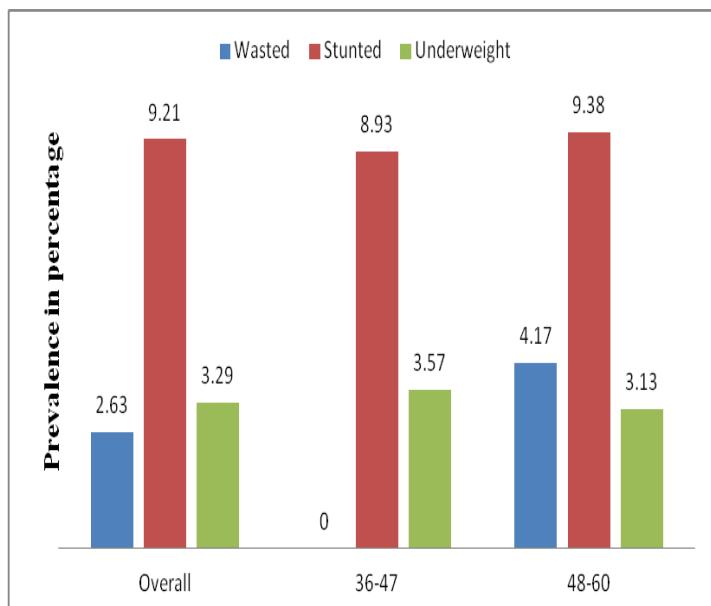


Figure1: Prevalence of under-nutrition in children

Factors associated with under-nutrition

Distribution of key predictors of under-nutrition

Most participants (95.39%) had toilets in their homes and 71.05% of the participants treated their drinking water. 95.39% of the children had completed immunization as reported by their care givers. Only 10.53% of the children were reported to have had diarrhea in the two weeks prior to the interview.

Many of the children (77.63%) were reported to have had at least an illness in the last two weeks prior to the interview.

Diseases mentioned included malaria (47.46%). 5 out of the 9 (55.56%) schools had treated water; the total number of children who had treated water at school was 83(54.61%).

Table 2: Distribution of key predictors of under-nutrition

	N=152	
	(n)	(%)
Household socio-economic status (Wealth index)*		
First quintile	31	20.39
Second quintile	30	19.74
Third quintile	31	20.39
Fourth quintile	30	19.74
Fifth quintile	30	19.74
Household WATSAN		
Availability of toilet	145	95.39
Treatment of drinking water	108	71.05
Child morbidity and immunization status		
Completed immunization	142	93.42
Had diarrhea in the last 2 weeks prior to interview	16	10.53
Had an illness in the past 6 months prior to interview	118	77.63
<i>Malaria</i>	56	47.46
<i>Flu</i>	45	38.14
<i>Abdominal pains without diarrhea</i>	7	5.93
<i>Septicemia</i>	3	2.54
<i>Measles</i>	2	1.69
<i>Injuries</i>	2	1.69
<i>pneumonia</i>	1	0.85
<i>Boils</i>	1	0.85
<i>Rashes</i>	1	0.85
School WATSAN		
Treatment of drinking water	78	51.32
Availability of hand washing facilities	59	38.82
* First quintile is lowest and fifth is richest		

Factors associated with wasting

In bivariate analysis occupation of care giver (casual worker against farmer), complete immunization of children and diarrhea in the 2 weeks prior to interview, had a p-value of less than 0.25. Only diarrhea in the last two weeks prior to interview was found to be independently and significantly associated with wasting in multivariate analysis. Wasted children had 9.57 more odds of having had diarrhea in the last two weeks prior to the interview than those who were not wasted.

Factors associated with stunting

In bivariate analysis age of caregiver, occupation of care giver and the wealth quintiles had a p-value of less than 0.25. It is only the wealth index that was independently and significantly associated with stunting in the multivariate analysis. Stunted children were more likely to belong to the lower quintiles. Children in the 5th quintile had 33% less odds of being stunted than children in the first quintile.

Factors associated with underweight

Financial independence of the principal care giver, diarrhea in the last two weeks prior to interview and illnesses in the last two weeks prior to interview specifically flu and abdominal pains

without diarrhea, had a p-value of less than 0.25. However, it is only diarrhea in the last two weeks prior to interview that was independently and significantly associated with being under weight in the multivariate analysis. Children who were under weight had 6.34 more odds of having had diarrhea in the last two weeks prior to the interview than those who were not underweight.

Table 3: Univariate analysis of factors associated with under-nutrition

	Associated factors	COR	P-value
Wasting	Occupation		
	Farmer	ref	
	Casual worker	16.33	0.07
	Completed immunization		
	No	ref	
	Yes	0.19	0.17
	Diarrhea(last 2 weeks prior to interview)		
	No	ref	
	Yes	9.57	0.03
Stunting	Age of caregiver		
	20-25	ref	
	over 40 years	2.7	0.21
	Occupation of care giver		
	Farmer	ref	
	Small business owner	2.88	0.13
	Wealth quintiles		
	First	ref	
	Second	0.12	0.05
	Third	0.24	0.09
	Fourth	0.38	0.2
	Fifth	0.12	0.05
Underweight	Care giver is financially independent		
	No	ref	
	Yes	0.25	0.22
	Diarrhea(last 2 weeks prior to interview)		
	No	ref	
	Yes	6.33	0.05
	Morbidity(2 weeks prior to interview)		
	Boils	ref	
	Flu	3.93	0.24
	Abdominal pains without diarrhea	9.17	0.13

Table 4: Multivariate analysis of factors associated with under-nutrition

	Associated Factors	(Yes#)	(No#)	Crude Odds ratio (95% CI)	Adjusted Odds ratio (95% CI)
Wasted	Diarrhea (last 2 weeks prior to interview)	2	14	9.57 (1.25-17.30)	8.72 (1.08-17.59)
Stunted	First quintile	7	24	1	1
	Second quintile	1	29	0.12 (0.01-0.29)	—
	Third quintile	2	29	0.24 (0.04-0.26)	—
	Fourth quintile	3	27	0.38 (0.08-0.64)	—
	Fifth quintile	1	29	0.11 (0.01-0.29)	0.67 (0.44-0.89)
Underweight	Diarrhea (last 2 weeks prior to interview)	2	14	6.34 (5.74-21.76)	7.38 (6.15-24.32)

Association between under-nutrition and psychosocial and academic performance

Wasting was positively associated with poor comprehension and absenteeism from school. None of the other nutrition parameters were significantly associated with psychosocial and academic performance in children.

Association between under-nutrition and psychosocial performance

The prevalence of children with poor attentiveness was 46% higher in wasted children than in non-wasted children. The prevalence of children with poor attentiveness was 20% higher in stunted children than in non-stunted while the prevalence of children with poor attentiveness was 37% lower in underweight children than in non-underweight. None of the associations were statistically significant

The prevalence of children with poor comprehension was 61% higher in wasted children than in non-wasted children (PR 1.61, 95% CI 1.42-1.82). The prevalence of children with poor comprehension was 2% higher in stunted children and 5% lower in underweight children as compared to the non-stunted and non-underweight counterparts.

The prevalence of children with poor interaction with others was 64% higher in wasted children, 79% lower in stunted children and 36% lower in underweight children as compared to non-wasted, non-stunted and non-underweight children respectively.

Table 5: Association between under-nutrition and psychosocial scores

		Fail	Pass	Prevalence ratio	95% Confidence Interval
Attentiveness					
Wasted	Yes	3	1	1.46	0.81-2.63
	No	76	72		
Stunted	yes	9	5	1.20	0.79-1.82
	No	74	64		
Underweight	Yes	2	3	0.632	0.21-1.86
	No	77	70		
Comprehension					
Wasted	Yes	4	0	1.61	1.42-1.82
	No	92	56		
Stunted	Yes	9	5	1.02	0.68-1.54
	No	87	51		
Underweight	Yes	3	2	0.95	0.46-1.96
	No	93	54		
Interaction					
Wasted	Yes	2	2	1.64	0.60-4.51
	No	45	103		
Stunted	Yes	1	13	0.21	0.03-1.44
	No	46	92		
Underweight	Yes	1	4	0.64	0.11-3.75
	No	46	101		

Association between under-nutrition and academic performance

The prevalence of children with poor arithmetic performance was 28% higher in wasted children, 4% lower in stunted children and 1% higher in underweight children as compared to non-wasted, non-stunted and non-underweight children respectively.

The prevalence of children with poor language performance was 17% higher in wasted children and 25% higher in underweight children as compared to the non-wasted and non-underweight children respectively. There was no difference in the prevalence of children with poor language performance in the stunted or non-stunted groups.

The prevalence of children who had been absent from school at least once in a period of three months was 23% significantly higher in wasted children than in non-wasted children (PR=1.23, 95% CI 1.14-1.33). The prevalence of children who had been absent from school at least once in a period of three months was 19% lower in stunted children and 2% lower in underweight children as compared to non-stunted and non-underweight children respectively.

Table 6: Association between under-nutrition and psychosocial scores

		Fail	Pass	Prevalence ratio	95% confidence interval
Arithmetic					
Wasted	Yes	3	1	1.28	0.71-2.28
	No	87	61		
Stunted					
Yes	8	6	0.96	0.60-1.55	
	No	82	56		
Underweight					
Yes	3	2	1.01	0.49-2.10	
	No	87	60		
Language					
Wasted	Yes	3	1	1.17	0.66-2.08
	No	95	53		
Stunted					
Yes	9	5	1	0.66-1.50	
	No	89	49		
Underweight					
Yes	4	1	1.25	0.79-1.97	
	No	94	53		
Absenteeism					
Wasted	Yes	4	0	1.23	1.14-1.33
	No	120	28		
Stunted					
Yes	8	6	0.81	0.50-1.28	
	No	98	40		
Underweight					
Yes	4	1	0.98	0.63-1.53	
	No	120	27		

DISCUSSION

According to the prevalence range classification by World Health Organization, the prevalence for wasted and underweight reported are low while the prevalence of stunting is in the medium category. [14] This however should not trigger complacency to action, since the findings do not generalize the situation for the entire region.

The prevalence of child under-nutrition reported; wasting, stunting and underweight in the area were lower when compared with the national prevalence reported in the latest national demographic health survey; 4% wasting, 26% stunting and 11% underweight.[5]

In comparison to the larger Siaya County, The proportions for stunting and underweight in Asembo, found by the study, were much lower than those reported for Siaya County in 2014 at 25% and 7.8% respectively. [5]

The findings of this study show that the levels of under nutrition may have decreased in Asembo over the years, going by proportions of stunting (33%) and wasting (7%) reported in 2011 in a paper looking at the burden of common infectious disease syndromes in Asembo. [15] The variance however, may be due

to the fact that Feikin's paper included children from 6 months, while this study looked at children from 36-60 months only.

Asembo is an area covered by the Household Demographics surveillance and survey project, led by Kenya Medical Research Institute in collaboration with Centers for Disease Control of the United States of America. The project closely monitors infectious diseases and quickly refers children and adults for treatment. The project also offers free medical care for its participants in one of the health facilities in the area. The area was also the site that was first used for trials before the introduction of the Rotavirus vaccination. Due to these interventions and increased emphasis on seeking care has led to decreased morbidities and mortalities in the area. [16] Reduced morbidities due to infectious diseases and more so declines in diarrheal diseases may be some of the reasons why the prevalence of under-nutrition seem to have declined in Asembo.

A comparison between the prevalence of under-nutrition reported by the study and those reported by a study conducted in a neighboring county in Western Province, shows that the prevalence of the study area were low, given prevalence of under-nutrition found by the study in Western province were 28.9% stunting, 1.7% wasting and 6.6% under weight.[17] The two studies however concur, in that the levels of wasting in these two close regions were lower than the other under-nutrition indicators.

In a study conducted in Machakos County in Kenya, the prevalence of under-nutrition reported were higher than those that were found in Asembo. The Machakos study reported wasting at 6%, stunting at 38% and underweight at 21%. [29] The similarity between these two studies is that both were school based but the Machakos study targeted children from the age of 2 to 5 years.

Diarrheal episode in the 2 weeks prior to interview was found to be significantly associated with wasting. This finding is concurrent with the findings of a systematic review paper, looking at stunting, wasting and underweight in Sub-Saharan Africa, whereby different papers from Nigeria, Somalia, Ethiopia, Uganda and Kenya, reported diarrheal episode as a risk factor for wasting. [18] Poor appetite, vomiting, deliberate withholding of food resulting in poor intake, malabsorption of macro and micronutrients; hastening of intestinal transit time; disturbance of metabolic and endocrine function; and direct loss of proteins and other nutrients in gastrointestinal tract are some of the known mechanisms which have an impact on nutrition during an episode of diarrhea.[19]

A study conducted in Ethiopia also reported that children with history of diarrheal morbidity in the previous 2 weeks preceding the date survey had higher odds of developing wasting. Delayed

treatment and poor health seeking behaviour and inappropriate home based management of diarrhea may increase the vulnerability of child developing wasting. [20]

This study found that children with stunting were more likely to come from poorer homes than those who came from richer homes as indicated by the wealth quintiles. Studies in Nepal, Bangladesh and Kenya show that children in higher wealth indices are less likely to be stunted than those in lower wealth indices.[21] [22] [23]. The study confirms that poverty is associated with malnutrition in most developing countries.

The study showed that diarrhea was associated with underweight. Children who were underweight were more likely to have had diarrhea in the last two weeks prior to interview than those who were not underweight. This finding contradicts a study conducted in Rwanda, which did not find diarrhea morbidity in the last two weeks as a risk factor for being underweight. [24] In a study conducted in Ethiopia however, diarrhea in the last 2 weeks prior to the interview was found to be associated with being underweight, whereby children who had had diarrhea were more likely to be underweight than those who had not. [25]

This study showed that nutritional status is a predictor of psychosocial and academic performance in pre-school children in the comprehension and school attendance domains respectively. The findings contradict findings from a school based study targeting 3-5 year old children in Indonesia, which found significant associations between stunting and underweight with cognitive development but no significant relationship was observed between wasted and cognitive development. [26]

In a paper looking at determinants of cognitive function in childhood, it was reported that cognitive function was negatively associated with stunting. [27] The findings of this study established negative associations between stunting and interaction of children with other children however, the association was not significant.

In a study conducted in Nigeria on the relationship between child development and nutritional status of under-five Nigerian children, there was no significant association observed between any of the nutritional status parameters and cognitive and language skills tested.[28] The findings of the Nigerian study are in line with the findings of this study as there was no significant association observed between stunting and underweight and the parameters of psychosocial and academic performance used.

CONCLUSIONS

The prevalence of under-nutrition in pre-school children in Asembo area is low. However, breaking down the proportions by age group and gender reveals substantially higher prevalence of under-nutrition in the different children categories.

Child morbidity; particularly diarrhea in the last two weeks prior to the survey and poverty were established as factors associated with under-nutrition. The study did not establish any association between under-nutrition and school water and sanitation characteristics.

The study established a significant association between under-nutrition (wasted) and comprehension of the children and absenteeism from school.

RECOMMENDATIONS

Recommendation is made for studies seeking to establish the prevalence of under-nutrition in pre-school children and the associated factors to be conducted in Siaya County and the region in general, so as to allow for generalization of results.

It is recommended that more studies looking at association between under-nutrition and psychosocial and academic performance be conducted in the country. This will allow for confirmation of the association since there is very limited data of such studies in the country.

It is further recommended that a study using different methodology to obtain the psychosocial scores of the children rather than use the opinion of the teachers, be conducted so as to avoid bias.

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Determinants of Financial Distress in Ethiopia Banking Sector

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Abstract- This study was conducted with the aim of finding the determinants of financial distress in the Ethiopia banking sector. The study mainly employed a quantitative research approach from 2012-2016 using sample data of 15 banks. To comply with the research objectives, the researcher used secondary sources of data. To measure the effect of determinants on financial distress multiple regression analysis would be adopted. The finding shows that Profitability and liquidity have a positive and significant influence on Debt Service Coverage. On the other hand, average inflation, solvability, and firm size have a negative and significant impact on Debt Service Coverage. Therefore, it concluded that micro and macro factors extracted from variables significantly correlated and have even better ability to determine financial distress of Ethiopia banking sector.

Index Terms- Financial distress, regression analysis, Debt service coverage

I. INTRODUCTION

Banking sectors are the backbone of Ethiopia economy. It is one of the important financial pillars in the financial institution that caters necessary financial inputs to produce goods and services which in turn promotes the well-being and standard of living for the people. It plays a crucial role in the development and promotion of the economy and allows the transfer of resource from savers to investors. The problem of financial distress in the banking industry has been of huge concern to all stakeholders of the economy and the world business community at large. Therefore, the issue of financial distress is critical in the area of banking sectors more than other sectors. If the banking sector of a given country faces financial crisis, chances are high that it would lead to general economic crises (Demiguc and Detraigaialche, 1998).

Beaver (1966) was one of the first researchers to point out that financial distress can have different forms of appearance. He defined financial distress as “the incapability of a firm to pay its financial liabilities on time.” Foster (1986) indicates that filing for bankruptcy is a legal event which is heavily influenced by the actions of bankers and other creditors. Andrade and Kaplan (1998) described financial distress as the situation when a company is not capable to pay its liabilities to the third parties or condition whereby a firm does not meet creditor obligations.

According to Altman (2006) firm is financially distressed if it faces four problems (failure, insolvency, default, and bankruptcy). Banks or financial institution will be considered

failed when the government agency or central bank recapitalized the financial institution or when the financial institution required a liquidity injection from the monetary authority; when the operation of the financial institution is temporarily suspended; or when the government closed the financial institution Arena (2008). Also, financial distress is a circumstance when an organization can't keep on existing in its present frame due to lack of sufficient cash Muleret et al. (2009) and a situation in which an institution is having operational, managerial and financial difficulties Adeyemi (2011).

In a general sense, financial distress could be understood as a negative connotation to describe the financial situation of a company confronted with a temporary lack of liquidity and difficulties. Creditor and debtor are the two parties always involved in financial distress. These can include stakeholders, employees, supplier, and providers of external capital. (Hui, H. and Jhao J., 2008).

Most of the former studies of financial distress on the banking sector were focus on financial health conditions and predicted determinants of financial distress of the selected private commercial banks. On the other hand other researchers focus on the causes of financial distress and its effects, the relationship between financial distress and firm performance, Financial Distress and Bankruptcy and other related areas (Ebiringa et al., 2011), (Memba, F. and Nyanumba, J.A., 2013), (Tan, T.K., 2012,) ,(Ephrem. G., 2015), and (Pranowo .K, et al., 2010).

In their previous studies, different authors point different variables as the determinants of firm financial distress. For instance, Pranowo, et al. 2010 classify determinant of financial distress into eight Categories in an emerging market economy: liquidity, leverage, profitability, solvability, efficiency, Good Corporate Governance, Macro Economy and status of financial condition and qualitatively analyzed the data. Additionally, the only study conducted in Ethiopia regarding this issue has done by Ephrem. G (2015) who tried to analyze the Determinants of Financial Distress Conditions on selected private commercial banks by considering non performing loan ratio, Capital adequacy, the ratio of interest income to total revenue, Efficiency, and Size. However, in his study, he used only six selected private commercial banks as sample size and data of one year only (2012/2013). That means the area the researcher tested also specific and it was used limited samples. Thus, to fulfill this gap the researcher used more recent data 2012-2016 (data of five years), the sample size was used more than previous and both government and private commercial banks to create the main understanding for management of banks on the issue and to

contribute the body of knowledge in a way that it adds value to the theory of financial distress. The previous study also did not indicate macroeconomic determinants of the financial distress in the banking sector of Ethiopia. The objective of the research is to determine the determinants of financial distress by combining both microeconomic and macroeconomic determinants of Financial Distress in the Ethiopian banking sector.

The next part of the study is structured and organized as follows. Section two is discussed the background of Ethiopia banking industry followed by literature review, research methodology, framework, analysis, and finding and recommendation respectively. A final part of the paper present conclusion, limitation, and future direction.

II. BACKGROUND OF ETHIOPIA BANKING SECTOR

In the modern economy, the banking sector is considered as the lifeline and play a vital role in the failure or success of economy. It is one of the important financial pillars in the financial institution as the particular and financial system as a whole. A sound banking system efficiently deposits and mobilize saving, deploys and disbursement of credit to various productive sectors to ensure and maintain the economic development of the country. It accepts a deposit from the public for lending or investment which is repayable on demand or otherwise, withdrawable by the means of any instrument whether a cheque or other instrument such as ATM. The banking sector also provides ancillary service such as transfer of funds, a collection of money from the customer, foreign exchange, safe deposit, and merchant banking.

Banking in Ethiopia originated in the first decade of the 19th century with the bank of Abyssinia coming into existence in 1905 based on the agreement signed between National Bank of Egypt and Ethiopia Government. In 1932 Emperor Haile Selassie, closed the Bank of Abyssinia, paid compensation to its shareholders and established the Bank of Ethiopia, which was fully owned by Ethiopians, with a capital of pound Sterling 750,000. From 1936-1941 the operation of Bank of Ethiopia came to a halt, and a number of Italian financial institutions were working in the country. These were Banco Di Roma, Banco Di Napoli, and Banca Nazionale del Lavoro. Agricultural Bank established in 1945 and replaced by the Development Bank of Ethiopia in 1951 and changed into the Agricultural and Industrial Development Bank in 1970.

With the purpose of segregating the functions of central banking from those of commercial banking state bank of Ethiopia divided into the National Bank of Ethiopia and the Commercial Bank of Ethiopia in 1963. In 1974, with falling of Emperor Haile Selassie and coming of Dergue regime on January 1, 1975, all private banks and 13 insurance companies were nationalized and placed under the control of National Bank of Ethiopia.

Thus, from 1975 to 1994 there were four state-owned banks and one state-owned insurance company, i.e., the National Bank of Ethiopia (The Central Bank), the Commercial Bank of Ethiopia, the Housing and Savings Bank, the Development Bank of Ethiopia and the Ethiopia Insurance Corporation. After the overthrow of the Dergue regime by the EPRDF, Several private companies were formed during the early 1990s, one of which is Oda S.C. (<http://www.abyssinialaw.com>)

Nowadays Ethiopia banking sector consists of a central bank (The National Bank of Ethiopia or NBE), two government-owned banks (Development Bank of Ethiopia and Commercial Bank of Ethiopia) and sixteen private banks (Awash International Bank, Bank of Abyssinia, Wegagen Bank, United Bank, Nib International Bank, Dashen Bank, Cooperative Bank of Oromia(s.c.), Lion International Bank, Oromia International Bank, Bunna International Bank, Zemen Bank, Berhan International Bank, Abay Bank S.C., Addis International Bank, Debub Global Bank and Enat Bank. Based on the most recent data, Commercial Bank of Ethiopia dominates the market in terms of branches, total banking workforce, assets, and deposits. (<https://www.export.gov>).

Literature Review

This section of study present relevant literature to the study and classify them under four section. Namely determinants of financial distress, measurement(proxy) for financial distress, and empirical studies in global and Ethiopia context.

III. DETERMINANTS OF FINANCIAL DISTRESS

Firm's liquidity is the ability of an asset to be converted to cash quickly at low cost. Brealey et.al. (2000) suggests that Liquid assets can be converted into cash quickly and cheaply. Liquidity refers to the solvency and ability the firm's to pay short-term liabilities as they come due. Because a common precursor to financial distress and bankruptcy is low or declining liquidity, these ratios are viewed as good leading indicators of cash flow problems Gitman (1991).

Leverage represented a risk to the firm, which covers the portion of the fixed costs. Operating leverage refers to fixed operating cost and measure of operating risk found in the firm's income statement, whereas financial leverage is a measure of financial risk and financing a portion of the firm's assets to rising and grow the return to the common stockholders. According to Shim and Siegel (1998) the higher the financial leverage, the higher the financial risk, and the higher the cost of capital

The firm's Profitability ratios are used to measure the firm's return on its investments Brealey et.al (2000). The research conducted on financially distressed firm suggests staking actions of adjusting the business to increase profitability (Chang-e 2006). There were some researchers such as Hotchkiss (1995) who explored the achievement of bankrupt reorganization firms in US of America and focus on profitability. Financial distress plays a great role in a firm's operation and profitability through the influence of cost implications, such as administrative and legal costs associated with the bankruptcy process (i.e., direct financial distress costs) or increased costs of debt i.e., indirect financial distress costs for example, (Betker, 1997) and (Beaver, 1966).

Solvability is the condition of being solvent; the ability to pay all just debts. In other way is defined as whether something can be resolved and the degree of ease with which it can be resolved. The researcher used equity to total assets in order to see the sensitive to the probability of financial distress (Hotchkiss, 1995). Size is also another determinant of financial distress. The researcher also includes the natural logarithm of total assets, since the size of total assets should be sensitive to the probability of financial distress (Hotchkiss, 1995).

According to Brealey et al. (2000) Firm's Efficiency or turnover ratios measure how productively the firm is using its assets. The firm efficiency is measured in terms of its asset turnover, average collection period and average payment period. These variables indicate the firm's success as well as the speed of turning over its assets within the year, which determines the firm's financial distress.

GDP is measured by the real GDP growth rate and it is hypothesized to affect the banking sector' financial distress in both said mean negatively or positively. This is because the default risk is lower in upturn than in downturn economy (Kevin et al, 2001). High inflation rate is related to higher income as well as higher costs. If a banking sector income rises more rapidly than its costs, inflation is expected to exert a positive effect on financial distress. On the other hand, a negative coefficient is expected when its costs increase faster than its income (Kevin et al, 2001).

Measurement (Proxy) For Financial Distress

According to Lico Junior (2000), debt-service coverage ratio is defined as earnings before interest and income taxes plus one-third rental charges, divided by interest expense plus one-third rental charges plus the amount of principal payback divided by one minus the tax rate. The debt service is interest payment plus repayments of principal to creditors, that is, the retirement of debt. The fixed-payment coverage ratio measures the firm's capacity to meet all fixed payment obligations, such as loan interest and principal, lease payments, and preferred stock dividends. Gitman (1991). The extent of financial distress of a company is determined by the capability to service its debts and rate the commercial debts on the basis of their own credit rating models, e.g. along the recent Basel accords Gruszcynski (2004)

Empirical Literature in Global Context

Financial distress literature specific to the banking sector is limited in number when compared to that of non-financial institutions using bank-level data and aggregate for several countries. Demiguc and Detraigaialche (1998), studied on the banking crisis and they found that growth of both deposits and credit decelerate substantially and the recent crises are not accompanied by fall in whole bank deposits and credit does not decline relative to output.

Carpeto, et al. (2010) examined the power of ten different accounting measures using banks which participated in merger and acquisitions or divestiture deals over the 22 years for a sample of 1,175 banks. The result of the study shown that, a bank should be defined as distressed if the ratio of its non- performing loans to total loans is in the two-maximum fall of the industry, using a three-year moving average.

Pranowo, Koes, et al (2010) conducted research on the determinant of corporate financial distress in an emerging market economy empirical evidence from the Indonesian stock exchange 2004-2008. The results of the study were shown that current ratio (CR), efficiency (Eff), equity (EQ) and dummy variable of the status good financial condition (D3) have positive and significant influences to Debt Service Coverage (DSC) as a proxy of financial distress. On the other hand, leverage (Lev) has a negative and significant relation with DSC. Other variables such as profit, retain earnings (RE), good corporate governance (GCG) and

macroeconomic factor have no significant impact on the status of corporate financial distress.

Nkusu and Muleisen (2011) analyze the link between nonperforming loans (NPL) and macroeconomic performance using two complementary approaches. They suggest that a sharp increase in NPL triggers long lived tailwinds that cripple macroeconomic performance from several fronts.

Tan, T.K. (2012) conducted his study between financial distress and firm performance using a sample of 277 from eight East Asian economies during the Asian financial crisis of 1997-1998. The results from this study reveal that firms with high financial leverage tend to perform worse than firms with low financial leverage. That means high-leverage firms experience worse performance during a crisis.

Empirical literature in Ethiopia context

Andualem (2011) conducted a research on the determinants of financial distress of selected firms in the beverage and metal industry of Ethiopia. In this study, the researcher includes the determinants of financial distress using panel data starting from 1999 to 2005. He used samples of 68 companies selected out of 116 share companies in the beverage and metal industry of Ethiopia. The results show that firm age, liquidity, profitability, and efficiency have positive and significant influences on DSC as a proxy of financial distress.

Deepak Kapur and Abebew Kassie Gualu (2012) examined the relationship of determining the different attributions of the performance measures of Ethiopia commercial banks in their ownership patterns using financial statements of public and private commercial banks in Ethiopia from 2001 to 2008. They indicated that the effectiveness in the utilization of assets and the ability to generating profits from interest earning investments were better in private sectors as compared to public sector banks. Thus, the profitability of overall operations and the bank's interest-earning business was better in private sector banks as compared to public sector banks. That means, ownership structure had an important impact on the profitability of commercial banks in Ethiopia.

Habtamu .B (2013) investigated the financial performance of the Ethiopia Banking sector using the panel data set for the period 2004/05 – 2009/10. The financial performance of the Ethiopia Banks has been evaluated using the volume of deposit, bank assets, ROE, ROA, and loan-deposit ratio /LDR/. The result of the study indicates the Ethiopia banking sector in general, as measured by volume of deposits, granting of a loan and possession of assets has also shown a persistent increase throughout the study periods..

Yohannes T., (2014), conducted a research on determinants of financial distress in the case of Manufacturing Share Companies in Addis Ababa. The result of the study reveals that liquidity, firm size, solvability, leverage, and economic growth are more important determinants of financial distress in manufacturing share companies Addis Ababa-Ethiopia whereas DSC has statistically insignificant relationship with, efficiency, profitability, and inflation.

IV. DATA AND METHODOLOGY

Data source and sample selection

The study intends to determine the determinants of financial distress in the Ethiopia banking industry. Thus, based on the nature of the research problem and the research perspective, this study was mainly employed quantitative research approach from 2012-2016. To comply with the research objectives, the researcher was used secondary sources of data. The secondary data was collected from the National Bank of Ethiopia. It has obtained from annual reports financial statements and website of different banks. This is due to different reasons, firstly it has higher quality in terms of relevance and free from researcher bias, secondly, it has advantage of permanence of data which means a secondary source of data is both permanent and available in a form that may be checked relatively easily by others, thus it will enhance the reliability of data (Kamins and Stewart, 1993 as cited by Yuqi Li 2007). Taking research needs and the compatibility of data into account, the researcher selected the sample data according to the following criteria: excluding those banks establish after 2012 because the researcher needs an annual report and financial statement of five years. The analysis was based on consolidated data from the 2012-2016 financial statements and annual reports of 15 different banks in Ethiopia.

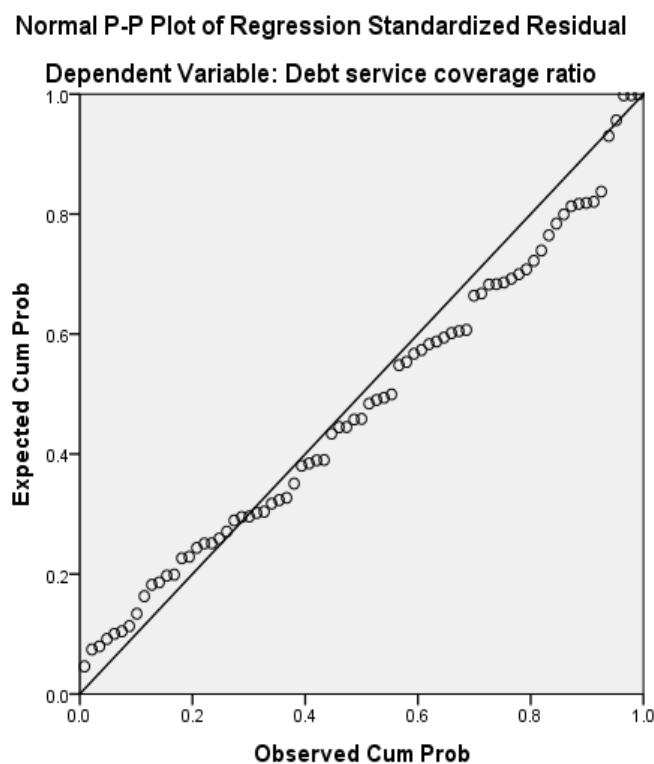
Analysis tools and estimating Methodology

To describe the existing phenomena related to factors that determine financial distress in the Ethiopia banking sector, the

researcher was used descriptive research design. To measure the effect of determinants on financial distress multiple regression analysis would be adopted. Multiple regression is further used to test the associative relationships between variables in terms of the relative importance of the independent variables and predicted values of the dependent variables. Correlation analysis is among the ways into which data have been analyzed to observe the relationship between the variables.

In the assumption of regression model there is no pattern in the errors or disturbance terms which is called autocorrelation. To detect the autocorrelation problem Durbin Watson (DW) test has been used. The result of Durbin Watson test revealed in table 3 imply that there is no evidence for the existence of autocorrelation between error terms. On the other hand, residual diagnostic test was conducted to check normality of data using graphical methods whether disturbance terms was normally distributed or not. The visual result of the normality test in figure 1 below showed that the data were approximately normally distributed. For estimation and selection of modeling between random and fixed effect model Hausman test has been conducted. Based on the result of the Hausman test displayed in table 3 the study used a fixed effect model to estimate the models.

Figure 1. The Normal p-p plot of regression standardized residual



Specification of the model

Debt service coverage ratio can be determined by different variables. In literature, various variables are explained as determinants of financial distress. The present study is conducted to examine and investigate the micro and macro determinant of

financial distress in Ethiopia banking industry. The variable included in the research are Liquidity, Leverage, profitability, solvability, size, efficiency, inflation, and gross domestic product. A study used Panel data multiple regression analysis (PDMRA) with Fixed Effect Model to find the relationship between the

explanatory variables and firms financial distress. Based on a model developed by **Pranowo (2010)**, the researcher examined, developed, and reformulated the following model for the study.

$$\text{DSCR} = \beta_0 + \beta_1 \text{Liq} + \beta_2 \text{Lev} + \beta_3 \text{Pro} + \beta_4 \text{Solv} + \beta_5 \text{SI} + \beta_6 \text{Eff} + \beta_7 \text{AINF} + \beta_8 \text{GDP} + \epsilon \dots \dots \dots \quad (\text{eq3.1})$$

In this, model the debt service coverage ratio has been measured with operating income to installment plus interest payment. The above model is applied to reveal the impact of micro and macro determinants on a debt service coverage ratio which is

used as a proxy of financial distress. β_0 in the model represents the constant value of beta, $\beta_1, \beta_2, \beta_3, \dots, \beta_8$ are coefficient of variables and ϵ portray error terms. The dependent variable is Debt service coverage ratio which measured by EBIT(operating income) divided by installment plus interest payment. Table explain full information on measurement of variables.

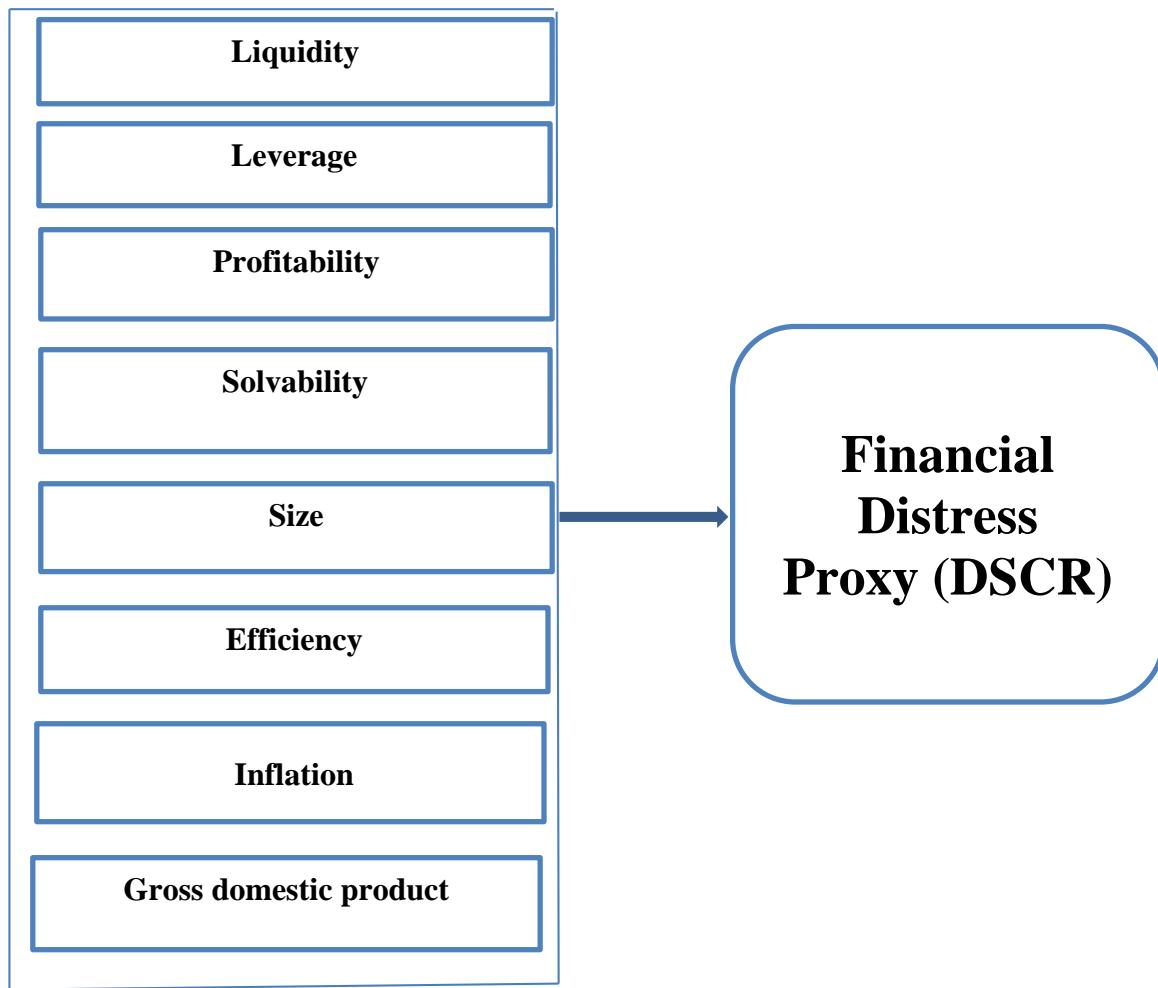
Table 1: Description of variables

Variable	Measurement	Notation
Debt service coverage ratio	Operating income /installment + interest payment	DSCR
Liquidity	Current asset /current liabilities	Liq
Leverage	Total asset /Total liabilities	Lev
Profitability	Net income /Average total asset	Pro
Solvability	Equity /Total asset	Solv
Size	logarithm of total asset	SI
Efficiency	Earnings before Interest and Tax / total asset	Eff
Inflation	Average inflation	AINF
Gross domestic product	Gross domestic product growth rate	GDP

V. RESEARCH FRAMEWORK

The research framework for the study is as follows:

Figure 1. The framework of the analysis



Source: - literature review

VI. DATA ANALYSIS AND INTERPRETATION

To empirically investigate the determinants of financial distress and achieve the objectives stated in the first chapter, all banking companies, their year of service greater than five years, was included. Based on the stated year of service and others reason data of a fifteen banking organization over the period of 2012-

2016 was collected. Therefore, seventy-five (5*15) observations were used to empirically analyzing the determinants of financial distress in the Ethiopia banking sector.

Descriptive Statistics

In this section, descriptive statistics are described in order to understand a summarized picture of data from the different bank. Descriptive statistics are given in table 1.

Table 1: Descriptive statistics

Variable	Minimum	Maximum	Mean	Std. Deviation
DSCR	0.36	2.72	1.4816	0.39599
Liq	1.00	1.60	1.1673	0.10217
Lev	0.62	0.98	0.8513	0.05346
Pro	0.00	0.07	0.0273	0.01298
Solv	0.02	0.38	0.1487	0.05346

Size	8.63	11.47	9.9095	0.55080
Eff	0.31	2.12	1.1271	0.35207
AINF	0.07	0.23	0.1120	0.06020
GDP	0.08	0.10	0.0940	0.00805
Observation	75	75	75	75

The table above shows that, minimum, maximum, mean, and the standard deviation of all nine variables and it indicates the results over the period from 2012 to 2016 in Ethiopia Banking companies which have computed from the financial statements, annual report, and website of the company.

Banks show a mean of 1.4816 in the study period (2012-2016). This indicates that the banking sector has covered their current obligation by 1.4816, with a maximum value of 2.72 and a minimum value of 0.36 which shows banking sector company generates just enough revenues to pay for its debt servicing. Standard deviation is 0.39599, which implies a small difference in debt service coverage in the banking sector. The descriptive statistics of the liquidity variables are shown that the minimum value of liquidity is 1.00 while the maximum value is 1.6, whereas the mean and standard deviation for liquidity is 1.1673 and 0.10217 respectively. This indicates that the liquid asset of the banking sector can be converted into cash quickly.

The minimum and maximum value of leverage ratio are 0.62 and 0.98 respectively, whereas mean leverage TL to TA is 0.8513 and the standard deviation is 0.05346. This is indicated that when comparing total liability to a total asset, the ratio for this banking sector is 85%, meaning equity still makes up a majority of the banking sector assets. The average profitability for the

Ethiopia banking institution during the study period is about 0.0273 and the value of the standard deviation is 0.01298 which implies the presence of moderate variations among the values of profitability across the banking companies included in this study.

The banking sector solvability during the study period (2012-2016) shows a mean of 0.1487 with a maximum value of 0.38 and a minimum of 0.02. A standard deviation is .05346 which indicating lesser deviation or variability in the firm's financial distress in the banking companies during the period of investigation. Mean value of firm size is 9.9095. Hence the highly variated firm size among different banking institution may have a significant impact on debt service coverage in the banking sector that we are going to see in the regression results. The standard deviation of efficiency from the mean is 0.35207 which implies the banking sectors are efficient to cover their debt.

Correlation Analysis

Correlation is a statistical Analysis which measures and analyses the degree or extent to which the two variables fluctuate with reference to each other. It indicates that there is some connection between the variables. It measures the closeness of the relationship.

Table 2: Correlation Analysis matrix

Variables	DSCR	Liq	Lev	Pro	Solv	SI	Eff	AINF	GDP
DSCR	1.000								
Liq	0.400	1.000							
Lev	-0.064	-0.592	1.000						
Pro	0.443	0.035	0.134	1.000					
Solv	0.064	0.592	-1.000	-0.134	1.000				
SI	-0.244	-0.552	0.783	0.063	-0.783	1.000			
Eff	0.207	0.189	-0.086	0.419	0.086	-0.087	1.000		
AINF	0.138	-0.021	-0.111	0.636	0.111	-0.221	0.322	1.000	
GDP	0.221	0.186	-0.019	-0.090	0.019	-0.095	0.146	-0.142	1.000

As shown from the above table correlation analysis indicate the relationship between the variables. If, $r = +1$ there is a perfect positive correlation, if, $r = -1$ there is a perfect negative correlation, if, $r < +0.5$ there is positive correlation and low degree, if, $r > 0.5$ there is positive correlation and high degree, if, $r < -0.5$ there is negative correlation and low degree, if, $r > -0.5$ there is negative correlation and high degree. In other words higher correlation shows a higher level of association between the variable while a lower correlation indicates a lower level of association. Based on the criteria, the result shows that all variables are not highly correlated.

VII. REGRESSION ANALYSIS RESULTS

The empirical model used to test the determinants of financial distress and the values for the regression equation for predicting the dependent variable from the independent variable, as follows:

Table 3: Regression Analysis results

Variable	Coefficient	Std. Error	t-Statistic	prob.
(Constant)	3.481	1.310	2.657	0.010
Liquidity	0.846	0.417	2.030	0.046
Profitability	11.448	3.767	3.040	0.003
Solvability	-2.699	0.993	-2.720	0.008
Size	-0.308	0.095	-3.243	0.002
Efficiency	0.101	0.105	0.967	0.337
Average inflation	-1.667	0.741	-2.249	0.028
GDP	3.404	4.084	0.833	0.408
Weighted	Statistics			
R-squared	0.6140	Hausman Test	Chi-Sq. Statistic	23.041371
Adjusted R-squared	0.5670		Chi-Sq. d.f.	7
Std. E. of the Estimate	.26062		Prob.	0.0017
F-statistic	13.105			
Prob (F-statistic)	0.000			
Durbin-Watson	1.213			
Level of sig.	0.050			

The above table reveals the results of regression analysis reveal that liquidity, profitability, firm size, solvability, and inflation are statistically significant whereas DSC has a statistically insignificant relationship with efficiency and GDP and the overall, F-statistic 13.105 with p-value 0.0000 indicates that the regression model is feasible. This implies that The adjusted value of R square (0.56) indicates that 56 % the dependent variable is explained by the independent variables. That means micro and macro factors are important determinants of financial distress in the Ethiopia banking sector to the extent on average 56%. A positive coefficient of variable liquidity specifies the positive relationship. However, the relationship between DSC and liquidity is statistically significant. The higher the firm's liquid assets, the higher the ability of the firms is covered its fixed charges, and the lower the probability of the firm to go for financial distress. The positive and significant relationship between profitability and DSC of Ethiopia banking sector implies that a higher profitability of the banking sector lower probability to confront financial distress.

The other explanatory variables firm size and solvability are with a negative coefficient sign. However, firm size and

solvability are statistically significant with the lesser p-values and significantly related with the DSC. This predicts that performance of large size banks is better than small size banks to solve financial distress, and the higher the solvability of banking sector means it could ability to pay all debts and low chance to face financial distress. Efficiency and GDP are with a positive coefficient sign and it is not statistically significant with the large p-values. Therefore, efficiency and GDP are not considered as powerful explanatory variables to define the determinants of financial distress in the Ethiopia banking sector over five years. Average Inflation is with a negative coefficient sign and statistically significant with the lesser p-values. If a banking sector income rises more rapidly than its costs, inflation is expected to exert a positive effect on financial distress.

VIII. RECOMMENDATIONS

There are several opportunities for future investigation in this area. First, encompassing all banks as the sample size might be used to get better results of this study. Future researchers can also conduct an analysis by looking at all banks in Ethiopia. But management of banking sector should monitor financial variables

which affect to financial distress, from in the beginning at the stage of early impairment as a symptom of financial distress, deterioration and cash flow problem, when operational cash flow is negative, maintaining and improving liquidity by improving cash collection through aggressively working on deposit mobilization or reducing long-term loan portfolio so that they can reduce the likelihood of financial distress and failure that primarily emanate from liquidity problems. National bank of Ethiopia should also strengthen prudential banking practice that would protect banks from taking excessive liquidity risk. Average inflation appeared as having a significant effect on financial distress, macroeconomic policies should consider these factors to protect the sector from financial distress.

IX. CONCLUSION, LIMITATION AND FUTURE DIRECTION

Nowadays, the issue of financial distress is indispensable in the area of banking sector more than other sectors. The reason behind this is banks are the backbones of a given economy (Bridge 1998). According to (Demiguc and Detraigaalche 1998), if the banking sector of a given country faces financial crisis, chances are high that it would lead to general economic crisis. Understanding the cause of financial distress in the banking industry can help the banking sector to identify the problem related to financial distress before attacking the industry as well as help the company to develop strategies to cope up with a financial distress problem. Therefore, the Ethiopian banking sector should work to protect the industry from financial distress by strengthen prudential banking practice and improving cash collection mechanism.

The results of the present study reveal that some micro and macro factors extracted from variables significantly correlated and even better ability to determine financial distress of the banking sector. Both micro and macro variables covering various variables, which are not considered in the present study, can be further explored as a determinant of financial distress in the banking sector in future studies. For instance, some variables like corporate governance, fraud and corruption, regulation of banks, market value and cash flow, which is not included in this could be considered in future studies. Future studies can be improved to address the limitations of the present study by including an increasing number of banks. Accordingly, the future studies will incorporate all banks in Ethiopia to eliminate this limitation. In other words, although it is impossible to do any research on the Ethiopia banking sector recently, the extended study in the future can cover all the banks in the country. In a nutshell, future studies using more micro and macro variables and all sample banks would provide a more complete understanding of the determinants of financial distress in the Ethiopia banking sector and it would become a useful contribution to the present study.

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DECLARATION

I declare no potential conflicts of interest with respect to the topic "Determinants of financial distress in Ethiopia banking sector" and have not previously been published. The material borrowed from other sources and incorporated in the research has been duly acknowledged.

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Assessment of the Impact of VICOBA in Poverty Alleviation: A Case of Babati Rural District

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ABSTRACT

The specific objectives of this study were; to assess the contribution of VICOBA on livelihood, to identify challenges associated in VICOBA, to identify the number of member benefits from VICOBA and suggest mechanisms to improve the delivery of VICOBA.

This study employed the qualitative research methods and techniques. The traditional quantitative research methods utilizing standardized research instruments such as highly structured questionnaires were not considered appropriate due to the low levels of education of the main category of respondent's namely local villagers. Nevertheless, some quantitative aspects were included in several instances.

Various instruments are available to the researchers for data collection and analysis. It is the researcher who decides the most appropriate instruments to use for data collection. While the positivist researcher is concerned with proving or disproving a hypothesis using scientific enquiry methods, the interpretive researcher is concerned with the context within which behaviour occurs

VICOBA have played a greater role in assisting people with low income and single parents' families. Livelihood has improves in the researched area as discussed in the findings. Members built houses, livestock keeping and paid for their children school fees. A lot can be said about VICOBAs success.

The government should provide education to VICOBA members free of charge. This will enhance the growth of small business in the poor families. It should also try to dish some funds to these community banks so that they gain more capital. Experts from all corners of the country should be encouraged to train members of effectively use of their funds.

INDEX TERMS

VICOBA -stands for Village Community Banks

SACCOS -Savings and Credit Cooperative Societies

INTRODUCTION

Background Information

The history of Savings and Credit Cooperative Societies (SACCOS) is said to begin in the 19th Century in England and in mid-1800s in Germany as small business assistance (Mganga, 2007). In Tanzania, SACCOS goes as far back as the 21st Century where all

people areas where there was living among the African peasants reacting against unfair marketing and processing practices and political discrimination (Mtindya, 2007). SACCOS were narrowed to Village Community Banks (VICOBAs).

Village Community Banks (VICOBAs) is structured in such a way that poor people especially those in the rural areas, are organized in groups and trained in various skills so as to build up their capacity to fight against poverty. Mafuru B (2009). VICOBAs holds a strong belief that even poor people have skills, capabilities and abilities which when unleashed and utilized effectively can help them to attain and improve their economic development and social welfare Alfani, H (2008).

The main aim of VICOBAs in Tanzania is to assist those who do not have possession. People in the villages have formed some groups and plan for what to do. For example, in Minjingu village in Babati district, people formed associations in which they get loans from village bank to run little shops, livestock keeping, milling machines and the like.

According to (Mwalugeni, 2008), the cooperative movement in Tanzania dates as far back as 1932 when coffee growers in Kilimanjaro established the first cooperative societies. The major aim of the societies at that time was to safeguard farmer's interest through availability of well-managed production and marketing activities, with fair prices for inputs and crops sold. In addition, the second aim was to promote Cooperation farmers in an attempt to help Tanganyika's politicians in their fighting for their independence. The same applies to VICOBAs nowadays. It was established to safeguard the lives of low income people. These include jobless, peasants, small business making, and various associations and so on (Bakari, 2009).

VICOBAs in Africa

Village Community Banks started in Africa specifically in Niger (Mbise, 2004). It operated through CARE International under the women group called "Matu Matu Dubara" (MMD), which means "Women in the Move". The main objective was to assist women on the separation problem. Niger women were left by their husband due to civil wars. The wars caused the family income to go down, lack of food/famine, rapping and unrest (Hadji, 2005). This incidence forced the Niger women to form groups for assisting themselves. Few years' later men were allowed to join the groups. The conditions to join were to have referees and also contribution. The higher you contribute the higher you borrow.

VICOBAs in Tanzania

Village Community Banks in Tanzania started in Zanzibar in 2001 (Mbise, 2004). It was introduced to reduce poverty to widow (women without husbands) and increase family income. Women were living having family responsibilities like paying schools for their children, food, house rents and other social life. Some men ran away from their families, others were irresponsible and so forth. From Zanzibar VICOBAs extended to Tanzania Mainland through Mtwara, Lindi and Rufiji district. Later on spread to all over the country.

VICOBAs in Babati

Mbise, (2004) asserts that VICOBAs introduced in Babati in 2002 as a proposal. VICOBAs in Babati operated under other Non-Governmental Organization like Land Management Program (LAMP) and Farm Africa. Thirty (30) people under five (5) groups were organized for VICOBAs training. They were trained short courses for planning, management, by-laws making and project selection. The groups made a study tour to Dar es Salaam in 2003. The purpose of this was to see how other community banks are operating. In Manyara region for example in Babati district there are now 200 groups with 800 million, Simanjiro 178 groups with 600 million and in Kiteto 160 groups with 500 million.

Specific principle of VICOBAs:

VICOBAs have five unique principles which include: membership, savings tailors loans, truth in leading and association with others (Mwangamila, 2000).

Membership Principles:

Membership policy should be to extend service to as many people as possible within the credit unions areas of operation, hence take in as many potential members as possible. However there are cases where credit unions may hesitate to admit to membership when a person;

- Has no purpose in mind other than to borrow money or did not want to become a member until an emergency had occurred and he couldn't get help from anywhere else.
- Membership policy should be to try to include every member of the family and not only the man of the household. This is important because:-
 - i. With development, it is more the housewife who knows from experience where household money needs to be spent.
 - ii. Many youngsters increasingly engage in petty business and therefore need some financial services. Indeed, helping young people on how to use their money wisely maybe a lifetime for them and a good investment for the future of the savings and credit cooperative movement.

Credit union membership should be as broad and inclusive as is legally possible. Thus, besides individual person, membership policy may include organizations of one kind or another. In Tanzania organization membership as laid down under paragraph 80 of the Cooperative Societies Rules 1991 includes: Local authorities, religious organization, labor organizations, charitable organizations or another credit unions. The member organization has only one vote like any other members.

Problem Statement

For the majority of Tanzanians, whose incomes are very low, access to financial services offers the possibility of managing scarce household and enterprise resources more efficiently. Other benefits include: protection against risks, provision for the future, unplanned spending, theft, and taking advantage of investment opportunities for economic returns. For households financial services allow higher standards of living to be achieved with the same resource base, while for enterprises and farmer's financial services can facilitate the pursuit of income growth.

Savings services are among the most beneficial financial services for low-income people. Nearly all households need to save to protect themselves against periods of low income or specific emergencies and to cover large anticipated expenses (like school fees). Enterprises also need to store the value they accumulate from their profits until they can invest them to earn a higher return. Moreover, savings in financial form provide funds for investment by others. Thus, savings services can have a very broad outreach and value.

VICOBA can perform some of the same services as savings and can allow enterprises and families to make some important investments sooner. Enterprises use credit as a source of short-term working capital and longer term investment capital. Households use it to meet consumption needs, particularly during periods when income flows are low, such as during the off-season before crops are harvested, and to make investments such as housing improvements.

Payments and other related services are also valuable to low-income people and to the residents and institutions in rural areas. Payments services can play an important supporting role in the overall profitability of the financial institutions that offer them. In short, VICOBA addresses the financial needs of major sectors of the Tanzania population. They are primarily facilitators rather than creators of the underlying economic opportunities that lead to widespread economic prosperity. VICOBA services are financial in nature. They differ materially from social welfare and resource transfer policies, although they can contribute to the reduction of poverty and improvement of income distribution.

Specific Research Objectives

The specific objectives of this study were; to assess the contribution of VICOBAs on livelihood, to identify challenges associated in VICOBAs, to identify the number of member benefits from VICOBAs and suggest mechanisms to improve the delivery of VICOBAs.

Conceptual Framework

The conceptual framework interlinks Independent, dependent and intervening variables as depicted in figure below.

Independent Variable

This demonstrates the opportunities and services VICOBAs offer that have bearing on performance (dependent variable). In the model VICOBAs variable include financial services in the form of savings, loan, insurance; investment opportunities in the form of shares, proximity, member education and training, safety, liquidity, positive returns; sense of ownership and belonging, convenience and solidarity.

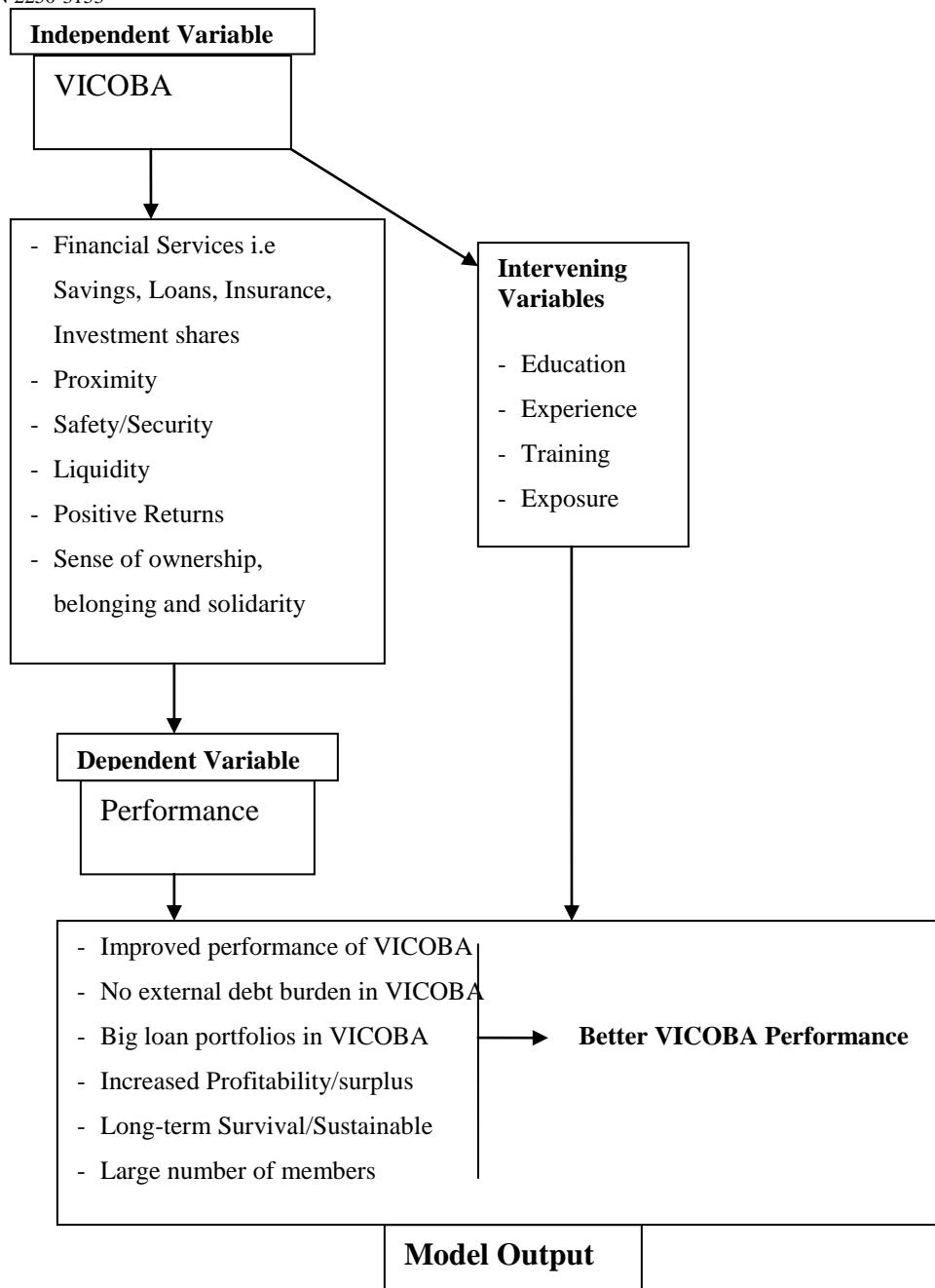
Dependent Variable

These attempt to depict the likely effects on VICOBAs. Performance variables include growth, profitability, sustainability, survival and stability. It is expected that availability of these variables and its associated activities will enhance better performance of VICOBAs.

Intervening Variables

These variables in the model attempt to portray that, whereas VICOBAs activities mentioned above and termed as independent variables are expected to induce improved performance, they may not be the end in themselves. Other factors such as education level, experience and exposure of the management and staffs, political and general government policies may as well have an effect on the performance of VICOBAs. Hence a provision of Socio-economic factors will be vital to form a comprehensive study that is multi-dimensional in nature.

In addition to the above, the VICOBAs is a self-help development scheme guided by ‘self-help’ philosophy and aims fundamentally at increasing members’ prosperity to save first prior to borrowing. This is apparently reflected in their name saving and credit as can clearly be seen in figure 1 below. Therefore, for the VICOBAs to perform better it should motivate its members to save, increase shares, and allow them to borrow wisely.



LITERATURE REVIEW

THEORETICAL FRAMEWORK

SACCOS Performance in Tanzania which later led to establishment of VICOBA

There are over 1,400 Savings and Credit Co-operative Societies (SACCOS) in Mainland Tanzania with a total membership of 200,000, which is very small as compared to the population of the country. Most of them are urban-based, operating on the old traditional model, which is socially oriented. Their total deposits are estimated at Tshs 12 billion. They have been blamed for being weak in terms of record keeping, reporting, and governance. Despite this, SACCOS appear to be the most important institutions through which poverty can be addressed in Tanzania, partly because they operate at the grassroots level. It is on this basis that the government has lately formulated a number of strategies and policies to promote the VICOBAs and the microfinance sector in general (Paschal 2004).

The overall performance of the VICOBAs has been encouraging despite some of their inherent weaknesses. Nevertheless, in view of the important role of VICOBAs in rural financial services in the Tanzanian context, it may be worthwhile to consider replicating the VICOBAs' experiences in the framework of future pipeline activities. To this end, if VICOBAs are to improve, continue and expand their role in rural financial services, they need to be supported through the provision of appropriate capacity building assistance, including training and members' education on savings and credit. This would enable them to upgrade their current level of management, resources, skills, accounting/financial knowledge, assets and overall operating procedures, which would in turn contribute to their sustainability, and make them more effective and efficient (Bibby, 2007).

By Jan 2001, there were 646 registered SACCOS of which 60% were in rural areas. The total shares and deposits of the 40% urban SACCOS outstripped that of the rural SACCOS, this demonstrates the extreme level of poverty of the rural poor, which mostly eke out on existence through small holder farming or small / micro enterprises, whereas members of urban SACCOS are often salaried income earners. However, SACA, and SACCOS are often limited in terms of their capacity, access to capital outreach. There have also been weak linkages between the informal financial institutions and formal banking institutions (Randhawa and Gallardo, 2003).

In addition to that, all SACCOS offer deposit – taking facilities, loans and certain transactional facilities (payment facilities, debit orders, stop orders, money transfers, etc) but the operations of SACCOS and average deposit and loan sizes differ substantially depending on the SACCOS tend to be larger than those of community-based SACCOS as the urban members generally have a higher income than on village level. Similarly, the average loan and deposit of SACCOS with the MFC differs tremendously depending on the level of maturity of the SACCOS, number and type of members (Gerda, 2007).

Performance of SACCOS demonstrates the ability of SACCOS to manage their own finances by using services from different institution, depending on their needs at the time. The growth of SACCOS depends on paid – up share capital increase members deposits increase and outstanding loans to members. Also loan repayment performance of members should also be considered. Loan repayment should be strong with less than 1% of the outstanding loan portfolio in arrears. In order for the SACCOS to demonstrate growth, it should aim to expand its products and services (Gerda, 2007)

The researcher assessed the role of VICOBAs in Babati District in Manyara Region based on the number of members, funds mobilization (paid –up shares + member's Deposit); Lending Activities (Loan Disbursed, capitalized interest, Total repayment, interest paid) VICOBAs deposits with other Financial Institution, Loans taken by VICOBAs from other Financial Institutions, and Repayment of those Loans.

School of thought in Co-Operative Theory

Co-operation is not a system with a single clear cut ideology on which the cooperators of the world agree. These have been some

controversy as to whether:-

- Co-operative are an economic system of its own or
- Those co-operatives are part of other economic systems.

Co-operative theorists have differed over the (appropriate) answer to this question. Thus:-

- One group argues that in co-operatives, the profit motive is eliminated, thus differentiating them from capitalism.
- Contrary to (a) above, group argues that co-operatives do extend the profit motive to more people and in so doing; they indeed strengthen capitalism and thereby broaden its base of operation.

Both groups however agree that co-operation is only a means to an end. It is not an end in itself but a means to achieve a particular goal. But what this goal should be, differs and is expressed in four campus described / known as the co-operative schools of thought as follows:-

The Co-Operative Enterprise of Yardstick or Pace Makers' School or School of Modified Capitalism

This school of thought has its historical basis in the liberalism and practical approaches of Herman Schulze-Delitzsch and Friedrich-wilhelm Raiffeisen (Germany). According to this school of thought, capitalism i.e a competitive economic system is a legitimate mode of life. Co-operatives play only a supplementary role / part so that:-

- If an individual is strong enough economically, to manage a capitalist enterprise, such individual has no need of joining a co-operative. However,
- The economically weak should join forces (co-operate) to attain economic strength and thereby/by so doing, be able to enjoy the benefits of capitalism.

As a result, the aims of the co-operative movement are strictly economic, seeking to increase members' incomes. The primary objectives of the co-operative movement therefore are:-

- Advancement of members' economic interests and
- Protection and maintenance of the economic independence of members, by balancing economic weaknesses through pooling of resources there by achieving economies of scale

The Co-Operative Commonwealth School

This school of thought has its theories emanating from the utopian socialists of the 19th Century – namely: Robert Owen (Britain), Charles Fourier (France) and the Rochdale Pioneers (Britain). Here, the long term objective is to eliminate the competitive capitalistic system and replace it by an economic system based upon mutual co-operation. It visualizes a form of Co-operatives are the dominate type of business organizations

Difficult though it has been to realize, this school of thought has shown the possibilities of having totally Co-operative type of Communities such as the Amish, Hutterite and Mennonites (USA and Canada) as well as the Kibbutz settlements in Israel.

The Socialist Co-operative School

This school of thought is based upon Mirxist – Leninist theory. According to this school of thought, Co-operatives are:-

- Essentially socialist institutions, oriented towards a left-wing ideology (socialism). As such, Co-operatives are public rather than private institutions, hence junior partners' of the state within a centrally planned (socialist) economy.
- Thus economic and social organization on of the working people.

Within this context, the state has commanding and final authority over all economic activities and co-operatives are only a sort of subsidiary to state enterprise. This school of thought has had a following in the (farmer) socialist countries and indeed in Tanzania especially the Arusha declaration.

The Co-Operative Sector School

This school of thought strives some sort of a compromise between the preceding three schools of thought. It advocates that co-operative constitute a distinct economic sector-essentially different from capitalism (enterprise school) on one side, and public enterprise (socialist school) on the other side; but with some features of on and certain features of the other.

It advocates that:

- There should be a mixed economic system wherein co-operatives co-exist with both private business and public enterprise; and that;
- All three – co-operative, private and public enterprises, should complement on another to form a national economy.

This school of thought puts forward the following factors to back it theory:-

- No single system – private, co-operative or state / public has been able build a perfect social order alone.
- Allowed to operate simultaneously the three methods of business will supplement one another, specializing where it is best
- With balanced co-existence of the three, there will be provision for a wide range of conditions and individual initiatives.

The researcher has explained all these principles because they have to be followed by SACCOS if it has to perform well. SACCOS has to bear all the principles for the better performance, but in reality some SACCOS do not follow these principles.

EMPERICAL STUDIES

There are many challenges facing VICOBAs including lack of education and skills among clients and staffs; lack of appropriate technology to reach to increasing number of customers; lack of appropriate strategies to achieve and maintain operational and financial sustainability over the long run; low capacity to provide tailor-made products and conduct research and development programmes; the government's intention to use VICOBAs as a strategy for poverty reduction may jeopardize institutional best practices due to political pressures Gerda, (2007).

Mbise, (2004) studied about sustainability of the 3 VICOBAs in Babati District namely Mwada, Mdori, Minjingu and Magugu. He identified sustainability indicators and concluded that in the three VICOBAs studied he concluded that specific community, technical, financial and political sustainability plans have been established by members themselves so that their VICOBAs continue providing quality financial products and services to the members. The findings of this study have assisted the researcher to identify sustainability indicators and paved the way to study the performance of these VICOBAs.

An assessment on the effect of Grameen and BRAC programmes on eight indicators of women empowerment. Ability to make small purchases, ability to make larger purchases, involvement in major household decisions, relative freedom from domination by the family, political awareness, legal awareness, participation in public protest and participation in political campaign the methodology used was to compare villages where Grameen or BRAC were present, with villages where the two programmes were not. The study concluded that, on balance, access to credit had enabled women to negotiate within the household to improve their positions.

According to Kasilo (2005), the three studies on the Grameen Bank and BRAC as discussed above all used control groups/villages in their Methodology. But since there are difficulties inherent in finding perfect control groups/villages, their conclusions do not mean the end of the debate. They provoke the needs for further similar studies.

Another impact study done in 1988 compared the income of BRAC members with the baseline. The results showed 160% increase in real incomes, 84% increase in employment, and 153% increase in possession of assets.

Fundacion Carvajal Program (FCP) formed to assist micro-enterprises in Colombia took off in 1979. They laid emphasis on business training and education prior to giving credit. An evaluation of the impact of FCP suggested that average employment increased by approximately one – employee per micro – enterprise; family income tended to go up; and business income increased by 45% in

The Kredit Investasi Kecil/Kredit Modal Perja Permanent (KIK/KMKP) was/is a government-sponsored credit Program for indigenous small – scale entrepreneurs in Indonesia. It was established in the early 1979s. By July 1987, 2.5million loans had been disbursed. An impact assessment basing on a sample of 70 small – scale enterprises found that the enterprises hired on average between 2.1 and 4.8 additional workers and acquired additional assets of between Rp 6.9million and Rp 16.2 million. The limitation in this study (and in similar ones) is the assumption that credit was the major determinant of the changes. The Badan Kredit Kecamatan (BKK) or sub district credit institution is a minimalist program in central Java – Indonesia. It predates the Grameen Bank and can claim a pioneer role in showing that the poor, particularly women, are bankable.

A study that sampled 662 clients, who had received an average of 13 consecutive loans from BKK, showed that 60% of the clients were women and 58% had little or no primary education. In terms of distribution by sector, it was found that 53% were in trade, 15% in agriculture 12% in services or repair crafts, 11% in handicrafts, and 7% in agricultural processing. The majority of respondents stated that a majority of BKK loans had a positive impact on the volume of materials purchases; on the variety of goods sold; on the number of customers; on sales volume, and on net profits. 50% stated that the loans had led them to additional employment. Basing on the impact assessment of this study it can be concluded that the extent of BKK real impact may be difficult to estimate.

An impact study on KUPEDES in 1990 found that at the time of their first loan 15/1% of borrowers fell below the poverty line; about 25% of borrowers were women; the enterprises employed an average of 3.4 employees and that the respondents had received three loans averaging US\$ 250/= each. Basing on the sample characteristics it can be said that one limitation of this study was that the sample was biased towards success full borrowers. The study further found that the income of borrowers grew at an average annual rate of over 20%. Total employment in borrower enterprises increased at 18/2 per annum; and that enterprise which borrowed more than the equivalent of US\$ 520, workers per enterprises increased from 3.4 to 5.6 Kasilo et al (2005).

According to Kashuliza, et al (1998) results of the Research on the role of Informal and Semi-formal Finance in Poverty Alleviation in Tanzania: Case of Iringa and Mbeya indicated that there is a significant difference between credit users and non-Credit users in relation to the farm size cultivated (of both food and cash crops in a season) and number of bags harvested. Credit users had consistently higher values for the above. However, the income from crop sales of Credit users was a bit significantly higher than non-credit users. The fact that Credit users show significantly higher crop yields and farm incomes than non-credit users, implies that the use of credit is playing a positive role in poverty alleviation.

THEORETICAL STUDIES

VICOBA enable the users to cultivate large farm areas and to use farm inputs, which would otherwise be difficult to access. Furthermore, an improved crop harvest (yields) implies some improvement in the food security of borrower households in comparison to non-borrowers. Besides, it was learnt from the study that over 95% of farmers who use credit indicated that they had the following benefits from credit consumption: access to farm inputs for intensive agriculture and higher standard of living.

A study by Kasilo (2005) on the impact of Microfinance Programmes on Poverty Reduction in Tanzania in full where by three microfinance Institutions were studies – IFAS/SHERFSP, MEDA, and PRIDE found generally that they have managed to help their customers finance health, and primary and secondary education. However, the three institutions have not touched customers' expectations in all other dimensions of Poverty as operationally defined; to reduce housing and food problems, acquisition of adequate clothing materials, beddings, kitchenware, increasing savings, to name of few.

Anyelwisye (2007), in the study on the Impact of MFI on Poverty Reduction among Smallholder Farmers: Case of selected SACCOS in Dodoma Urban and Kongwa Districts observed that there was an insignificant difference in total Farm Size owned but transport assets between SACCOS Credit borrowers and Non-borrowers were Significant. Further, significant differences were noted between these two Categories with respect to Household's income, expenditure on basic needs, valuable assets, children's education and status and type of labor.

Mwakibasa (2007) asserts that who carried a study on an assessment of the impact of SACCOS towards Poverty Reduction found that members of the Madibira SACCOS – who were once wage earners Labourers but now Paddy farmers have managed to increase the yearly income from between Tshs. 720,000 – 1,440,000/ p. a (when employed) to between Tshs. 2.5million and 10/= million p. a. (when became Paddy growers).

Besides, these members of Madibira SACCOS, using the financial credits managed to improve their shelters from living in muddy and thatches roofed houses into houses made up of bricks roofed with corrugated iron sheets. Some beneficiaries of Madibira SACCOS opened shops, milling machines, Guest Houses, Restaurants and a few brought Minibuses for transportation of Passengers. On top of that member of Madibira SACCOS were able to meet costs involved in primary and Secondary Schools for their children, purchases equipment like T.V Sets,bicycles and Motorcycles.

Tisimi (2007) found that out of 40 respondents, 33 of them (82.5%) acknowledged to have benefited from MOCEMA SACCOS. They were able to solve their emergency problems, reduced vulnerability from risks, stabilized Consumption pattern, bought clothes, build houses, meet treatment needs, pay for school fees, save some of it for future use, obtain capital for small business and create employment.

Another Scholar called Mbise ,(2004) in his study on Role of VICOBA on Socio-Economic Development. Of Babati District observed that VICOBA borrowers were able to hire other people for farm activities and selling in their shops. It revealed that Non-borrowers who constituted 6.7% of all respondents were able to hire for those activities while to VICOBA borrowers (21.6%) of all respondents could do that. Also 58.7% of Non-borrowers were able to buy Pesticides contrary to 62.2% of borrowers. Besides, only 9.3% of Non-borrowers could buy Fertilizers for farm production while 18.9% of borrowers did.

Makombe et al, carrying a study on the credit scheme for productive Activities of women in Tanzania identified, among other things, that women had become empowered to some extent contrary to their husbands in many households. Forty six percent (46%) of the respondents said that the scheme had improved their living standard. On negative side, the study found that 59% of the micro – enterprises financed by the scheme was not sustainable Makombe et al as quoted by Kasilo et al (2005).

RESEARCH METHODOLOGY

Research Approach

This study employed the qualitative research methods and techniques. The traditional quantitative research methods utilizing standardized research instruments such as highly structured questionnaires were not considered appropriate due to the low levels of education of the main category of respondent's namely local villagers. Nevertheless, some quantitative aspects were included in several instances.

According to Denzin *et al* (2000) a qualitative research involves a research process in which the researcher studies a phenomenon in

its natural setting, and attempts to make sense of it or to interpret a phenomenon in terms of the meaning people bring to it. Qualitative research attempts to describe and interpret some human phenomena often in words of selected individuals (informants). It stresses on the socially constructed reality and the situational constraints that shape the inquiry.

The researcher in this approach is required to be clear about respondents' biases, pre-assumptions and interpretations. Some of the important characteristics of qualitative research, as outlined by Davis, (2000) include the phenomenological focus, studying experiences and behavior, the use of natural contexts that cannot be manipulated, and the need for a close rapport and trust between the researcher and the informants. Informants are allowed to tell their own stories and experiences rather than abstractions.

Qualitative approach is appropriate for discovering patterns, through looking closely at people's words, actions and records and examines the meaning, which emerges from the data after close observation, careful documentation, and thoughtful analysis of the research topic. Second, qualitative approach is adaptable to suit new conditions in its research design and data collection. The adaptability of this approach lies in the fact that its research design needs not to be thoroughly designated in advance as it is specified in quantitative research. This is because human behavior is not standardized; rather, it changes accordingly depending on the situation faced. The research, therefore, employed the qualitative approach to allow flexibility to modify the design and data collection methods. The approach was appropriate to the study particularly bearing in mind the level of education of the local communities from the four villages in Babati district.

Research Design

Two common paradigms employed by social researchers in the search for truth include the positivist and interpretive paradigms. The positivist paradigm emerges from the idea that human behaviour is fundamentally governed by rules and should be investigated using scientific methods (Cohen et al. (2000). This is echoed by Johnson (1975) that positivism is firstly, "a complicated philosophy of science which focuses on the factual character of real world observations" and secondly, "a rigorous methodological programme, consisting of a set of formally rational cognitive procedures known as the scientific method". Within this paradigm, positivists use scientific methods to test hypotheses that are then verified by empirical testing. Positivists develop theory well before the research and use scientific enquiry to investigate this theory.

In contrast, the interpretive paradigm is concerned with individuals and endeavors to build theory that emerges from the data yielded from individuals' interpretations of the world around them (Cohen, 2000). The interpretive researcher uses the data from these interpretations to develop theory, which is then used to understand people's behaviour at different times and places. The interpretive paradigm sets the precedent for this research as it attempted to explore the human interpretations of their interactions with the environment and how it guided their understanding of the world around them.

A methodological approach that links well with the interpretive paradigm is the case study. According to Cohen et al (2000), case study "is a specific instance that is frequently designed to illustrate a more general principle". Yin (1988) provides a more technical definition as "an empirical enquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used".

Yin's definition highlights the issue of real-life context as the setting of the investigation where the investigator has little control over the events and multiple sources of evidence are essential to yield data required to illustrate a general principle or phenomenon

investigated. Like other research strategies, cases study “is a way of investigating an empirical topic by following a set of pre-specified procedures” (Yin 1988). It attempts to establish causes and effects and enables the researcher to observe effects of real people in real situations. Yin also emphasizes that case study employs various historical techniques of obtaining information but specifically uses direct observation and systematic interviewing which is not included in the historic techniques.

There are several types of case studies, and Merriam (1988 in Cohen et al., 2000) identifies three types of case studies as descriptive, interpretative (exploratory) and evaluative (explanatory). According to Merriam, descriptive case studies provide narrative accounts while interpretative case studies develop conceptual categories inductively in order to examine initial assumptions; and evaluative case studies attempt to provide explanation and judgment. Merriam also identifies four domains of case study as ethnography, historical, psychological and sociological. It is within the ethnographic domain that this research was conducted.

Ethnography is defined as the work of describing a culture and aims to understand another way of life (Spradley, 1980). This is further described by Brewer (2000 in Bell, 2005, p.16) as “the study of people in naturally occurring settings or fields by methods of data collection that capture their social meanings and ordinary activities”.

Ethnographic research is therefore, a “process involving methods of inquiry, an outcome and a resultant record of the inquiry” that attempts to “create as vivid a reconstruction as possible of the culture or groups being studied” (LeCompte *et al*, 1993). Ethnographic approaches are concerned more with description of a context rather than prediction (Cohen et al., 2000) and result in generalized views of situations or groups studied, thus allowing opportunities for comparison of the data yielded. The comparative nature of ethnographic research enables readers to make meaningful comparisons with similar or dissimilar groups.

The ethnographic approach was preferred for this study because it would enable the researcher to understand the indigenous people’s perceptions of their natural world on forest governance and the related forest practices. Although, the use of ethnographic in field work was very expensive to the researcher particularly interviewing people it was time consuming.

The Sample of the Study

According to Cohen *et al* (2000), a sample is a selected portion of individuals or items that represent the aggregate of the population of the study. The sample of the study comprised of 2 district business officers, 16 VICOBAs leaders, 320 members and 320 non members

Table 1: Composition of the Sample.

Category	Respondents
District Business Officer	1
VICOBAs Leaders	16
Members	320
Non-Members	320
Total	657

Sampling Techniques

Kothari, (2004) define sampling as s a definite procedure of obtaining individuals or items to comprise the sample from a given

population (This study used purposive and Logical Quality Analysis Sampling (LQAS) techniques. Purposive sampling technique was used to select the district business officers, VICOBAs leaders, members and nonmembers. They were selected by virtue of their positions. Logical Quality Analysis Sampling (LQAS) was employed to select number of VICOBAs groups (Lucas, 2008). In this particular study a total number of VICOBAs in Babati 200 (Source; District business officer).

Data Collection Methods

Various instruments are available to the researchers for data collection and analysis. It is the researcher who decides the most appropriate instruments to use for data collection. While the positivist researcher is concerned with proving or disproving a hypothesis using scientific enquiry methods, the interpretive researcher is concerned with the context within which behaviour occurs (Cohen et al., 2000).

This focus on context is vital in that it provides the researcher with insight and understanding of people's behaviour and how this provides meaning for comparison of the events in the current context with what may occur at another location and time. Following the interpretive paradigm this study used interview, observation and documentary analysis as methods of collecting data.

Interview

Interviews are interpretive research methods aimed at understanding and interpreting subjective views. An interview involves "an interchange of views between two or more people on a topic of mutual interest" (Kvale, 1996, p.14) through verbal interactions. According to Brenner et al (1985, p.3), an interview allows both parties to explore the meaning of the questions and answers involved. Interviews may be distinctively characterized by the process of seeking and supplying of information.

The purpose of the interview is to gather information in an attempt to find out what people know value or think. As a research tool, the interview is very flexible. It can deal with a variety of subject matter at different levels of detail or complexity (Brenner, Brown et al., 1985). The use of interviews in research signifies a move away from the traditional view that humans are subjects to be manipulated and towards regarding knowledge as generated between humans through conversations (Cohen et al., 2000). Humans are therefore seen as the central focus for knowledge production and that the social situation in which they exist provides the basis for the research data.

Interviews are various types including structured, unstructured, non directive and focused interview (Cohen et al., 2000). In a structured interview, questions are prepared in advance and organized in a well defined format. This provides the researcher with very little room for alteration due to its close-ended status.

The unstructured interview, on the other hand is, more flexible as the questions are open-ended allowing for more freedom of expression. Non-directive interviews have minimal direction in which the interviewer has minimal control although the respondents have freedom of expressing themselves fully whenever they choose.

The fourth type of interview is focused interview, evolved from the non-directive interview in the search for more researcher control. It allows the researcher to exercise control over the interview process in guiding the respondent to respond within a focus or theme.

The choice of the type of interview is guided by the objective of the study undertaken. This study utilized the unstructured type of interview due to fact, unstructured interview give the researcher to ask a question bases on the response of respondent. Also was

preferable on the bases of ethnographic stance. The participants were informed of the objectives and procedures of the study.

Observation

Observation is a vital feature of the ethnographic case study approach, as it allows the researcher to “collect live data from live situations” (Cohen *et al.*, 2000). It provides the researcher with the opportunity to accumulate rich data and develop an in-depth understanding of what goes on in the area. Observation works well with interviews as together they provide a greater understanding of the context investigated.

Primarily, participant’s observation in this particular study was used to observe the everyday activities in the selected VICOBAs. In addition, participant’s observation was similarly employed to solicit current status of VICOBAs. This method is important for observing things on the ground (direct observation) and collecting necessary primary data.

Focus Group Discussion

A Focus Group discussions (FGDs) is a group discussion of approximately 6-12 persons guided by a researcher/facilitator, during which group members talk freely and spontaneously about a certain topic (Cohen *et al*, 2005). FGD is a qualitative method purposely to obtain in-depth information on concepts, perception and ideas of group members. District business officers, VICOBAs leaders and knowledgeable leaders were guided by the researcher to discuss the impacts of VICOBAs in four selected villages.

Historical trend

Historical trends analysis was done in collaboration with village business officers, members, nonmembers and leaders. The participants recalled major events within their VICOBAs in chronological order and in a participatory manner. They generated information was recorded for latter cross checking and triangulation.

Transect walk.

A transect walk is a tool for describing and showing the location and distribution of resources, features, landscape, main land uses along a given transect (UNDP, 2005). A transect was also used to assess VICOBAs potential strength, weakness, opportunities and threats of VICOBAs.

Documentary Review

Documentary review refers to studying existing documents to obtain relevant data. Denscombe, (1998) maintains that review of records provides more insight into the phenomenon being studied by cross validation and augmenting evidence obtained from other sources. Moreover, it is asserted that documentary review provides a vast amount of information; it is cost effective and provides data that are permanent and available in a form that can be checked by others.

Validation of Research Instruments

Validation of the research instruments is concerned with identifying ambiguities and unclear questions in order to make necessary corrections (Rea & Parker, 1997). No pilot study was done given the time and financial constraints which the researcher had. Nevertheless the researcher asked his fellow postgraduate students in business studies with experience in the governance stance, to review the research instruments critically focusing on the relevance, clarity, and coverage of items as per objectives. Finally, under the guidance of the supervisor, appropriate comments for correction and modification were made before embarking on data collection in the field.

Ethical Issues

Ethical considerations were observed throughout the research process. Ethical issues relating to informed participant consent, confidentiality of participant responses, transcription of interviews, the reporting of findings, and securing of information were

adhered to. This research was undertaken according to the ethics guidelines and procedures outlined by the University of Dodoma. Interviews and observations were undertaken at the time and place convenient to the respondents.

Data Analysis Procedure

Data analysis is a systematic process which involves working with data, organizing and breaking them into manageable units, synthesizing them, searching for patterns, discovering what is important and is learnt and deciding what to tell others (Bogdan and Bicklen, 1992). Qualitative data from interviews were subjected to content analysis whereby they were organized into categorize of themes, interpreted, quantified where necessary and presented in the form of tables, figure or narrations. Qualitative data were computed into frequencies and percentages and presented into tables.

RESULTS AND DISCUSSION

Socio-demographic characteristics

Socio-economic characteristics, namely, gender, age, marital status, education level, residence duration and socio-economic activities of local communities of four villages of Magugu, Mwada, Mdori and Minjingu villages in Babati district are presented.

Gender, age distribution and marital status

About 60.3% of the respondents were males compared to 39.7% for females (Table 1). This balance in sex was chosen to include gender perspectives. Table 3 indicates age distribution of selected respondents. Respondents ageing between 18 to 33 years old were the majority (45.5%), followed by individuals aging 31 to 45 years old (36.2%) and 46 to 60 years old (12.3%). Respective ageing above 61 and above years old whom were minority (7%).

Literacy level

Table 3 shows results on education level. About 3.9% of respondents were educated compared to literate (69.9%) and 26.2% of respondents whom were illiterate.

Table 1: Gender of respondents

Sex status	Response	%
Male	181	60.3
Female	119	39.7
Total	300	100.0

Table 2: Age of respondents

Age group	Responses	%
18-30	137	45.5
31-45	109	36.2
46-60	37	12.3
>61	21	7
Total	300	100.0

Table 3: Literacy level of respondents from selected villages

Literacy level	Responses	%
Form Four and above	89	29.7
Standard Seven	111	37
Never been to school	100	33.3
Total	300	100.0

Table 4: Weekly Contribution of members

Contribution Level (Weekly)	Responses	%
1000 - 5000	100	33.3
6000-10000	91	30.3
11000-15000	74	24.7
16000 and above	35	11.7
Total	300	100

Table 5: Amount of loan offered to members

Loan Level	Responses	%
10000-100000	139	46.3
110000-200000	88	29.3
210000-300000	55	18.3
400000 and above	18	6
Total	300	100

Socio-economic activities

Predominant socio-economic activities of Babati inhabitants are agriculture and agro-pastoralism represent main socio- economic activities. Other important socio-economic activities included formal employment, for example, primary school and secondary teachers, petty trade/business men/women and other entrepreneurs

Contribution Level.

A VICOBIA member seems to of low income. This is due to the amount contributed. Table 4 shows that only 33.3% contribute less than 5000, 30.3% contribute below 10000, not only that but also 24.7% contribute less than 15000 and only 11.7% contribute above 16000. This shows that members are not rich. They are people from poor families.

Contribution of VICOBIA on Livelihood in Babati District

Training facilitation

The banks facilitated training for its members on planning on the nature of business to be conducted by the member, trace opportunities, threats and so on. Project management and selection is also trained by the banks.

Business Skills

Entrepreneurial skills were also taught by the banks. Professionals from that field are hired to equip members on business skills. For examples, business professionals from The Open University of Tanzania Manyara centre are hired by the banks to equip members on this skill.

Agriculture

VICOBA facilitated in providing loans to members. The member uses the loans to buy fertilizers, seeds, power tillers, pesticides, money maker pumps and other agricultural materials hence more harvests. The kind of agriculture that is used by the member is a modern one compared to the previous.

Modern houses

Members built bricks and block houses covered by iron sheets for their families. Before that members were living in mud made houses. In tradition they are known as "tembe".

Milling machines, generators and solar systems

Members were provided milling machines for business. The purpose was to raise their life standards. Two (2) and above people are given the machine and also time to clear the loan. Through VICOBA members benefited to buy generator for domestic uses. A big area of the selected village has no power supply. Solar systems played the same role as generators.

Animal keeping

New animal breeds were given to the members. The kind of breed produces more products compared to the local one. Bulls, dames and poultry were introduced to members. Some members are keeping poultry and these help them to earn a living.

Market business and Shops

Members started to involve themselves in various businesses in markets and shops selling. Some of them buying beans, maize, goats and many other. They buy at cheap price and sell them with profit. For example they buy maize in Gallapo and sell in Mdori and Minjingu. One maize bag in Gallapo is sold for Tshs 35000 and sold in Minjingu for 60000 by June 2011.

Companionship

Some people found friends in VICOBA. Some of them were lost their beloved like wives and husbands. So the place is now comfortable to them.

Challenges Facing VICOBA in Babati

Clearance of loans

It is found that loan clearance is a problem to some members. Some of them misuse the money and at the later stage fail to repay back the loan.

Training and low education

Table 3 shows that 33.3% of the members have never been to school. So to train them on business education is difficult. Majority of them cannot read and write.

Technology (Computers)

Computer literate are few among the members. This makes the work tiresome to the leaders and members. Computers are installed but only few people use them.

Availability of business professionals

Manyara region is among the new regions in Tanzania. It was established in 2002. Higher learning institutions are not in the region. There is only one centre for the Open University of Tanzania. So this make professional scarce.

Big number of people compared to VICOBA

After the non-members saw how the members are enjoying in VICOBA they decided to join the banks. This tendency made number of people to flock to VICOBA.

Geographical location

Babati geographical location is not networked by the roads. There are some places which are not accessible. For example in Mwada village, to reach people around Lake Burunge is difficult. The transport from Mbuyuni to Lake Burunge is the use of bicycles and nowadays motorcycles (bodaboda).

Members who are VICOBAs beneficiaries

Those who contribute more are given more loans. Table 4 shows that only 11.7% of the members contribute from Tshs 16000 weekly. Most people contribute from Tshs 1000.

Mechanism to improve VICOBAs delivery

Business training provision

VICOBAs employed own business experts so that as to facilitate effective training. The classes or venue are expected to build for training. Certificated will be offered to those who will attend.

Creation of business opportunities

VICOBAs design the nature of business to be conducted by its member and advise on it. This helps the members to be able earn profit and make the project successful.

Lowering of interest rates

VICOBAs only give 7% interest. This makes the members to improve in their day to day activities. Other financial institutions offer a 16% to 21%.

Maintaining a number of VICOBAs

The leaders are trying to maintain the number of their banks so that to make them effective. 6 to 20 people form a group. The number is only increased when there is a strong need.

To improve technology

The leader introduced classes for computer training to those members who are in places which access electricity power. For example in Magugu township, Mwada, Mdori and Minjingu.

Cooperation with government and other non-governmental organizations

VICOBAs leaders work together with government. They invite the district business officer to advise them on their issues. Not only are those but also non organization groups working with VICOBAs in Babati. For example Land Management Programme (LAMP) and Farm Africa

CONCLUSION

VICOBAs have played a greater role in assisting people with low income and single parents' families. Livelihood has improved in the researched area as discussed in the findings. Members built houses, livestock keeping and paid for their children school fees. A lot can be said about VICOBAs success.

RECOMMENDATIONS

The government should provide education to VICOBAs members free of charge. This will enhance the growth of small business in the poor families. It should also try to dish some funds to these community banks so that they gain more capital. Experts from all corners of the country should be encouraged to train members of effectively use of their funds.

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Effectiveness of Educational Policy in Curbing School Dropout in Secondary Schools in Tanzania: A Case of Dodoma City

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ABSTRACT

This paper exploits on effectiveness of educational policy is in curbing school dropout in secondary schools in Tanzania, a case of Dodoma City. The specific objectives of the study were to explore the effectiveness of educational policy on alleviating school dropout of secondary schools students, to determine challenges facing educational practitioners in implementing educational policy, to find out the magnitude and growth of drop out in Dodoma Urban, to examine setbacks facing education investment in relation to dropout and to examine the financial and social impacts of drop out in secondary schools

The results from the study revealed that all respondents (the DEO, WECs, HOS and Class teachers) responded positively to the question which asked: ‘what is your opinion on the dropout policies in place, is there a need to be changed?’ Their response was that the policies have no problem. They are sufficient in content and are self-explanatory. The only problem is the implementation process. The people to who are supposed to implement the policy are not aware enough to make the process successful, and make the set policy objectives realized. Therefore, to a great extent the government policy is effective in addressing the dropout problem, the issue is implementation. Though there is a clearly laid out policy to address the dropout of students from secondary schools, the policy has not been quite effective in alleviating the problem. As a result the problem of dropouts in secondary schools still persists due to the explain factors.

There is a need for the government, more specifically, the Ministry responsible for Secondary Education to re-examine the policy on retention and dropout of students from secondary schools in order to come out with a more effective policy, Heads of schools should work more closely with the DEO for secondary schools, as well as their teaching staff so as to curb the problem of student dropout, Parents and guardians should be sensitized on the need for them to make a close follow up of their children regarding attendance to school and the government should improve remuneration for teachers so as to motivate them to perform their duties more effectively.

INDEX ITEMS

Dropout: A student who for any reason other than death leaves school before graduation without transferring to another school (Kotwal, Neelima and Rani, 2007).

Policy: A statement or pronouncement which outlines a doctrine and principles as a guide for action(s) or decisions in a particular area of social and economic development (Mlawa, 1996:3-4).

Policy Implementation: Is the testing of hypothesis about how to solve social problems throughout the formulation phase (Walker, 1989: 10).

Circular: A printed document, notice issued by an education authority at central or local government level and sent to different people/stakeholders at the same time (Longman Dictionary of Contemporary English, 2006: 265).

Education: It is a process by which the individual acquires knowledge and skills necessary for appreciating and adapting to the environment and the ever-changing social, political and economic conditions of society and as a means by which one can realize one's full potential. OR Education is the process of initiating and preparing an individual through training, in his/her environment, to play active roles in society (ETP, 1995: i and viii).

INTRODUCTION

1.1 Background

Dropouts in schools is one of the major forms of wastage in education and if not curbed could lead to poor student completion rate in most schools. Dropping out of school in most cases does not only result into wastage of students but also leads into wastage of financial resources, for example a student dropping out at the level of form three or four means a great loss as a lot of costs have already been incurred on her/him (Bunto, 2002). Also, time is wasted as well as loss of future manpower. Hence, there is a need to adopt appropriate education policies so as to address the problem. In addressing the drop out problem in the education system, the government of Tanzania has adopted several policies which are in place.

Currently, there are several policies which include policies that try to reduce dropouts in schools such as "No Child is Left Behind Act of 2001" in the USA. The Education Act of 2002 which has replaced the National Education Act of 1978 in Tanzania is in Part V(C): Section 35(3), the Education Act which states that: "Every pupil enrolled at any school shall regularly attend to school at which he/she is enrolled until he/she completes the period of instruction specified in respect of the level of education for the attainment of which he/she is enrolled at the school. In addition, the parent(s) of every child enrolled for education shall ensure that the child regularly attends the school at which he/she is enrolled until he/she completes the education cycle (Education Act No. 25 of 1978:266)".

Therefore, one can deduce that the policies to prohibit dropping out of school are in place and should be implemented effectively. However, in terms of implementation, these policies have been ineffective particularly in Tanzania as the statistics of dropouts continue indicating their increase. Table 1.1 shows the number of dropouts and enrolment in

different zones of Tanzania Mainland, for the period of six consecutive years (2002-2007). The zones and their respective regions in brackets include: Central Zone (Dodoma, Singida); Eastern Zone (Morogoro, Pwani, Dar-es-Salaam); Lake Zone (Kagera, Mara, Mwanza, Shinyanga); Northern Zone (Tanga, Arusha, Manyara, Kilimanjaro); Southern Zone (Lindi, Mtwara); Southern Highlands Zone (Mbeya, Iringa, Ruvuma); and Western Zone (Tabora, Kigoma, Rukwa).

Table 1.1: Total Dropout and Enrolment by Zone in Tanzania Mainland Government and Non-Government Secondary Schools, Form 1-6 (2002-2007)*

S/N	ZONES	TOTAL ENROLMENT	TOTAL DROPOUTS	PERCENTAGE DROPOUT
1.	SOUTHERN HIGHLANDS	197,848	4,090	2.1
2.	LAKE ZONE	226,718	3,628	1.6
3.	NORTHERN ZONE	232,565	2,191	0.9
4.	CENTRAL ZONE	64,060	1,371	2.1
5.	WESTERN ZONE	81,002	1,190	1.5
6.	EASTERN ZONE	181,069	1,100	0.6
7.	SOUTHERN ZONE	37,248	395	1.1
	GRAND TOTAL	1,020,510	13,965	1.4

*Source: Modified from BEST (2007: 69 and 91-94; Regional Data)

According to Table 1.1, when one looks only at the dropout totals she/he can assume that the Southern Highlands Zone is leading for dropout cases while the Southern Zone is the least. However, in actual fact the opposite is true because total enrolment is lowest in the Southern Zone than all other zones. For example, it is about 6 times less than that of Northern and Lake Zones, and 5 times less than total enrolments of Southern Highlands and Eastern Zones, respectively. Frankly speaking, the Central Zone (Dodoma and Singida) leads for secondary school dropouts, with 1,371 dropouts (2.1 percent) out of 64,060 the students enrolled between 2002 and 2007. On the other hand the Northern Zone has the lowest dropout rate, 2,191 (0.9 percent) out of 232,565 enrolment, which is the highest of all zones in the country.

It should be noted that education is a fundamental right of every citizen of the United Republic of Tanzania. For that case, the government has decided to provide quality primary education for all children of school going age. So it is a must to enroll all the school going age children; they have to attend and complete the cycle of the education level to which they are enrolled (Education and Training Policy, 1995). It has been observed that there are different forms of drop-outs with diverse causes which include: early pregnancies; truancy; illness, economic constraints and parental

role performed by the student while schooling due to HIV/AIDS pandemic, to mention a few (BEST, 2008:72; National Data, 2004-2008).

However, one of the major problems that have caused a lot of student dropouts is pregnancy. It is mainly influenced by moral decay in the contemporary society where even aged male adults who are parents are involved in love affairs with young female students. Girls' pregnancies are at times accelerated by: lack of parental care for children, family education level, as well as the family's poor economic status that forces some female students to indulge in immoral behaviors like commercial sex as a means of earning income (WEC, Msalato Ward, 2009). Sometimes pressure from peer groups exacerbates girls' early unwanted pregnancies. Girls pressurize each other to have boyfriends, hence, find themselves engaged in irresponsible sexual relations resulting into unexpected pregnancies (WEC, Msalato ward, 2009). Unfortunately, school rules and regulations in Tanzania do not allow both male and female students to commit fornication or adultery. One regulation states: "Any student (boy or girl) who is evidently proved by the school administration to be engaging in fornication will be instantly expelled from school. Worse still, if that action (fornication) has led to pregnancy (to a girl) or to a boy causing pregnancy, both will be discontinued from studies, hence becoming dropouts (HSGB, 1997:47- 48)".

On the other hand, truancy is also a leading reason for dropouts in Tanzanian secondary schools, followed by lack of school needs especially for students from families with poor economic status. Other factors which include: illness, parent/guardian illness as well as death are negligible. The stated factors are minor because proportion of students who dropout for such reasons in every region is very minute. For example, in Dodoma region in 2007, about 1,021 students dropped out of secondary schools for different reasons. However, those who dropped out because of illness were only 7(0.6 percent), and no student dropped out due to death or parent/guardian illness. While dropout figures for truancy, pregnancy and lack of school needs were 740 (72.5 percent), 56 (5.5 percent) and 42 (4.1 percent) respectively.

1.2 Policies Governing School Activities

School heads are guided by the HOSGB. This guide book clearly proclaims that: "All secondary schools in Tanzania should have one stand point. Laws and Principles of secondary schools should adhere to the following eight aspects:- Discipline/Respect; Attendance; Evening preparations (for boarding scholars); Punctuality; School uniforms; School boundaries; Cleanliness (of body and environment); and Dining hall (HSGB, 1997: 42-47).

To ensure that the government is concerned with the dropout of female students, a stern policy is in place and intends to take measures against those who have caused girls to drop out of their studies.

Moreover, the circular Number ED/OK/C.2/III/134 proclaims that: once the offence is committed, the concerned HOS/HT in collaboration with the School Board/Committee will present the issue to the District Commissioner (DC) concerned, so that the issue is forwarded to the judicial court. In case a student is raped, the "Law of Rape No. 4 of 1998" will apply. On top of that, every HOS/HT will keep records of all pregnancy and marriage cases of female students and actions will be taken against the offenders. Such records will be sent by the District Education Officers/Regional Education Officers to the Chief Education Officer after every three months (January, April, July and October). This circular number ED/OK/C.2/III/134 replaced Circular No. 6 of 1998 and came into effect on April 15, 2004. Something new in the new circular that was not there in the old circular of 1998 is that, the new one has

clarified the rate of fine, and jail penalty duration, against the culprits, whereas the old circular did not contain such details.

Truancy is also one of the forms of dropout in Tanzanian schools. By “truancy” here it means a state of being regularly absent from school without permission (Cambridge International Dictionary of English, 1995:1562). Thus, a pupil who is regularly absent from school without permission is a truant. Truancy is more pronounced in pastoral and commercial oriented societies (regions), and it is the boys who are mostly affected when compared to girls. For example, in 2005 and 2007 there were more boys who missed school than girls in Dodoma, Mara, Manyara (pastoral zone) and Kilimanjaro (commercial zone).

In such regions, the number of truants' boys to girls in percentage was: 51.8 to 48.2, 50.4 to 49.6, 56.6 to 43.4 and 52.4 to 47.6, respectively as in Table 1.1. Despite these rules and regulations being in place, there is a persistent increase in number of dropouts in different regions in Tanzania.

The ten leading regions described in Table 1.2 can be categorized into four major economic zones or clusters, namely:

- Pastoral zone (Dodoma, Mara and Manyara); Mining zone (Mwanza and Shinyanga); Commercial zone (Kilimanjaro Region) and Agricultural zone (Iringa, Mbeya, Ruvuma and Kagera). Such economic activities are gender oriented. For example, more males are engaged on pastoral, mining and commercial activities than females. Probably that is why boys' dropout aggregates are higher than those of girls in Dodoma, Mara, Manyara and Kilimanjaro

On the other hand, agricultural activities seems to be a female occupation as huge number of girls dropped out of schools in 2005 and 2007 in Iringa, Mbeya, Ruvuma and Kagera regions. Probably, they were involved in agricultural activities to labor as farm workers or domestic servants as this is a common practice especially for young females in Iringa

Region

TABLE 1.2: Dropout by Region, Sex and Reason in GVT and NGT Secondary Schools, Form1-6 for 10 Leading Regions, 2005 and 2007*

	SCHOOL TYPES	GVT SEC. SCHOOLS (A)							NGT SEC. SCHOOLS (B)									GRAND TOTAL
	REASONS		TRUANCY			PREGNANCY			GROSS TOTAL	TRUANCY			PREGNANCY			GROSS TOTAL		
S/N	REGIONS/ SEX	YEAR	B	G	T ₁	B	G	T ₂	T ₁ +T ₂	B	G	T ₁	B	G	T ₂	T ₁ +T ₂	A+B	
1	IRINGA	2005	130	165	295	0	44	44	339	50	47	97	0	9	9	106	545	2,668
		2007	863	1088	1951	1	52	53	2,004	44	66	110	0	9	9	119	2,123	
2	MWANZA	2005	115	122	237	3	39	42	279	56	60	116	0	5	5	121	400	1,766
		2007	567	586	1153	0	66	66	1219	57	84	141	0	6	6	147	1,366	
3	MBEYA	2005	88	135	223	4	54	58	281	125	110	235	0	9	9	244	525	1,291
		2007	277	314	591	5	67	72	663	50	48	98	0	5	5	103	766	
4	K/NJARO	2005	271	254	525	0	35	35	560	95	59	154	4	6	10	164	724	1,155
		2007	196	170	366	0	32	32	398	14	18	32	0	1	1	33	431	
5	DODOMA	2005	167	68	235	0	26	26	261	10	14	24	0	0	0	24	285	1,081
		2007	330	394	724	0	56	56	780	7	9	16	0	0	0	16	796	
6	S/NYANGA	2005	134	170	304	0	35	35	339	45	29	74	0	7	7	81	420	996
		2007	214	216	430	0	50	50	480	32	34	66	0	0	0	66	546	
7	RUVUMA	2005	122	123	245	0	67	67	312	21	25	46	0	24	24	702	382	985
		2007	246	218	464	7	100	107	571	16	6	22	2	8	10	32	603	
8	KAGERA	2005	161	191	352	0	33	33	385	12	9	21	0	4	4	25	410	947
		2007	238	225	463	0	60	60	523	3	11	14	0	0	0	14	537	
9	MARA	2005	147	144	291	0	20	20	311	53	72	125	0	6	6	131	442	788
		2007	144	142	286	0	43	43	329	10	7	17	0	0	0	17	346	
10	MANYARA	2005	120	162	282	0	8	8	290	11	19	30	0	2	2	32	322	782
		2007	274	140	414	17	28	45	459	0	0	0	0	1	1	1	460	

Also, from Table 1.2, the rate of increase in the number of dropouts is more scaring in some regions than in others. Iringa, for example ranked first, followed by Mwanza and Dodoma. From 2005 to 2007, dropout rate increased by 289.5 percent, 241.5 percent and 179.3 percent in Iringa, Mwanza and Dodoma respectively. However, there was a decrease in dropout rate in other regions especially Kilimanjaro (40.5 percent) and Mara (21.7 percent).

In addition, statistics show that, dropouts in GVT secondary schools are significantly higher than in NGT secondary schools. For example, in both years for NGT schools, Manyara had the least number of dropout followed by Kagera and Dodoma. The three regions had 33 (29.5 percent), 39 (34.8 percent) and 40 (35.7 percent) dropouts respectively (BEST, 2007: 91-94). Therefore, there was a need to find out as to why dropout is high in GVT secondary schools but low in NGT ones despite the anti-dropout government policies in place. In general, these regional data show that for both reasons (pregnancy and truancy) in both years (2005 and 2007) in the ten regions, more girls dropped out of school than boys.

BEST (2008:72) reveals that: "In 2007, dropout caused by pregnancy tripled to 21.9 percent when compared to previous years. This is because some parents do not take education of their children seriously. They do not inquire about progress and performance of their children in school". In a related vein, Mwananzila (former Deputy Minister for Education argued: "In some cases, especially among the pastoral communities parents demanded that boys look after livestock instead of going to school. Awareness levels were, however, rising among those communities and more of their children were going to school. We are getting good reports from Manyara and Arusha regions, where the Maasai children are now allowed to go to school".

Women activists have accused the government of delaying a review of the law on marriage, especially the provision that allows a girl to marry at 14 or 15 years. "The government should make it illegal for a girl to be married at an age younger than 18 because she is still a minor as far as the country's constitution is concerned", said Ananilea Nkya, Director of the Tanzania Media Women Association. The Law of Marriage Act (1971) allows a girl as young as 14 to be married.

This study therefore, intended to investigate the effectiveness of government policy in combating students' dropout in secondary schools in Tanzania. Also, this introductory section is geared to present the background to the problem, statement of the problem, objectives of the study, research tasks, and significance of the study as well as conceptual framework of the study.

1.3 Dropout rate in Tanzania

Among the challenges that are facing the education sector in Tanzania today is the way to address different forms of school wastage in education especially dropouts as it is threatening the development and rapid expansion of the secondary education sector. A good system of education must be effective not only qualitatively but also on the quantitative aspect specifically ensuring access to and retention of students in schools (ETP, 1995: Foreword). The education sector in Tanzania is confronted by a problem of high dropout rate. The Secondary education sector in particular has been noted to have a high dropout rate leading to a substantial number of secondary school children failing to complete form four (World Bank, 2001). To address the problem government policy proclaims that: "The parent or parents of every child compulsorily enrolled for primary/secondary education shall ensure that the child

regularly attends primary/secondary school at which he/she is enrolled until he/she completes primary/secondary education" (Education Act: CAP 353 R.E. 2002: 18; Section 35 (2))."

BEST (2004-2008: 72; National Data), dropout rate in secondary schools is higher than retention rate and keeps on increasing year by year as described in Table 1.3.

Table 1.3: Transition Rates Form 1 to 4 for 2003/2004 - 2007/2008*

Transition	Transition Rates	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008
Form 1-2	RR	2.0	0.8	0.3	0.4	1.2
	DR	0.2	2.0	2.0	1.9	2.4
Form 2-3	RR	6.5	7.0	6.0	4.5	5.2
	DR	14.2	15.0	20.4	7.5	2.4
Form 3-4	RR	1.8	1.4	0.7	1.4	2.5
	DR	5.3	4.6	7.2	3.9	3.3
AVERAGE	RR	3.4	3.1	2.3	2.1	3.0
	DR	6.6	7.2	9.9	4.4	2.7

*Source: BEST (2008: 72; National Data)

KEY: RR= Retention Rate DR= Dropout Rate.

Table 1.3 shows that the rate of dropout in Form 1 increased by about 2.2 percent from 0.2 percent in 2003/2004 to 2.4 percent in 2007/2008. However, there was a decrease in dropout rate for Form 2 to 3. It decreased from 14.2 percent to 2.4 percent in 2007/2008. Likewise for Form 3 to 4 dropout rates declined from 5.3 percent in 2003/2004 to 3.3 percent in 2007/2008. In general, for all the five years dropout rate was higher than retention rate as given in Table 1.3.

It has been observed that school dropout is more serious in community secondary schools than in other categories of secondary schools probably because of various factors like poor learning environment (poor physical and learning resources), and inadequate teaching staff some of whom are less qualified teachers. The main issue raised concerning such teachers is that their professional training was of a short one, conducted in July 2006 and 2007. Form 6 leavers were prepared to teach in secondary schools on 'crush program' basis. These factors discouraged students to stay at school.

To deal with such shortcomings, the Ministry of Education took the following steps: First, it ceased conducting such programs, thus from 2008 crush program is not in operation. Second, all crush program teachers were ordered to upgrade themselves academically and professionally within 5 years by undergoing teacher education training programs offered by the Open University of Tanzania; Teachers' Colleges and other universities offering Education degree programs like St. John's University of Tanzania, Dodoma University, University of Dar es Salaam, among

others. Third, the Ministry resumed the former 2 years diploma teacher training program entailing academic (content) and methodology (MoEVT, 2008).

1.4 Extent of Dropout rate in Secondary Schools

Generally, the statistics on dropout rate by reason in secondary schools for Forms 1-6 from 2003 to 2007 are as presented in Table 1.4.

Table 1.4: Dropout by Reasons in Secondary Schools, 2003 – 2007*

Years /Percent	2003	%	2004	%	2005	%	2006	%	2007	%
Truancy	8,071	63.2	6,912	60.0	7,734	62.6	9,600	68.8	6,016	33.2
Pregnancy	776	6.1	772	6.7	993	8.0	904	6.5	3,965	21.9
Death	77	0.6	180	1.6	11	0.1	5	0.0	1,254	6.9
Illness	0	0.0	0	0.0	149	1.2	150	1.1	1,124	6.2
Parent/Guardian Illness	0	0.0	0	0.0	42	0.3	15	0.1	469	2.6
Lack of School Needs	0	0.0	0	0.0	884	7.2	727	5.2	2,348	12.9
Others	3,853	30.2	3,649	31.7	2,550	20.6	2,554	18.3	2,956	16.3
Total	12,777	100.0	11,513	100.0	12,363	100.0	13,955	100.0	18,132	100.0

*Source: BEST (2008: 72; National data)

Therefore, with reference to policy statements as well as previous studies and Basic Education Statistics in Tanzania from MoEVT, it was imperative to find how effective the education policy is, on combating the dropout problem in secondary schools in Tanzania.

1.5 Problem Statement

Dropouts in secondary schools have been one of the main problems facing the education sector in many developing countries, Tanzania inclusive. Several studies have been conducted to address this problem and numerous causes. The same applies to this study.

Grimsrud and Stokke (1997) reported that besides, more than half of the school-aged children worldwide receive no primary education suggesting that they might be in the informal labour market. Estimates show that about 80,000 new children are recruited globally into child labour every day of which most of them are from poor and marginalized families.

In addition, most of the studies done, have concentrated mainly on the causes and impact of dropout in secondary schools. For example, the study by Millanzi (2005) on patterns and causes of dropouts in community secondary schools which found out that there is higher dropout in remote rural located than urban situated community secondary schools, mainly caused by poor school environment especially inadequate teaching staff, and teaching/learning facilities like books, laboratories, library, thus exacerbating truancy in such schools.

It has been found that 30 percent of Tanzanian children enrolled in school fail to complete seven years of primary education, while in secondary schools, the dropout rate is 20 percent (Daily News, June 8, 2007). Pudenciana Temba, in the Daily News of September 10, 2008 reported that many of the children who dropped out of school ended up being exploited in many ways since they become employed in the informal sector as farm workers, miners, domestic servants, prostitutes and often under abusive and exploitative conditions. In rural Tanzania, for example, one out of three (33.3%) children between the ages of 10 and 14 years work outside their families.

There have been a number of efforts undertaken to deal with the drop out problem such as punishing irresponsible parents as well as employers of such children. In addition, the government emphasizes equality in access to and retention in schools but still dropout rate is increasing time after time.

Therefore the existence of drop out in secondary schools provides a rationale to investigate the effectiveness of educational policy in Tanzania.

1.6 Specific Objectives

The specific objectives of the study were to explore the effectiveness of educational policy on alleviating school dropout of secondary schools students, to determine challenges facing educational practitioners in implementing educational policy, to find out the magnitude and growth of drop out in Dodoma Urban, to examine setbacks facing education investment in relation to dropout and to examine the financial and social impacts of drop out in secondary schools

1.7 Public policy implementation process

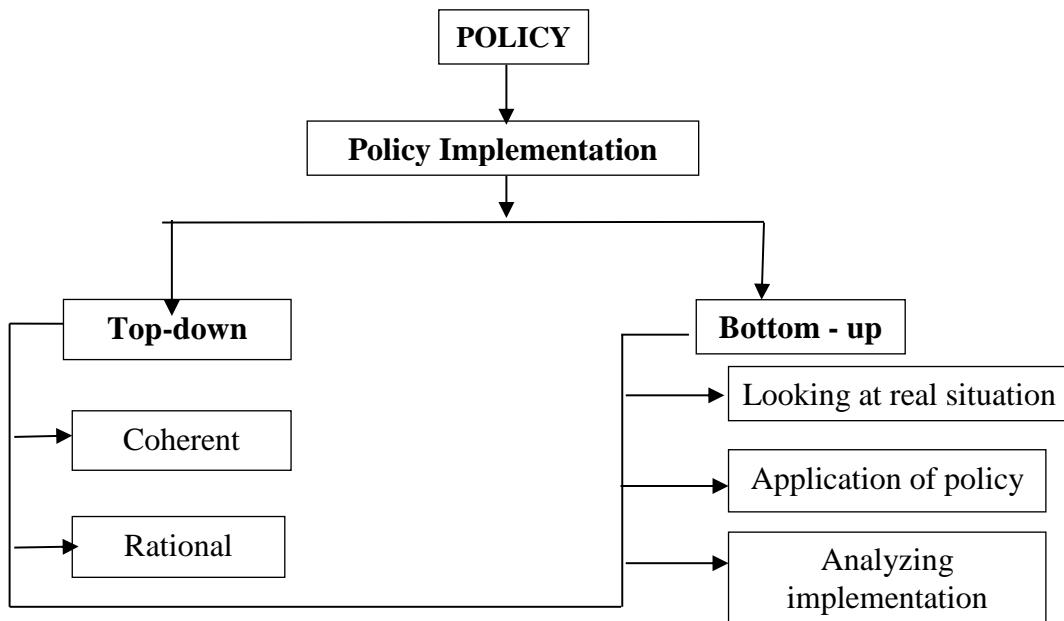
The formation and implementation of policies are different issues in theoretical and practical terms. Implementation is more complicated, being concerned with political, financial, administrative and socio-economic issues. It requires motivation, proper lobbying, and technical, professional and administrative support (Khalid, 2001:87-92). This is simply because the way things are interpreted by each individual can affect the implementation process. This is purely related to the Tanzanian context in that one cannot talk of successful government education policies' implementation out of political will consideration, financial support, and existence of competent and committed administrative staff as well as public social economic status. A combination of these ingredients brings about effective policy implementation.

1.8 Implementation Models

Policy implementation and evaluation are, in the classical sense, the final stages of a policy program (Ham & Hill, 1983:96). This, in itself, suggests the traditional view of policy as finite rather than as phases, evolutionary or cyclical. Implementation has been viewed as the missing link between policy decision-making and policy execution (Hargrove, 1975, cited in Lane, 1990:21).

In a short survey of implementation models conducted by Lane (1990:22-32), implementation was identified variously as perfect administration, policy management, evolutionary learning, structural outcomes, perspectival mapping, political symbolism, ambiguous, advocacy coalitions, normative and utilitarian. These examples fall into two categories: those which appear coherent and rational, viewing implementation as directed from the top; and those which look at the real situation, the application of policy, analyzing implementation from the bottom up, as illustrated in the Lane Model shown in Figure 1.1.

Figure 1.1: Implementation Model*



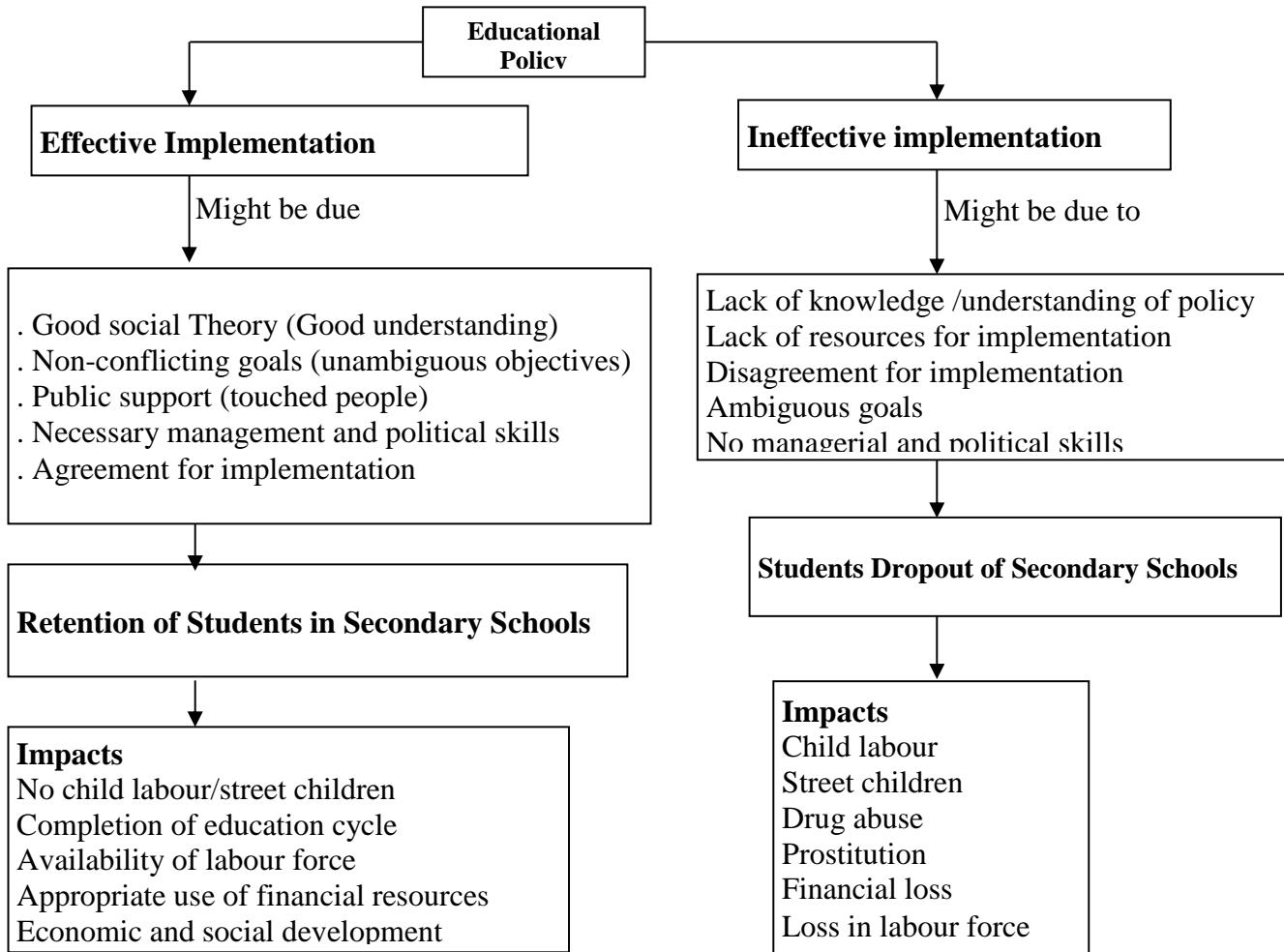
*Source: Extracted from Lane (1990: 22-32)

In Figure 1.1, one can deduce that, a number of factors are responsible for effective government policy implementation process, as follows: - If policy implementation is top-down in nature, then it should be coherent and rational; whereas if it is bottom-up then there is a need to look at the real situation, to assess applicability of the policy, as well as to consider analysis of the implementation process.

In addition, implementing agencies must have the necessary management and political skills: because the implementation process requires a lot of resources utilization. So, in case of public policy implementation failure is either (i) due to people

who are implementing the policy not knowing what they are required to do; (ii) not having the means or resources to implement the policy; (iii) or such people disagreeing to implement the policy. Therefore, government policy has an influence on dropout or retention of students in schools. If the policy is effective enough then majority of students will be retained, while if not dropout will standstill. The impacts for both are as described in conceptual frame work model (Figure 1.2).

Figure 1.2: Conceptual Framework Educational Policy on Dropout Model)*



Source: Documentary Review, 2018

LITERATURE REVIEW

2.1 The status of dropout in some countries and Tanzania

Internationally, there is considerable variation in dropout rates, because different nations are in different stages of extending universal secondary education as follows: In U.S.A, dropout rates have been examined in three perspectives, namely:-event, status and cohort dropout rates. The U.S. National Centre for Education Statistics (NCES) reports annual event dropout rates that describe the proportion of young adults ages 15 through 24 who dropped out during the school year prior to the data collection. Between 1972 and 2000 this annual event dropout rate ranged between 4 and 6.7 percent. This rate however, has decreased from 1972 through 1987. From 1987 to 2000 there were year-to-year fluctuations, but the overall pattern was one of stable rates ranging from 4 to 5.7 percent.

Status dropout rates are reported by NCES as the proportion of young adults' aged between 16 through 24 not currently enrolled in schools that have not completed a high school diploma or the equivalent. Between 1972 and 2000 the annual status dropout rate declined from 14.6 percent to 10.9 percent. Status dropout rates and changes in these rates over time differ by race/ethnicity which implies the Whites, the Black and the Hispanics.

Cohort dropout rates are calculated for various cohorts studied as they make their way through secondary school. The most recent large scale secondary school cohort is found in the National Educational Longitudinal Study of 1988, which examined the cohort

Dropout rates for the eighth-grade class of 1988 followed up at two-year intervals through 1994. For this national sample of U.S secondary school students, the cohort dropout rate in the spring of 1992 was 10.8 percent. The rate declined to 10.1 percent by August 1992 after some of the students completed high school in the summer. The rate declined further to 7.2 percent by August 1994, two years following their scheduled completion of high school.

In Uganda secondary school dropout status is somehow different. Data from administrative records of the Uganda MoES indicate that school dropouts in all government aided schools in the country is higher at primary level than at secondary level and that more girls than boys dropout at this level as well as at the primary school level. The reasons for dropout in Uganda are similar to those of Tanzania, including: truancy, pregnancy, lack of school needs, early marriages. Table 2.2 presents percentages of boys and girls dropping out of secondary school as presented by three national data sets.

Table 2.1: Secondary School Dropout Rates in Uganda*

Year	% Boys dropping out		% Girls dropping out	
	Urban	Rural	Urban	Rural
2001(DHS)	15.7	7.8	22.6	7.9
1997	6.0		6.9	
1995	6.0		7.6	

*Source: DHS EdData 2001:58 and Education Statistics Abstracts (1995, 1997).

Similar to Uganda, the dropout status in Kenya is examined in three different perspectives, these are: sex, geographical location and socio-economic status (students' family background). On the sex perspective, administrative data on education statistics in Kenya (2008) shows that, there is higher dropout rate for female students than males in secondary schools (29.6 percent to 25.5 percent). In terms of location, statistics reveal that, more students are dropping out in urban areas (30.3 percent) than in rural areas (26.3 percent). On economic status, the data shows that, dropout phenomenon in Kenya is more common among students from rich families than from poor families, and the proportion is 30.6 percent to 23.9 percent, respectively. Average total dropout aggregate is 27.4 percent (see table 2.2).

Table 2.2: Kenya - Secondary School Dropout Rate in Percentage*

Total	Male	Female	Urban	Rural	Richest	Poorest
27.4	25.5	29.6	30.3	26.3	30.6	23.9

*Data Source: Kenya 2003 DHS

There is also high dropout rate in Mozambican secondary schools though the extent is not as high as in Kenya and Uganda. Statistics in Mozambique have been examined in three aspects, which are: gender (male/female); location (urban/rural) and economic status (richest/poorest). *Gender wise*, there is a slight difference in dropout between boys and girls. They differ by 0.4 percent, which is 7.8 percent for males and 8.2 percent for females. With regard to *geographical location*, Mozambique has higher dropout rates in rural areas (8.6 percent) than urban areas (7.9 percent). On *economic basis*, the Ministry of Education provided data which is hard for someone to comprehend, as it shows that by May, 2008 there was no dropout for the poorest (0.0 percent), while for the richest it was 7.4 percent (UNICEF, Division of Policy and Practice, Statistics and Monitoring Section: May, 2008). Table 2.4 complements the above descriptions.

Table 2.4: Mozambique, Secondary School Dropout Rate in Percentage*

Total	Male	Female	Urban	Rural	Richest	Poorest
8.0	7.8	8.2	7.9	8.6	7.4	0.0

*Source: Education Statistics: Mozambique, 2003-2004; DHS

In Tanzania, secondary school dropout is an issue of concern. Statistical data from MoEVT show a proportionate increase year after year, in both annual dropout figures and transition dropout rates (DR) from one class/form to another. According to BEST (2004-2008), data in Table 2.5 (a) and (b) present a vivid status of dropouts in the country for the past five years.

Table 2.5(a): Total Dropout in Tanzania Secondary Schools, 2003-2007*

Years	2003	2004	2005	2006	2007
Dropout Total	12,777	11,513	12,363	13,961	18,132

*Source: Modified from BEST (June, 2008: 72),

Table 2.5(b): Average Transition Dropout Rates Form 1-4 for 2003/2004-2007/2008 in percentage*

Years	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008
Average DR (%)	6.6	7.2	9.9	4.4	2.7

*Source: Modified from BEST (June, 2008: 72).

In both tables 2.5 (a) and (b) above, there is fluctuation in the number of dropouts. For example, in Table 2.5 (a) total dropout decreased in 2004 by 1,264 dropouts when compared to that of 2003. Then, total dropout progressively increased from 2005 to 2007. Meanwhile, Table 2.5 (b) signifies that, the dropout rate had been irregularly increasing between 2003/2004 and 2005/2006, before suddenly declining in 2006/2007 to 2007/2008.

2.2 Government policies on school dropouts

The scarcity of resources in developing countries often necessitates the adoption of education policies that differ significantly from those in industrialized countries. Among developing countries themselves, there is a wide range of policies in place. Yet, surprisingly little is known about the consequences of these ‘alternative policies’ (Steward, 1998; World Bank, 1993). Policies on ground to address dropout problem vary from one country to another depending on context and extent of the problem. Some are written and documented, like the ‘Education and Training Policy’ of Tanzania; while others are just verbally proclaimed by government officials like the President, Prime Minister or Ministers.

In U.S.A, anti-dropout policies in place are ratified by the National Dropout Prevention Center and they are in form of programs. Some of the School Dropout Prevention Programs include: “No Child is Left Behind (NCLB) Act of 2001; Career Academies Strategy and Talent Development Model”. At the Federal level, the NCLB Act authorized the school dropout prevention program. It aimed at providing three-year grants to States and school districts to assist in dropout prevention and school re-entry activities. “Career Academies,” another prevention dropout strategy, offer career-focused curricula, team teaching, and involvement from the business community. An ongoing, 10-year evaluation of career

academies found that, among other results, they significantly cut dropout rates of students at high risk of school failure (Kemple and Snipes, 2000).

Under the Talent Development Model, one template for this approach, officials may restructure a school into smaller learning academies, create standards-based instructional programs, and put more emphasis on professional development. A three-year evaluation of five Talent Development high schools in Philadelphia found that in addition to achievement gains, schools that implemented the model for two or more years saw their 9th grade attendance rates rise by 15 percent (Philadelphia Education Fund, 2002).

Despite the fact that U.S anti-dropout policies have helped students not to dropout, the following are some of the challenges which face the established dropout prevention programs: As accountability and standards continue to dominate school policy, some experts say that more and more students may feel pressured to dropout. Under 'No Child Left Behind', all students must meet proficiency level on state examinations by the year 2014; and demonstrate Adequate Yearly Progress (AYP) up to that deadline. Conclusively, it is for this reason that several policy analysts suggest making high school graduation rates a stronger component in the NCLB accountability system to encourage schools to prevent dropouts (Swanson and Chaplin, 2003).

In Tanzania policies on dropout are diverse. Among the prevailing policies include: National Education Act No. 25 of 1978 (NEA), and the Education and Training Policy (ETP) of 1995. The Education Act has put emphasis on both enrollment and retention of students up to the end of education cycle. For example, Part V (C), Section 35 (3) states that: "Every pupil enrolled at any school shall regularly attend the school at which he is enrolled until he completes the period of instruction specified in respect of the level of education for the attainment of which he is enrolled at the school." Section 35 (4) insists: "The Minister shall make rules, which shall be published in the Gazette, for the better carrying out of the purposes of this section and may, in those rules, prescribe acts or things which shall be done by any person and penalties for the contravention of those rules" (NEA, 1978, 35 (3) and (4): 18).

Another policy in place is the Constitution of the United Republic of Tanzania of 1977 (amended in 1998) to address issues of education especially access and retention in schools. For example, Article 11.2 declares that: "Every person has the right to self-education, and every citizen shall be free to pursue education in a field of his/her choice up to the highest level according to his/her merits and ability"; and Article 11.3 further proclaims: "The government shall endeavor to ensure that there are equal and adequate opportunities to all persons to enable them to acquire education and vocational training at all levels of schools and other institutions of learning".

Thirdly, anti-dropout policies are also in the HSGB of 1997, Chapter 6 Part B on attendance, states that: "Students should be insisted on the importance of attending to school for the whole term, and Students should attend all periods conducted inside and outside the classroom (HSGB, 1997: 44)".

In a related vein, Part I pointed out 13 mistakes that may cause expulsion of students from school, one of them states: "Any student (boy or girl) evidently proved by school administration that she/he is engaging in fornication will be instantly expelled from school. Worse still, if that action (fornication) has led to pregnancy (to a girl) or caused pregnancy (for a boy), both will be discontinued from studies, hence becoming dropouts" (HSGB, 1997: 48).

Fourthly, Education Circular Number 134 of April, 2004 which concerns pregnancy-related dropout declares: "Any parent who betroths his/her daughter studying in primary/secondary school is guilty and will be liable to pay a fine of not more than 100,000/= or jailed for not more than 2 years or both penalties. Additionally, any person who marries a primary/secondary school girl is guilty and have to pay a fine of at least 300,000/= and at most 500,000/= or to be imprisoned for not more than 3 years or both penalties at once. Moreover, a man who will make pregnant a girl at primary/secondary school level is guilty and deserves a prison sentence of more than 3 years but less than 6 years without a fine" (MoEC, 2004: 25-26).

The most current policy was announced by the Minister of Education and Vocational Training in September 2009. It endorsed readmission of pregnant female primary/secondary school students and for the first time Class 7, Form 2 and Form 4 pregnant girls sat for the 2009 national examinations.

The challenges to this new policy include the difference in perceptions among social groups. Whereas women activists have positively received the new policy of recruiting back into the formal education system all pregnant female students, religious groups oppose it on allegations that by doing so it is legalizing adultery and fornication which is against the scriptures. Others argue that allowing such students to continue with studies will exacerbate sexual immoralities among students, as they will no longer fear to be terminated from studies. Also, some community members further argue that, it will accelerate HIV/AIDS infection and unwanted pregnancies due to irresponsible sex practices.

2.3 Effectiveness of government policy in addressing the drop out

South Africa has no clear policy/circular or strategy purposely meant to address the dropout issue in secondary schools. The only visible education policy is that for primary school children under grade nine, so called: "The South African School Act of 1996". This makes it compulsory for all children to attend school until they reach the age of fifteen or the end of grade nine (Motala, 2008). The 7-15 years age-bracket in South African population have reached the enrollment levels of 90 percent, but 30 percent of Philippi children do not attend primary school, due to poverty.

In South Africa in general, enrolment starts to decline sharply from the age of 15. The highest dropout rates are from the age of 16-18 years (Panday and Arends, 2008). Professor Mary Metcalfe recognized that an integrated approach towards South African 'school dropouts' is necessary; with the following interventions: "Extend the child support grant to 18 years of age; second, build into the education system much more rigorous quality and relevance; thirdly, strengthen the availability of resources to teachers, both within the education and social services systems, identify children at risk of

dropping out such as school aids and peer support mechanisms; and finally, improve counseling and support services to children (Panday and Arends, 2008)".

Tanzania has something to learn from other countries' experiences on how to handle the issue of dropout through adopting the successful policies and strategies applied in such countries. For example, Tanzania can make use of the National Re-enrolment Strategy as effectively as used in U.S.A. Also, re-admission efforts as those imposed by the Indian government. Other effective strategies that can be utilized by Tanzania by copying and modifying from other countries or States include: The Successful Students' Partnership' strategy in Pennsylvania State; and the 'No Child Left Behind' policy, in U.S.A. Further, Tanzania ought to adhere to the four suggestions stipulated by Professor Mary Metcalfe of the Republic of South Africa.

RESEARCH METHODOLOGY

3.1 Population and Sample

3.2 Target Population

The population under study comprised mainly of education stakeholders who in one way or another are involved in the formulation and implementation of policies aimed at combating dropouts in schools. As previously mentioned, they include: Secondary school teachers; Heads of Schools, Ward Education Coordinators, and the District Education Officer. Others were: Parents, Regional Education Officers, as well as officials in the Ministry of Education and Vocational Training.

3.3 Sample size and sampling techniques

The sample of the study had 25 respondents. The purposive sampling technique was applied to select the wards and their respective schools for the study. For the purpose of this study, schools were identified in relation to the rate of dropout statistics, the number of students enrolled, and the number of teachers available in the school. Similarly, the wards were identified according to the number of secondary schools established in the ward. Thus, respondents to the study included teachers; HOS; WECs; and DEO.

3.4 Methods of Data Collection

Despite the fact that the study is qualitative in nature, a combination of instruments and techniques were employed, all aimed at realization of objectives of the study. These instruments included questionnaires, interviews and documentary review. Questionnaires were administered to class teachers. HOS, WECs, and the DEO responded through face to face interview with the researcher. Documents reviewed were: HSGB; BEST (2006, 2007, 2008 and 2009; National Data) and BEST (2005, 2006 and 2007; Regional data). Through these documents, the researcher tried to countercheck the availability of students' attendance registers and roll-call sheets or books in schools, and if they are effectively utilized. Also, the HSGB; the Constitution of the United Republic of Tanzania (1977); the National Education Act No. 25 of 1978; and Education Circulars of 2001-2005. In these official documents the researcher counterchecked chapters, sections and parts related to the research problem under study, specifically objectives of the study; and those which in one way or another could answer the pertaining research questions. Furthermore, the researcher reviewed other documents such as:

Tanzania Education and Training Policy (1995) as well as Basic Education Statistics in Tanzania, National Data (2002-2006; 2003-2007; 2004-2008 and 2005-2009) and Regional Data (2005; 2006 and 2007).

DATA PRESENTATION AND ANALYSIS

4.1 Policy on truancy

According to the DEO, there is a policy on truancy and it is followed. This policy is stipulated in the HSGB of 1997, it states that: "Students must attend to school for the whole schooling period in the term/year". Hence, if students do not attend to school for more than two months consecutively without proper communication to the school, the HOS are responsible to make a follow-up, then after that consult the School Board to discuss the issue and report it to REO. The REO is the one who will ensure that legal action is taken against the culprits as per policy directives. Examples of such incidents were reported by the HOS of DO (2) and MS (1). The HOS of MS handled it by first making the matron visit the student's home place which is Ifakara in Morogoro region to investigate the whereabouts of the girl. She found the student under comma, and was an AIDS victim. Then the HOS presented the issue to the School Board which discussed and the resolution was reported to the REO for final decision. It took about five months to finalize that incident. The incidents of DO secondary school (for a boy and a girl) were handled in a similar way but took less time (only three months) than that of MS because DO is a Day school, hence follow up processes are a bit cheaper and easier as all students hail from the Municipality.

4.2 Policy on pregnancy

According to the interview with the government official, government policies have been set up and disseminated to all officers concerned including the REO, DEO and directly to heads of schools for implementation. This policy categorically states that: "Every Head of School will keep records of all pregnancy and marriage cases of female students and actions taken against the criminals. Such records should be sent to the Regional Education Officer who in turn will forward them to the Chief Education Officer after every three months (January, April, July, and October)." For example, students who were found pregnant were automatically discontinued from studies.

According to HOS, these students were identified by the school matrons who conduct pregnancy test for female students twice per term, that is, at the beginning and at the end of each term. Also, the HOS added that, even if someone is just about to finish school if she is found to be pregnant, she is expelled from school as per school regulations stipulated in the HSGB and other circulars. Unfortunately, no HOS could provide supporting document as empirical evidence to signify the extent to which this policy is implemented.

Therefore, pregnant students who were candidates sat for National Examinations and continued with the next level of education. However, the HOS and teachers are not supporting this new policy for girls who are pregnant to do their examinations and continue with their studies as it is against the policies which are in place for quite a long time. Supporting empirical evidence was obtained at two neighbouring schools within Dodoma Municipality where two Form 6 and four Form 4 female students were beneficiaries of this policy.

4.3 Trend of dropout in Dodoma Municipality

The trend of dropouts that has been discussed here includes: all the students who for one reason or another have decided to discontinue their school program. These include those who have dropped out due to truancy, pregnancy, illness lack of school needs, parent/guardian illness and sometimes death.

Data from the questionnaires that were distributed to class teachers and results from interview schedules administered to HOS, WECs, and the DEO. Also, documentary review from BEST (2004-2008), Circular Number 134 of 2004, and a HSGB were used to get a clear picture of the dropout problem., They showed that showed that majority of the students dropped out of school because of Truancy and Pregnancy.

4.4 Causes of school dropout in Dodoma Municipality

All four HOS and WECs mentioned the same causes of student dropout in their respective schools. The number of students who dropped out due to pregnancy exceeded that of students who did so due to truancy in the surveyed schools. This may be due to the fact that the number of girls is more than that of boys as two of the schools are absolutely girls' schools (MS and HU), and the other two are co-education schools (JA and DO) and therefore the number of female students in such schools exceeds that of male students. For example, the total number of girls at JA and DO secondary schools is 1,193, while that of boys is 1,149.

The main reasons for these girls getting pregnant are diverse, two of which are economic problems and moral decay. The former reason is due to the fact that some female students come from families with poor economic status, hence they are likely to be deceived by men who are economically well off. One respondent pointed out moral erosion in the society to be another reason for school girls' pregnancies (HOS). Another respondent argued: "Nowadays, it is quite often for adult males, popularly known as "*Fataki*" to entice young school girls for sexual immorality. The reason could be the looming wrong presupposition that school girls are free from HIV/AIDS" (WEC).

4.5 Awareness of class teachers on school dropout policies

By awareness here it means, the ability to notice something using your senses; the knowledge or understanding of a particular subject or situation (Longman English Dictionary, 2006: 88). Therefore, when talking about awareness of dropout policy, one refers to knowledge of the nature and pattern of policies that address the contextual trend of dropout in schools, secondary schools in particular.

The awareness of class teachers on government policy on dropout is very little. All 16 teachers (100%) said, they have never come across the official government policy document on combating dropout of students in schools; and therefore, none of them had a copy of the said policy. It seems there is a communication gap between Heads of Schools and their teaching staff. All the teachers said, they just implement what the HOS ordered them to do, and copies received from the Ministry are not given to them. There is only one copy in the office of the head of school.

Further, the findings showed that educational policy making process is done by parliament after receiving proposals from central government (through MoEVT) and then forwarded to schools for implementation. Therefore, class teachers are just implementers of school rules and regulations as instructed by the head of school who receives policy statements

from the Ministry. The class teachers' role is to report students' long term absenteeism to the second master (the chairperson of the school discipline committee). The decision to punish the victims is the head of school after receiving recommendations from the discipline committee. However, if the student has to be expelled from school, then the final decision maker is no longer the HOS but the School Board.

Among the challenges which class teachers face include harsh orders from HOS; improper directives; and interference from school administration in fulfilling their responsibilities. Evidence of this was received from one of the class teachers at Dodoma high school. He said sometime when students in his class misbehave and as a class teacher he decides to punish, his head becomes furious especially if the head is related to the parents/guardian of a student or a student himself/herself. At times there is a negative relationship between HOS and teachers; and in extreme cases there is a tendency of some HOS to be involved in love affairs with female students. In such situations it is very difficult to reprimand such students and control discipline in the school. This was pointed out by some class teachers when they were interviewed in privacy. However, the respondents preferred anonymity, and because of ethical issues in research, evidence on the doers of some of these immoral issues is withheld.

This makes it difficult for a class teacher to monitor and control students' discipline, as some students become arrogant and do not listen to their class teachers because they know that they will not be expelled from school as they will get a favour from the Headmaster (a class teacher in the surveyed schools). The general conclusion from what was stated by the teachers is that the heads of schools should entrust full mandate to them as they trusted them and appointed them to be class teachers. Hence, they do not want to be interfered when fulfilling their duties and responsibilities of monitoring students' discipline, and academic progress. They want to be recognized and their status respected. They suggested the following: "Heads of schools should be directing and not dictating issues when giving instructions or directives to their subordinates for successful implementation. In addition, heads of schools should be role models in terms of behavior which other teachers and students can imitate, instead of indulging themselves into deeds that may tarnish the image of their schools, for example involving into love affairs with students, instead of rebuking students and other members of staff practicing such immoralities".

4.6 Heads of School views on dropout policies

All the four Heads of Schools who were interviewed agreed that there are many circulars that are in place for a long time. For example, the National Education Act No. 25 of 1978; Tanzania Education and Training Policy of 1995; and the Education Circular Reference Number: **ED/OK/C.2/III/134** issued on **13th April, 2004**. To avoid repetition of information, the details of each of these mentioned circulars and how they work in schools are described in chapter one, section 1.1 and 1.2. Also, one HOS showed the researcher a section in the HSGB of 1997. The section gives guidelines to school heads on how to handle the issues of pregnant girls and truancy problems.

Chapter 6, Section B of the book states that: "HOS should insist to students the importance of attending to school for the whole period of studies. Also, should make sure that students attend all periods conducted in or outside the classroom. Further, the guide directs that roll calls should be conducted regularly so as to ensure effective attendance to school

(HSGB, 1997: 44)". If there is a case on pregnancy, the HSGB states that: "Any student evidently proved to commit adultery/fornication or get pregnant (for a girl) or cause pregnancy (for a boy) will be expelled from school instantly".

On truancy, any student who fails to attend to school for two consecutive months without genuine reason(s) will be considered truant and hence written off in school records (HSGB, 1997:47-48). However, neither DEO nor REO could admit the presence of these documents in schools as none of them received report of that nature from any of the school heads in his administrative area. It is likely that such cases are terminated at the grassroots through negotiations between parents of truant students and school administration (researcher assumption).

On the other hand, the researcher was interested to know the teachers awareness of these policies, the school heads agreed that teachers especially class teachers are well informed and are assigned to follow up students missing or with irregular attendance in their respective classes. According to the findings the circulars are self-explanatory hence; there is no need of conducting special training sessions for the class teachers on how to implement them.

From these findings, it can be concluded that HOS need to present before teachers all the policies on dropout which they receive from the Ministry and then hold a discussion with them, to make teachers well informed rather than just ordering them to implement something which they are not conversant with. In a related vein, the HOS should explain such policies to students too, as they are clients of the policy, as well. If possible let students be made aware of the policy copy by posting it on the school notice board for reference. As indicated in the conceptual framework, for any policy to be effectively implemented there must be support from stakeholders or public; good social theory/knowledge and understanding of the policy content; non-conflicting goals; possession of managerial skills and resources; and there must be consensus/agreement for implementation.

4.7 WECs and the education policy on pregnancy and truancy

There were diverse responses of WECs to the question asking about the availability of government policy/ circular issued by the Ministry to address the dropout problem in secondary schools. 50 percent of the interviewed WECs were able to present a copy of the circular/policies that where present and that were used in the schools to punish students who were truant and who got pregnant. But the rest of the WECs did not have any copy. In addition, the WECs admitted that such policies have been in place since 1978 when the NEA No.25 was first issued. Also, the WECs, interviewed agreed that HOS together with their teachers are informed and are aware of anti-dropout policies and that there was no special training session for HOS in the ward on how to make use of them because they are self-explanatory. At Ward level, the WECs are involved in the implementation of the policies/circulars. They are guided and directed by the DEO. Their general view on the policy is that, they want the secondary education department to recognize them as stakeholders by seeking their advice on how to implement the dropout policy because they are aware of the context more than anybody else. So they are unhappy with what they have and they negatively reacted to the new statement by the Minister of Education who allowed pregnant girls to sit for national examinations and in case they pass to continue with studies to the next level of education.

4.8 DEO's views on government policy on truancy and school girls' pregnancy

The DEO admitted that a number of policies are issued and disseminated to ward education coordinators and heads of schools for implementation. However, copies were not available because the secondary education department was formerly under the Central Government. Hence, she advised the researcher to consult the DEO for secondary schools though he was not accessible because he was new in office.

However, the researcher was informed that most policies have been in place for a long time but at district level secondary education circulars were provided but not exercised. "The task was delegated to the REO", she told the researcher. They make follow up of these policies by maintaining close contacts with the HOS who exercise these policies on day to day basis, then give feedback to the DEO and the REO through monthly, terminal and annual reports. Through this communication system, the DEO and REO are informed and are up to date and aware of the policy implementation process at the grassroots, even for the latest policy issued to school administrators on how to handle pregnancy problem for female students. However, evidence of reports that are sent to the DEO and REO from the schools so as to show evidence of each step, could not be accessed as all school heads said such reports are confidential, hence they cannot expose to anybody not concerned. They asked me to consult the DEO and REO themselves. Unfortunately, I got a similar response.

The DEO through interviews said that all HOS and WECs are aware of these policies. The DEO said all these people are informed during meetings of the Tanzania Heads of Secondary Schools Association (TAHOSSA) which are regularly conducted country wide at district, regional and zonal levels; as well as during the Annual Meeting for HOS. During this meeting the Chief Education Officer emphasizes to the HOS that they have to maintain students retention in their schools by monitoring students daily attendance at schools by conducting roll-calls regularly; ensuring that students attend all lessons conducted in and outside the classroom; and that HOS should ensure that all teachers and supporting staff attend and fulfill all their duties and responsibilities as assigned to them (HSGB, 1997: Chapter 6, Section B, p.44). This section addresses students' attendance, and it gives the followings instructions to HOS:

- “(i) Students should be insisted to attend to school for all school days in the year.
- (ii) Students should be demanded to attend all lessons conducted in and outside the classroom.
- (iii) All students should be urged to attend all manual activities.
- (iv) All students should be required to attend all school meetings like the “*School Baraza*”; cleanliness inspection; national flag rising; dormitory meetings, etc.

NB: In order to ensure effective attendance, the procedure of calling names (Roll-call) should be adhered (HSGB, 1997:44)”.

It should be noted that, as discussed before there are two main forms of dropout investigated in this study, truancy and pregnancy. However, there are other causes of dropout such as lack of school needs, students' illness, P/G illness as well as death. The reason of lack of school needs was not pointed out by the respondents as a problem, as the majority of the students come from urban areas where economy is better than in rural areas, hence possible to finance education of their children. The common problem in these schools in terms of "lack of school needs" is that, parents fail to cover school requirements for their schooling children, for example, they cannot: pay fees; buy uniforms; cater for school facilities like books and pens. Also, some of them cannot pay even examinations' fees. On this, the students and teachers say that the problem with parents who do not care for education and not because of poor economic status as it is claimed to be. Their argument is based on the fact that school fees in government schools is very low, which is only Tsh. 20,000/= and 70,000/= for day and boarding secondary schools, respectively. Lucky enough it is paid in two installments.

In other extreme cases such as death, most respondents said, it is a will of God, thus it is beyond human control as it can happen to anybody. Therefore, death cannot be discussed as a dropout problem. About illness of student or his/her parent/guardian, HOS said, it is not a serious problem because very rare cases have been reported in their respective schools. For example, between 2005 and 2009, only seven students (3 boys; 4 girls) dropped out of school because of illness. No student abandoned studies because of parent/guardian illness. Empirical evidence that in some areas students are affected by illness of their P/Gs and could not come to school can be drawn from Makete District, Iringa region, where over 35 percent of the population is HIV/AIDS victims (TAC-AIDS, 2009).

5.1 CONCLUSION

Though there is a clearly laid out policy to address the dropout of students from secondary schools, the policy has not been quite effective in alleviating the problem. As a result the problem of dropouts in secondary schools still persists due to the explain factors.

5.2 RECOMMENDATIONS

There is a need for the government, more specifically, the Ministry responsible for Secondary Education to re-examine the policy on retention and dropout of students from secondary schools in order to come out with a more effective policy, Heads of schools should work more closely with the DEO for secondary schools, as well as their teaching staff so as to curb the problem of student dropout, Parents and guardians should be sensitized on the need for them to make a close follow up of their children regarding attendance to school and the government should improve remuneration for teachers so as to motivate them to perform their duties more effectively.

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Use of Educational Technology Learner Centered Methods in Enhancement of Performance in School Physics

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Abstract- Physics is key in STEM and plays a major role in National development yet its performance and enrollment in schools has not been impressive. This paper is based on a study to determine the use of Learner- Centered Instruction in the enhancement of Performance in Physics among students in Kenya. The study deployed Descriptive survey design. The study subjects were Form Three Physics Teachers and students in Migori County. A total of One Hundred and ninety two (192) students and twenty (20) teachers across twelve (12) schools in the county undertook the study. Data was gathered using a Checklist and questionnaires. Data was then analyzed using Statistical Package for Social Sciences (SPSS) and presented in descriptive statistics using frequency tables, percentages and graphs. The study finding revealed that Multimedia was predominantly used to enhance performance in Physics. Web- based learning and Resource-based learning was rarely and in most instances not used at all. Only one sampled school had a Learning Resource Centre and none of the schools that had computer rooms used them to access Physics WBLR. The study also revealed that even though majority of the teachers were familiar with the educational technology learner centered instruction, this was not reflected in the actual lessons as the learner centered instructions were rarely used. Lack of appropriate facilities was a major hindrance to implementation of the learner- centered methods. Others found hindering implementation of learner- centered instructions included: a tight school programme with little flexibility and high teacher work load.

Index Terms- Learner- centered instruction, STEM, Web- based Learning Resources, Resource Based Learning, Multimedia.

I. INTRODUCTION

Learner- centered teaching is an approach to teaching that places emphasis on the learner. The student hence becomes an active participant in the learning process. This is opposite to the traditional Teacher- centered approach where the student is a passive recipient in the learning process and is viewed as an empty vessel to be filled with knowledge. In Learner- centered teaching, the role of the instructor (in this case the teacher) focuses on constructing authentic, real life tasks that motivate learner involvement and participation (Weimer, 2002). Learner-centered methods in teaching has gained worldwide approval due to its

immense benefits which include; enhancing content retention by the student, promoting critical thinking, making learning enjoyable to the student and promoting creativity (Maxwell, 1998; Slavin, 1990). Advancement of Information Communication Technology (ICT) has influenced the development of Education by introducing Learner- centered teaching methods like Multimedia learning applications and Web-based learning resources. This in turn has created multiple platforms where learners are exposed to a more student-centered learning experience (Li & La Mont, 2005). New Communication and Information Technology has availed major resources for teaching and learning. The word technology is derived from the Greek word "techno" which means the skills, knowledge of the way, skills, tools and willingness and 'logos' which means science, word, learning mental state (Stosic, 2015). There is no single term for Educational Technology. Different Countries use different terms and synonyms as Educational Equipment or the Technology of Teaching. Use of Information Communication Technology (ICT) in teaching can also be taken to mean use of Educational Technology in teaching. More than ever the role of Educational Technology is of great importance. With application of Educational Technology, students can independently progress in mastering teaching materials, to choose the pace of work, to repeat the material that is not sufficiently clear and track their progress (Stosic, 2015).

Integration of Informational Communication Technology (ICT) is very important in modern day class (Aina, 2012). For instance computers can be put to different types of use in teaching Physics which include simulations, computer data acquisition, animation and many more (Kola, 2013). These simulations can be used to explain phenomena that look abstract to students like optical, magnetic and mechanic phenomena. The students would be able to slow down the speed of the phenomena that are too fast to comprehend quickly and be able to study them and learn (Kola, 2013). Some Educational software like Encarta can be used to teach difficult concepts or observe difficult concepts in Physics like the working of an electric motor. As further elaborated by Kola (2013) concepts like rotation of the coil in a magnetic field is best appreciated by students when seeing it demonstrated through this software. He noted that most teachers struggled to explain the mechanism of either electric motor or generator to students properly but when the software was used the problem of complexity was overcome and the student learning was enhanced. The advancement in technology has brought about Resource-

based learning which allows a greater freedom for the student to hear, see and above all to do (Mwaka & Kafu, 2013). Indeed if teachers are to prepare learners so that they are able to satisfy the needs of the modern industrial society and be able to fit into the working life, then they have to do it with Educational Technology (Tienne, 1994).

In most countries, the popularity of Physics among students has been low and the enrollment has declined. Physics is the least popular school subject and it has been for a long time (Hulobova, 2008). Kiptum (2016) also noted that despite Physics being an important subject, its enrollment and performance in Kenya has not been impressive. Countries such as United Kingdom, United States of America, Mainland China and Australia are in the top list of countries whose focus special attention on the new trend of Science Technology Engineering Mathematics (Sujeewa et al., 2017). Physics is a key subject in STEM and as such is important in achieving development of a country.

Science Technology Engineering Mathematics (STEM) literacy is an interdisciplinary study that bridges four areas of science, technology, engineering and mathematics. STEM literacy does not simply mean achieving literacy in these four areas, but investigating and questioning interrelated facets of the world (NGA, 2007). STEM Education policies in Europe report 2018 highlighted the increasing involvement of private companies working in STEM fields in supporting teachers in producing educational content (European Schoolnet, 2018). The report also noted that most teachers share a positive vision of innovative STEM teaching with their colleagues and their heads of schools and this is linked positively with the amount of innovation brought to school. The report also noted that ICT teachers in STEM appeared to be using student centered pedagogical approaches. STEM education motivates student interest through video games, instant messaging, experimental learning, hands on activities and project- based learning (Morrison, 2006). Any country who decides to pay lip service to the development of her physics education will surely lag behind others in the comity of nations (Benson & Nkimba, 2013).

II. METHODOLOGY

The study deployed Descriptive Survey Design. The major purpose of Descriptive Survey Design is to describe the state of affairs as it exists (Kombo & Tromp, 2014). This research aimed to establish the extent of use of Educational Technology on Learner- centered methods in teaching Physics in Kenya. The study population was one hundred and ninety two (192) Form Three students and Twenty (20) Form Three Teachers. The population was sampled across Twelve (12) schools in Migori County. Data was collected using a Checklist and Questionnaires. Data was then analyzed using Statistical Package for Social Sciences (SPSS) and then presented in descriptive statistics using frequency tables, percentages and graphs. Questionnaires were administered to both students and teachers. Stratified random sampling was used to sample twelve schools in the county. The schools were stratified according to levels of National, Extra-county, County and Sub- county schools. Schools were then randomly selected from each stratum for purposes of reaching a reasonable sample size.

III. RESULTS

Data was collected using Questionnaires and a Checklist. Student questionnaires were used to collect data on frequency of use of LCI in a week and effects that the LCI have on their learning. Teacher Questionnaires were used to determine challenges the teachers face in trying to implement the LCI as well as their familiarity with the Instruction methods. A Checklist was used to find out state of resources that required in implementing the LCI.

The Data collected was then analyzed using SPSS and the results presented using descriptive and inferential statistics.

Rate of Exposure to LCI

Fig 1 represents a summary of frequency of exposure to LCI.



Figure 1: Frequency of use of LCI

According to Stosic (2015) the use of Educational Technology in teaching provides better interaction with students, better reception of information because the student receive knowledge visual, auditory and kinesthetic way. For instance computer simulated experiments can be used to enhance performance of an average mathematical ability student. Therefore efforts should be made to equip Physics laboratories with computer software that can be used in computer simulated experiments in Physics practical (Benson & Nkiruka, 2013). An Educational Technology LCI also motivate students to work independently where the student is more motivated to return to learning and working because Educational Technology is widely available at any given moment. Teachers therefore should be encouraged to use them frequently.

From Fig 1, Multimedia is the predominantly used LCI method with 65.8% of learners saying they have ever been taught using a Multimedia resource. 89% of the learners have never experienced Resource Based Learning (RBL) while 77.5% have never interacted with Web Based Learning Resources (WBLR) in Physics. Only 22.5% of the learners have been taught using WBLR while only 11% have engaged in RBL. 34.2% of the learners have been taught using Multimedia.

A study done by Makanda (2015) in Kenya noted that even though 100% of the sample schools had at least some computers and all schools had digital content in Physics sourced from different authors including Kenya Institute of Curriculum Development (KICD), only 20% of lessons observed used ICT.

STEM Education policies in Europe report 2018 reported that paper based materials are most used in teaching (88% of the responses) followed by audio- visual materials (77% of the responses) while 50% of the responses said they use web based or computer based simulations (European Schoolnet, 2018). Multimedia Instruction as the predominant teaching method to RBL and WBL was also noted by Amaal (2016). In the study, students stated that their teachers sometimes used videos in their classrooms and one student further indicated their teachers always used Multimedia tools if required. A study done in Turkey

established that the use of film and video was only used four times in a week by 5% of the teachers (Orhan, 2009).

The low use of RBL is likely caused by lack of a learning resource center in almost all schools. Equally, low use of WBL is likely due to lack of internet access and computer rooms in most schools. The relatively high use of Multimedia is likely due to availability of charts and Photographs in Physics which are usually cost effective. It is also likely that teachers use their own personal laptops to implement Multimedia instruction. Table 1, 2, and 3 shows the frequency of use of the LCI in a week.

Table 1: Frequency of use of Multimedia Instruction

Frequency in a week	Valid Percent
4 or Above	23.8
2 or 3times	35.7
Once	24.6
Never	15.9
Total	100.0

Multimedia could be defined as various digital media such as text, images, sound and video that is integrated into a multi-sensory interactive application or presentation to convey a message to an audience (Oshinaike & Adekunmisi, 2012). 23.8% of the students are taught Physics using Multimedia regularly. Almost 60% of the students are taught Physics using multimedia at least twice in a week. Over 80% are taught Physics using Multimedia at least once in a week. Multimedia teaching is said to result in increase in quality of student knowledge and comprehension (Schnotz & Lowe, 2003). When students are taught Physics using Multimedia they are able to easily understand the materials they are being taught.

Multimedia technology carries risks for teaching because the computer is perceived by some teachers as an impoverishment of the forms and means of expression by the teachers. This might probably be the reason why 15.9% of the students are not taught using any Multimedia resource at all (Janusz et al., 2013). It is also likely that there aren't the necessary relevant Multimedia resources in the school that the teacher can use. Teachers don't teach using Multimedia resource material because they are not

readily available and they lack skills to make them available by improvising them (Okedeyi, 2015).

Given the above results, Multimedia is used frequently to enhance performance in Physics among Secondary Schools in Migori County. Indeed recent research supports the transition from traditional tools to teaching to multimedia tools like videos (Amaal, 2016). More teachers are also likely to use their laptops to access and utilize Multimedia resources or have likely acquired multimedia skills. As noted by Okedeyi (2015) there is a significant relationship between teacher acquisition of multimedia skills and teaching of scientific concepts and there is also significant relationship between teachers attitude and acquisition of multimedia skills in teaching resources.

Frequency of using RBL

Another consideration in the study was the use of Resource Based Learning (RBL) which showed weak frequency as shown in Table 2.

Table 2: Frequency of use of Resource Based Learning

Frequency in a week	Percent
Above 5 times	4.8
3 or 4 times	9.5
1 or 2 times	66.7
Never	19.0
Total	100.0

Resource Based Learning (RBL) is the instructional strategy where learners construct meaning with a wide range of print, non-print and human resources (Sitepu, 2010). According to Sitepu RBL allow learners to discover knowledge for themselves. RBL is supported by a Learning Resource Centre (LRC) which is the development of convectional library. In the Physical sense a Learning Resource Center is a room set apart as a quiet study center in which to use or possibly store the various learning resources on offer. From a physiological point of view it can be what you make it. If there is no appropriate room, one can be made available for an LRC. With the existence of an LRC, RBL approach is developed to be a learning center approach. It is disappointing that only one sampled school had a learning resource center. Even in the sampled school that had an LRC, only 66.7% of the students use it once or twice in a week. Students are thus unable to perform experiments like splitting atoms which

cannot be done in the real world but possible with RBL (Girod, 2000). The lack of regular use of RBL even in the school that had a LRC is likely caused by a tight and rigid school program. This allows for little time for flexibility and time in the LRC for the students. Furthermore RBL is thus greatly hampered by lack of an LRC and subsequently the resources required thereof. Developing an LRC could be a potential solution towards scarcity of resources in education (Sitepu, 2010) Hence RBL is rarely and in most cases never used to enhance understanding and hence performance in Physics in Migori.

Frequency of using WBLR

Learners were asked to indicate how frequently they use WBLR in a week. The results were then summarized in Table 3.

Table 3: Frequency of use of WBLR

Frequency in a week	Percent
Above Six times	14.0
4 or 5 times	9.3
2 or 3 times	30.2
1time	25.6
0 times	20.9
Total	100.0

Due to increased tendency towards learner's digital literacy, Web- based learning resources as pedagogical tools are becoming increasingly important in classroom instruction (Faegheh, 2015). According to Faegheh (2015) countries like Iran have identified Web- based technology in classroom instruction as top priority and have made deliberate efforts to have them embedded into wider professional teaching practice.

The use of WBLR is still very low in Migori County Schools. Almost all Boarding Schools do not have internet access and computer rooms. Students that have access to WBL also do not quite often use it. WBLR are thus minimally used to enhance understanding and hence performance of Physics in Migori likely due to lack of computers, computer rooms and internet. A study done by Makanda (2015) stated that most teachers accessed computers for less than one hour a day even though there was favorable attitude towards ICT use in classroom instruction. There is likelihood that even in schools with internet connected computers, teachers and leaners are unable to access these computers due to lack of time caused by a crowded timetable. Data on Effect of LCI was collected using a Likert Scale with four options [Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD)] for each teaching method using the following series; Series 1(I am able to remember easily what I learnt) Series 2 (I enjoy the learning) Series 3(I become more interested in Physics) Series 4 (I improve in my academic performance) Series5 (I master concepts easily) Series 6 (I am able

to apply the knowledge in my own real life) series 7(It overburdens me and gives me a lot of work). The results are presented in Figures 4, 5 and 6.

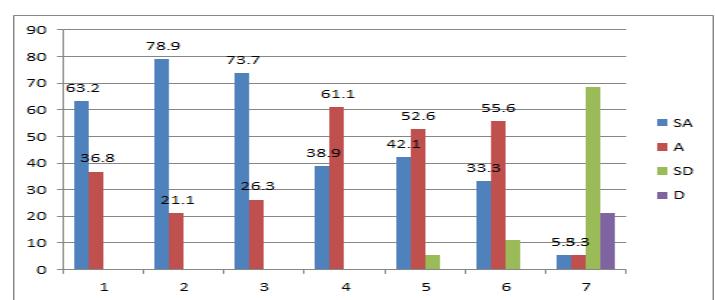


Figure 1: Effect of RBL

Resource- based learning operates on the premise that learning can be facilitated with access to information organized around a specific domain that learners can actively ignore (Daris & white, 2001). From Figure 1 almost all students either strongly agree or agree that RBL increases their learning capabilities. All students enjoy learning via RBL and they feel RBL increases their mastery of concepts. Almost similar results are reflected in the use of multimedia (Figure 2).

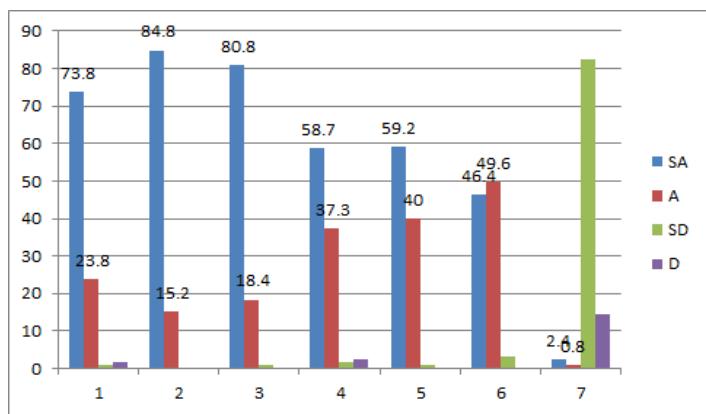


Figure 2: Effect of Multimedia

When Multimedia is used in teaching, information will easily make more sense to the learner (Janusz et al., 2013). From Figure 2, almost all students feel that Multimedia increases their mastery of concepts and enable them to remember concepts easily. They also become more interested in Physics and enjoy lessons when taught by Multimedia. Very few students feel that Multimedia is burdensome to them. Multimedia instruction engages the learner on various senses which in turn elicits positive attitude towards their use in instruction (Neo & Neo, 2000). A study by Ubogu (2006) in Nigeria states that Multimedia facilitates access to all human knowledge anytime and anywhere in a friendly, multi- modal and efficient and effective way. Close to 98% of the sampled learners said they easily remember what they learnt when Multimedia instruction is used which support the findings of Lindstrom (1994). According to Lindstrom (1994) use of Multimedia Instruction has shown to increase retention rates. Research has shown that people remember 20% of what they see, 40% of what they see and hear and 75% of what they see, hear and do. Multimedia materials like still and animated graphics, video and audio integrated in a structured manner, compared to traditional textbooks are confirmed to be more efficient tools in adopting new knowledge (Sadaghiani, 2012; Stelzer et al., 2009). Multimedia application in teaching Physics had resulted in a significant increase of the quantum and quality of student's knowledge in all categories of Bloom's taxonomy, as well as the retention of knowledge quality in the category of application compared to the traditional teaching method (Cubrilo et al., 2014). The findings of this study are also concurrent with other studies done previously. For instance a study done by Amaal (2016) found out that most students agree that multimedia tools are best for them in understanding the course materials and that the students prefer videos to lecturing and printed materials as a teaching method in classes. The students in the study also said they wished their teachers would use videos and games more in their classes. Indeed Multimedia like videos help to attract students attention, generate students interest, focus students concentration, increase understanding and increase the retention content (Berk, 2009). As established in this study 99% of the students agreed that Multimedia enables them to master concepts easily. According to Okedeyi (2015) when teachers use multimedia resources, instruction is made easy and well understood by students which will improve teaching and learning of scientific concepts in Secondary Schools. Mastery of scientific concepts cannot be fully

achieved without the use of Multimedia as an instructional learning material (Oshinaike & Adekunmisi, 2012).

There exists a logical question whether or not Multimedia assisted teaching can influence student attitude towards school subjects and if it is possible to eliminate student's negative attitude to school subjects (Hofer & Srobova, 2005). This is particularly interesting question to Physics teachers and Physicists in general given that the popularity of Physics among high school students is not impressive. The findings of this study suggest that increased use of Multimedia instruction in Physics lessons could potentially solve this problem. According to this study over 99% of the sampled students agreed that they become more interested in physics and 100% said they enjoy learning Physics when Multimedia instruction is used. Subsequently only 3% felt that Multimedia instruction is burdensome to them. Multimedia instruction could hence be used as a possible remedy for negative student attitude towards Physics.

There was a measure of students attitude towards use of WBLR and the general impression was that it was positive (Figure 3).

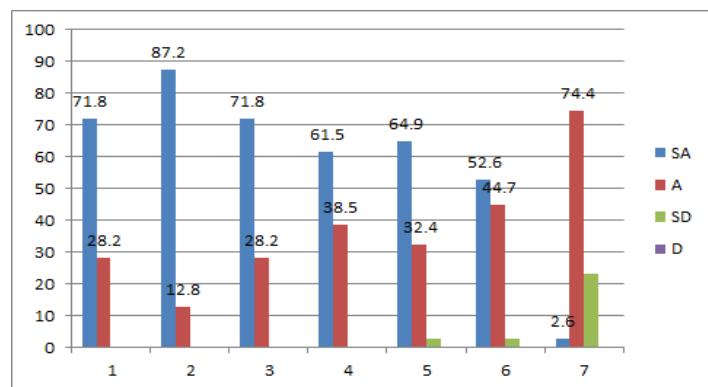


Figure 3: Effect of WBLR

Web Based Learning Resources (WBLR) is instructional content or activity delivered through the web that teaches a focused concept, meets specific learning objectives and provides a Learner- centered learning context (Liu & LaMont, 2005). Web based instruction (WBI) is delivered via the internet and the intranet only. Examples of WBI include; chatrooms, instant messaging systems, Desktop video conferencing, Listservers, newsgroups, web or discussion Boards, Personal Digital Assistants, webcams, Plugins, Multi-User Domain (MUDs), Multi-User Object Oriented (MOOs) and Multi-User Shared Hallucination. Findings indicate that Smart School Teachers were generally motivated to use WBLR because they believed that technology infusion in the classroom setting could help improve their own teaching, improve student engagement and accelerate learning (Salehi & Salehi, 2012).

Students generally have a positive attitude towards WBLR. Even though WBLR are minimally used, most students who used them enjoy being taught with these methods and master concepts easily. Most feel too that WBL is not a bother to them or give them a lot of work. A study done by Sengel (2005) in Turkey found out that 100% of the learners sampled enjoyed learning Physics through the internet. The learners also found it interesting and easy and even recommended that use a similar application in the rest of the subjects. Even though 50% of the learners had little or

minimum experience with eLearning platforms, most of them said they did not need much support to use ePhysics and found the structure and navigation appropriate and comprehensible. Teacher familiarity with LCI is important and this was tested by using a Yes- No Scale against the three modes of instruction (Figure 7)



Figure 4: Teacher Familiarity with LCI

Lack of familiarity with a specific method has been identified as an intrinsic challenge towards implantation of Learner-centered methods (Lloyd, 1999; Stein et al., 2001). Shedd (2004) noted that those preparing to be modern day teachers must incorporate technology in their class. One Principal in the study done by Amaal (2016) stated that teachers needed to update their skills, keep up with advances in technology and use more computer programs in their classes. From the data in Figure 7, 15% of teachers are not aware of RBL or Multimedia teaching while 20% of the teachers are not aware of WBLR. However there is some positive news as a big percentage of teachers are aware of the aforementioned LCI. 80% are familiar with WBLR, 85% are familiar with RBL and a similar percentage is familiar with Multimedia. Indeed as noted by Makanda (2015) 70% of the teachers in the sample schools had been trained to use computers and 60% had been trained on how to integrate ICT in the teaching and learning of Physics. In this study there is a big disparity between teacher familiarity with the aforementioned LCI and their frequency of use in classroom instruction. Despite most of the teachers being familiar with the LCI, their frequency of use in lessons is not as high as shown earlier in Table 1, 2 and 3. Gokalp (2015) noted that the fact that a teacher is trained in ICT use in class does not necessarily translate to him or her using it in the actual classroom. The under use of Educational Technology is primary due to poor school equipment, necessary resources, insufficient information and knowledge of teachers and lack of motivation of teachers to use them (Stosic, 2015). Furthermore it takes more than just basic knowledge on Educational Technology to have it used by teachers in their classes. Teachers have to go through a variety of conferences, courses, professional literature and seminars in order to get a better knowledge in the use of Educational Technology (Stosic, 2015). According to Stosic some of these teachers might feel the need to attend workshops or seminars in order to gain additional technical knowledge of these appliances and how to use them in their classes especially in regard to older teachers. This is because older teachers did not have the possibility of training with modern technology as opposed to younger teachers. Attending such seminars and workshops are expensive and requires concerted effort and financial support from institutions to the teachers. This may prove hard to do especially when majority of schools in developing nations still lack even

enough resources required for Educational Technology LCI. Studies done in Nigeria have found out that teachers do not attend ICT workshops, conferences and seminars because of lack of money (Adedibu, 2001; Olagunju, 2012). Due to this challenge, some teachers have taken up individual initiatives to update themselves on the current trends in Educational Technology. The majority of STEM teachers in Europe had not taken any ICT-related professional development or training related to innovative STEM teaching in the last two years. When they do follow training, teachers tend to update their knowledge online and in their own time (European Schoolnet, 2018).

Another possible cause for this is likely due to lack of time to access computers by the teachers. Inadequate time to access computers was noted by Makanda (2015) as one of the causes for low use of ICT in lesson delivery. According to Leung et al. (2005) challenges faced by teachers in countries where ICT is being introduced include limited time caused by time required for lesson preparation. Teachers who are not familiar with Multimedia, RBL and WBLR have probably not been exposed to such methods. If they have minimal exposure they might not be able to integrate them in the learning of Physics. As a conclusion to the study some challenges facing LCI were considered.

Table 8 shows a summary of major challenges facing the LCI as expressed by the teachers.

Table 5: Challenges facing LCI

Challenges facing LCI	No of Respondents
RBL	
• Lack of relevant resources	10
WBLR	
• Lack of Internet connectivity	9
• Lack of Computer room	2
• Learner engaging in irrelevant web pages	1
Multimedia	
• Lack of relevant resources	9
• Electricity failure/ blackouts	1

Questionnaires were administered to teachers in order to determine the challenges they faced in trying to implement the aforementioned Teaching Technology methods. From Table 8 ten teachers noted that the main challenge they faced in trying to effectively implement RBL is lack of resources. Only one sampled school had a Learning Resource Centre. For Schools to have an LRC, school administrators must make deliberate efforts to create or build one. If there is no appropriate room, one can be made available (Sitepu, 2010). Resources in a variety of formats such as Web Quests, original documents, newspaper articles, magazine articles, games, poems, reference books, nonfiction books, experts, videos, maps, charts, the Internet, works of art, plays, CD-ROMs, musical compositions, costumes, exhibits, PowerPoint presentations should be in the LRC and other learning resources that may emerge with advancement in technology. Clearly RBL is

costly to implement especially at the initial starting phase but schools should regardless strive to have LRCs due to its immense benefits to learning.

The main challenges affecting implementation of WBLR is lack of internet connectivity and lack of computers. If computers are minimally used in schools then the teaching process will be dominated by traditional methods (Stosic, 2015). Among the factors affecting implementation of STEM as quoted by teachers in Europe according to European Schoolnet (2018) include insufficient number of internet connected computers (61% of the responses), insufficient number of computers (63% of the responses) and budget constraints in accessing adequate content material for teaching (68% of the responses). There is no doubt the use of the internet has increased all around the world (Gokalp, 2013) however Leu et al. (2013) noted that children in developing countries very rarely use the internet as a learning tool. Makanda (2015) noted that some of the students in Bungoma District, Kenya, had never handled computers which likely points to a possibility of lack of proper policies in some schools that would ensure that every student can access computers. The study also noted that students who had had access to the internet for whatever purpose probably did so at home but not in school. Kola (2013) noted that lack of access to the internet was a major challenge facing implementation of Educational Technology in Nigerian Schools. Furthermore the study also established that 18% of the learners sampled had never interacted with a computer for whatever purpose. Studies done by Salehi & Salehi (2012) showed teachers lacked technical support at school and had limited access to the internet. Shortages of school computers were identified as one of the main challenges facing implementation of ICT in teaching and learning in Hong Kong during the initial stages (Leung et al., 2005). However they were able to overcome this hurdle by creating awareness through the media to the teachers about the advantages of incorporating ICT into teaching and massive support from the Government. School authorities also helped teachers to squeeze time to learn how to incorporate ICT to teaching. Lack of internet connectivity also affects Multimedia application as the internet offers over 5000 Multimedia learning materials for Physics Learners (Obadovic et al., 2016). The most widely used are video materials in the form of computer generated simulations, animations and interactive research experiments. Students can have access to the internet but use it for another purpose other than accessing Physics web resources. A study by Demirbilek et al. (2001) found out that 30% of the students aged 16- 22 years use the internet for entertainment while only 10% of them use it for educational purposes. Another challenge quoted by the teachers included lack of computers and Internet connectivity. It is likely that schools view implementation of the LCI as expensive and as such are not enthusiastic to provide the relevant resources.

Educational Technology has yet to take its place (Lowther et al., 2012). This may be particularly true in Kenya and most countries that want to implement Educational Technology due to lack of relevant resources. As noted from the data in table 8, lack of resources is the major challenge facing implementation of the aforementioned LCI. As noted by Makanda (2015) use of ICT in lesson delivery was low due to factors such as inadequate facilities, inadequate time to access computers or lack of ICT skills. Aisha (2017) noted that lack of resources and inadequate

equipment were one of the major challenges facing implementation of Educational Technology. The study also noted that schools were reluctant to repair equipment that had broken down due to the costly nature of repair. This resulted in zero use of such equipment and hence no use of Educational technology in class. In Nigeria, the number one problem facing Nigerian Educational system is corruption (Adedibu, 2001; Olagunju, 2012). Funds that were meant to purchase ICT equipment and other Educational facilities were often diverted to private accounts. Individuals including teachers were not spared of this corruption. They stole government money meant for educational purposes for their private use (Kola, 2013). As noted too by Kola, there is lack of uninterrupted power supply in Nigeria which has caused a lot of setbacks as far as usage of Educational technology is concerned. This is because Educational Technology LCI is heavily reliant on reliable power supply during that specific time the teacher or a student would wish to teach or learn using the technology.

CONCLUSION

Multimedia options predominantly used educational technology teaching method while Web- based learning and Resource Based learning were barely used. Lack of relevant resources greatly hampered the use of Web-based learning and Resource-based Learning. In cases where such resources were available, the school program was too tight to allow time for sufficient applications of these methods. Half of the sampled schools lacked computer rooms and even those that had rooms never used them to access WBLR. Only one sampled school had a Learning Resource Centre. The study recommended that resources should be availed to enable application of the interactive Educational Technology teaching methods for these are the ones that bring about meaningful learning in Physics and STEM subjects in general

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The Effect of Addition of Sorbitol and Dextrin to Amino Acid Profile and Fatty Acid Profil of Albumin Powder Cork Fish (*Ophiocephalus striata*)

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Abstract

Albumin has a big role in healing wounds, especially for patients after surgery so it is very necessary for the body. HSA (Human Serum Albumin) the price is relatively expensive so the need for another alternative is cork fish. However, the fishy smell of cork fish is less favored by the people so it is necessary to process it in the form of cork fish albumin powder to minimize the fishy odor. In making cork fish albumin powder, additional fillers of dextrin and sorbitol are needed. This study aims to determine the effect of the addition of sorbitol and dextrin on the type and amount of amino acids and fatty acids of cork fish albumin powder. The chemical composition of cork fish albumin powder was tested by proximate analysis. Amino acid content in cork fish albumin powder can be tested using HPLC (High Performance Liquid Chromatography), while the fatty acid content can be tested using GC-MS (Gas Chromatography Mass Spectrometer). Albumin powder in the treatment of addition of 6% sorbitol and 80% dextrin was obtained albumin levels of 2.75%, protein 22.38%, 1.50% water. The highest amino acid content of Glutamic acid is 0.56% and Aspartic acid is 0.52%, and the highest fatty acid content is Palmitic acid at 24%.

Keywords: *albumin powder, amino acids, fatty acids, sorbitol, dextrin*

I. INTRODUCTION

Cork fish is a type of freshwater fish that is commonly found in rivers and other public waters. In general, cork fish are sold in preserved or marinated form. Cork fish can be used as an alternative to serum albumin. Cork fish is a type of fish that has a high protein content when compared to other fish. The protein content of cork fish reaches 25.5%, while for albumin levels it reaches 6.22% (Fitriyani and Ika, 2013). Usually cork albumin extract is consumed in liquid form so most people don't like it because it smells fishy. Therefore the need for another alternative is to make albumin extract in powder form using the vacuum drying method. In the process of making albumin powder, the coating material is in the form of sorbitol and dextrin. According to Irzal *et al.*, (2016), sorbitol can be used as an anti-regulation because the properties of sugar can increase the surface tension of protein molecules so that water can maintain tissue and protect products that can cause protein molecules to stabilize. While the function of adding dextrin in making albumin powder is as a filler. The choice of using dextrin fillers is because it is easily available and the price is relatively cheap (Yana and Kusnadi, 2015). Addition of dextrin to the production of albumin powder because dextrin is a type of filler that has the properties of coating the flavor component, increasing the volume, and accelerating drying in the powder and preventing material damage due to the heat process.

Amino acids are constituents of proteins that are needed by living things. Amino acids are divided into 2, namely essential amino acids and non-essential amino acids. Amino acids can be used to repair damaged tissue cells, protect the liver from toxic substances, lower blood pressure, regulate metabolism, and reduce ammonia levels in the blood. Besides amino acids, fatty acids also have an important role in the body. Fatty acids are divided into two, namely saturated fatty acids and unsaturated fatty acids. The role of fatty acids in the human body include maintaining the structural parts of cell membranes, playing a role in brain development, preventing cancer, diabetes, and strengthening the immune system (Abdullah *et al.*, 2013).

II. MATERIALS AND METHODS

2.1 Materials

The research material used consisted of raw materials for making albumin extracts, ingredients for making albumin powder, and materials for chemical analysis. The raw material for making albumin extract, 500 grams of cork (*Ophiocephalus striatus*) fish obtained from Malang's large market is alive. The ingredients for making albumin powder are albumin extract derived from extraction of cork fish and fillers in the form of dextrin and sorbitol.

In this study, the concentration of sorbitol and dextrin 6%: 80% was used. 250 g of cork fish is extracted using vacuum extractor at 70 °C for 12.5 minutes. Furthermore, the albumin extract obtained was added by sorbitol and dextrin according to each treatment. Then the cork albumin extract was dried using vacuum drying with a temperature of 49 °C for ± 6 hours. The test parameters used in the main research were albumin, protein, water, ash, fat levels, fatty acid profiles and amino acid profiles.

2.2 Albumin Analyze

Analysis of albumin levels according to Suprayitno (2014), using a spectrophotometric method. The procedure for analyzing albumin levels using the spectrophotometric method, namely a sample of 2 cc, was added to the biuret reagent and heated at 37 °C for 10 minutes. The samples were then cooled and their absorbances measured with electronic 20 and recorded absorption. Then it is calculated using the formula:

$$\% \text{ Of albumin content} = \frac{\text{ppm} \times 25}{\text{sample weight} \times 20} \times 100\%$$

2.3 Protein Analyze

In analyzing protein content using spectrophotometric methods. Measurement of protein content is taken by taking 0.9 ml of sample and precipitating it with added crystal ammonium sulfate. Then centrifuged for 10 minutes and the supernatant was taken. Then the precipitate is dissolved by buffer acetate pH 5 to 10 ml. A sample of 0.9 ml was put into each test tube and added biuret reagent and a solution of 0.8 ml and 1.3 ml of acetic acid buffer respectively. Then let stand for 10 minutes and read the absorbance at the maximum wavelength (Jubaiddah *et al.*, 2016).

2.4 Water Analyze

Water content analysis was determined by the dry oven method (thermogravimetric method). Water content analysis procedures according to Rachmania *et al.*, (2013), namely porcelain dishes were dried at 100 °C for 1 hour in the oven. Then cooled in the desiccator and the cup was weighed. A sample of 0.5 grams was put into a dry cup and dried in an oven at 105 °C for 24 hours. Then the cup containing the sample is cooled into the desiccator. After that the cup containing the sample is dried weighed and calculated using the formula:

$$\text{Water (\%)} = \frac{\text{The weight of sample and cup before drying} - \text{The weight of sample and cup after drying}}{\text{Berat sampel} \times \text{sample weight}} \times 100\%$$

2.5 Amino Acid Analyze

The principle of analysis of amino acid profiles is by using HPLC (High Perfomed Liquid Chromatografy), which is by utilizing the pre column reaction of primary amino groups in an alkaline atmosphere containing mercaptoenol to form compounds that fluoresce so that they can be detected by fluorescence detector. The procedure for analysis of amino acid profiles is that the sample is added to the potassium borate buffer solution pH 10.4 with a ratio of 1: 1. Then the sample solution was taken as much as 10 µl and mixed with orthoformaldehyde (OPA) reagent as much as 25 µl. The mixed solution is left to stand for 1 minute so that the derivatization is complete. The same is done for standard amino acid solutions. Furthermore, a standard solution of 5 µl is injected into the HPLC column and awaited until all amino acid separation is complete (Sari *et al.*, 2017).

2.6 Fatty Acid Analyze

The principle of analysis of amino acid profiles is by using GCMS (Gas Chromatography Mass Spectrometer). Analysis of fatty acid profiles according to Pelick and Mahadevan (1975), samples were weighed as much as 150 mg, then dissolved in 0.5 N KOH as much as 2 ml in methanol. Then reflux for 5 minutes. Then added 2 ml of BF3, 15% methanol was refluxed for 5 minutes, then added 4 ml of heptan and then refluxed again for 2 minutes. Added 5 ml of saturated NaCl and anhydrous Na2SO4 solution to taste and then cooled to room temperature. After cold the solution is put into a split flask, shaken, left for a moment so that heptan separation occurs and taken. Then put into a closed test tube to be injected into the GC using a syringe.

III. RESULTS AND DISCUSSION

3.1 Albumin

Albumin level with the addition of 6% sorbitol concentration and 80% dextrin of 2.75 g / dL. This is presumably because the addition of the constituent ingredients of sorbitol and dextrin fillers can protect albumin content in the powder. According to Suryaningsih and Priyanto (2011), the addition of anti-regulation can maintain protein from denaturation, because it is an ingredient that can inhibit changes in the structure of protein molecules that cause changes in physical, chemical and biological properties of a material. Besides increasing albumin levels is also influenced by increased dextrin concentration, according to Naibaho *et al.*, 2015, the addition of dextrin in making powder because dextrin is a filler that can coat the flavor component, increase the volume, and accelerate drying. So the addition of

dextrin to albumin powder can reduce drying time and reduce the occurrence of damage to albumin content in the powder.

3.2 Protein

Protein levels with the addition of 6% sorbitol concentration and 80% dextrin were 22.38%. This was allegedly due to the addition of the constituent ingredients of sorbitol and dextrin fillers to reduce the occurrence of protein damage in cork fish albumin powder. According to Irzal *et al.*, (2016), the addition of sorbitol to a material can reduce the occurrence of protein denaturation. This is because sorbitol has properties that can increase the surface tension of protein molecules so that it can protect products that can cause protein molecules to become more stable. According to Indriani (2013), dextrin can be used in various purposes, one of which is as a filler. Dextrin has a low viscosity so it is often used in making jelly, as a source of solids that can stabilize the texture. In addition, dextrin can be used to speed up the drying process. With the faster drying process, the loss of protein components in the powder decreases.

3.3 Water

Water content with the addition of 6% sorbitol concentration and 80% dextrin at 1.50%. This is due to the addition of materials that are capable of evaporating water such as sorbitol and dextrin. According to Rumaharbo *et al.*, 2015, the higher the concentration of sorbitol added to a product, the lower the water content in the product. This is because sorbitol is able to bind the free water that is in a food ingredient. Sorbitol includes humectants which are water-binding agents in food. According to Naibaho *et al.*, 2015, the higher the concentration of dextrans added, the lower the water content contained in a product. This is presumably because dextrin is able to absorb water in the material and easily vaporize the absorbed water. Dextrin is hygroscopic, although it can absorb water but when the drying process is absorbed the water will be released.

3.4 Amino Acid Composition

Table 1. Results of Analysis of Amino Acid Powder of Cork Fish Albumin

No.	Amino Acid Type	Level (%)
1.	Aspartic Acid	0,52
2.	Glutamic Acid	0,56
3.	Serine	0,21
4.	Histidine	0,10
5.	Glycine	0,39
6.	Threonine	0,18
7.	Arginine	0,22
8.	Alanine	0,37
9.	Tyrosine	0,09
10.	Methionine	0,09
11.	Valine	0,19
12.	Phenylalanine	0,26
13.	I-leucine	0,27
14.	Leucine	0,34
15.	Lysine	0,38
Total		4,18

Source : data processed , 2018

Based on Table 1, it is known that there are 15 types of amino acids present in cork albumin powder. The highest amino acid content in cork albumin powder is the type of amino acid Glutamic acid and that is equal to 0.56%. According to Nugroho (2013), the main amino acids making up albumin are glutamic acid and aspartic acid. In addition, the amino acid content in the highest cork fish is the type of glutamate amino acid, aspartic amino acid, and leucine. Glutamate acid is also found in beef, eggs, and other types of fish meat. Glutamic acid and aspartic acid play an important role in creating the characteristics of aroma and taste in a food (Purwaningsih *et al.*, 2013).

The high glutamic acid in cork fish albumin powder is also influenced by dextrin, this is due to the nature of acid dextrin, can dissolve hot and cold water, and is classified as carbohydrates. Proteins are easily hydrolyzed, so the protein in cork fish is hydrolyzed with acids contained in dextrin so that glutamine occurs deamination and forms glutamate. The value of glutamic acid increases. Where glutamic acid consists of 2 carboxyl groups, 1 amino group, hydroxyl group, and branch chain. The formation of carboxyl groups in glutamic acid due to the hydrolysis process between proteins and acids. Compounds C = O in proteins are bound to OH in dextrans and CO compounds are bound to OH, both of which are in dextrin. So that formed 2 COOH groups. And the formation of NH₂ is due to the presence of NH bonds in proteins with H atoms in dextrans (Meiyani *et al.*, 2014). The high value of glutamic acid content is also thought to be due to the addition of sorbitol as an regulating ingredient. Sorbitol has a polyhydroxy group that can react with water molecules by hydrogen bonds, so it can increase surface tension and prevent molecules from getting out of

protein, and protein stability is maintained. So that this causes the high content of glutamic acid in cork albumin powder to be maintained (Suryaningsih and Priyanto,2011).

Whereas the lowest amino acid content of cork fish albumin powder was methionine and tyrosine which was 0.09% each. This is because methionine and tyrosine are limiting amino acid types. Every food has a limiting amino acid. Limiting amino acids are usually very few in food ingredients. To increase the limiting amino acid content can be done by supplementing with foods that have high amino acid content (Dewi *et al.*, 2010). Amino acid content of cork fish consists of essential amino acids and non-essential amino acids. Essential amino acids present in cork albumin powder include histidine, threonine, methionine, valine, phenylalanine, i-leucine, leucine, and lysine. The more types of essential amino acids, the better the quality of cork fish albumin powder. According to Asfar *et al.*, 2014, essential amino acids are amino acids that cannot be synthesized by the body so that food intake is needed. Essential amino acids include isoleusina, leusina, lysine, methionine, phenylalanine, threonine, tryptophan, and valina. While the non-essential amino acid groups that are important in cork fish are glutamic acid, arginine, and aspartic acid. These three types of non-essential amino acids play an important role in helping wound healing.

3.5 Fatty Acid Composition

Table 2. Results of Analysis of Fatty Acid Profile of Cork Fish Albumin Powder

No.	Fatty Acid Type	Level (%)
1.	Fat Content	2.42
2.	Fatty Acid**	
3.	Lauric Acid, C12:0	0.13
4.	Tridecanoic Acid, C13:0	0.07
5.	Myristic Acid, C14:0	3.39
6.	Myristoleic Acid, C14:1	0.08
7.	Pentadecanoic Acid, C15:0	1.17
8.	Palmitic Acid, C16:0	24.00
9.	Palmitoleic Acid, C16:1	5.07
10.	Heptadecanoic Acid, C17:0	1.78
11.	Cis-10-Heptadecanoic Acid, C17:1	0.86
12.	Stearic Acid, C18:0	5.42
13.	Elaidic Acid, C18:1n9t	0.10
14.	Oleic Acid, C18:1n9c	18.46
15.	Linolelaidic Acid, C18:2n9t	0.05
16.	Linoleic Acid, C18:2n6c	3.15
17.	Arachidic Acid, C20:0	0.21
18.	γ -Linolenic Acid, C18:3n6	0.26
19.	Cis-11-Eicosenoic Acid, C20:1	0.62
20.	Linolenic Acid, C18:3n3	1.47
21.	Heneicosanoic Acid, C21:0	0.07
22.	Cis-11,14-Eicosadienoic Acid, C20:2	0.27
23.	Behenic Acid, C22:0	0.15
24.	Arachidonic Acid, C20:4n6	0.41
25.	Tricosanoic Acid, C23:0	0.05
26.	Cis-13,16-Asam Dokosadienoat, C22:2	0.02
27.	Cis-5,8,11,14,17-Eicosapentaenoic Acid, C20:5n3	0.16
28.	Nervonic Acid, C24:1	0.09
29.	Cis-4,7,10,13,16,19-Docosahexaenoic Acid, C22:6n3	0.81
Total		68.31

Source : data processed , 2018

Based on Table 2, it is known that there are 27 types of fatty acids present in cork albumin fish powder. The highest fatty acid content is in the type of fatty acid Palmitic Acid by 24%. According to Isamu *et al.*, 2017, from 17-21% saturated fatty acids found in fish meat are palmitic fatty acids (C16H32O2). Saturated fatty acids such as palmitic, meristate, and stearic acids are more stable against heat. This is because the nature of saturated fatty acids is more stable. Stearic acid and meristate are not easy to react than unsaturated fatty acids. The double bond of unsaturated fatty acids is easy to react with oxygen (easily oxidized). According to Nashiruddin *et al.*,2016, palmitic fatty acids are a type of saturated fatty acid. The most commonly found in innards and heads in African catfish, mas, gurami, and cork fish are palmitic fatty acids. The high saturated fatty acid content can affect Low Density Lipoprotein (LDL) cholesterol. High LDL levels can cause coronary heart disease. In addition, the high content of palmitic acid in cork albumin powder is due to the increasing concentration of dextrin. This is because dextrin dextrin is commonly used in the encapsulation process, to protect volatile compounds, protect compounds so that they are not easily oxidized or heat because dextrin molecules are stable against heat and oxidation so dextrins can protect during the drying process. The

properties of palmitic acid which are not easily oxidized and stable against heat cause the higher palmitic acid content with the addition of high dextrin concentrations (Rizal and Putri, 2014).

The high palmitic acid content in cork fish albumin powder can also be influenced by several factors including the type of food, geographical location, age, season, and method of processing cork fish. In types of freshwater fish, they contain higher linoleic acid and lower EPA content than sea fish. Whereas for fish species whose habitat in swamps such as cork fish tends to contain high palmitic acid, this is because there are few phytoplankton and swamp fish also tend to be predators of small fish (Kaban and Daniel, 2005). Palmitic acid (C16: 0) is a long chain saturated fatty acid that has a high melting point of 64 ° C. Products that contain high palmitic acid will be more resistant to oxidation (rancidity). Palmitic acid is found in plants such as coconut and oil palm (Jacobe et al., 2015).

While the lowest type of fatty acid in cork fish albumin powder is Docosadienoic Acid which is equal to 0.02%, this is because Docosadienoic Acid is a type of unsaturated fatty acid. Oxidative decomposition of unsaturated fatty acids during the heating process at high temperatures is easier to occur considering that when making cork albumin powder using high temperatures during the extraction and drying process. Fat molecules which contain unsaturated fatty acids undergo oxidation. Furthermore, these radicals with O₂ form active peroxide which when reacting with one fatty acid molecule will form hydroperoxide (Gumilar et al., 2009). The content of fatty acids in cork albumin powder is divided into two, namely essential fatty acids and non essential fatty acids. . In cork albumin powder there are 6 types of essential fatty acids including Linoleic Acid, γ -Linolenic Acid, Linolenic Acid, Arachidonic Acid, Eicosapentaenoic Acid, Docosahexaenoic Acid. The more types of essential fatty acids in a food, the better the quality of the material will be. Essential fatty acids are important nutrients needed for growth, maintenance, and various functions of physiological processes where the body cannot synthesize itself and needs to be obtained from food (Simarmata et al., 2012).

IV. CONCLUSION

Cork fish albumin powder can be used as a source of albumin because it contains 15 types of amino acids and 27 types of fatty acids. Of the types of amino acids and fatty acids present in cork albumin powder have an important role in the process of wound healing including the types of glutamate, arginine, and aspartate acids. As for the types of fatty acids that play a role in the wound healing process, EPA and DHA.

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Qualitative Content Analysis of Some Selected News Stories of Etv

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Abstract

The paper aimed to analyze selected news stories of Ethiopian Television. Accordingly, the study focused on the critical reporting practices and how the media station covers development news stories. Besides, the study also examined the kind of news the media station prioritized. To do this, the study mainly used qualitative content analysis as a major tool. To substantiate the data, interview also used as another tool of data gathering. The findings of the study indicated that critical reporting on government which reveals the wrong doing of the government was neglected in Ethiopian Television (ETV). Rather it was used to manipulate and shape public attitude. The contents of ETV news reflected that development news was given above all a special attention over other issues. The news was presented in the way it brings forth government in most positive light. In the case of news coverage, ETV gave priority for government issues. This means that ETV served the interest of the government at the expense of the public. Most of the news was presented from the government point of view. Hence, ETV should revisit the way news stories in the media station are being produced and broadcast in accordance with the major principles of the profession of journalism.

Key words: Ethiopian Television, Content Analysis, News stories

1. INTRODUCTION

The media do not simply report something newsworthy as it is. News is the final product of various processes. MacDougall (1968) explains this: At any given moment billions of simultaneous events occur throughout the world... all of these occurrences are potentially news.

Though it is difficult to find a universal definition for news, scholars do have common agreement for news value being constant through different times and places. As Gans 2004:80, (cited in Gizachew, 38: 2006), news is "information which is transmitted from sources to audiences, with journalists -who are both employees of bureaucratic commercial organizations and members of a profession - summarizing, refining, and altering what becomes available to them from sources in order to become the information suitable for their audiences".

There are rules which guide journalists for the selection of news. One of these rules is the news value. According to Golding and Elliot (1979), news values are used in two ways. They are criteria of selection from material available to the newsroom of those items worthy of inclusion in the final product. Second, they are guidelines for the presentation of items, suggestion what to emphasize, what to omit, and where to give priority in the preparation of the items for presentation to the audience.

Media historian, Michael Schudson (1996) notes three approaches on the production of news. First is the political economy perspective, which relates news production to issues of political and economic structure and control. This means news tends to reflect the views of the political elite, or of the large corporations that own major media organizations. The second approach involves the influence of the social organization of the

journalistic processes. “The story of journalism, on a day-to-day basis,” wrote Schudson, “is the story of the interaction of reporters and bureaucrats”. Put another way, “the world is bureaucratically organized for journalists”. This approach also encompasses the role of public relations in shaping the news agenda by making potential stories easily available to journalists. Some adherents to the organizational perspective also contend that the personal values and social backgrounds of journalists shape the news product, whether in terms of political bias or coverage of underrepresented groups. Whereas the social organizational perspective emphasizes personal relations, the third approach, a cultural view, stresses cultural and symbolic aspects. This is when news stories are framed in terms of cultural stereotypes. It is apparent that the way these perspectives reflected in the production of news can affect the contents of news.

2. STATEMENT OF THE PROBLEM

There are different scholars who dealt with news selection process. Among them, Gans (2004:78) broadly categorizes the news selection into four theories. The first is, journalist-centered where the responsibility of selection lies on journalists. Here journalists have burden in selecting and gathering news stories. Here it is possible to deduce that the contents of news can be affected.

Gans’s second theory focuses on the role of news organization in the news selection process. This shows the power of news organizations in selecting and shaping news stories. This indirectly implies that journalists are supposed to select and gather news stories from point of views of their organization. The organization is there to determine what news is or not. Here the power lies not on journalists.

The third theory is event-centered or the so-called “Mirror theory”. This is where events play an important role for news selection and gathering. The fourth theory focuses on the factors that play a great role in affecting the news selecting and gathering processes. These factors can be economical, political, technological, and other factors can shape the production of news.

McManus (1994), Koch (1990) and others claim that the move over the past ten years to a ‘market-driven journalism’ has fundamentally changed the daily role of journalists in making the news. A survey in the year 2000, by the Pew Research Center for the people and the press and Columbia Journalism Review, reinforces this view. The study, which surveyed almost 300 journalists in the United States, found that four out of ten journalists purposely avoid or soften stories to preserve the interests of their news organization (Associated Press, 2000). Paletz and Entman (1982) found that where the primary objective of a news organization was efficiency in the gathering, describing and transmitting of news, the result was reliance on official sources and homogeneity of reporting. From this point of views, the researcher doubts that Ethiopian Television is practicing critical reporting to the development news. Hence, this specific study aims to analyze selected news stories of the media station.

3. OBJECTIVES OF THE STUDY

3.1 Major Objective

The study major objective is to qualitatively assess some selected news stories of Ethiopian Television

3.2 Minor objectives

- ⊕ To examine the critical reporting practice of Ethiopian Television

- ⊕ To scrutinize the way the media station cover development news stories
- ⊕ To find out the kind of news the media station gives priority.
- ⊕ To identify if there is any pressure on the media station's practitioners when they make news stories.

4. RESEARCH QUESTIONS

1. What is the critical reporting practice of the media station?
2. How does Ethiopian Television cover development news stories?
3. What kind of news gets priority in ETV?
4. Is there any pressure on the journalists of media station in making news stories?

5. METHODOLOGY

The study employed qualitative research methodology. To critically analyze some of news stories of Ethiopian Television, the study used qualitative approach. The following deals with the tools separately.

6. Method of Data Collection

6.1 Qualitative content analysis

Qualitative content analysis refers to a research technique that is used to study the content of data qualitatively as opposed to quantitatively. Qualitatively here means that the analysis rules are followed in a step by step manner in order to achieve the right output. Content analysis is a purely descriptive method. It describes what is there, but may not reveal the underlying motives for the observed pattern ('what' but not 'why'). The early approach to content analysis was criticized because of its focus on basic quantitative elements. Therefore, qualitative content analysis has been used to analyze the text thoroughly.

Qualitative content analysis in media studies relies heavily on researcher 'readings' and interpretation of media texts. This intensive and time-consuming focus is one of the reasons that much qualitative content analysis has involved small samples of media content and been criticized by some researchers as unscientific and unreliable.

The present study employs qualitative content analysis believing that it allows the researcher to systematically analyze the latent content of the media content (the prime time news, 8:00PM, in this case) through the selection of units of analysis. According to Flick (2002:75), this "enables a distinction to be made between the objective facts of the situation and the interviewee's subjective definitions of the situation with a view of comparing them." This implies that content analysis would help the researcher to double-check the data obtained through qualitative content analysis and in-depth interview.

Generally, qualitative content analysis is important method to conduct a primary research and come up with facts to use as evidence. It can be useful technique for allowing us to discover and describe the focus of individual, group, institutional, or social attention (Weber, 1990 cited in Stelmer, 2001). Therefore, qualitative content analysis is a vital method in studying the focus of the media institution. This means that the method is important in assisting the present study find out the extent ETV is practicing journalism.

6.2 In-depth Interviews

The researcher employed in-depth interviews with editors and senior reporters found in the media institutions. Though the main tool of the study is qualitative content analysis, the researchers used in-depth interviews to corroborate the data gathered through the former tool. So that it assists the researcher to make a conclusion based on the data that the study would cause.

7. Sampling Method

For the media content sample, the study focuses on ETV's prime time news at 8:00 PM. The main reason the researcher focuses on news is because news is the big issue that separates journalism from public relations and it's the life of journalism; '....without news journalism would not exist' (Mwaffisi:1994). The researcher prefers prime time news believing most of the news presented in a day is repeated at this time and also the majority of news arrives to newsrooms in the afternoon. Also, this is the time most people come back to their home and watch the news.

The researcher believes that a sample of one or two month's prime time news of whatever issues can serve the purpose of the study. Accordingly, the study examined the first two weeks of each of the three months: December, 2012, January and February, 2013. This also has its own reasons.

Firstly, the researcher believes that ETV's news broadcast of any times can serve the purpose of the study. Secondly, in order to create variety, it is important to see news that was broadcast at different times.

Since the selected media institution broadcast in variety of languages, the study focuses on Amharic program. As Amharic is the working language of the country. ETV has been chosen for the study as it is the biggest media in the country.

8. DATA PRESENTATION AND ANALYSIS

8.1 Qualitative Content Analysis of Selected News Stories

Qualitative content analysis deals with analysis and interpretations of the themes of the categorized titles, tones, and with the analysis of news coverage. The identification of themes was conducted as Rice and Ezzy (1999:258) says through 'careful reading and re-reading of the data'. It is a form of pattern recognition within the data, where emerging themes become the categories for analysis. Different researchers might implement content analysis differently.

Based on the framework of qualitative analytical procedures developed by Miles and Huberman (1994), Romanowski (2009) outlined the common strategies of qualitative content analysis as follows: (a) The researcher carefully examine the textual data and takes notes; (b) The researcher performs data reduction by selecting, focusing, and condensing the data in the way that could best answer the research questions; (c) The researcher organizes, arranges and displays the condensed data. Based on the display, the researcher identifies themes, patterns, connections, and omissions that could help answer the research questions. Further, quotations might be listed for supporting the themes and inter-connections among the themes. If necessary, categories could be added, deleted, and revised to maximize mutual exclusivity and exhaustiveness; and (d) The researcher revisits the data many times in order to verify, test, or confirm the themes and patterns identified.

Accordingly, dominant themes were developed from the sampled news stories of the prime time news (December, January, February i.e. the news stories taken from the first two weeks from each months). Thus, based on the gathered data, the researcher puts the news content under two big umbrellas: Social issues news and political news. The categories of social issues news include health, transportation, water and sanitation, education, agriculture, and industrial coverage. Whereas, corruption, democracy and good governance, speeches of different officials and organizations and Ethiopia's external relations news stories were categorized and analyzed under the political news umbrella. So, the central ideas of the news in relation with the categories were discussed. The tone of news signifies news which criticizes or supports government or neutral to anybody. The news coverage signifies how the media prioritize and cover specific issues or events as opposed to others. By and large, this approach is crucial in answering the major research question of the study-'To what extent

ETV is practicing journalism?' The analysis was done using the extracts taken from the sampled news stories and interviews concomitantly.

8.2 Themes of News Content

8.2.1 Social Issues News

Most ETV news of this category focuses on success stories. They deal with what the ruling party has done in every sector in the country. As informant 4 of the study said 'ETV focuses on Development Journalism (DJ). However, the concept of DJ is misperceived by government.' According to Hermant Shaw (1990:1035) development news should examine critically, evaluate and interpret the relevance of development plans, projects, problems and issues. It should indicate the disparities between plans and actual accomplishments. Based on this, the practice of DJ in ETV is in contrary with the argument of Shaw outlined above. Most of the news stories of different projects of social services deal with the final results not on the process of the projects. Some of the news was presented in the following ways.

A project of clean drinking water which benefits more than 100,000 refugees was inaugurated in Dolo Ado Refugee Camp, located in Somali region. It is also reported that the relief delivered by the Ethiopian government to the Somali refugees displaced by the internal troubled caused by insurgents of Alshabab, and it is also creates strong bond between the two countries' people. (February 03, 2013)

Clean drinking water centers developed in more than birr 26 million have started delivery of service in East Wolega Zone as of last year. Hence, more than 200,000 people turned out to be beneficiary of clean drinking water. Like the explanation of the zone's water and minerals office, in the current budget year, various activities also carried out to enhance the coverage of clean drinking water in the zone, in birr 30 million. (February 12, 2013)

The excerpts above reflect coverage of two government-sponsored projects and their inaugural ceremonies. They detail how the projects solved the problem of clean drinking water in certain regions. And yet the report didn't give even the smallest glimpse of the problems project leaders encountered as the work was under way. Background information about the projects; the ups and downs that took place while the projects were in progress was not reported. However, the main intention of the news is to show as the government gave emphasis on society's problem.

Journalists of the media cover only the positive aspects of the development activity that is taking place and leave aside the critical stories related to the projects. Scholars like Salter (2005) argues that what journalists are supposed to do are not only cover what happened, but also to show the progression of the event in question for their audiences. In line with this, the researcher asked the key informants whether or not they cover a critical story.

Informant 1 stated: we don't cover it for the reason that the government believes as it is working for the public; construction of new roads, clean drinking water projects and others are really the service that the government is providing for its public. Conversely, we do not have the clout to inspect those things whether they are accomplished within the given time with appropriate utilization of the budget or maintaining their standards. What is more, we cannot cover the public complaints regarding the projects because we know that it is not permitted to give coverage for such critical issues.

Here, it is possible to understand that journalists are simply covering the constructive actions of the government and even they pass over critical things even if they come across due to lack of journalistic independence. They are acting as the mouth piece for the government. When journalists cover critical development news, legal and economic security of the journalists should be ensured. Otherwise the risk of a government-loyal development journalist emerges (Edeani 1993:131)-ultimately, this journalism can contribute to the stabilization of unjust power structures and become a servant of governments. This causes to occur what Herman Chomsky says ‘media serve political ends’ by mobilizing bias, patterning news choices, marginalizing dissent, by allowing ‘the government and dominant private interests to get their messages across to the public (1988:2).

On similar note, in ETV it is routinely mentioned that as the country is on rapid development stage from sub-Saharan African countries, but not many details are given about the process of the development. Here is one of the news stories that deal with this issue:

The ministry of finance and economy has announced that the execution of the two years growth and transformation plan was 10% in average. The minister also explained that the activities to be executed in the coming three years shall be a two digit growth. The economic growth has shown significant change as of 2003.

Hence, in the past nine consecutive years, the country has attained economic growth of 11%, like the deputy minister Dr. Abraham Tekest’s explanation. Since the implementation of the 5 years GTP commenced, the execution of the growth plan for the past years has been 10% in average. The growth, the industrial sector 13.6% and the service rendering sector 11.1% as per the explanation of the deputy minister, the growth domestic product of Ethiopia has reached 7%, which is birr 37 billion. The amount of investment also has shown a rise of 34.6% in 2004 in comparison with 27.9 in 2003. Income per capita of citizens also has shown a rise of 513 US dollar in 2004 in comparison with 338 US dollar in 2003. (February 04, 2013)

The above selected news stories would imply that the country is on sustainable growth; as the growth is achieved in different sectors i.e. in agriculture, industry and service rendering sectors. It simply implies the government continuous effort in all sectors. From the text it is impossible to refer views other than the central idea of the text which worship the government role for the growth of different sectors. The text didn’t incorporate views from different bodies only the government official view is reflected in the text. MaCnamara (1999:6) explains that PRs had its birth in the Press Agency Model, which focused on publicity (good or bad) from a very one-sided point of view. Scholars like Hatchen (1998:37) attaches Paramount importance to the diversity of views that are reflected through news. Conversely, most of the news stories of ETV present-ideas from one point of view where government officials dominate the media and news presented in the direction desired by the government. Similarly, the preferred meanings that are structured into news discourse are typically ‘those that are functional for elites (Herman and Chomsky; 1988:23). So, most ETV development news was presented from one side in so far as it builds a good name for the government. The followings are news stories reflecting the issues outlined above.

Farmers of Elubabor turned out to be beneficiary from the spices and coffee they grow on their farm land. The farmers also explained that the support delivered by agriculture professionals has made them successful. (December 09, 2012)

The central statistic agency has announced that the inflation in the country has declined to 12.9% in comparison with the Hidar month 15.8%. According to the explanation of the agency, which is based on the country’s 129 market centers, and to be announced on monthly basis, the inflation has witnessed a declination with 30% within one month only. It is believed that the figure indicates the government’s effort to bring the inflation down to one digit. (January 10, 2013)

If one examines critically the two extracted news stories above, their central idea rests upon the crucial efforts of government in increasing the produce of farmers in agriculture and in decreasing the inflation rate in the country respectively. They appeared on the media because they build a support of the public for government. Such kind of coverage is given in almost in all sampled news stories.

It is also possible to take and see the theme of a sample of news that deals with health related issues. The news runs as follows:

In the past 10 years, Ethiopia has managed to decrease the infant death in the country in 47%. The health service installed at every level has played a vital role for the attained result. The death of infants who passed away before the age of 5 years has also declined in 47%. As per the official announcement of the UN, in the year 2000GC, 166 infants out of 1000 live born babies were exposed to death. Nevertheless, currently the number has declined to 77. The expansion and installation of health care institutions in every area has contributed a vital role. The result attained by the country regarding the declination of the number of infant death, the representative of UNICEF-Ethiopia Dr. Piter's explanation, it is a very swift progress when considered internationally. (February 06, 2013)

As the above news story shows, the coverage of the news is all about the decline of infant mortality in the country. It portrays the government attention to reducing the rate of infant mortality rate in Ethiopia, as the numbers dropped dramatically. The report also reveals as the improvement is recognized by international organizations like UN and UNICEF. However, the main intent of the news story is to show the government's activity in increasing the coverage of the health service that benefits the public. Giving coverage for such stories helps the ruling party to acknowledge itself in front of the public and other organizations found internationally. This reflects the practice of PRs in order to create and maintain favorable relations between organization and the public in various forms of media as Sandia and Simolin (2006) reflect.

Thus, though few news stories are extracted in this section, the majority of news reflects the same theme as discussed so far. The study by Terje Skjerdal (2009) on how development journalism is practiced in Ethiopian media institutions corroborates this finding. It revealed as the Ethiopian media institutions neglect critical stories, avoid oppositional voices and hide information from the public. Every story published either in print media or broadcast media is about the positive role of the government. It is tough to see a critical or investigative story which is designed to act as a watchdog over the government. This shows as journalists are there to serve the interest of the government against that of the large public. Therefore, it can be concluded that ETV largely focuses on development news and the theme for the majority of the news is centered to build the good images of the government and void of critical reporting in general.

8.2.2 Political News

In ETV, political news stories were presented in a manner that embellished the actions of the ruling government. The news stories were presented to exhibit the strength of the ruling party and its contribution in the development activity of the country. It seems that what Herman argues for a 'propaganda model' of journalistic production, to analyze the numerous and important cases where the mass media serve as instruments in campaigns of ideological mobilization (Herman and Chomsky 1988:175). Below is some of the news:

Prime Minister Hailemariam Dessalegn explained that Ethiopia is currently established on soiled foundation of peace, as well as the EPRDF government is a government of development, and the people of the country are also peace loving. In the aftermath of the passing away of the late Prime Minister Meles Zenawi, some parties

have reflected suggestions that the development activities will come to a halt, a suggestion which failed to take the governing party's and the development governments institutional strengthens, as well as the diligence and peace loving people of Ethiopia into consideration. (December.02, 2012)

Afar National Democratic Party (ANDP) marks its 13th founding anniversary in Logia and Avira towns. Regional chiefs and party chairman took note that the public in the state are benefiting from fruits of development happening in the country. The party has taken massive activities in combating, progressing and improving the livelihood of pastoralists. (December 05, 2012)

In ETV, whatever the issue is, in one way or another the news can be related with the development and growth of the country. The following news stories illustrate this:

Ethiopia is elected to host the 2013 Africa and European Union parliaments' combination assembly. The speaker of house of people's representatives, Mr. Aba Dula Gemedo explained that Ethiopia was elected as a host country due to its significant role throughout Africa and other areas. 13 countries in the zone also delivered their support to Ethiopia's election. Like the speaker explained, the election was made in consideration of the current peace and security, as well as the development activity in the country. (January, 03, 2013)

Members of AEDM in Addis Ababa have announced that they strive to ensure and hasten the country's renaissance and to sustain the results of development activities in the country, through good governance. The 32th anniversary of AEDM was celebrated in Addis Ababa under the name of 'Operation Meles for Growth and Green Development'. As per the explanation of the ministry of trade attended the celebration, AEDM has executed a number of activities to ensure the benefit of the people. (December 01, 2012)

Mr. Ali Suleman, commissioner of the Federal Ethics and Anti-Corruption Commission, was elected as the advisory member of board for the anti-corruption commission of African Union. It is announced that the election of Mr. Ali a proof that the Federal Ethics and Anti-Corruption Commission is carrying out encouraging and producing activities, as well as it is an indicator that Ethiopia has a solid anti-corruption stand. (February 06, 2013)

One can discover the same theme for the texts above though the issues in question are different. The texts worship the development activity that is taking place in the country. The texts illustrate the ideology of ETV, which is pursuing Development Journalism. As one of the informants of the study revealed so far as the notion of development journalism is misinterpreted in the country, the main purpose of ETV is heralding the success of the country in different aspects by hiding critical stories that may hamper the country's image. It is the government that can benefit when the country is portrayed in positive way. Whatever the event is in ETV, what can be raised on the event is obvious because they all relate with the success of the country economically, politically and socially. Government uses events or occasions to bring to light the validity of its work so as to influence others. And the above texts reflect this notion.

In the following news stories, the speeches of different organizations and individuals were incorporated in a manner representative of the development activity taking place in Ethiopia.

World Bank announced that the growth attained by Ethiopia in the past nine successive years is a double fold in comparison with other sub-Saharan countries. The bank also announced that the growth enables more than 2.5 million citizens to break free from poverty. (December, 13, 2012)

The European Union member states ambassadors explained that the union appreciates the fast growth secured by Ethiopia in every sector. It is reported that service delivery of health care

centers situated in Benishangul Gumuz has shown progress from time to time. (December 13, 2012)

Japanese Professor Turtu Shih explained that Ethiopia is in the right trajectory of development. As per the explanation of the professor, Ethiopia is one of the African countries in the middle of better industrial growth, and country with the appropriate industrial development. (December, 11, 2012)

Like the news stories discussed so far, the above news stories which incorporate speeches of different bodies deal with the same core point as before though they came from different bodies. They all deal with the economic growth of the country. These show the news stories that were given coverage in ETV are those that deal only with the progress of the country. The researcher doesn't find news critical of government in this regard. So, it is possible to conclude that ETV doesn't give coverage for speeches or reports of international or individual that is critical to government. An informant of the study said 'BBC doesn't work to ruin its country's image, ETV too' (informant 5). As informants of the study, ETV doesn't give coverage for either internal or external sources that are critical to the national interest.

When we look at some news stories which deal with the constitution of the country, it is possible to discover its interior as of the subsequent demeanor.

The announcement is made that various opposition forces have entered in the city of Addis Ababa pursuant to the peace call made by the government of the Federal Democratic Republic of Ethiopia to various insurgents and territories groups. An opposition/insurgent group namely AL-ATHAD has accepted the call of the Ethiopian government to peace and development, and commenced taking part in the development activities exerted in Somali region. The AL-ATHAD insurgent group has also accepted the peace process carried under Kenya's negotiator role, which was commenced by the great Ethiopian leader, the late Prime Minister Meles Zenawi. The anti-constitution forces are not acceptable any more in Ogaden. They have a very limited support in the region. The Somali region, which is benefited from the system of the Federalism, has started to administer its affairs like other regions, hence, the anti-peace forces has joined the mainstream. (December, 02, 2012)

The above news story seems to suggest that the FDRE government is the peace loving and development-centered government and shows as the system of federalism is the fruitful system of governance. This builds good name for the ruling party. In line with the above context, the following sound bite by the Deputy Spoken Person of the House of People's Representatives followed by the news story broadcast on December 07, 2012 corroborate what has been said above.

The people of the country are becoming beneficiary in economic and political aspects due to the ratification of our constitution after steadfast process and its implementation has played a significant role for the overall positive direction of the country and the economic growth, which is astonishing to the whole world. Due to each nation and nationality was emancipated by the constitution, and each ethnic group has equivalent right and freedom, they carry out their education in schools in their own language, as well as in court of laws. Thus, the constitution is a source of pride and beneficiary to the people.

The head of Harreri region administration explained that the constitution is fundamental and base for the journey of the renaissance of the country. Like the explanation of the head of the region, Ethiopia has managed to attain successive economic growth as of the time it has started following the constitutional system. In the future, as per his explanation, it is important to ensure

the renaissance of Ethiopia through policies and strategies designed by the great leader Mr. Meles Zenawi. (February 11, 2013)

As can be deduced, every government officials rejoices in the ratification of the FDRE constitution. They all celebrate as the implementation of the current constitution in the country, apparently, have paved a way for national renaissance of the country and have given equal rights to all people of Ethiopia. Within the sampled news stories, the way most news stories were presented especially with regard to the constitution is to capture the attitude of the audiences; the researcher couldn't find any story that damages government's image and most of them were presented from the angle of the opportunity that the constitution created for people of the country. So, the political theme revealed that most news stories of this category were centered on presenting government in most positive way.

8.2.3 News coverage

The foundation of journalism is the desire to serve the general public interest and to act as a check and balance on society and government. As communication policy scholar Robert Horwith (2005) has written, "The public interest in broadcasting was translated to mean the presentation of diverse viewpoints-a general balance of programming-and equitable treatment of political candidates". If we take a look at some selected news stories, the majority of the reporting in question deals with government interest news because it is framed in the way that lauds the actions of the government. Here is one of the selected news stories.

The Ministry of Agriculture announced that the model farmers in all areas have increased their produce through using fertilizers such as Urea, Dap and Potassium on their farm. (February, 12, 2013)

As can be inferred from the above excerpt, the model farmers increased their produce due to the government support paid to agriculture sector. The aim of the bulletin is to show the government role in increasing the production output of farmers. So, this builds the government's good image in front of the audiences.

The Silte Zone trade and industry department explained that it has rendering training for more than 400 small and micro finance enterprises. It is also delivering various enhancement trainings. It is believed that the training could tackle the problem of joblessness in the region as well as to strengthen the enterprises. (January 14, 2013)

Southern Gondar farmers who sow in the method of line sowing explained that they have achieved the produce of more than 40 quintal per hectare. They explained that the technology has helped them to increase their produce in double fold. (February 07, 2013)

These extracts aptly demonstrate the role of government in decreasing the problem of joblessness and increasing the output of farmers by equipping them with modern technology. So, the extracts are more beneficial for government rather than for the public's. They build a good name for government. Moloney (2000:65) argues that PRs is often used to support the government interest at the expense of other interests. The excerpts given above also reveal the interest of the government because it has a little to do or to serve the interest of the public. With regard to this problem, the researcher asked the informants 'to which issue (public/government) do ETV's media professionals give priority in their coverage? The informants responded as follows:

Informant 4: Exceptional coverage is given for government related issues. There is a rationale for this, Most of the time we collect '*Tikoma*' (*lead*) from different sources. The *Tikoma*(*lead*) is based on government plans. There is an extraordinary case in which we collect news based on

our own plans because we are not permitted to do so. This hinders us to leave the public's interest; news stories which deal with different problems of society will not be discovered. This doesn't mean that ETV doesn't give treatment on public related issues, but it is given less focus when we weigh against the government.

This argument substantiates the themes discussed within the extracts above. The main reason why most of ETV's news stories resemble public relations work is that reporters depend on events that the government prepares. This means that ETV is serving the governments' interest at the expense of the public. Journalists have the responsibility to serve the public's best interest. It is rare to see stories critical of the events. The majority of the reporting at ETV focuses on copying the speeches of government officials without critically analyzing them. Thus, it is difficult to see in ETV when journalists produce news based on their professional judgment and creativity. This displays the manner in which media cover the speeches of government officials in order to manipulate public attention. Bernays (1955) provided a seminal view of public relations, defining it as "the attempt, by information, persuasion and adjustment, to engineer public support for an activity". The journalist is considered to be the independent source of information, and it is believed that the information provided by the journalist is free of any manipulation, exaggeration, and nepotism. The following news story shows how reporters at ETV transcribe the speech of government officials without critical analysis.

Prime Minister Hailemariam Dessalegn has announced that most of vast projects in the country are executed in line with the set forth plan. As per the explanation of the prime ministers, Ethiopia is in the right trajectory of growth. The country's economy is also expected to show a rise of more than 11% in the current budget year, like the prime minister explanation. He is also explained that it is obvious that as the country is known in agricultural sector, our produce of agriculture is increasing from time to time. Farmers training centers were established and various efforts were made to enable the farmers. With regard to the industrial sector, various industrial zones were established. (January 01, 2013)

The above text serves as evidence that ETV's reporters focus their full attention on the speeches of government officials. Viewers are hard-pressed to see a sentence critically analyzing the problems of the country. All of the coverage deals with what government is doing and has done to improve the country. ETV's reporters focus on government speech and the achievement of Ethiopia's ruling party. It is thus rare to see diversified coverage in ETV's news programming because most of the news stories depend up on the government's agenda. In line with this view, the researcher asked whether ETV's coverage reflects attention to the public interest.

Informant 3: Substantiates what is said above in the following manner: In ETV it is not the public that can be seen; it is the government officials that speak and seen on media most frequently. To me, I don't think that ETV is giving a chance for the public to transmit their voices in the way it should be. It is the government plan that the station is reflecting. This means, to me, a kind of propaganda. *Justify why ETV reflects government plans/interests at the expense of the other.* The informant said: we are under pressure of our bosses; so we don't have the power to use the journalistic independence.

From the above excerpt, it is again apparent that reporters from ETV focus on the speech and actions of government officials because of the institutional pressure weighed upon them. There is a 'systematic and highly political dichotomization in news coverage that is based on serviceability to important domestic power interests' (Herman and Chomsky, 1988:35).

Similarly, most news coverage of ETV aligns with the interests of the government. Danny (2000), proffers that the job of journalism is to provide service for the larger publics by uncovering truth that otherwise hidden. From here it can be deduced that journalists are a vital source of information for society. The service to the

public involves revealing necessary information of which average citizens may not be aware. Some news stories that appeared in ETV served little value to the public. Rather, they lauded the achievements of government for the purpose of constructing a positive image. The following news broadcast on January 02, 2013 deals with this issue.

It is announced that the utilization of technological inputs for farmers has increased in 2005 in comparison with the year 2004. Pursuant to the forecast the national statistical agency, the produce secured in the year 2004 was 218 million quintal. As per the current year research of the national statistical agency, it has forecasted 229 million quintal produce will be attained. According to the announcement made by the ministry of agriculture, the produce is increased due to the agricultural inputs have progressed. The other reason for the increase of the produce is wide utilization of technologies and new methods of implementation.

Thus, according to the researcher, the aim of the above text is to show the sustainable effort of the government to increase the production output of farmers by providing agricultural inputs. It is thus obvious why the news is broadcast in such a manner. Based on the text, it is due to the fact that the inputs have increased which have increased farmers produce. This has something to do with government's image. Riaz (2008) contends that the increase in the news coverage is thought to bring about an increase in the salience of particular issues or events. Journalists are required to "Report and interpret honestly, striving for accuracy, fairness and disclosure of all essential facts" (Media, Entertainment & Arts Alliance 2012). One can from the excerpt above, deduce that ETV values government interest news stories above all other types of news. It covers issues of the government. The media are there to serve the government at the expense of the interest of the large public. As the media products showed and confirmed by most informants of the study, journalism practice of ETV seems PRs of the government. It is possible to say that most stories of the media product build the image of the government. From this point of view, it is possible for somebody to bring to a close this media institution as PRs organization. This is where the media role in building democracy and in reflecting diversified views would stop working.

8.2.4 Tone of the News

McCombs (2000) argued that the content of mass media messages including the tone of the messages influence the pictures of the world in our minds. The news coverage of ETV lacks critical reporting. Though there are hardly negative stories in the media's news coverage, they deal with how the government is playing its own role to alleviate the problems or how the government solved the problem. Besides, the news stories are presented as the problems occurred due to other bodies not due to the negligence of the government. The news stories excerpted below justify this claim:

The Gedo Bako Nekemt road construction project's delay has created serious and negative influences on their day to day activity, as per the explanation of the dwellers of the area and road users. The Ethiopian roads authority also explained that the problem is created by the contractor, which is in charge of the construction of the road. According to the explanation of the authority, possible effort will be made to finalize the construction of the road. (January, 09, 2013)

As can be seen from the extracted text above, though it deals with the problem residents of the area are facing, the blame is placed on an entity other than the government. The passage displays how ETV provides very scant coverage for potentially critical stories. It is the way it not negatively affects the government.

From the sampled news stories, almost all of the news deals with positive actions of the government. The news celebrates and appreciates the progress and development in the country in different sectors. What the researcher observed in the news coverage of ETV is that the network prefers to cover the problems of society, whether they involve scarce access to clean drinking water or transportation-related issues, after the problem is solved by government. There is no evidence of the network detailing the complaints of society before the project had been started.

The following news story further illustrates this problem:

The administration of Hosana town has announced that different investors with capital of birr 1.5 billion have contributed significant role to the town's growth. The dwellers of the town also explained that as the project of clean drinking water commenced its service, the problem of drinking water is tackled. According to their explanation, they used to get clean drinking water once in 3 days. Nonetheless, the project carried out in birr 120 million has sorted out the problem of drinking water. The lack of drinking water also discouraged the investors to invest in the town previously. As the explanation of the Hosana municipality, the completion of the project will sort out the problems once and for all. The current investment activity also will be improved. (December, 09, 2012)

It is possible to understand from the above news story that the government solved the problem that the area residents encountered. Maybe it hasn't been given any coverage about this problem before the problem overcame. From this excerpt, it is easy to conclude that ETV as a media network follows and reports on governmental progress rather than revealing the problems Ethiopians face. Such kind of coverage is not in the interest of the society. The public does not benefit if reports of such issues are filed after the problem is solved. This type of coverage benefits the government in molding the attitudes of society members by displaying positive actions of the government in media. The mass media are instruments of power that mobilize support for the special interests dominating state and private activity (Herman and Chomsky, 1988: Xi). PR academics similarly claim (Bernays and Goldman and others) that PR has served as a type of manipulative communication in the vast majority of its practice.

One can thus conclude that ETV is providing coverage for the stories of most positive tone which vaguely resemble development journalism in their content. This refers to the absence of critical reporting, which may have affected the attitudes of people to government in ETV. This calls to question whether ETV is really practicing journalism. So, government is using the media as a means to control and shape the public's attitude for the purpose of building good name.

The researcher questioned the informants of the study on how they cover critical stories in their news reporting. Their comments are displayed below:

Informant 1: in the first place, to do a critical reporting you need to have journalistic independence. And when follows you need to select news and source of the news by yourself. However, in ETV both news and its sources are selected by our bosses who are parts of the government. The source we contact is also parts of the government. So, there is no way in ETV to do critical reporting. Sometimes when you bring critical news, they can edit it the way they want it.

Informant 2: though it is rare, we cover critical reporting, but neither in-depth nor the way the name of government officials are negatively raised.

The arguments offered by the informants reflect the issues plaguing the stories discussed so far. In ETV though, sometimes critical reporting is given coverage, but they are not the way the government name is mentioned

negatively. This shows as the media is working or giving coverage for news story which doesn't affect any government officials. This means ETV is serving the interest of the government rather than focusing on the problem of the society. It is clear to infer also that there are external pressures on journalists not to engage on investigative reporting.

Generally, the findings reveal that ETV gives more coverage from the government interest's news stories. As a result most portraits of ETV are deal with positive tone which is concerned with success and development stories. In contrary, the investigative responsibility of media is disregarded in ETV.

9. FINDINGS

The majority of ETV's news content, whether it was social or political news, was presented within the aim of lauding the government actions in front of the public. The news was presented in the way it served the government. The themes that emerged from the data mostly centered on quoting government as development government and celebrating its actions.

In the case of news coverage, ETV gave priority for government issues. This means that ETV served the interest of the government at the expense of the public. Most of the news was presented from the government point of view. Journalists directly quoted government officials posted at different levels and presented it in the media. It was too rare that news of public interest was given coverage. The voices of ordinary people were also absent in ETV.

It was also found out that almost all of the tone of ETV news about government was positive. It was rare to find news stories that were critical of the government. Even if the news was critical, it was showed from the angle of the government's effort made to solve the problem as there were pressures on the media professionals from their bosses.

10.CONCLUSION

Critical reporting on government which reveals the wrong doing of the government was neglected in ETV. Rather it was used to manipulate and shape public attitude. Herman and Chomsky (2002) state, through the structure of ownership, and power and pressures on news organizations, business and government elites are able to ensure that certain views prevail and news become a means for the ruling to control ideas in society to produce its pre-eminence. This notion was reflected in the finding of the study. The media professionals were acting as the mouth piece of the government to make laudable the voice of government officials as there were pressures on them from their bosses. The media acted to shape the public attitudes by presenting the views of the government elites. Moreover, the contents of ETV news reflected that development news was given above all a special attention over other issues. The news was presented in the way it brings forth government in most positive light.

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Analysis of the Semi-Empirical methods used for the estimation of the load capacity of the Soil-Pile, using the stratified Soil.

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Abstract: This scientific work, is the result of the study of some Semi-Empirical methods used for estimation of the load capacity of the soil-pile assembly, using data from the Standard Penetration Test (SPT). Like case of study, the construction of the Central Hospital of Jing Zhou (1st phase), located in China, Hubei Province, City of Jing Zhou is used. For this paper, three Semi-Empirical methods, developed in countries outside China, and already used in other parts of the world, were chosen. These methods are: the methods of Aoki and Velloso, the method of Decourt and Quaresma, and the method of Meyerhof. The results of the Semi-Empirical methods under study are compared with the test results of static load tests performed on site, as recommended by the national Standards (Chines), and local regulations. In addition to the Semi-Empirical methods mentioned above, the relevant provisions of the technical specifications for building foundations (DB42/242-2003) and technical specifications for construction piles (JGJ94-2008) are used. At the end, comparisons are made between the results of the methods under study, the results of static load tests (slow loading) performed on site, the results of the GEO5 Software, and the results of characteristics

value of the single pile (R_a), according (DB42/242-2003). In a general vision, with this work the following conclusion was reached: Using the Meyerhof method, the value of Q_u was greater than the value of the load test, but it is also the method that presents the values closest to the values of the static load test performed on the spot, with a deviation of 2% in relation to the value of the load test; The Aoki and Velloso method, in addition to providing a value of Q_u lower than the value of the static load test, thus ensuring greater safety, also provides acceptable values in comparison to the values of the load test, with a deviation of 6%; The Decourt and Quaresma method, although giving a value of less than the value of the static load test, gave values with a very large deviation from the value of the static load test, being above 10% ; In relation to the software Geo 5, the results are very satisfactory, with a deviation of 0%, in relation to the static load test values.

Key Words: Foundations on piles, Semi-empirical methods in piles, Piles Load Capacity, Soil Load Capacity.

1 Introduction

The fundamental purpose of deep foundations is to transfer the load from the superstructure to the ground. It

is important to understand that with the evolution of the technical-scientific knowledge in the area of Civil Engineering in general, and Geotechnical Engineering in

particular, together with the current trend in relation to the globalized market, competition has been increasing in the area of civil construction.

This requires more and more companies to adopt increasingly competitive prices, which raises the need to study various methods of analyzing structures, which may be inexpensive (without some soil testing), but without causes the structure to function unproperly.

It was with this intention, that emerged over the years, several Empirical and Semi-Empirical methods, for the estimation of the load capacity of the piles, worldwide. Because these methods have been developed in certain geographic areas, sometimes with unique characteristics, it is necessary to make some comparative studies of the results of these methods, before they are applied in these new areas of geographic location.

For these reasons, in this work, we will study some Semi-Empirical methods developed in some countries of America and Europe.

According to Citra (2010), in some cases, the theoretical formulas of prediction of the load capacity in stakes, may not offer adequate results; therefore, there is need to study and use the semi-empirical formulas that are usually based on empirical correlations, and in-situ test results in the end adjusted with load tests.

The objective of this research is to study some semi-empirical methods used for the estimation of the load capacity of soil and piles based on the SPT tests, Load capacity tests and local standard of Hubei Province, for the estimation of the load capacity of piles, "Technical Specifications for Building Foundations" (DB42/242-2003). As case study will be use the project of the Jing Zhou Cetral Hospital (phase I), located in Jing Zhou city, Hubei province, China.

1.1 Jing Zhou Project Overview

The project is located on the north side of Chuyuan Road in Jing Zhou city, approximately 1 km from the city Government. During the research period, the elevation of the site varied between 30.15 to 38.24 m. Figure 1.1. shows some details of the site.



Figure 1.1. Location Map.

In figure 1.2, is showed the architectural design of Jing Zhou Central Hospital, and Table. A1. (in annex) shows the specific conditions of the proposed buildings. According to the "Geotechnical Research Code" (GB50011-2001, 2009 edition), as to its importance, the proposed project is level 1; in relation to the positioning, the project corresponds to level 2 (Medium complex); and the Geotechnical Research Degree, is Grade 2.



Figure 1.2. Architectural Renderings.

2 Profiles and Geotechnical Data of the Site

Because it is the tallest building of all (First Stage of Jing Zhou Central Hospital) and the building that carries the most ground demands, our study will be fixed in the main building. The building has a height of approximately 55.7 m, consisting in 20 floors of the

visible part, and 2 underground floors, with a building area of approximately 69842 m². Following the contours of the building, in the area of implantation, 20 drilling holes with the following references were opened: ZK 20, ZK 21, ZK 22, ZK 23, ZK 24, ZK 25, ZK 27, ZK 28, ZK 29, ZK 30, ZK 31, ZK 32, ZK 33, ZK 34, ZK 36, ZK 37, ZK 38, ZK 39 e ZK 40, ZK 41, as shown in Figure 2.1. The spacing between exploration points was defined according to the Geotechnical Code (GB50021-2001) in use in China, which defines the spacing between 15 and 30 meters for foundations of level 2, which is the case of this building.



Figure 2.1. Exploration holes in the main building.

According to the design of the building, and the Geotechnical exploration plan (Fig. 1.2 and 2.1, respectively), Points ZK 30 and ZK 31, are the ones that transmit greater efforts of the building structure, to the foundation.

In figure 2.2, the profiles of the holes ZK 30 and ZK 31 are presented, with detail of the stratification of the constituent layers. For this building, bored piles, molded in-situ, with a diameter of 800 mm and 1000 mm, and 15 m in length were used. The piles are seated in <5-2>, layer of Pebble.

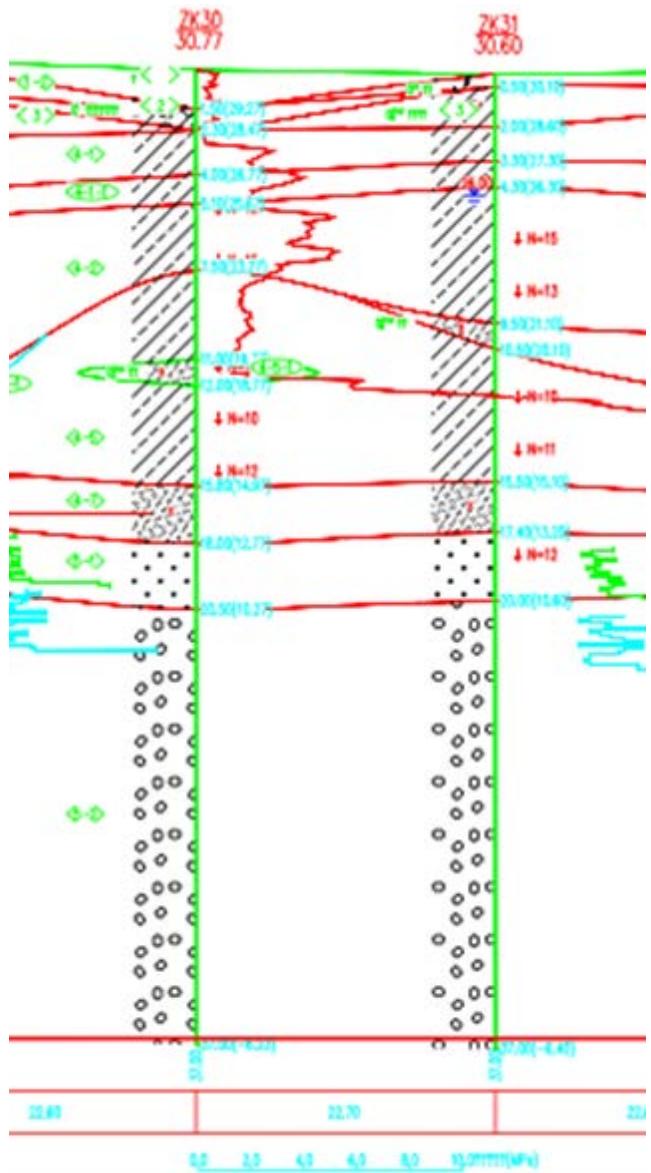


Figure 2.2. Geotechnical Profiles of the exploration points ZK 30 and ZK 31.

After the data collection on the site, the work of data processing follows. Tables A1, are the result of the statistical processing of the SPT test data, performed on site.

2.1 Static Load Test Results carried out on Site

According to the loading capacity of the design piles, equal to 6400 kN, the loading is divided into 6 stages, and the unloading is divided into 4 stages, as indicated in chart 3.4 (chart resulting from the static load tests carried out on site). The geotechnical report of the static load tests carried out in situ, defines -12.10 m as the top level

of the pile, and the stratum <5-2> as where the base of the pile stay. According to the Chinese regulation, the characteristic value (Ra), from the maximum load (Qu), can be determined according to equation 2.1.

$$R_a = \frac{Q_u}{2} \quad \text{Eq. 2.1.}$$

3 Analysis of Dadas

3.1 Results of ZK 31 Profile Load Capacity and Pile Material

The ZK31 profile is composed of the layers <5-2>, <5-1>, <4-7>, <4-5>, <4-5-1> and <2-1>. The pile crosses the strata, <5-2> (9.20 m); <5-1> (2.60 m); <4-7> (1.90 m); <4-5> (3.40 m).

The pile in study is Drilling pile (reinforced concrete), with a diameter (d) of 800 mm, and 17.10 m in length (l).

3.1.1 Estimation of the characteristic value of the vertical support capacity of single pile (Ra).

According to national (Chinese) and local standards,

Building	Hole Number	Pile Type	Pile Top Elevation (m)	Pile Length (m)	Bearing layer	Pile Diameter (mm)	Vertical bearing Capacity of Single pile	
							Characteristic value Ra (kN)	
							Before Grouting	After Grouting (1.3)
Inpatient Building	ZK31	Drilling (punching) hole pouring pile	19.9	17.10	<5-2>	800	3238.51	4210.06

Table 3.1. Results of the estimation of Ra, according to DB42 / 242-2003.

3.1.2 Aoki and Velloso

According to these authors, the ultimate bearing capacity of a pile, can be evaluated by the equation 3.2.

$$Q_u = A_b \frac{N_{SPT}^L}{F_1} + P \sum \frac{\alpha N_{SPT}^m}{F_2} \Delta L \quad \text{Eq. 3.2.}$$

Where:

P - is the perimeter of the pile;

ΔL - is the thickness of the soil layer (m);

N_{SPT}^L is the N_{SPT} near the point of the pile;

N_{SPT}^m is the N_{SPT} average for each ΔL ;

F_1 and F_2 are coefficients of correction of the end and side resistances.

By analyzing the results for each layer, for this method (Aoki and Velloso), the highest value of Qu is reached in the last layer of the pile (<5-2>). These results can be

"Technical Specifications for Foundations Construction" (DB42 / 242-2003) in Hubei Province, the vertical support capacity of the single pile, can be determined by equation 3.1.

$$R_a = q_{pa} A_p + u_p \sum q_{sia} l_i (D \leq 800\text{mm}) \quad \text{Eq. 3.1.}$$

Where: R_a - Characteristic value of the vertical load capacity of the single pile; q_s - Characteristic value of lateral resistance of the soil around the pile; q_p - Characteristic value of the final resistance of the pile; A_p - The cross-sectional area of the pile; l - Pile length; u_p - Base Perimeter of the pile;

Table 3.1 shows the results of the characteristic value of the vertical capacity of a single pile, determined according to local standards, calculated according to the data found in table A2.

seen clearly in chart 3.1.



Chart 3.1. Layers x Qu by the method of Aoki and Velloso.

3.1.3 Decourt and Quaresma

In 1996, Decout introduced factors α and β , in the part of tip resistance, and lateral resistance respectively, to adapt the method to excavated cuttings with bentonitic mud,

generally excavated cuttings, continuous flight auger, root cuttings, and stakes injected under high pressure; obtaining equation 3.3.

$$Q_u = \alpha CN_p A_p + \beta 10 \left(\frac{N_L}{3} + 1 \right) UL \quad \text{Eq. 3.3.}$$

Analyzing the results for each layer, in Decourt and

Quaresma method, the highest value of Q_u is reached in the last layer of the pile (<5-2>). These results can be seen clearly in chart 3.2.

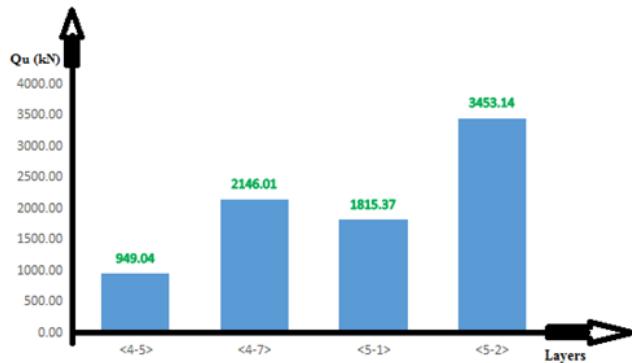


Chart 3.2. Layers x Q_u by the method of Decourt and Quaresma.

3.1.4 Method of Meyerof

According to the Meyerof method, the maximum load capacity of the pile is 6540.86 kN. In this method it is proposed that the resistant capacity of a spiked pile is obtained by Eq.3.4.

$$Q_u = 400NA_b + 2\bar{N}A_s \quad \text{Eq. 3.4.}$$

Where:

R is the bearing capacity of the pile (kN);

N is the number of strokes (SPT);

A_b is the area of the pile tip (m^2);

\bar{N} is the average value of N along the length of the pile;

A_s is the lateral area of the pile (m^2).

The maximum resistance capacity of the layer <5-2> (the last layer) is approximately 6540 kN, and be seen clearly in chart 3.3.

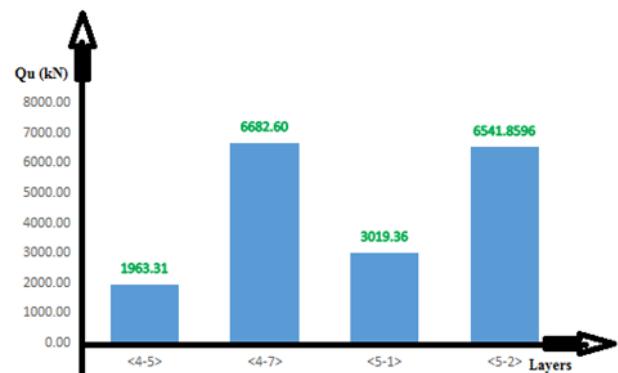


Chart 3.3. Layers x Q_u by the method of Meyerof.

3.1.5 Static Load Test D-Z59

The static load test D-Z59 obtained a maximum load of 6400 kN, as shown in chart 3.4, and maximum settlement of 14.26 mm. The characteristic value is 3200 kN, corresponding to 4.03 mm of settlements. The residual settlement is 11.47 mm.

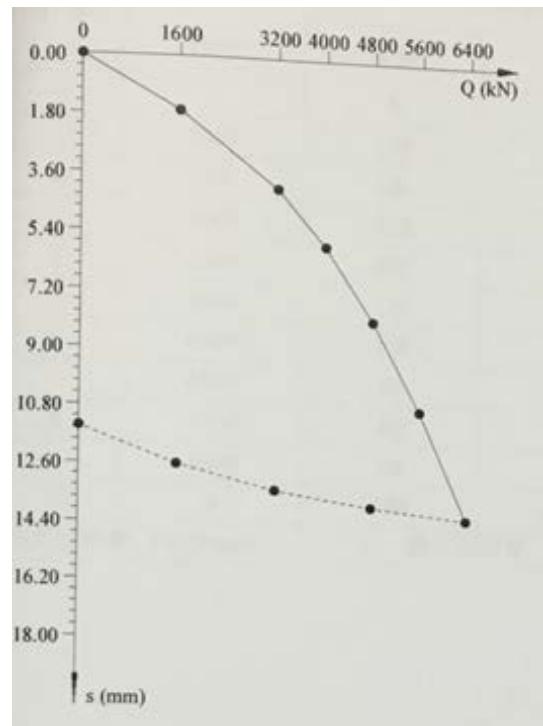


Chart 3.4. Load (Q) x Displacement (S).

3.2 Simulation in GEO 5 Software.

3.2.1 The results of GEO 5 Software

In the GEO 5 software, the conditions of the Geotechnical profile of the site, and parameters of the load test pile D-Z59 were produced. The result of the profile and the

pile is shown in figure 3.1.

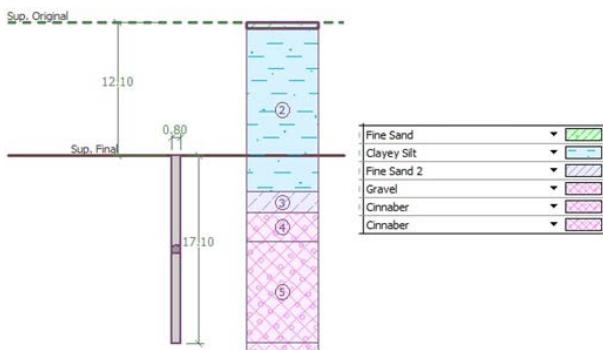


Figure 3.1. Profile of the pile and soil, in GEO5.

According to the result founded using GEO 5 software, the maximum load capacity of the pile (Q_u), is 6401.22 kN. In relation of R_a , considering a safety factor ($F_c = 2$), as recommended by the Chinese Geotechnical Engineer, the value of R_a is equal to 3200.61 kN, as showed in table 3.2.

Layer	Q_p [kN]	Q_l [kN]	Q_u [kN]	R_a [kN]
<5-2>	396.01	6005.21	6401.22	3200.61

Table 3.2. Results of the GEO5 software.

4 Comparison of Results

According to the results of the semi-empirical methods under study, the Meyerof method is one that has values of Q_u that are closer to the value of the static load test; with a deviation of 2%, in relation to the static load test; Then, we have the method of Aoki and Velloso, with a deviation of 6%, in relation to the static load test value. Finally we have the method of Decourt and Quaresma, with a deviation of 46%, in relation to the static load test value. In chart 4.1, the comparative values between the Q_u , and the static load test of the slow loading are presented. The red horizontal line (serie-2) represents the value of static load test performed at the site.



Chart 4.1. Results of Q_u [kN] in all method used, and comparing with Static Load Test.

The chart 4.2 shows the comparative values between the R_a values of all the methods used, the R_a value of the static loading test performed in the work field, and the characteristic value of the pile, according to (DB42 / 242-2003) . The horizontal brown line (value 4210.1 kN) represents the service value of the pile, after grouting, and the horizontal blue line (value 3238.5 kN) represents the service value of the pile, before grouting. According to chart 4.4, all the methods offer a safety admissible, in relation to the vertical load capacity of the single pile.

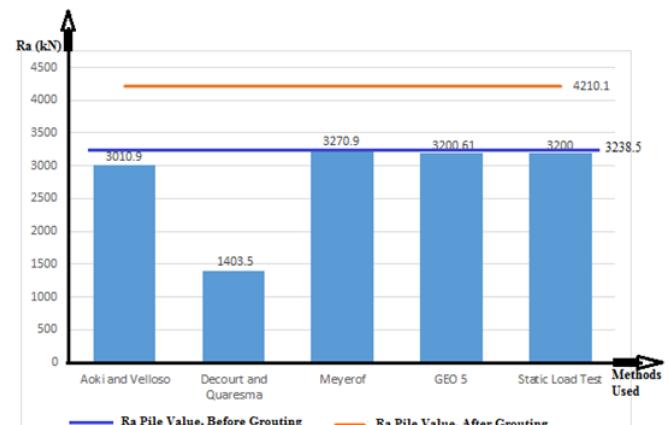


Chart 4.2. Results of R_a in all method used, and comparing with Static Load Test.

5 Conclusions

According to the results of the semi-empirical methods studied, can be concluded that the Meyerhof method, although it has given a value of Q_u greater than the value of the load test, is the method that presents the closest values in relation to the values of the static load test

carried out in the place, with a deviation of 2% in relation to the value of the load test. The Aoki and Velloso method, in addition to providing a value of the Qu lower than the value of the Static load test, thus ensuring greater safety, also provides acceptable values in comparison to the values of the load test, with a deviation of 6%, and the method of Decourt and Quaresma, although it gave a value of Qu lower than the value of the test of static load, is the one that gave values with a very great deviation, in relation to the value of the test of static load. In relation to the software Geo 5, the results are very satisfactory, with a deviation of 0%, in relation to the values of the static load test. According to the results of Geo 5, the load of the base of the pile contributes with smaller percentage in the total resistance of the stake.

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Analyzing the results obtained in a safety-oriented view, it can be stated that the method of Decourt and Quaresma is the one that offers greater security, following the method of Aoki and Velloso, while the method of Meyerhof, for providing values of the Qu higher than the limit determined by the static load test, can be considered low safety. If we look at the economic point of view, since the Meyerhof method gives a higher value of Qu, it can reduce the number of stakesof the project, which also reduces the amount of material to be used, so it can be the favorable method. In relation to the characteristic value of the single pile, all the methods under analysis, work in safety, mainly, if considering the pile, after grouting.

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Table A1. SPT Strokes count statistics.

Number of strata	Type of soil	Situation	Number of tests n	Basic value			Standard deviation σ	Coefficient of variation δ	Statistical correction factor Ψ	Standard value N
				Max	Min	μ				
<3>	Clayey Silt	Plastic	37	11	7	9.1	1.026	0.11	0.968	8.8
<4-1>	Clayey Silt	Hard plasticity	37	15	11	13	0.902	0.07	0.980	12.5
<4-1-1>	Clayey Silt	Plastic	19	10	7	9	1.079	0.12	0.951	8.5
<4-2>	Clayey Silt	Hard plasticity	266	18	11	13	1.208	0.09	0.990	13.0
<4-3>	Fine Sand	Slightly Dense	29	17	10	12	1.885	0.16	0.950	11.5
<4-4>	Fine Sand	Mean Density	22	27	13	18	3.741	0.21	0.923	16.8
<4-5>	Clayey Silt	Plastic	103	11	8	9	0.863	0.09	0.984	9.1
<4-5-1>	Fine Sand	Mean Density	6	24	16	19	3.098	0.16	0.865	16.4
<4-5-2>	Fine Sand	Mean Density	10	35	25	29	3.502	0.12	0.930	27.3
<4-6>	Clayey Silt	Compact	51	12	7	10	1.012	0.10	0.975	9.5
<4-7>	Fine Sand	Compact	69	36	26	31	2.485	0.08	0.983	30.5
<5-1>	Gravel	Mean Density	61	11.	9.1	12	0.572	0.06	0.955	10.1
<5-2>	Cinnabar	Compact	61	13.	11.0	24	0.453	0.04	0.992	11.8

Table A2. Suggested Values for Stake Foundation Project Parameters

Stratum Code	Name of Soil	Compactness	Prefabricated piles			Drilling Pile			Coefficient of increase of post-bitumen strength β_s / β_p	
			q_{sia} (kPa)	q_{pa} (kPa)		q_{sia} (kPa)	q_{pa} (kPa)			
				$h \leq 10m$	$10m < h \leq 15m$		$10m < h \leq 15m$	$h \geq 15m$		
<3>	Clayey Silt	Malleable	32	/	/	35	/	/	1.4/2.2	
<4-1>	Clayey Silt	Rigid	36	/	/	40	/	/		
<4-1-1>	Clayey Silt	Malleable	31	/	/	36	/	/		
<4-2>	Clayey Silt	Rigid	36	/	/	42	/	/		
<4-3>	Fine Sand	Slightly dense	20	/	/	15	/	/	1.6/2.4	
<4-4>	Fine Sand	Mean density	28	/	/	24	/	/		
<4-5>	Clayey Silt	Malleable	31	/	/	30	/	/		
<4-5-1>	Fine Sand	Mean density	30	/	/	26	/	/		
<4-5-2>	Fine Sand	Mean density	33	/	/	25	/	/	1.6/2.4	
<4-6>	Clayey Silt	Compact	28	/	/	32	/	/		
<4-7>	Fine Sand	Compact	40	/	/	34	/	/		
<5-1>	Gravel	Mean density	65	3900		70	1000		2.4/3.2	
<5-2>	Pebble	Compact	70	4500		75	1250			

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Application of Mathematical-Statistical Techniques in Natural Geography

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Abstract- This article outlines the importance of mathematical-statistical techniques in natural geography. Also, the ideas of scientists who have studied mathematical-statistical techniques have been analyzed.

Index Terms- Mathematical statistics, Geography, correlation and regression analysis, the residential areas, cybernetics, information theory, semiotics, modern cartography, socio-economic geography.

I. INTRODUCTION

We know that quantitative methods are the basis of statistical methods and they are the sum of quantitative methods of collecting, processing and analyzing general data. These methods have been used for a long time. In this regard, it is enough to mention the XVIII century reference statistics in Germany. The main objective of the public service statistics was to collect and systematize information for the federal government's needs and government officials.

Depending on the nature of the research and the nature of the objects studied in our area, mathematical statistics methods and geographical statistics are widely used in social and economic statistical methods. Mathematical statistics methods allow to evaluate the accuracy and reliability of conclusions based on limited statistical material. Geography includes more mathematical-statistical methods of corollary, correlation and regression analysis, multi-dimensional statistical methods (factor analysis, basic component methods) and statistical modeling. Socio-economic statistics, first of all, is used for various social, economic, and other events and processes, including regional studies.

II. MATERIAL AND METHODS

An example of the application of statistical (mathematical) statistical methods in natural geography is the use of this method to calculate average annual and monthly parameters of air temperature, calculation of rainfall, calculation and dispersion of indicators, and their classification using different correlation. In the socio-economic geography, economic and social statistics is

widely used, which describes the quantitative aspects of the production forces, and, more broadly, the events and processes that relate to the location and territorial organization of society. Multiple-factor analysis plays a major role, and its essence is to replace a large number of variable variables in countries and regions with less complex variables. Studying the geography of the population is based on the use of almost complete and complete statistical materials and, first of all, applies the method of grouping. This method is the starting point for the whole process of scientific research on all information about the residential areas. It is a demographic statistical material covering an independent and comprehensive research area.

Mathematical methods are a novel way of research that sets out a "quantitative revolution" not only in technical, but also in natural and social sciences, in modern interpretation of this concept, which is largely a scientific and technical revolution, cybernetics, electronic computing techniques. They all recognized mathematical logic, cybernetics, information theory, semiotics, theory of common systems.

Mathematics of natural and humanitarian sciences began in the 50s in the economics. Academicians L.V.Kantorovich, V. Nemchinov, N.P.Fedorenko were very important in this process. He later entered mathematics, geology, biology, philosophy, sociology, psychology, linguistics, and geography. The mathematics of geography is explained by a clearer understanding of the methodology, inclination of the phenomenon with abstract and simplified description with logical and mathematical formulas, and aspiration for a systematic approach. Mathematical logic theory and methods were also needed to verify the concepts in science, to create logical bases of geographical sciences, and to strengthen integration processes.

Mathematic process of geography passed through several development stages. Firstly, mathematical geography became the part of the fields closest to physics (oceanology, meteorology, hydrology) and statistics (economic geography). Later, articles on the use of mathematical techniques in other geographical sciences emerged. Mathematics of geography reached the peak in the 60s - early 70s. During this period most of the works in this field were published, translations of William Bunge, Peter Hagget, David Harvey, the Union of Special Union seminars and conferences, summer mathematics schools, and new faculties of mathematical techniques was launched. The initiators of this mathematical "rise"

are Yu.G.Saushkin, D. Armand, V.M.Gohman, A.Smirnov, L.I.Vasilevsky, B.Gurevich, N.I.Blaiko, A.S.Devdariani, V.M.Mikheeva, A.Matlin, V.Preobrajensky, Yu.V.Medvedkov, Yu.G.Simonov, A.M.Trofimov, S.Y.Nimmik, A.G. Topchiev, Yu.G.Lipets and many other geographical scholars. Some prominent supporters of mathematical mathematics left a little bit of mathematical techniques than others. Naturally, this has led to a reverse reaction, which includes academics S.V.Kalesnik, KMMarkov, B.N.Semevskiy, A.Probst, V.Anuchin, A.K.Kolotievsky and others have. V.A.Ansuchin: Mathematics in geography often demolishes scientific discoveries. According to A.M. Kolotievsky, in the theoretical geography, abstractness emerged as a result of excessive mathematics, which, in its own way, is virtually no different from the art of abstractism. In the press, academician A.N.Krilov's early thoughts could be found in math, which resembles mathematics like mills: what kind of wheat you can get. When you apply mathematical methods to foolishness, you usually have a bigger stupor. In 1995, Yu. E. Efremov called mathematical methods "mathematical siobism."

At present, the attitude to mathematical methods in geography is quite high. Obviously, they can not replace all other research methods. At the same time, using mathematical methods is absolutely necessary. It helps to solve the problems related to typology, classification, zoning and fishing, and an instrument of geography science with one of the common methods of scientific knowledge. Geography and mathematics are a combination of geographical and mathematical thinking, and make geography more precise and inconsistent.

At present natural and socio-economic geography uses mathematical logic, plurality, elementary and analytical geometry theories, numerical methods of mathematical analysis, linear algebra methods. It is widely used for square and square corners, linear programming, and graphics. Mathematics has penetrated deeper into modern cartography, with the use of numbers and dimensions to create completely new opportunities for solving scientific and practical issues.

Modeling methods are one of the main categories in the theory of knowledge. Its essence is to investigate some phenomena, processes, or structures through the construction and study of their models. Accordingly, the object, event, or process being studied in the modeling process is replaced by another auxiliary or artificial system. The laws and trends identified in the modeling process are then applied to the real reality. Modeling simplifies and simplifies research, reduces labor costs and improves performance. It also provides a key to learning objects that are not directly quantifiable (e.g., Earth's nucleus).

The most common principles of simulation are analogy and systematics, which are dialectically interconnected. Systemic modeling also includes analytical and synthetic approaches. It is important to emphasize the importance of the other principles in the object being studied, as well as regular coordination of the model with a particular object. Using the model, you can experiment with various variants, ways to influence different ways. This means that you can create different models of one object.

According to A.Trofimov, modern mathematical-geographical modeling is a separate methodology, characterized by a certain structure and consistency of the research process. The following issues can be solved or resolved: a) processing of

primary geographical information; b) the assessment and modeling of the homogeneity or gender of the geographic space; c) Evaluation of the composition, characteristics and relationships of the space; d) adaptive systems construction and imitation modeling; d) the construction of geo-information systems and obtaining accurate results for their purposes; e) automatic zoning and automatic classification; j) development of the theory of interests (conciliatory solutions).

In the modern natural geography, block (graphic) and mathematical models are widely used. Geomorphological processes, sea flows, climate change, especially natural-territorial complexes are modeled. Types of geographical models used in natural geography V.S. Preobrajensky describes in detail. It divides geographical models into objects, object-object and subject-object models, as well as mono- and politically-driven models. It is important to emphasize that in recent works of academician V. Kotlyakov certain emphasis is given to complex global models of natural-geographical processes. This is about the global climate improvement model and the overall global atmosphere of the geographical crust over the last 18,000 years, including the restoration of the global hydro-climate regime over the last 18 years.

Geography of the population is modeled on the networks and systems of settlements, urban systems, as well as the cities and agglomerations considered as complex systems. Population migration, including migration flows, migration factors, and mathematical models of migration structure are made. Various models of population reproduction, especially predictive models, have been widely developed. Estimated models are based on some or all of these hypotheses about the dynamics of birth and death, marriages, and divorce. Here, geographical modeling is closely linked to a large and complex class of demographic models.

In the field of economic geography, since the 70s of the last century, systematic modeling has come to the forefront, in which, according to Yu.G. Lipets, mathematical methods and systematic approach are united. The modeling includes logical, block, matrix, and cartographic models. In turn, it is possible to distinguish between band, regional and complex (inter-sectoral and inter-regional) models, depending on their characteristics and functions. In the theory and practice of geography in the 1970s, network models are presented as models of single energy system, traffic flows, transport systems and models, and regional models - primarily SSC models and complex models - models of inter-sectoral and inter-regional balances. Complex models can also include regional planning models, as a complex dynamic management system. Mathematical modeling in socio-economic geography has recently been written in detail by S.E. Khanin.

Global modeling of a particular type of socio-economic modeling is widespread in global models known to all Rome Club and some other international organizations. In the 1980s, in the former Soviet Union, models of "nuclear winter" and international relations were established.

In cartography modeling, it is often referred to as maps (not only as spatial imagery of realism), but also mathematical-cartographic modeling, which has been repeatedly mentioned by A.M. Berlian, A.Lutiy, V. Tikunov and other experts in this field. Mathematical-cartographic modeling is a combination of mathematical and cartographic models for the design and analysis of thematic content of maps. In this modeling process, it is

possible to create not only elemental models of one ring, but also more complex chains, pitch and tree combinations. In turn, he encouraged the development of special car graphics and personalized cartographic techniques. Creating maps on the screen saver allows you to compare between the various content of maps and the way they are developed, which is especially useful for displaying the dynamics of processes and events. As a prime example of mathematical-cartographic modeling, V. Tikunov brings a model of studying the cosmic differentiation of the Atlantic Ocean, which is complex and sturdy and shows the point of view of the economic development of the ocean.

Geographical mathematical-cartographic models are of particular importance for geography, which are characterized by a rather complex synthetic significance. First of all, it is possible to add different models to the problem of interaction between society and nature. However, blocked models of this "population - economy - nature" class may also be general and specific. Overall, the basic model has a global aspect. On its basis, regional models can be created, specifying a particular feature, including the characteristics of one or another region. The most striking example of regional models is the model of various geo-systems. In the 1970s, W. Sochava recommended the separation of functional-component, functional-geomorphic and structural-dynamic models of geospaces based on the theory of geotimes. The ecosystems were created by the scientists of the Institute of Geography of the Russian Academy of Sciences V.S.Preobrajensky, T.D. Alekandrova, L.I. Mukhina and others. It is found in V.Preobrajensky's cases. When it comes to scientific and practical experience, it has been primarily implemented in "Model Countries" (the "model countries" system has internationally recognized in the times of the Economic Cooperation Council as international teams of scientists have been working in such areas as Czech Republic, Slovakia, GFR, Poland, Bulgaria, which was a Kursk biosphere station at the Geography Institute of the same model).

Taking everything in consideration, it should be noted that mathematical and statistical methods in geography science and their application are of great importance in the age of modern information and innovation. Environmental pollution, global warming problems, ozone depletion, mineral extraction and other research and researches can not be achieved without mathematical and statistical methods. Therefore, the study of these techniques is considered to be an actual issue

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THE EFFECT OF ADDITION OF SKIM MILK AND NATRIUM ALGINATE TO THE QUALITY OF CRUDE ALBUMIN FISH CORK (*Ophiocephalus striata*) (Drying with Vacuum Drying)

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Abstract

Fish Cork (*Ophiocephalus striatus*) is a fish that belongs has a high content of albumin. High albumin levels in fish Cork makes this fish is known for its utilization in the world of health as HSA (Human Serum Albumin). In General esktrak albumin has a fishy scent so that processing into powder is considered a proper way. the use of penyalut skim milk and a alginat natrium to reduce the fishy odor and maintains albumin albumin powder during the drying process. The purpose of this research is to know the influence of interaction of skim milk and a alginat natrium to quality crude albumin powder by using a vacuum drying. The methods used in this study, namely the method of experimentation. Experiment design in the research was Complete Random Design (RAL) factorial using skim milk dan natrium alginat for 25 treatment and 2 times repeats. Test parameters included albumin level, protein content, moisture content, fat content, ash content, water absorption, yield, organoleptic scoring test, amino acid profile and fatty acid profile. The test data were analyzed using ANOVA, if the effect was significantly continued by the Tukey test, while the organoleptic data were analyzed using Kruskal-Wallis. Determination of the best treatment using the De Garmo method. The results showed the best results in the treatment of skim milk 7% and 4.75% natrium alginat with quality includes the value of albumin levels of 2.8%; protein 22.3%; 1.05% water content; fat content 2.3%; the rate of 9.15% ash; 4.25% water absorption; 25.15% yield. skoring 4.7 scent (not fishy); and skoring 4.77 color (not brown) which is generally favored by panelists. In addition with the highest content of amino acid Glutamic acid of 4.55% and Aspartic acid of 2.00%, and highest fatty acids Palmitic Acid of 19.39%.

Keywords: albumin's powder, skim milk, natrium alginat

I. INTRODUCTION

Albumin is the highest plasma protein in the amount of about 60% and has a function as forming new cell tissue and restoring damaged body tissue and managing fluid balance in blood vessels with fluid in the interstitial cavity within normal limits, blood albumin levels 3.5- 5 g / dl (Nugroho, 2012). As long as albumin is used as a therapy taken from human serum HSA (Human Serum Albumin) which has a price of around 1.3-1.5 million per 200 cc or each pounch (Erwin *et al.*, 2015). Therefore it is necessary to have an alternative source of albumin that is cheaper but has the same clinical aspects. One alternative that can be used as a source of albumin is cork fish. Cork fish is one type of freshwater fish that has a high albumin protein content that has benefits that can increase albumin content and endurance (Suprayitno *et al.*, 2013).

Albumin extract is usually consumed in a liquid and fishy form so that not everyone likes it, so an alternative is needed to reduce the fishy odor on albumin extract by drying so that it produces powdered albumin extract which is expected to be accepted by everyone for consumption. Albumin is a protein that is easily damaged by heat so we need a coating material that can resist the denaturation of albumin protein from heat. one of the coating materials that can be used as coating material in vacuum drying, namely skim milk and natrium alginate (Sumanti *et al.*, 2016). The use of skim milk in making albumin powder is to function as a coating material that can increase yield, increase volume, form a rounded coating surface with a smooth surface. (Khasanah *et al.*, 2015). In addition to skim milk ingredients that can be used as coating material in the manufacture of crude albumin powder are natrium alginate which is able to protect the active components from factors that can affect stability (Halim *et al.*, 2010).

The drying method is carried out by means of a vacuum dryer. Vacuum drying is drying by vacuum air method with a pressure of 1 atm. Vacuum drying is used in the manufacture of crude albumin powder because the drying method is fast, the temperature and pressure can be adjusted so that it can maintain the quality of the dried product so that this method is suitable for use in drying food ingredients.(Suprayitno, 2013).

II. MATERIALS AND METHODS

2.1 Materials

The material used in this study consists of three parts, namely. Raw materials, materials for making crude albumin powder and materials for chemical analysis. The raw material used in this study was live cork fish (*Ophiocephalus striata*) obtained by Malang Big Market. The ingredients used for the manufacture of crude albumin powder are skim milk and sodium alginate, and the ingredients used for chemical analysis are silica gel, aquades, blemish, biuret and NaOH.

2.2 Albumin Analyze

According to Suprayitno (2014), albumin levels were determined using the spectrophotometric method. that is. A sample of 2 ml added to the reagent was added with biuret and heated at 37 ° C for 10 minutes. Cooled then measured with electronic 20 and absorbance recorded with a length between 350-2200 nm, then calculated the albumin level with the formula.

$$(\%) \text{ albumin level} = \frac{\text{ppm} \times 25}{\text{sample weight} \times 10^6} \times 100$$

2.3 Protein Analyze

Protein content analysis was carried out using the Spectrophotometric method. Measurement of protein levels was carried out by taking 0.9 ml of protein samples, first applying it with the addition of crystal ammonium sulfate. Then centrifuged for 10 minutes, separated the clear part (supernatant). The precipitate which is a protein is then reconstituted with acetic acid buffer pH 5 to 10 ml. In the test tube, 0.9 ml of each sample was added, 0.8 ml of biuret reagent was added and 1.3 ml of an acetic acid buffer solution was added. Let stand for 10 minutes, read the absorbance at the maximum wavelength on the detection screen.

$$(\%) \text{ protein content} = \frac{V_{\text{standar}} - V_{\text{blanko}} \times N_{\text{standar}} \times 14 \times 6,25}{6,25 \times 100\%} \times$$

2.4 Water Analyze

The method of analyzing water content was carried out by means of a dry oven method (thermogravimetric method). According to Aventi(2015), Water content analysis using the termogravimetro method can be done by weighing the initial weight of the sample (gram), place it in the oven tray Drying chamber is approximately 110oC, put the oven tray containing the sample into the oven, leave it for 2 hours after 2 hours, until the sample is completely dry homogeneous constant. This is known from the constant weight, then calculated by the formula

:

$$(\%) \text{ water content} = \frac{(\text{initial weight} - \text{final weight})}{\text{Initial weight}} \times 100\%$$

2.5 Fat Level Analyze

Analyze fat content according to Shahidi (2001), done by the goldfisch method by transferring the sample and then put it into the thimble and installed in a buffer tube which at the bottom has a hole, then the solvent is placed on the back of the buffer tube, when bekerglas is heated the solvent will rise and cooled by a condenser so the material will be moistened with solvent in lipids it will be extracted and then it will be accommodated in bekerglas again, after extraction is complete (3-4 hours), the heater is turned off and the following sample is buffered. The heater is turned back on so that the solvent will be evaporated again and condensed and floated into the tank which is installed at the bottom of the condenser. Thus the floating solvent can be used for other extractions, the residue in the bekerglas installed on the heater is then dried in an oven 100oC until a constant weight is obtained. This residual weight is expressed as oil or fat in the material

..:

$$(\%) \text{ Fat Level} = \frac{A + B - C}{B} \times 100\%$$

2.6 Ash Content Analyse

The method used in the analysis of ash content is the kiln method. According to Nugraha (1997), the steps to be taken are first the cup is dried in an oven at 85 ° C overnight, cooled in a desiccator until it reaches a new room temperature then weighs its empty weight (G). Approximately 2 grams of standard / dry sample material is weighed into a cup with known weight (W). The cup containing the sample was placed into the kiln and burned at 550 ° C for 16

hours (Method A), and at 600 ° C for 3 hours. The burned material is cooled in a desiccator (containing silica gel) to room temperature. Then weighed using a balance sheet. Calculation:

$$\text{Ash Content (\%)} = \frac{\text{Ash weight (g)}}{\text{Sample weight (g)}} \times 100\%$$

2.7 Water Absorption jTest

Test of moisture absorption is carried out to determine the resistance of crude albumin powder to a moisture or air in the storage space. This is based on the hygroscopic powder properties so that it is necessary to test moisture absorption as a characteristic of crude cork albumin powder. Absorption of water vapor is inversely proportional to water content. The lower the water content, the more absorbent the moisture, the ability of the powder to absorb water depends on the product to be produced (Sari dan Kusnadi, 2015).

2.8 Rendemen

The purpose of calculating the yield of crude cork albumin powder is to determine the effect of the concentration of a combination of skim milk and sodium alginate and the efficiency of making crude cork albumin powder. The rendement calculation can be done based on the method carried out by Sunardi et al., (2008), the formula used to calculate the yield as follows:

$$\text{Rendemen} = \frac{\text{Output}}{\text{Input}} \times 100\%$$

2.9 Organoleptic Analyse

Organoleptic testing can be done by scoring. Organoleptic testing with an autoleptic test scoring test method was carried out by giving a score on texture parameters such as taste, aroma and elasticity in each sample based on the numerical parameters chosen by the panelists, and drinking as a neutralizer after each sample test. Panelists were asked to fill out the form by stating the scent score as an example very very fishy = 7, very fishy = 6, not fishy = 5, rather fishy = 4, and somewhat fishy = 3, fishy = 2, very fishy = 1. (Suradi, 2007).

2.10 Amino Acid Profile Analyse

Analysis of amino acid profiles using HPLC consists of four stages, namely: the stage of making protein hydrolyzate by means of weighing 0.1 gram of sample and being crushed, then added with 10 mL HCl 6 and heated in an oven at 100oC for 24 hours. Then the drying phase of the sample aims to make the sample completely clean apart from the solids. The filter was taken as much as 30µL and added 30µL of the drying solution. The drying solution is made from a mixture of methanol, picotiocyanate and triethylamine (Babu et al., 2002). 30 µL of derivatization solution was added to the results of drying, then mixed with methanol, sodium acetate and triethylamine, then diluted by adding 20 ml of 60% acetonitrile or 1 M sodium acetate buffer, then left for 20 minutes. Then injection into HPLC was carried out by taking 40 µL of liquid to be injected into the HPLC, then calculating the amino acid concentrations present in the material was carried out by making a standard chromatogram using ready-made amino acids which experienced the same treatment as the sample (Bartolomeo dan Maisano, 2006).

2.11 Analysis Of Fatty Acid Profile

Analysis of fatty acid profiles can be done using the GC-MS method (Gas chromatography-mass spectrophotometry). Setyastuti et al., 2015). The fatty acid profile analysis procedure, which weighs approximately 150 mg of oil sample, is then dissolved in 2 ml of 0.5 N KOH in methanol. Then reflux for 5 minutes. 2 ml of acid catalyst was added, namely boron trifluoride (BF3) methanol 15% which was mixed with the sample and refluxed at 40oC for 1 hour on the hot plate. Added 5ml of anhydrous Na2SO4 and Na2SO4 solution to taste and then reflux is cooled at room temperature. After that it is put into a separate flask and added distilled water, then extracted with the addition of n-hexane. After forming 2 layers where the bottom layer containing glycerol is separated and the top layer containing methyl ester is extracted again with n-hexane, then distilled water is added to neutral pH again, then anhydrite Na2SO4 is added to remove water that is likely to remain in solution. Furthermore, separation is carried out and the filtrate obtained is evaporated with an evaporator buchi. The methyl ester mixture obtained is injected using a simple piston pump tool such as a closed test syringe or syringe and analyzed using GC-MS to identify fatty acid profiles. Calculation of weight% for each sample component is calculated by the following formula (Manduapessy, 2017).

$$\% \text{component weight} = \frac{\text{LPS} \times \text{BST} \times 100}{\text{LPST} \times \text{BS}} \quad \%$$

3.1 Albumine

Albumin with the addition of 7% skim milk concentration and 4.75% sodium alginate which is 2.8 g / dL. albumin levels increase with increasing concentrations of skim milk and sodium alginate. This is presumably due to the addition of sodium alginate which is inert to the core material which is coated and cohesive to skim milk which has a small moisture content so that it can reduce damage to the core material during the drying process. According to Lin, Lin, and Hwang (1995), optimal efficiency can be produced from a matrix combination between protein and carbohydrates that is able to provide protection against microcapsules, higher efficiency than the use of one

encapsulation as a filler because of the ability of encapsulants to interact to form granules that can overlay better encapsulated components. According to Fransiska and Murdinah (2009), Natrium alginate is a cohesive coating material for coating materials that is combined and is able to maintain integrity in the core material. While skim milk is a coating material that has a low water content can prevent ballooning or bubbling during the drying process due to high moisture content so that it can damage the core components due to cracks (Rizqiaty *et al.*, 2009).

3.2 Protein

Protein results with the addition of 7% skim milk and 4.75% natrium alginate which is equal to 22.3%. The protein content in crude cork albumin powder is higher along with the increase in the addition of skim milk and natrium alginate. This is presumably because the addition of natrium alginate which contains quite a lot of protein and skim milk also contains high levels of protein so that when the two coating ingredients are united they will increase the protein content of the product, besides natrium alginate which is inert towards the coated core material and cohesive to skim milk which has a small water content so that it can reduce the damage to protein in the material during the drying process, besides the use of drying temperatures below 50°C does not significantly affect protein damage. According to Mulyani *et al.*, (2017), natrium alginate has a high protein content that can provide an increase in protein in the products produced, besides skim milk containing high protein also contributes the largest protein in the formula for the manufacture of products.

3.3 Water

Analysis of water content with the addition of 7% skim milk concentration and 4.7% natrium alginate which is equal to 1.05%. The water content in crude albumin powder of cork fish decreases along with the increasing addition of skim milk and natrium alginate. This is presumably due to the addition of inert natrium alginate to the core material which is coated and cohesive to skim milk which has a small moisture content so that it can reduce damage to the core material during the drying process and the addition of skim milk which has a considerable influence on viscosity in the powder before drying can cause a decrease in water content. According to Sumanti *et al.*, (2016), the use of skim milk as coating material can cause a decrease in water content in food because the addition of skim milk is related to the higher viscosity of the material which causes the decrease in water content plus the use of drying methods that can affect decrease in water content.

3.4 Fat

The results of the analysis of fat content with the addition of 7% skim milk concentration and 4.75% natrium alginate were 2.3%. The fat content in crude powder of cork albumin fish decreases along with the increasing addition of skim milk and natrium alginate. This is presumably due to the addition of natrium alginate which is inert to the core material which is coated and cohesive to skim milk which has a low water content. When skim milk and natrium alginate are combined it will increase viscosity because it is aided by the presence of natrium alginate which can cause a decrease in water content in food. A little water content in food will increase the concentration of radicals which can help the process of fat oxidation plus also using the temperature of vacuum drying which can oxidize and damage fat in food. According to Lin, Lin, and Hwang (1995), optimal efficiency can be produced from a matrix combination between protein and carbohydrates that is able to provide protection against microcapsules, higher efficiency than the use of one encapsulation as a filler because of the ability of encapsulants to interact to form granules that can overlay better encapsulated components

3.5 Ash Level

The results of the analysis of ash content with the addition of 7% skim milk concentration and 4.75% natrium alginate that is equal to 9.15%. ash content increases with increasing concentration of skim milk and natrium alginate. This is presumably due to the addition of natrium alginate which has a high enough mineral content which allows increased ash content in crude powder of cork fish albumin. skim milk also has high protein and mineral content which can contribute to increasing the ash content in the product. When skim milk and natrium alginate are combined it will increase the ash content in the food produced. According to Lin, Lin, and Hwang (1995), optimal efficiency can be produced from a matrix combination between protein and carbohydrates that is able to provide protection against microcapsules, higher efficiency than the use of one encapsulation as a filler because of the ability of encapsulants to interact to form granules that can overlay better encapsulated components.

3.6 moisture Absorption

The results of the analysis of moisture absorption with the addition of 7% skim milk concentration and 4.75% natrium alginate which is 4.25%. The absorption of water vapor in crude powder of cork fish albumin is increasing along with the increasing addition of skim milk and natrium alginate. This is presumably due to the addition of natrium alginate which is inert to the core material which is coated and cohesive to skim milk which has a low water content. When skim milk and natrium alginate are combined it will increase viscosity because it is aided by the presence of natrium alginate which can cause a decrease in water content in food so that the absorption of moisture will increase. According to Mulyani *et al.*, (2017), a combination of skim milk and natrium alginate can increase the viscosity of the

product and can increase the water binding capacity of the product. Increasing the binding capacity of water on the product can increase the taste and texture of the product produced.

3.7 Rendemen

The results of the yield analysis with the addition of 7% skim milk concentration and 4.75% sodium alginate were 25.15%. The yield of crude cork albumin powder increases with increasing addition of skim milk and sodium alginate. This is presumably because the addition of skim milk which has a high mineral content including Ca will interact with sodium alginate and filtrate to produce a liquid with high viscosity and form more crosslinking with the tip of the molecule of glutamate in sodium alginate and deposition resulting in the yield of powder crude albumin if cork will increase. According to Maharani et al., (2017) the increase in yield of a product occurs because of the viscosity of the raw material. Increasing the viscosity of the material will increase the yield of the product produced.

3.8 Aroma Scoring

Scoring scents with the addition of 7% skim milk and 4.75% sodium alginate showed scent scoring results of 4.73 (not fishy). Scent scoring of crude powder of cork albumin fish increased along with the increase in the addition of skim milk and sodium alginate. This is presumably because the addition of skim milk and sodium alginate will form hydrocolloids formed from proteins binding to alginate which is composed of polymanuronate and glutamic acid whose functional groups depend on the ratio of glutamic and manuronic groups which are known to bind free water. Volatile compounds can be dissolved in water and evaporate quickly because they have a light molecular weight so that the presence of hydrocolloids formed from proteins mixed with alginate can trap volatile compounds in crude powder of cork fish albumin. According to Koesoemawardhani and Ali (2016), hydrocolloid compounds formed from proteins and alginates are composed of polymanuronat and glutamic acid whose functional groups depend on the ratio of glutamic and manuronic acids known as hydrophilic compounds that can bind water, so that sodium alginate is used as a compound that can bind to volatile compounds dissolved in water.

3.9 Color Scoring

Color scoring of 4.77 (not brown) in the 7% skim milk concentration and 4.75% sodium alginate. Color scoring of crude powder of cork albumin fish increased along with the increase in the addition of skim milk and sodium alginate. This is presumably because the addition of skim milk and sodium alginate has almost the same color tendency, namely in the white skim milk while in sodium alginate is yellowish white so that when the two coating ingredients are combined it will produce a yellowish-white color, besides that yellowish white produced on albumin powder occurs because albumin from cork fish contains amino acids. According to Mulyani (2017), sodium alginate is yellowish white which affects the color of the product and is able to increase the preference of the panelists for the color produced. Skim milk has white color because it comes from the same livestock and does not affect the color produced on the product (Krisnaningsih dan Efendi, 2015).

3.10 Amino Acid Profile

Table 1. Results of Analysis of Amino Acid Powder of Cork Fish Albumin

No.	Amino Acid Type	Level (%)
1.	Aspartic Acid	2.00
2.	Glutamic Acid	4.55
3.	Serine	1.23
4.	Histidine	0.57
5.	Glycine	0.96
6.	Threonine	1.00
7.	Arginine	0.88
8.	Alanine	1.08
9.	Tyrosine	0.90
10.	Methionine	0.61
11.	Valine	1.36
12.	Phenylalanine	1.26
13.	I-leucine	1.18
14.	Leucine	2.15
15.	Lysine	1.57
Total		21.29

Source : data processed , 2018

From the table above, the highest amino acid content is glutamic acid, the high content of glutamic acid in crude cork albumin powder because the albumin content produced from cork fish is glutamic acid because the amino acid glutamate is an amino acid making up albumin. This is supported by Nugroho's research (2013), the components of albumin are glutamate and aspartic acid. While the amino acids composing albumin according to Pratari et al., (2017) the components of amino acid making up albumin are dominated by amino acids in the form of glutamic acid, aspartic acid, leucine, and arginine. The high amino acid glutamate in albumin occurs because of the deamination process

between amino acids glutamine and asparagine, where asparagine is an analog of aspartic acid with the replacement of carboxyl groups by neutral carboxamide groups in water solvents, the results of the deamination process can increase glutamic acid in meat (Sari et al., 2017). The lowest amino acid in crude albumin powder is methionine which is equal to 0.01%. The low methionine content is thought to be due to the drying and extraction process in the process of making crude cork albumin powder that uses high temperatures so that some amino acid content with low levels and is susceptible to high temperatures is damaged. The low content of methionine or methionine according to Annisa et al. (2017), each food has a limiting amino acid, where limiting Mino acid is an amino acid that has the lowest value. The limiting amino acid for composing albumin is methionine, so it is necessary to add a type of food that has a higher amino acid content to increase the amino acid content of food ingredients. The essential amino acids found in crude albumin powder are valine, methionine, isoleucine, leucine, phenylalanine, lysine, histidine. This is supported by the results of research by Suprayitno (2014), albumin produced from cork fish contains essential amino acids in the form of threonine, valine, methionine, isoleucine, leucine, phenylalanine, lysine, histidine, and arginine, while non-essential amino acids are aspartic acid, serine, glutamate, glycine, alanine, cysteine, tyrosine, hydroxyline, ammonia, hydroxyproline, proline.

3.11 Fatty Acid Profile

Table 2. Results of Analysis of Fatty Acid Profile of Cork Fish Albumin Powder

No.	Fatty Acid Type	Level (%)
1.	Capric Acid, C10:0	0.05
2.	Lauric Acid, C12:0	0.23
3.	Tridecanoic Acid, C13:0	0.22
4.	Myristic Acid, C14:0	2.88
5.	Myristoleic Acid, C14:1	0.07
6.	Pentadecanoic Acid, C15:0	1.73
7.	Palmitat Acid, C16:0	19.39
8.	Palmitoleic Acid, C16:1	5.90
9.	Heptadecanoic Acid, C17:0	1.42
10.	Cis-10-Heptadecanoic Acid, C17:1	0.74
11.	Stearic Acid, C18:0	5.06
12.	Elaidic Acid, C18:1n9t	0.21
13.	Oleic Acid, C18:1n9c	14.31
14.	Linolelaidic Acid, C18:2n9t	0.03
15.	Linoleic Acid, C18:2n6c	2.77
16.	Arachidic Acid, C20:0	0.21
17.	γ -Linolenic Acid, C18:3n6	0.24
18.	Cis-11-Eicosanoic Acid, C20:1	0.29
19.	Linoleic Acid, C18:3n3	1.18
20.	Heneicosanoic Acid, C21:0	0.06
21.	Cis-11,14-Eicosadienoic Acid, C20:2	0.24
22.	Behenic Acid, C22:0	0.15
23.	Cis-8,11,14-Eicosatrienoic Acid, C20:3n6	0.23
24.	Arachidonic Acid, C20:4n6	0.54
25.	Tricosanoic Acid, C23:0	0.04
26.	Lignoserin Acid, C24:0	0.10
27.	Cis-5.8.11.14.17- Eicosapentaenoic Acid. C20:5n3	0.20
28	Nervonic Acid, C24:1	0.04
29	Cis-4,7,10,13,16,19-Docosahexaenoic Acid, C22:6n3	0.51
Total		58.77

Source : data processed , 2018

From the table above shows the highest fatty acid content is palmitic acid fatty acids of 19.39%, palmitic fatty acids are saturated fatty acids which have a single bond in the hydrocarbon chain which is stable to heat (Jacob et al., 2014). The lowest fatty acid in crude powder of cork fish albumin is linolelaidic fatty acid which is 0.03% complete. The low linolelaidic fatty acid content is suspected because linolelaidic is a type of unsaturated fatty acid which is easily damaged by heat during the process of making crude albumin powder. According to Kapitan (2013) Essential fatty acids contained in crude powder cork albumin from unsaturated fatty acids MUFA (monounsaturated fatty acids) palmitoleic fatty acids (C16: 1), elaidic acid (C18: 1), cis-11-eicosanoic acid (C20: 1) Whereas from the class of PUFAs (polyunsaturated fatty acids) linoleic acid (C18: 2n6c), linolenic acid (C18: 3n3), eicosapenoic acid (C20: 3n6), arachidonic acid (C20: 4n6), Eicosapentaenoic acid (C20: 5n3), acid Docosahexaenoic (C22: 6n3). While SFA saturated fatty acids (saturated fatty acids) myristic acid (C14: 0), pentadecanoic acid (C15: 0), palmitic acid (C16: 0), stearic acid (C18: 0), arachidic acid (C20: 0), behenic acid (C22: 0), margarous acid (C17: 0). The presence of n-3 and n-6 in fish indicates essential fatty acids, which means that they are obtained from fish food intake in the form of micro-chorella,

diatome, dinoflagellata. The different fatty acid content between freshwater fish and sea water fish is located in PUFA. Freshwater fish contain n-6 PUFAs, while those in sea water contain n-3 PUFAs. The PUFA content of cork fish is linoleic essential fatty acid (C18: 2n6c) which is an omega-6 forming other unsaturated fatty acids such as linoleic acid (C18: 3n6) and arachidonic acid (C20: 4n6), through a desaturation system that is the formation of double bonds and elongation of chains (Kaban and Daniel, 2005).

IV. CONCLUSION

The addition of 7% skim milk concentration and 4.75% sodium alginate obtained results that were albumin levels of 2.8%, protein content of 22.3%, 2.3% fat content, 1.05% moisture content, 9 ash content, 15%, yield 25.15, moisture absorption 4.25%. While the organoleptic scent scoring test showed 4.7 (not fishy) and color scoring of 4.77 (not brown)

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Urban Liquid Waste Management: An Appraisal of Sewerage System in Dharamshala, Himachal Pradesh

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Abstract- Dharamshala, a hill city with natural beauty and seasonal tourist attractions. A Fluvial Himalayan Glacier serves this region for the water source as well as aesthetically rich landscape with snow capped mountains. Part of Himalayas, McLeodGanj located in the Upper Dharamshala within the Planning Boundary and it has the highest elevation of 2800m above MSL in this city. It has a great trekking route from Dharamkot to Triund Peak which is known for adventurous destiny. There are many Buddhist monasteries, temples, famous cricket stadium which attracts people from various places. Perhaps footfall of tourism is increasing gradually and also city expands due to urbanization and globalization. This city also selected for development under SMART Cities mission.

Sanitation is one of the important aspect to be considered for the urban development. It deals with the waste management, sanitary factors like toilets, sewage, solid waste, drinking water in qualitative and quantitative. This paper mainly focuses on the Sewerage Management in Dharamshala. It analyzes the existing situation of liquid waste management and inculcates the possible practice methods with the recommendations. In fact there are no industries established in this city and this acts as a positive factor to scrutinize that the human sewage become a biggest threats to rivers and natural streams. So it is very important to appraise the gap of infrastructural services and to sustain the surrounding clean, better and more viable.

Index Terms- Sanitation, Liquid Waste Management, Sewerage System, Waste water, Health

I. INTRODUCTION

Sewerage system is a physical infrastructure being governed by the urban local body of an area. In Dharamshala, Irrigation and Public Health & Municipal Corporation are the two responsible agencies for this system and they have a key role to assess the household connections, suitable disposal methods & compatible technology. Every city should have a Sanitation Plan (Development Plan) to detail out the framework and agenda for the waste management. It is a statutory plan prepared with respect to approved perspective plan of a particular region. According to WHO, Sanitation generally refers to the provision of facilities and services for the safe disposal of human urine and faeces.^[1] This city has a natural cover of dense forest of 36% of a total planning area and it compels this study to be more sustainable than an existing status.

Aim of this study is to appraise the existing scenario of Sewerage condition and to manage its impacts. Objectives are 1) To assess the existing sewerage network and household connections, 2) To optimize the treatment technology and disposal methods, 3) To consult the stakeholder and public regarding this sewerage management and 4) To analyze the gaps and to propose the needful for the betterment of a city. Scope of this study tends to transform Dharamshala into a totally sanitized, healthy, and to sustain good public health and environmental outcomes for all the citizens with a special focus on hygiene and affordable sanitation. Limitations are considered for being a hilly area might have restrictions in implementation and climatic conditions may influence this output. This study approaches its extent through CPHEEO guidelines, CSP Toolkit and Case Study of Shimla.

II. METHODOLOGY

Sample Design & Size This study has been carried out with primary survey on site of an area and interviewing the nodal officers. The designated areas are filtered and buffered through high density of settlements in villages of Dharamshala within the planning boundary. This has been done so that the sample could achieve the original status of population size. It is based on the judgment sampling so that the mixed economy of people would be engaged. An equal number of 20 samples has been surveyed to represent their status of each village. Secondary data were collected from case studies, journals, and concerned government offices.

III. STUDY AREA

Dharamshala is a tehsil, also an district headquarters of Kangra district and it has the role of administration of a district from a statutory place. It has a population of 53,543^[2] and the demarcated study area in (Fig 2) is an Planning Area Boundary for the future development.

Fig 1: H.P State Map showing Kangra District

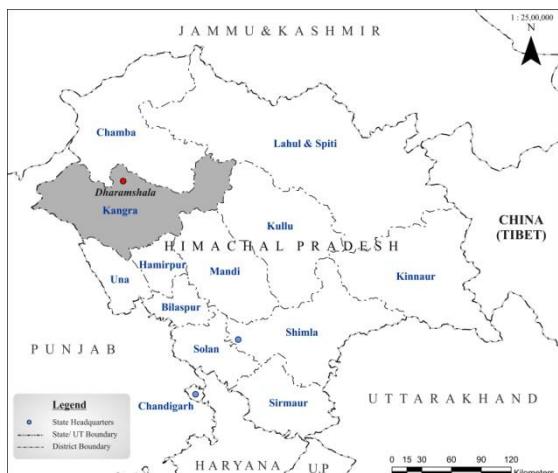
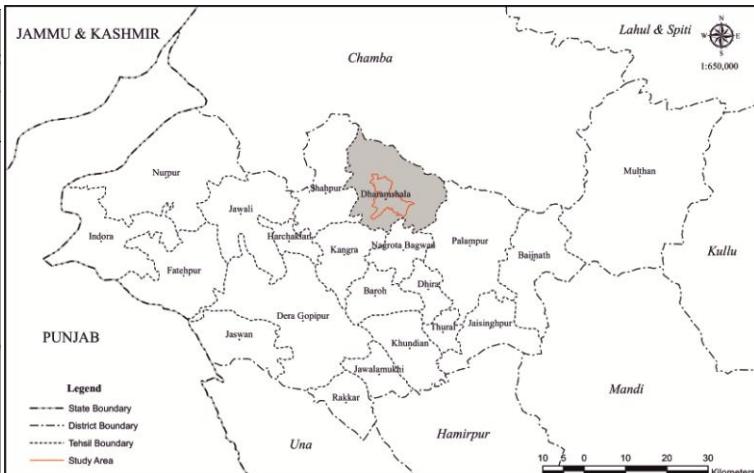


Fig 2: Kangra District Map showing Dharamshala Tehsil



Source: GIS Mapping based on Himachal Pradesh State Map series and Aerial Imagery- Google Earth.

Fig 3: Jurisdiction/Administrative area

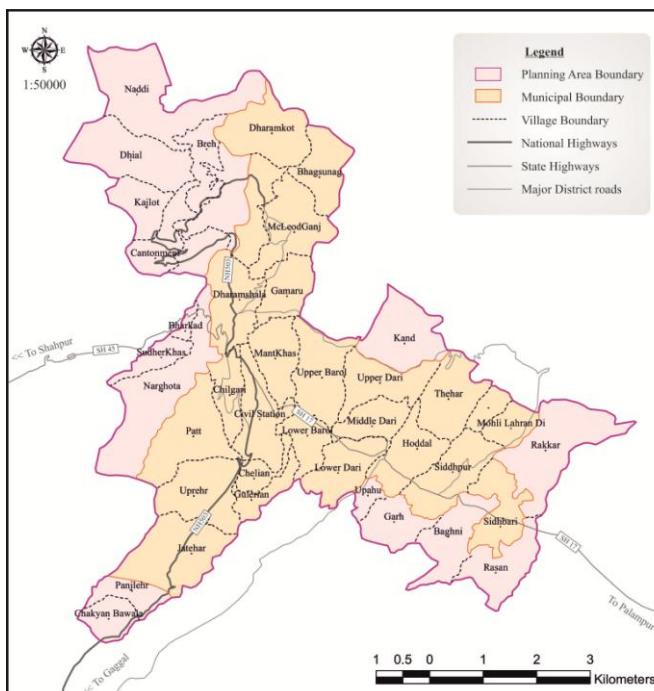
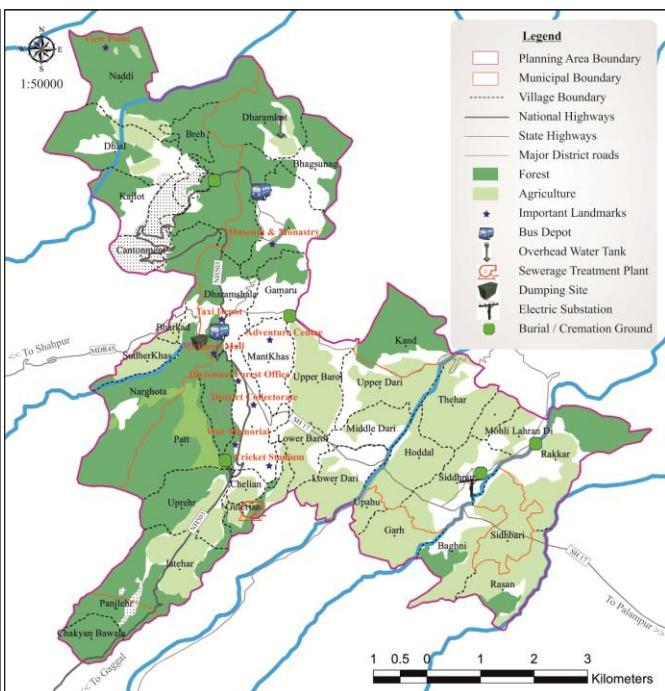


Fig 4: Topographic features and major landmarks



Source: GIS Mapping based on City Development Plan, Dharamshala 2035.

It is a town in the upper reaches of Kangra valley and is surrounded by dense coniferous forest consisting mainly of state Deodar Cedar Trees.^[2] The Suburb includes McLeodganj, Bhagsunag, Dharamkot, Naddi, Forsythganj, Kotwali Bazar, Kachehri, Adda, Dari, Ramnagar, Sidhpur and Sidhbari etc. (Fig 3) shows the jurisdiction of Dharamshala Planning Area which is of 41.63 Sq.Km and Municipal Area is of 27.60 Sq.Km. There are totally 17 number of wards in a municipal area and 33 villages including revenue villages in total boundary area. Orange color depicts the urban area and pink represents the rural area.

IV. CITY PROFILE

Dharamshala doesn't have railway connectivity or network but nearest railway station is in Pathankot which is of 93 Kms away from the city. The city is accessible through NH 503, SH 17, and MDR 45 and other local roads. Major cities connected through Dharamshala are Palampur, Mubarikpur, Pathankot, Mcleodganj etc. Buses ply daily between Dharamshala and major cities such as Chandigarh, Delhi, and Shimla.^[2] Dharamshala can be reached by Gaggal airport, about 15 Kms from the town.

Fig 5: Regional Connectivity

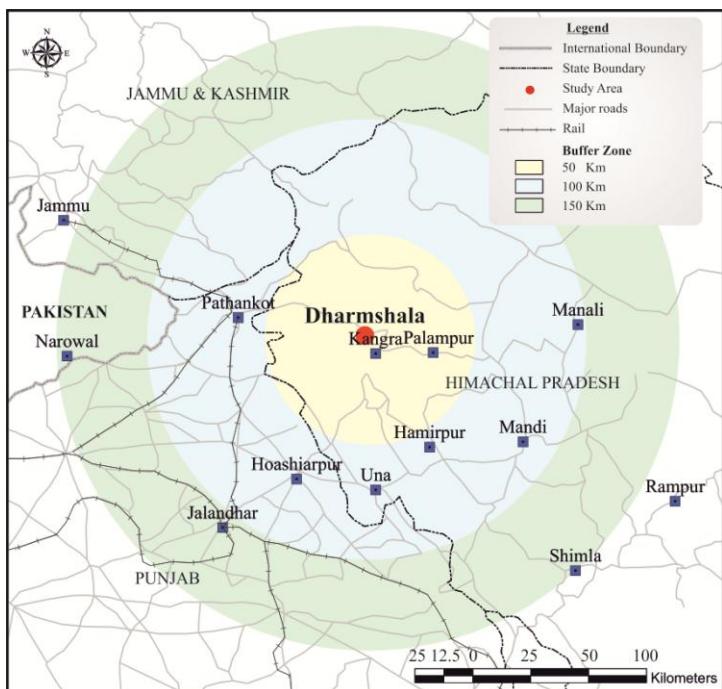
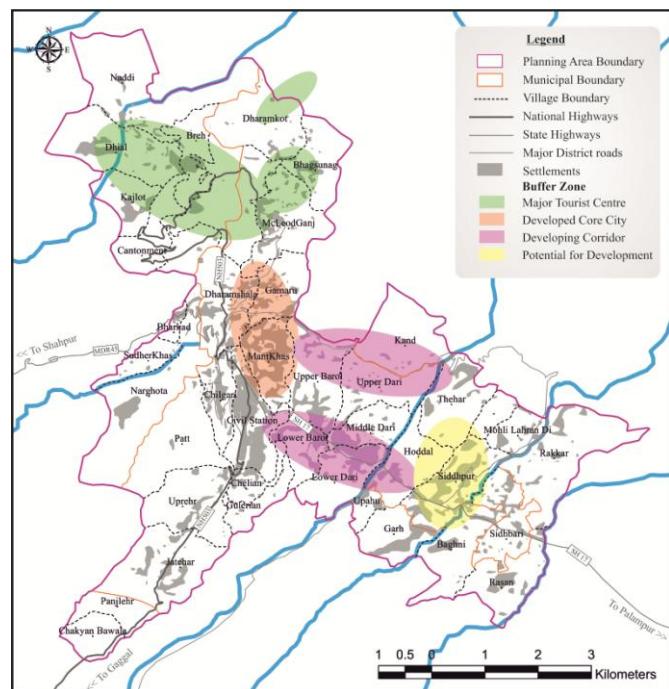


Fig 6: Development Pattern



Source: GIS Mapping based on City Development Plan, Dharamshala 2035.

Fig 7: Climate (2018)

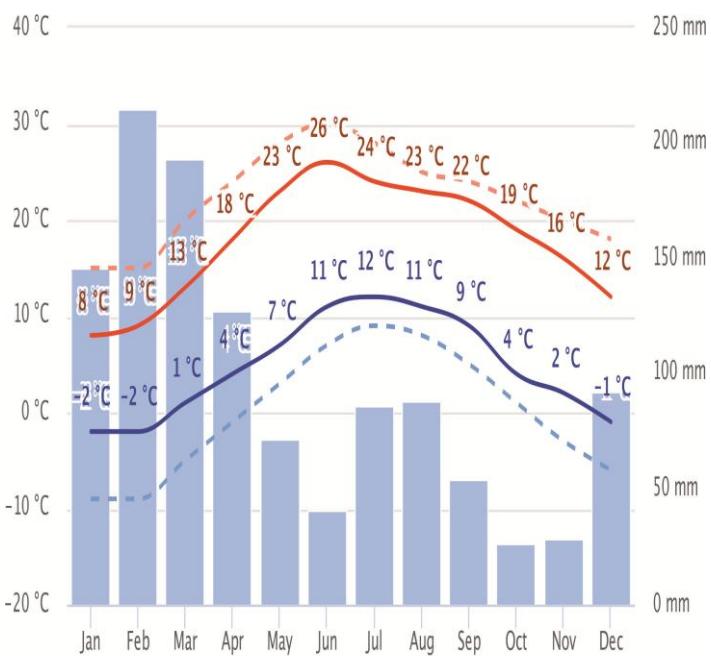
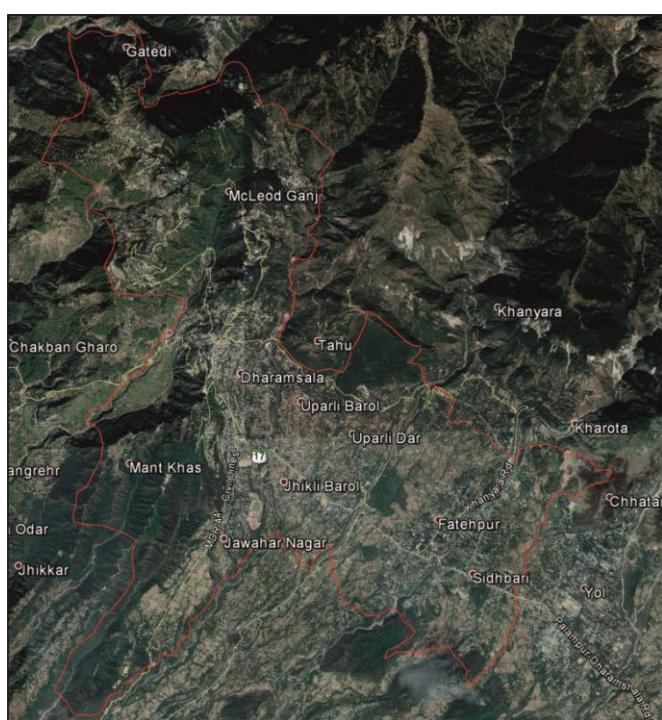


Fig 8: Aerial Imagery-Google Earth 2016



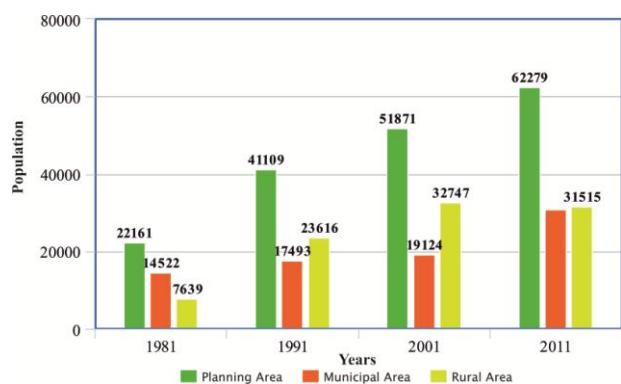
● Precipitation — Mean daily maximum — Mean daily minimum — Cold nights — Hot days

Websource: www.meteoblue.com/dharamshala.aspx

The development of dharamshala takes place from core part to periphery. Due to steep slope and hilly area, certain places are restricted for development including forest, low line areas etc. Fig 6 shows the buffer zone of Major Tourist Centre, Developed Core area, Developing corridor and Potential for development. Rainfall is the major source of groundwater recharge, apart from the influent seepage from the rivers, irrigated fields and inflow from upland areas, whereas discharge from ground water mainly takes place from wells and tube wells; effluent seepages of ground water in the form of springs and base flow in streams etc.^[2] Kangra District is having six types of soils out of which Alfisols (sub mountain) soil is found in the Planning Area.^[2]

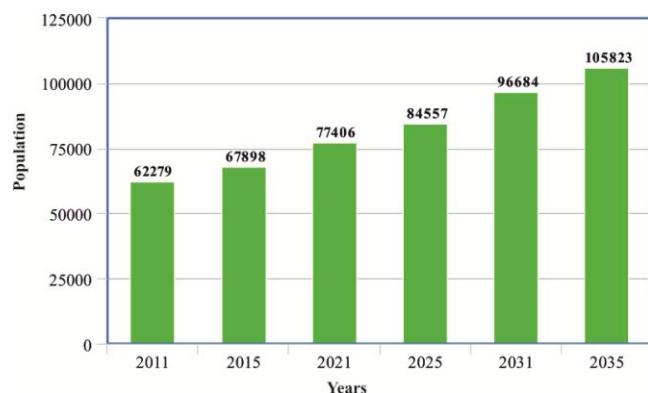
V. DEMOGRAPHY & SOCIO PROFILE

Chart 1: Trends of Population



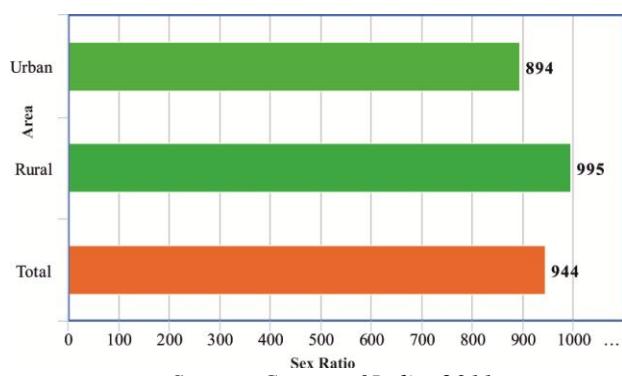
Source: Census of India, 2011

Chart 2: Population Projection



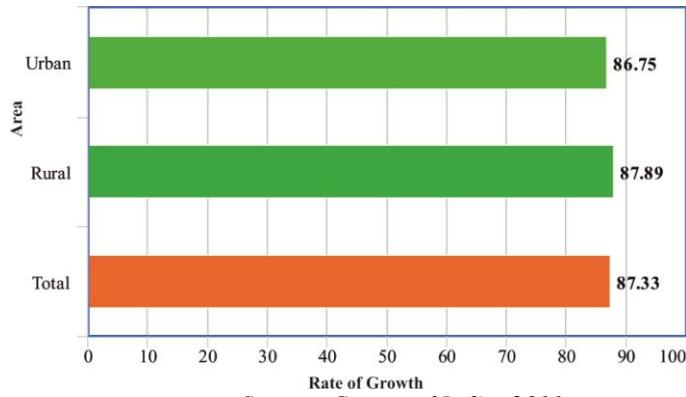
Source: City Development Plan, Dharamshala 2035

Chart 3: Sex Ratio



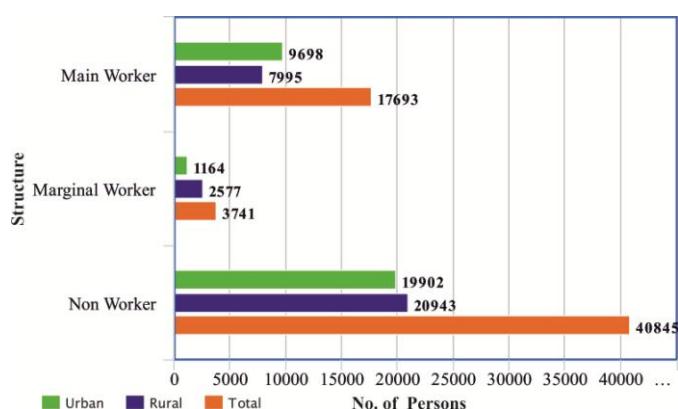
Source: Census of India, 2011

Chart 4: Literacy Rate



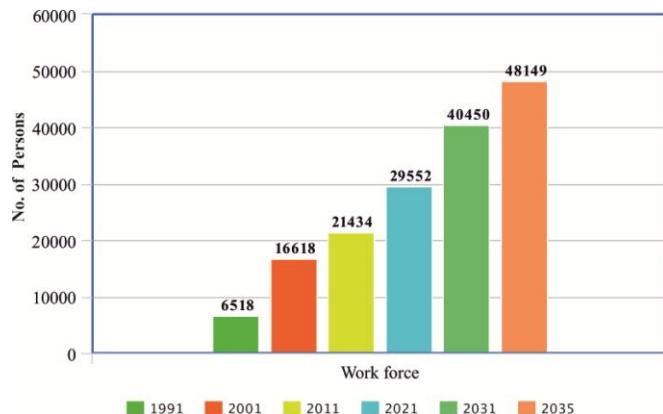
Source: Census of India, 2011

Chart 5: Current Workforce



Source: Census of India, 2011

Chart 6: Projection of Workforce



Source: City Development Plan, Dharamshala 2035

Area has shown a positive development in the past and growth has taken place rapidly which resulted in the up gradation of Municipal Council to Municipal Corporation.^[2] The instances of relatively rapid increases in population and share of urban population to total population of the Planning Area were mainly caused by villages and outgrowth areas being added to the municipal area.^[2] Unemployment is one of the serious problem in India, Chart 5 shows that there are 40845 non workers and there chance of economical impacts. According to the workforce projection Chart 6, there is a need of employment by 2035, so that the city could do efficiently in GDP share too. With high influence of tourism which is considered as a floating population, it is expected that the attraction of the people for the city will increase. Sex ratio of the city is 944 and literacy rate of growth is counted to be 87.33.

VI. HEALTH FACILITY & EDUCATIONAL INSTITUTION

Fig 9: Coverage of Facility centre

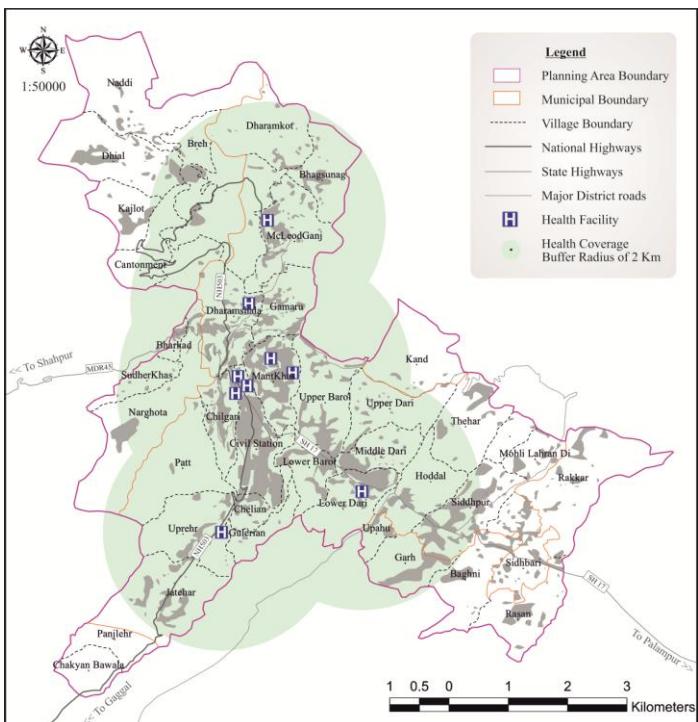
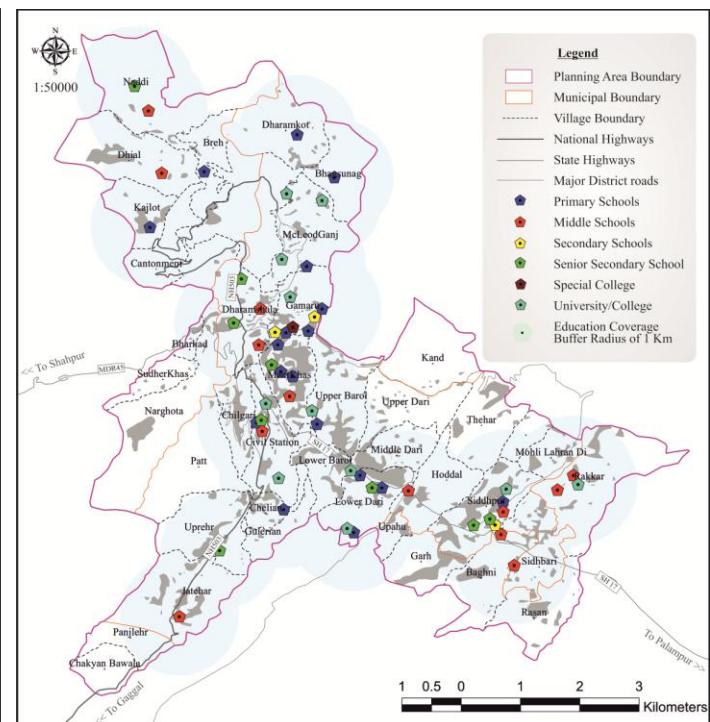


Fig 10: Coverage of Schools or Institutions



Source: GIS Mapping based on City Development Plan, Dharamshala 2035.

Health Facility & Schools has a strong relationship with sanitation factors in view of social aspects. It is very much important to undertake this study for the Sanitation. The poor sanitation of surrounding caused by inadequate facility (Physical Infrastructure) may lead to people illness. Mainly it should be focussed on Institutions, because the average of one from each house is engaged in this. Proper Water supply, Toilets, Waste Management and Health facility should be maintained for the projected size.

There are number of medical facilities present in the city to cater to the city population along with the hinterland population. A government hospital of 300 beds and Apart from that there are small hospitals, dispensaries, welfare centres etc. in the city.^[2] 70% of the area facilitated with the proximity of 2 Km. There are 69 government and 41 private educational facilities of different hierarchy in Planning Area and almost 80% of the area facilitated with the proximity of 1 Km. It is focussed because the Schools/Institutions could be source for illness due to inadequate sanitation facilities and Health facility centre is considered as an destination to tackle the illness of people and it becomes a cycle practically.

For example, a person from one of the institutions affected by germs because of improper maintenance due to lack of water supply, inadequate sewerage management leads to lag of waste water on surface. Probably all these leads to water borne diseases, increases vitality of micro organisms. Hence the affected person belongs to one area of that region and that area is considered for threat and person will be rehabilitated through facility centre. This can happen for the half of the catered population as a cycle. There is a need to stop this cycle towards hygiene.

VII. LAND USE

Fig 11: Existing Land Use 2017

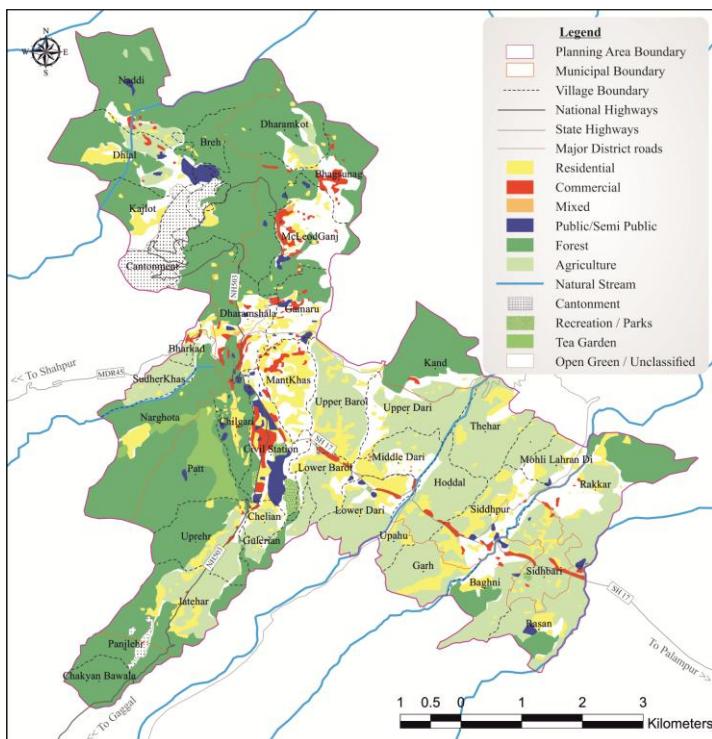
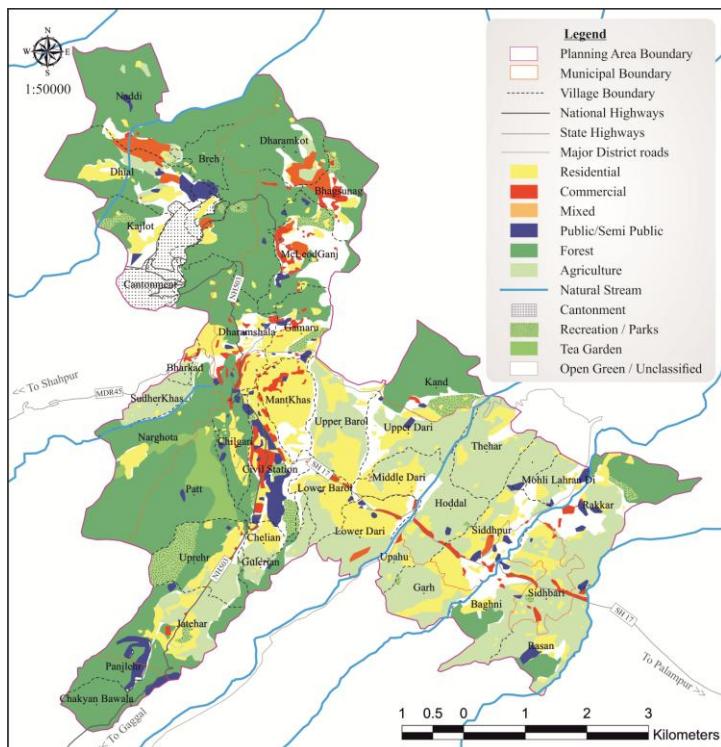


Fig 12: Proposed Land Use 2035



Source: GIS Mapping based on City Development Plan, Dharamshala 2035.

Chart 7: Existing Land Use Share

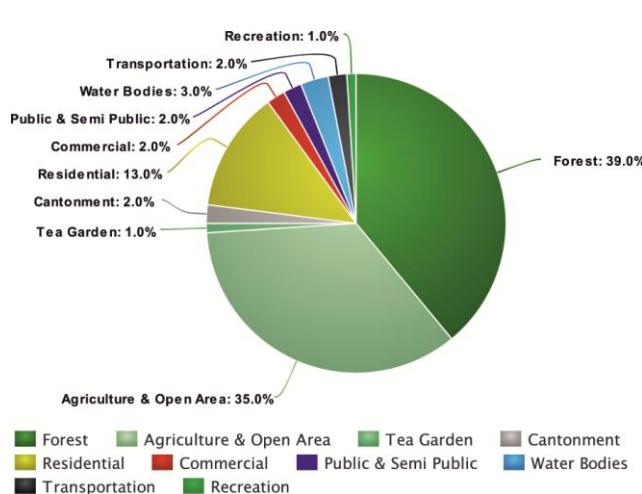
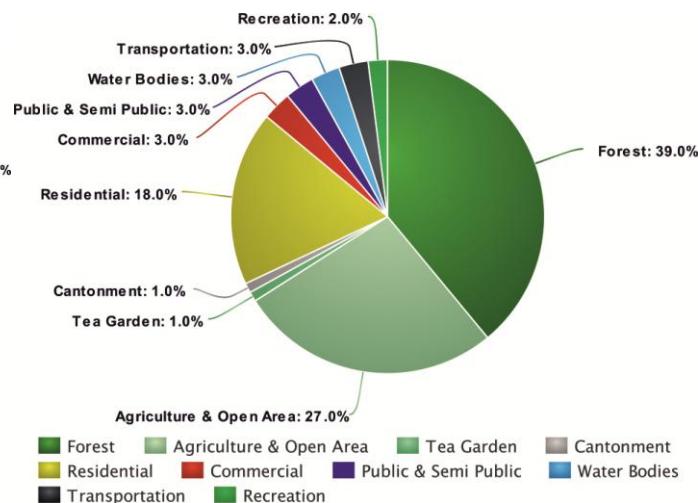


Chart 8: Proposed Land Use Share



Forest occupies majority of land use in total planning area. Comparatively Chart 7 and Chart 8 there is no change in land use of forest. There is a change of Agriculture land reduced to 27% from 35%, Residential land increased to 18% from 13%, Commercial increased to 3% from 2% and others follows. As per URDPFI guidelines, green space for a city should be between 15 to 18%, but it is 2.81% of developed land and is much lower in comparison to the percentage prescribed for recreational land use for medium sized hill town (15 to 18%).^[2] Land use is been analysed for the land suitability of sanitation projects. It is very important to take care of other elements and linkages to make it more sustainable.

VIII. CONTOUR & ELEVATION

Fig 13: Contours

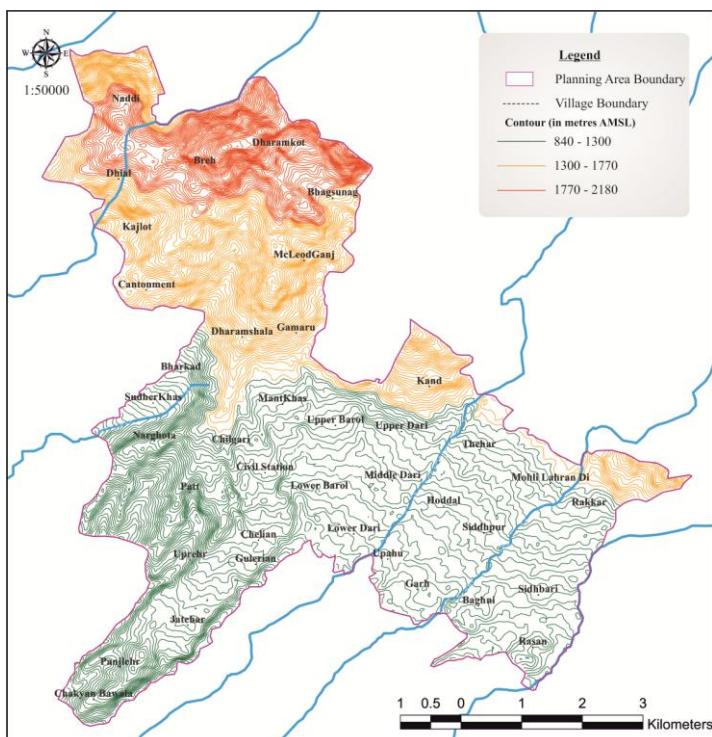
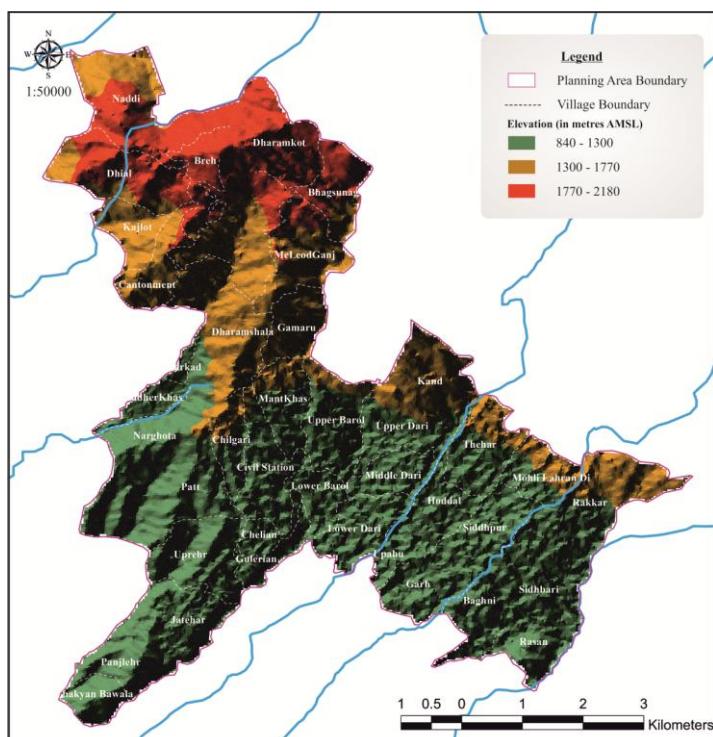


Fig 14: Elevation



Terrain of the entire area is undulating and slope of the planning area is in the north to south direction. North is having steep slopes of more than 25% whereas central and southern parts are having comparatively less slope of below 10%. Fig 13 shows the contours of study area to understand the section of geographical features. Fig 14 show the elevation of study area which is an digital elevation model classifies the heights based on satellite imagery. These helps in this study to synchronize the ideas feasibly for the sanitation project. Moreover the flow of water and inceptor installations can be assessed through these analysis.

IX. DATA ANALYSIS: LIQUID WASTE MANAGEMENT

In Municipal Corporation area, the sewerage system has a total length of 72.8 km with an area coverage of 60% and population coverage of 67% through almost 3000 household connections.^[2] The city has a sewage treatment capacity of 5.15 MLD at Chelian. A large number of households (2000) are also served by septic tanks.^[2] Treated waste water does not meet international standards and is currently disposed in nallahs/drains.^[2] I&PH department, is responsible for treating sewage generated in Municipal Area. Existing sewer network needs to be strengthened since it is degraded at places.^[2]

Chart 9: Duration-Septic tank cleaning

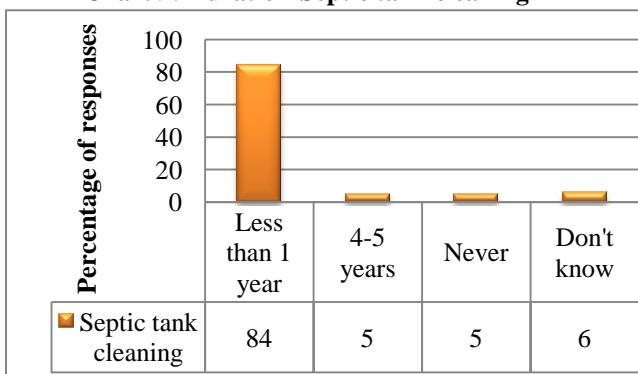
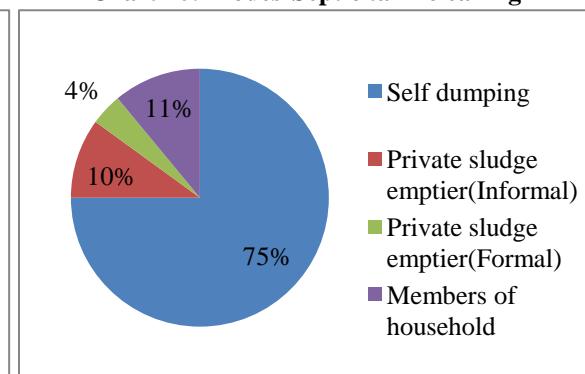
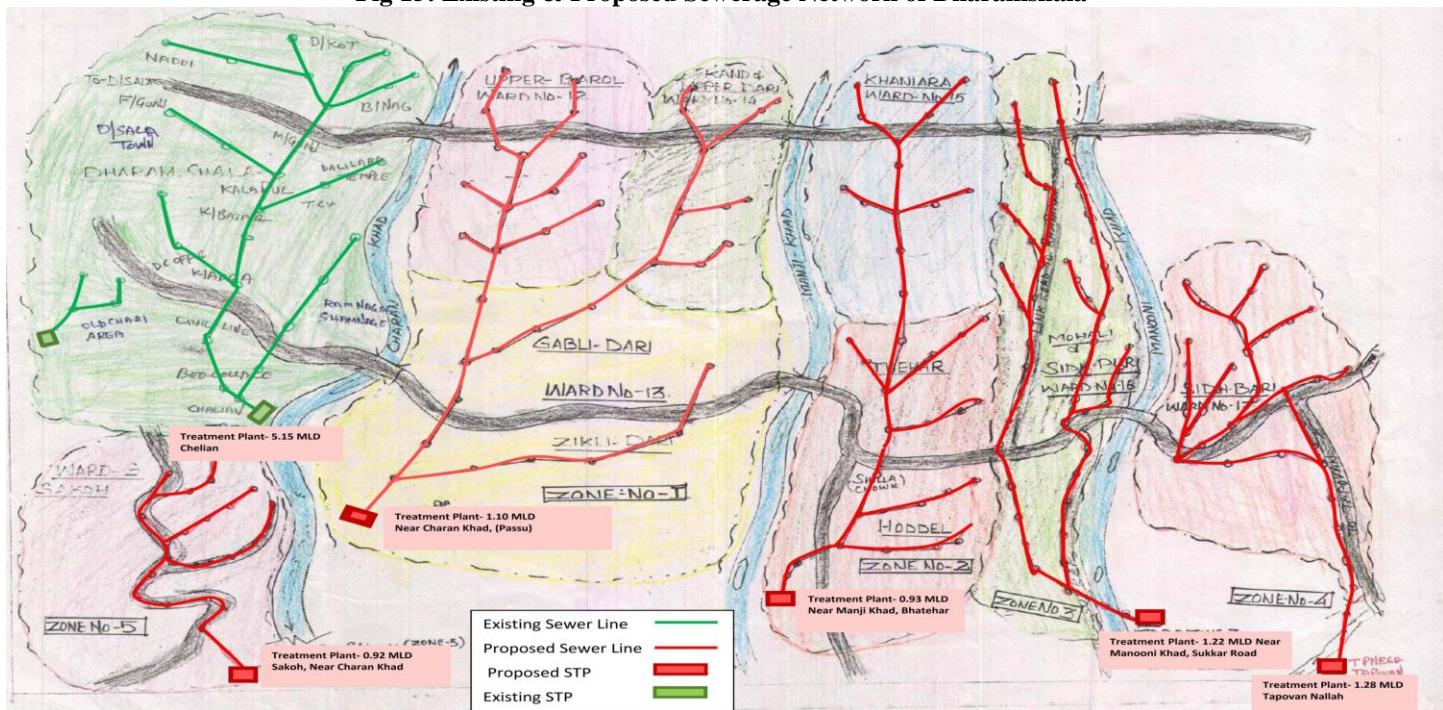


Chart 10: Modes-Septic tank cleaning



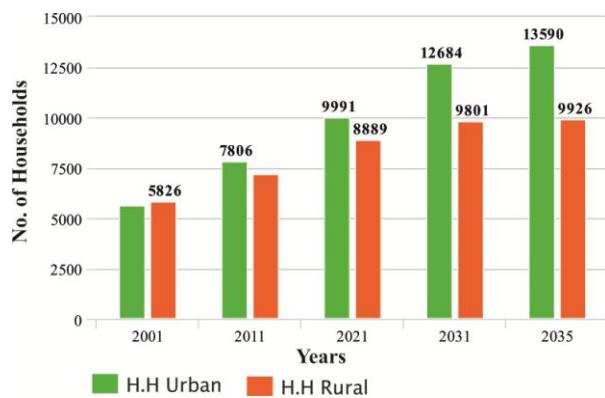
Source: Primary Survey conducted on 1st of March, 2019.

Fig 15: Existing & Proposed Sewerage Network of Dharamshala



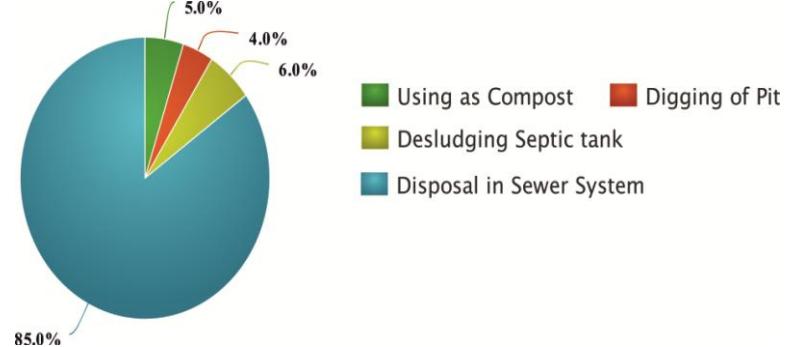
Source: I&PH Department, Dharamshala.

Chart 11: Projection of Households



Source: City Development Plan, Dharamshala 2035.

Chart 12: Disposal Methods in Planning Area



Source: Primary Survey conducted on 03rd of March, 2019

It is expected that the generation of waste water is about 20-30MLD and there is a need of scrutiny in this sector to full fill the gap for better sanitation. The treated waste water is not reutilized or reusable for irrigation and recreation purpose because of non-standard quality of treatment. It is also to be noted if the treated water is drained to nallahs, streams etc, then the usage of STP is quite worse. It is all because in due absence of Tertiary treatment in Sewerage Treatment Plant.

There is a plenty source of waste water in this city to manage sustainably but it is been diluted with natural stream and that may impact other region for no reason due to slope. Nowadays, waste is considered as an gold resource for making money because it is available all over the world at free of cost. Hence the opportunities are higher for the private investors to setup a sewerage treatment plant in PPP model for the development of society as well as own.

In India, manual scavenging is prohibited legally by the government for the better way of humans. Because it is found in some places that the peoples used to practice without any precaution and that leads to loss of lives. Hence it was proper initiative from the government to regulate the body and guidelines against scavenging.

Chart 13: Disposal Methods Area wise

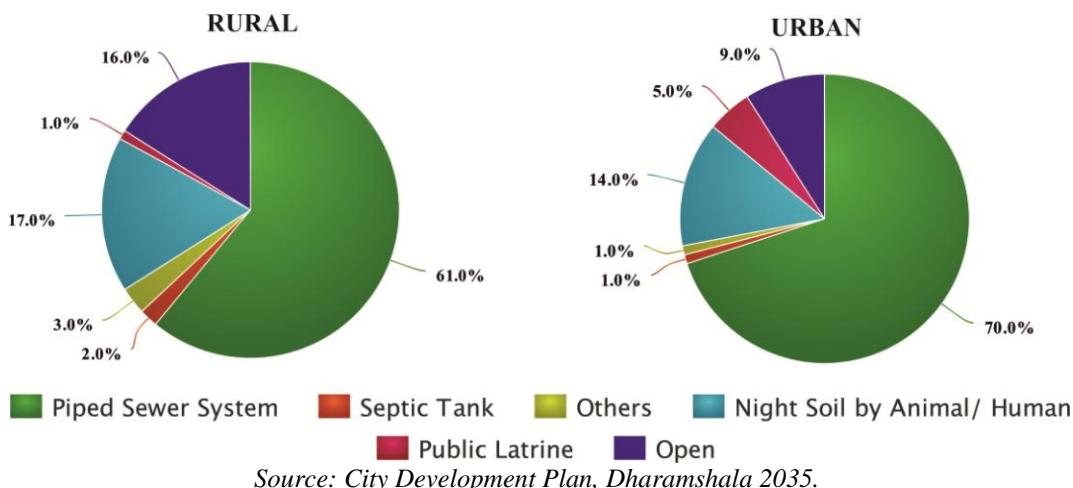


Chart 14: Bathing Facility

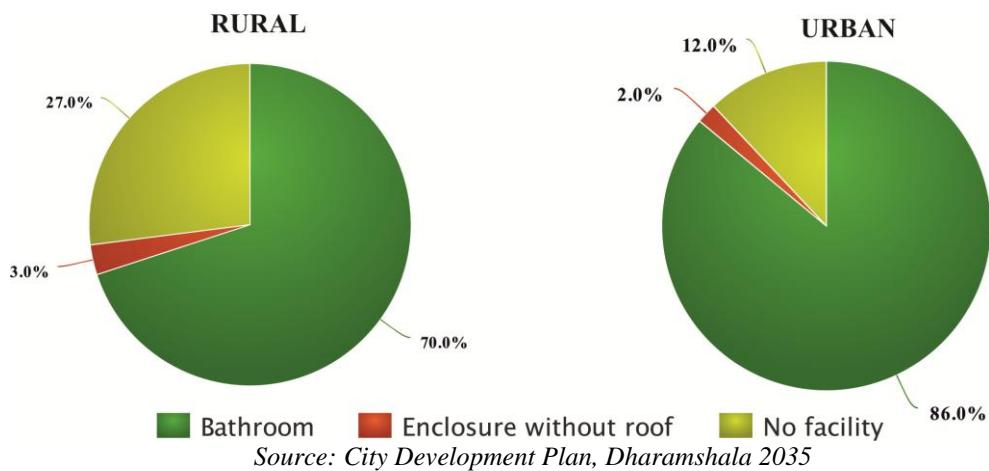


Chart 15: Waste water outlet connections

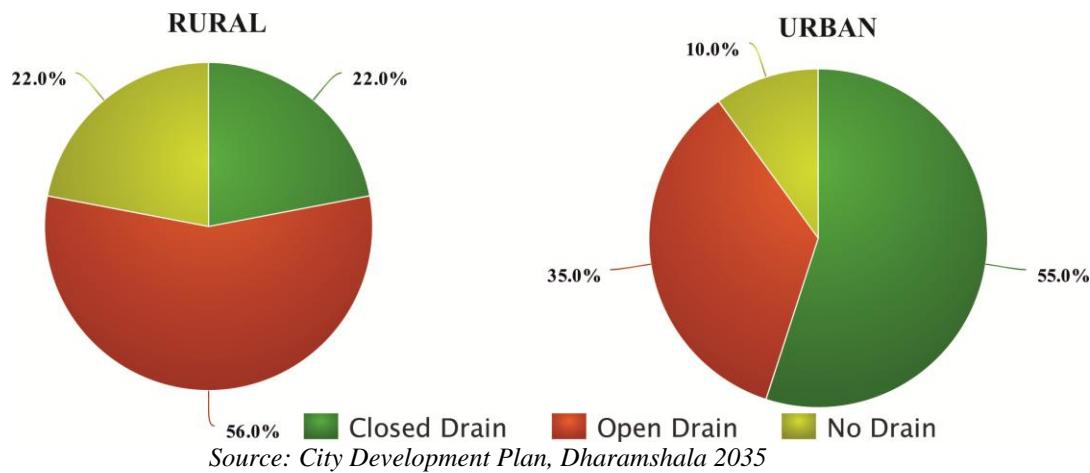


Table1: Existing Service Level Benchmarks

Performance Indicator	Desired Level of Service	Existing Level of Service	Remarks
Coverage of Sewerage Network	100%	60%	Significant coverage in terms of area
Collection efficiency of Sewerage Network	100%	43%	Low collection efficiency in-spite of extensive coverage
Adequacy of Sewage Treatment Capacity	100%	25%	Existing treatment capacities are adequate for the next 10-12 years
Quality of Sewage Treatment	100%	No data	STPs are functional. Some additions required for optimized treatment levels.
Extent of Reuse and Recycling of Sewage	20%	0.00%	Due to quality, the reuse of treated wastewater has not been explored
Extent of cost recovery	100%	0.00%	Nil.
Efficiency in Collection of Sewage Charges	90%	0.00%	
Efficiency in redressal of customer complaints	80%	100%	The response time to address the complaint has been good

Source: City Development Plan, Dharamshala 2035 and Primary Analysis

X. KEY ISSUES & FINDINGS

- Inadequate number of Sewerage Treatment Plant to cater the entire households and waster water.
- Degraded sewer network and engineering failure i.e., flow of waster water.
- Lack of Sewer network coverage throughout Planning Area Boundary.
- Current practice being a threat for Water Borne Diseases and others etc.
- Recycling or Reusable method is not being practiced due to non standard quality of treatment.
- The open discharge from septic tanks results in pollution of land, natural water bodies etc.
- The accountability for provision of efficient services is not ensured.
- Lack of scrutiny in treatment technology and alternative modes.

XI. PROPOSALS & RECOMMENDATION

Implementation

- Sewer Network- 100% coverage of planning area.
- Pressurized interceptors should be installed in decentralized manner.
- Combined with Solid waste, usage of Bio-Gas plant which should be eco-friendly in nature may work efficiently to cater the gap, So it has to be invested.
- Integration of Sewerage Treatment Plant with Bio-Gas Plant through lagoon.
- Extension of Planning area for Bio-gas plant is required.
- Operation & Maintenance should be done regularly.
- Advanced tools and technology should be engaged timely.
- Skilled labors and expertise should get involved for the innovative design.
- The treated sludge can be used for Bio-cement and treated waste water can be used for ground water recharge, irrigation, green belt development, recreation purposes etc.

Awareness

Social Awareness Program should focus on Liquid waste management by the NGO, Institutions to the end user.

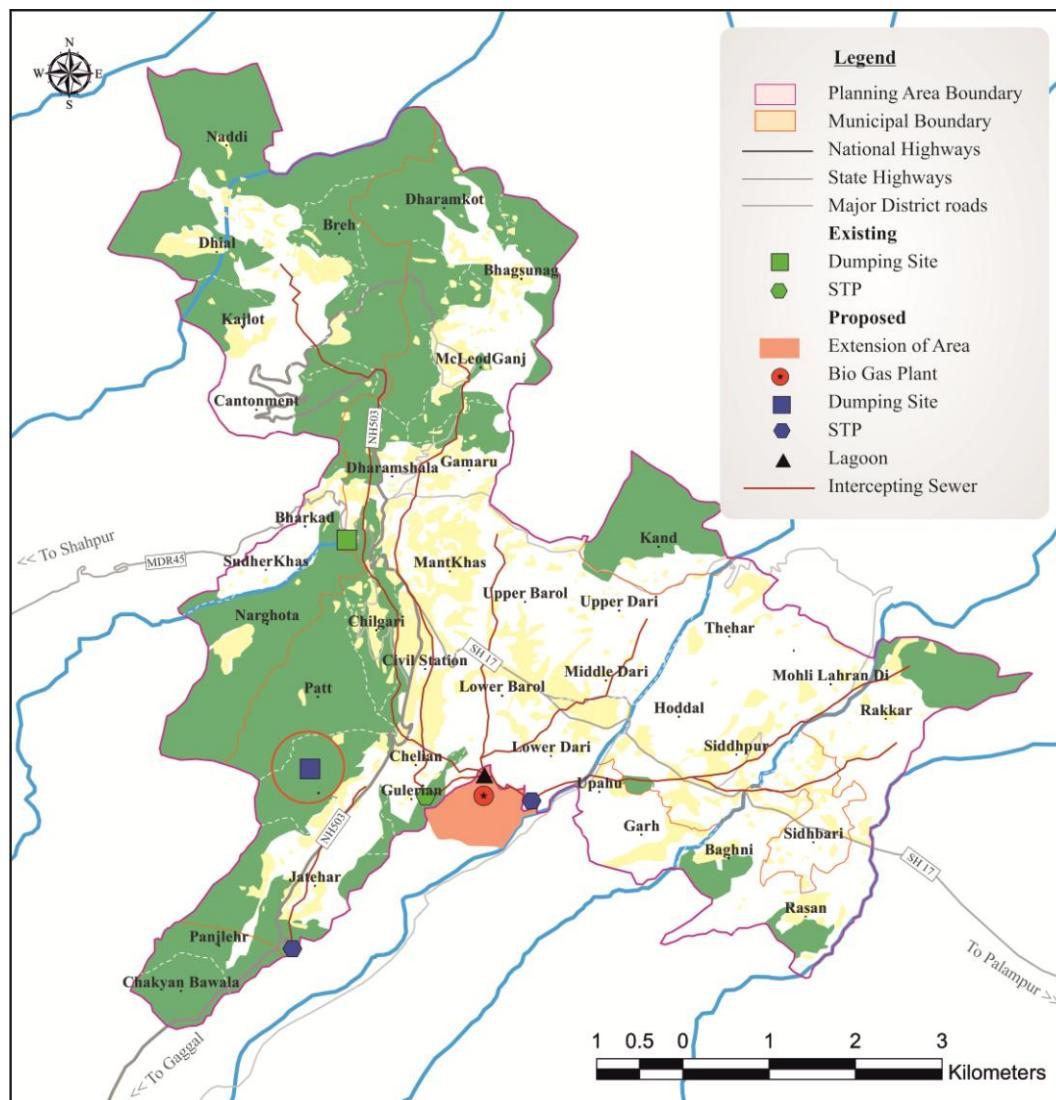
Rules & Regulations

Disposal of treated waste water into streams, drains should be abandoned.

Economy generation

- Levied through Municipal Tax.
- Production of Bio-gas tends to reduce the alienation of power from other sources.
- The treated effluent water can be provided for the institution, irrigation, recreational purposes in commercial basis.

Fig 16: Proposals & Recommendations



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At last to the start of my journey, a lovely wishes to my parents who gave me this beautiful life 'SLAM'.

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He is an Physical Planner and specialized in GIS, Spatial analysis and other advanced analytical tools in mapping and design. He serves many professionals and students with his skills and opinions in aid of non physical firm. He also authored few research papers and presented in national conference wisely. Now, he is researching on various sectors with the guidance of affluent professionals of core research team. His focus and interests are in Cyber Design, GIS, MIS, Poverty Alleviation etc. A strong believer in the ability of planning and research combined with Spatial thinking for strengthening our societies and having a positive effect on the world. His prime objective is to achieve the original status of planners among all other profession throughout India.

“Design and Fabrication of Hand Operated Spring Powered Cycle”

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Abstract- A cycle which is operated by hand and stores power in spiral spring and uses it to drive and gives more rest to driver. This cycle is operated by hand so that it can also be used by physically handicapped people. This cycle is inspired from rowing cycle and we have modified the mechanism in rowing cycle. We have utilized the spiral spring to store the potential energy and use it whenever required and when spiral spring drives the cycle the driver can take rest. For workout this is best cycle. Rowing motion is better option for workout so, that for sportsperson this cycle is best for workout. We have also used a particular spring for we can get high speed rather than regular and geared cycles. This cycle has highest speed than other cycles. By regular effort we can travel more distance by use of spiral spring. It is more efficient. By use of spiral spring in rowing cycle for replacing constant effort in regular cycle and use the power of spring and gives the rest while driving the cycle. We can drive this cycle in any road condition.

Index Terms- Hand operated spring powered cycle, Hand operated cycle, Row cycle, Spring powered cycle, Spiral spring cycle

I. INTRODUCTION

As the handicapped person uses effort to drive cycle and they feel fatigue. They can't take rest while riding cycle. Travelling distance of handicap cycle is lesser than other cycles. So, we find out solution, we designed a mechanism which can give rest while driving so they can't feel fatigue comparatively to handicap cycle, and at same effort cycle can travel more distance. We have designed a cycle which is operated by hand and stores power in spiral spring and uses it to drive and gives more rest to driver. This cycle is operated by hand in order that it can even be employed by physically handicapped individuals. This cycle is galvanized from row cycle and that we have changed the mechanism in row cycle. A row cycle could be a vehicle operated by a row motion of the hand. By the handlebars steering, braking, and shifting area unit causally done. row cycles area unit in numerous styles, notably with relevance frames and drive mechanisms. Commercially, production numbers for row cycles area unit is tiny compared with regular bicycles. row cycles have the potential to be quicker than regular bicycles as a result of the upper output of torsion generated by a row motion.

II. LITERATURE REVIEW

A. Row Cycle History

The use of a rowing-like action to propel a land vehicle goes most likely to the decade, as George W. Lee used a sliding-seat during a trike. Road sculler races were command in Madison sq. Garden within the Eighteen Eighties. A toy catalog from FAO Schwarz in 1911 publicized a four-wheel "Row-Cycle" for youngsters, operated exploitation 2 levers during a standing position and with steering done by the feet. within the Nineteen Twenties, Manfred Curry in Germany designed and created the Land small boat ("land boat"), a four-wheel vehicle that might be called a Row mobile within the English-speaking countries. A short subject from 1937 shows a rowed bicycle that's terribly the same as today's Crafts bury SS row bicycle, Row bike.

• Propulsion and steering

Some rowed vehicles use a stroke the same as a boat, in this force is employed only straightening the body, the drive portion of the stroke, not the recovery. different rowed vehicles, largely those who use linkages and crankshafts in their drive trains, use force in each straightening and bending the body. On most, the handlebars move; most even have moving footrests and a few have a moving seat. The handle bars on some rowed vehicles travel on a curved path owing to the handlebars being mounted to a set length lever fastened to the frame. Some decide to simulate a lot of level stroke utilized in row a boat, as an example Street boatman. Street boatman has "the most natural row action of any row vehicle to date". the road boatman uses a steering mechanism motivated by servos and controlled by the rider with a joy stick.

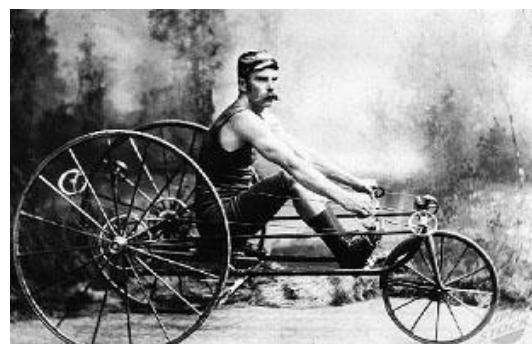


Figure 1: Old row cycle

- Drive train

Rowed vehicles usually have one amongst 3 drive trains: chain, linkages, or cable. The Row bike complete uses a regular chain, rear gears, and derailleur. The chain doesn't travel during a loop, as is the case with a regular bicycle. It moves back and forth over the rear cog in a very reciprocatory motion. The chain is connected at one end to the frame of the row bike and to a bungee rope on the opposite. because the boatman pulls back the chain engages the rear cog and therefore the bungee rope is extended, and once the boatman returns forward the bungee rope contracts, propelling the chain back and making certain there's no slack within the chain. All Row bikes have a rear derailleur, even single speeds, because of the requirement to stay correct tension within the chain. Row bikes that use linkages embrace Champion and Power pumper. They use linkages connected to a crank shaft, the same as a pedal automobile. The row bike and Street boatman use a cable that coils and uncoils a few spool. This calls his version a sneak drive.

B. Patent Analysis

1) Spring powered bicycle: -

Author: - Mario Filippo Alvigini, 217 W. 18th St., New York, N.Y. 10011

Publication Date: - Aug. 22, 1978

Analyzed description: -

In this paper there is a mechanism which uses spiral spring's energy to drive the cycle. A spiral spring is connected to a drum and drum is clutched to back wheel. There is a foot pedals mounted each on a cylindrical oscillating shaft on opposite sides of a drive wheel gear. By oscillating them spring is wind up and by unwinding drum clutched to back wheel which can drive cycle.

2) Human powered drive-mechanism with versatile driving modes: -

Author: - Anti M. Keskitalo, 4014 Norwood Dr., Columbus, Ga. 31907

Publication Date: - Nov. 25, 1997

Analyzed description: -

From this research paper, we get steering mechanism in which steering wheel is connected to pulley with the help of sleeved cable which is connected to opposite sided of slot.

FIG. 2.

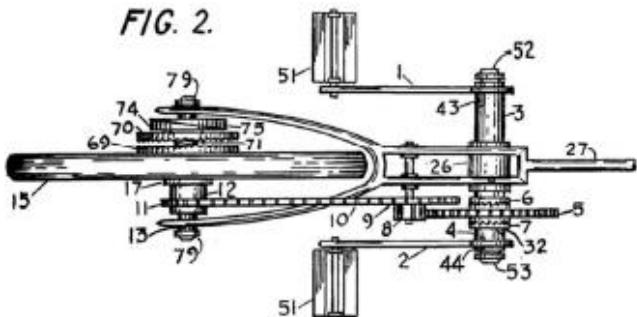


FIG. 1.

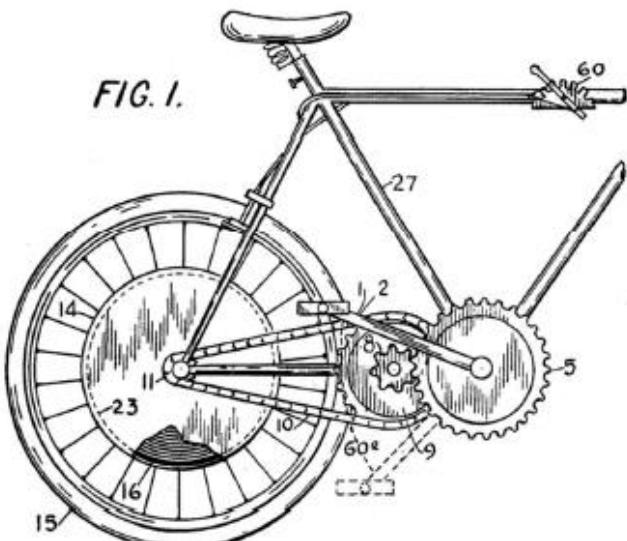


Figure 2: Spring powered bicycle

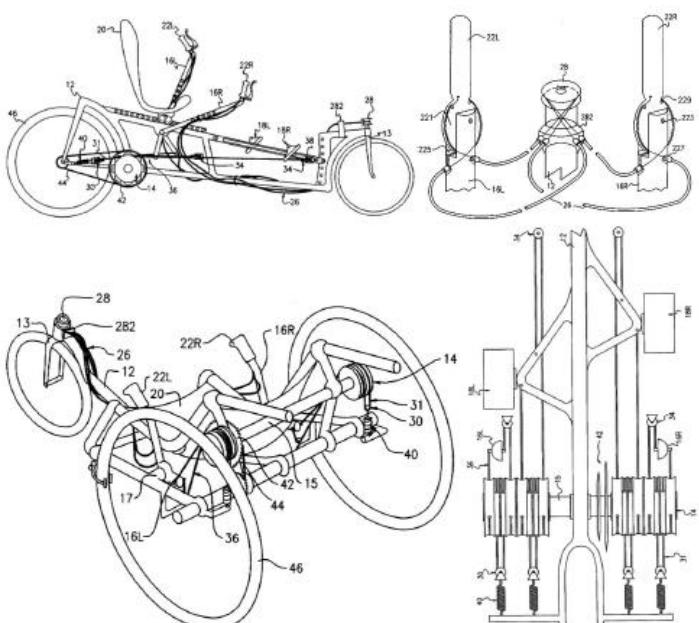


Figure 3: Human powered drive-mechanism with versatile driving modes

3) Human powered cycle: -

Author: - James A. Lehman, 4423 Black Otter Trail, Dallas, TX (US) 75287

Publication Date: - Mar. 20, 2001

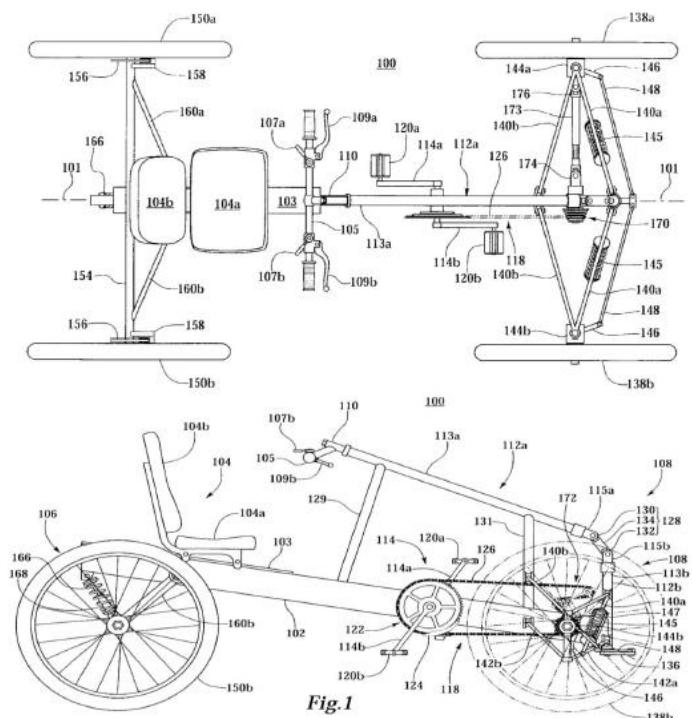


Figure 4: Human powered cycle

Analyzed description: -

In this paper, this invention for improving comfortable riding and may be ridden by rider with minimum effort and that overcome one or more of the aforementioned problem.

4) Arm and leg powered cycle and method of use thereof: -

Author: - James A. Lehman, 4423 Black Otter Trail, Dallas, TX (US) 75287

Publication Date: - Aug. 5, 1997

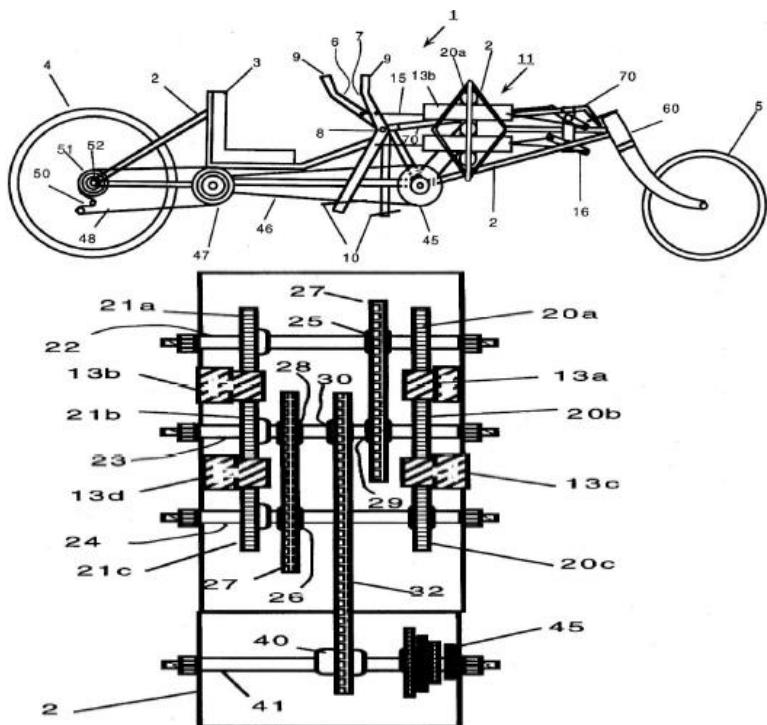


Figure 5: Arm and leg powered cycle and method of use thereof

Analyzed description: -

The paper focuses on invention related to arm & leg powered cycle with multiple drives. It uses alternate method of powering. From that we are using hand operated drive mechanism special for handicapped people.

5) Human powered cycle which is ridden while lying down: -

Author: - Emil Dzvonik, 07231, Vinne 452 (SK)

Publication Date: - Aug. 26, 2003

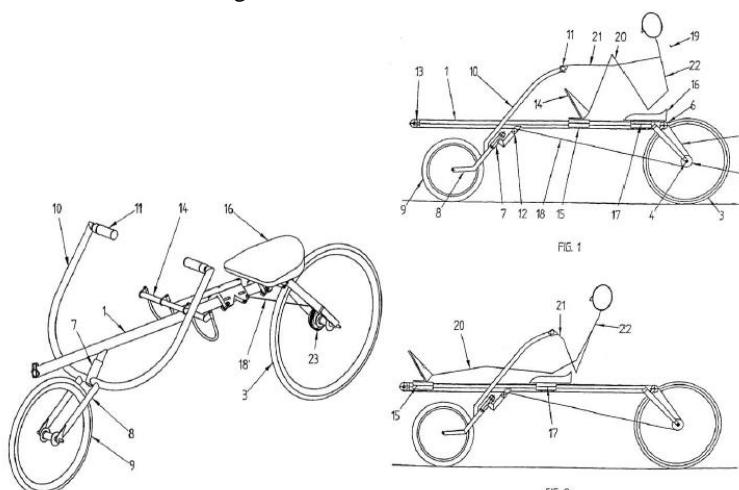


Figure 6: Human powered cycle which is ridden while lying down

Analyzed description: -

In this paper, the cycle having a steering device connected to the front wheel forks and formed by handlebars between which the rail extends. The foot actuating devices are formed by a foot rest

for both feet. The Seat can be displaced on the rail in a longitudinal direction of the rail.

C. Literature Review – Conclusions

- 1) Spiral spring energy is used to drive the cycle and can take rest while driving due unwinding spring.
- 2) New steering mechanism founded in which sleeved cable is used to steer cycle.
- 3) Comfortable seating and better frame design and environmental safety factors.
- 4) The chain mechanism using alternate arm or leg or both powering systems to cycle.
- 5) There is a frame in which driving the cycle while lying down to get comfortable seating and foot rest.

III. SELECTION OF MATERIAL

For cycle, selection of material for all components is necessary. So that we have selected the materials for components of cycle which given as below:

Frame material should be light in weight so that aluminum frame is used.



Figure 7: Aluminum frame

Sprocket &chain material is stainless steel as per ASME/ANSI standard



Figure 8: Chain & Sprocket

Gear & clutch is also as per ASME/ANSI standard steel. Steel is commonly most fascinating as a result of it offers a winning combination of high strength-to-weight quantitative relation, high resistance to wear, the flexibility to boost the physical properties through heat treatment, and competitive evaluation.



Figure 9: Gear & Clutch

Here, spiral spring material is SAE 304 SS as selected.



Figure 10: Spiral spring

Shaft material is mild steel.



Figure 11: Shaft

IV. MODEL

As the handicapped person uses effort to drive cycle and they feel fatigue. They can't take rest while riding cycle. Travelling distance of handicap cycle is lesser than other cycles. So we find out solution, we designed a mechanism which can give rest while driving so they can't feel fatigue comparatively to handicap cycle. And at same effort cycle can travel more distance. By our imagination we have drawn a rough model on a drawing sheet. Basic idea is to combine rowing cycle to the spring power of spiral spring

A. Product Architecture

We have combined rowing cycle to the spring power of spiral spring and added sleeve cable steering system. For mounting spring in cycle we have to design a mechanism which can run cycle with spring energy.

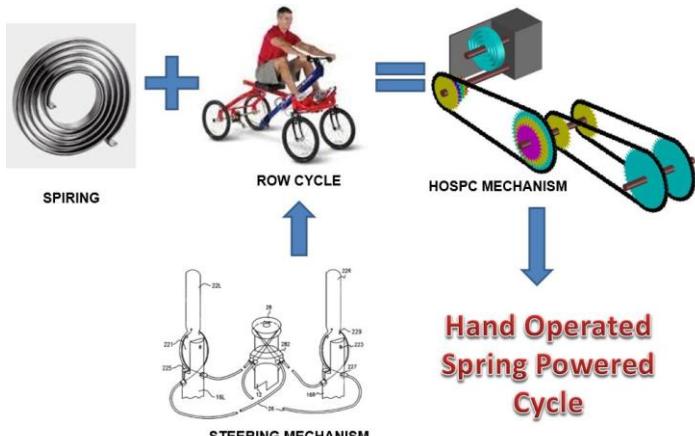


Figure 12: Product Architecture

B. Cad Model

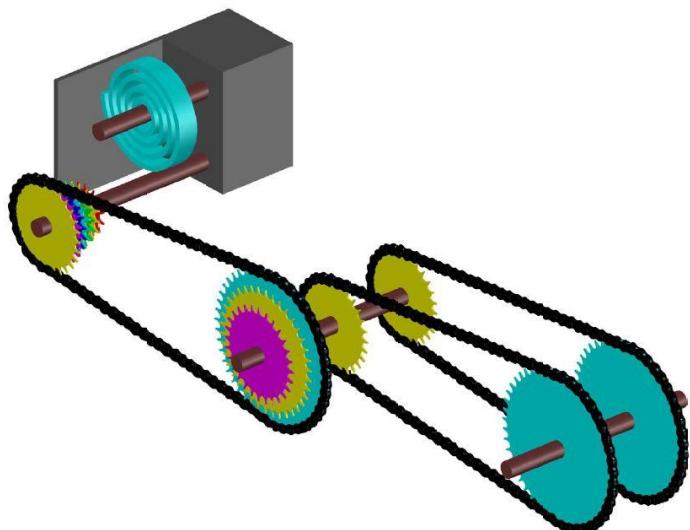


Figure 13: CAD model of mechanism

We have designed this cad model in CAD. We have to put all the dimensions to create mechanism and other parts. It is very difficult to design such mechanism in CAD.

V. DESIGN

We have designed a mechanism to use spiral spring energy to drive cycle and done calculation about designing spiral spring, and assumed unavailable data. We have found out torque based on chain & sprocket rotation and by Newton's second law of motion. First of all, the rowing cycle design is as follows. In simple rowing operation there is two chain drive system as shown below picture. One chain drive rotates and other will rest in forward rowing and vice versa in backward.



Figure 14: Rowing mechanism



Figure 15: Row cycle
 (Bungee cord mechanism for rowing)

The below picture shows rowing cycle model. It has aluminum frame. By use of aluminum frame this cycle has low weight.



Figure 16: CAD model of frame structure

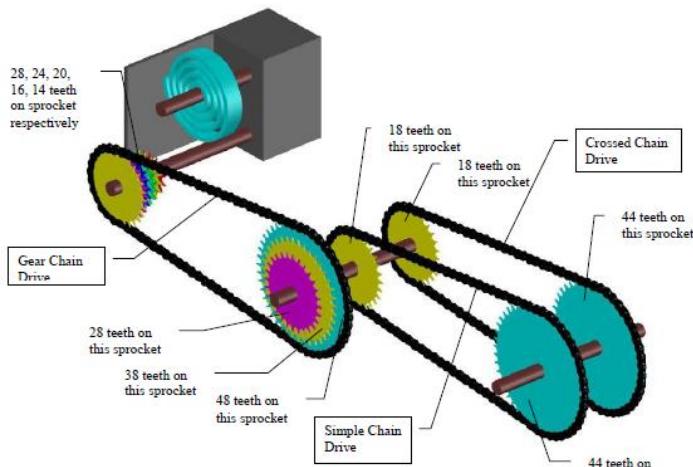


Figure 17: CAD model of mechanism with details

First of all, by rowing motion to the driving shaft one chain drive rotate and other will rest in forward rowing and vice versa in backward and there is a clockwise ratchet system on one chain drive and other has anti clockwise ratchet system. The driving shaft rotates idler shaft. In idler shaft there is geared chain drive which rotate driven shaft. The driven shaft is connected to gear box which is connected to auxiliary shaft having spiral spring mounted. Spiral spring is wounded by gear box and when its wounded gear box will change gear and engaged to driven shaft which has wheels mounted and drives wheels. In steering mechanism there is wire system to pull one side and steer the front wheel.

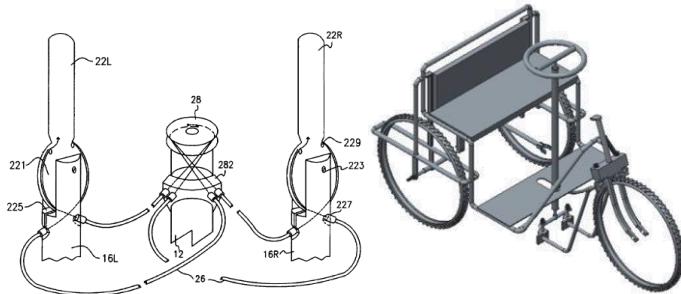


Figure 18: Steering mechanism

VI. CALCULATION

Some Assumption in Components

As per ideal condition

The sprocket teeth calculated and as per 60' rotation twice of handle the total rotation of each sprocket is calculated.

Assuming 10 rowing operations in 1 minute

Now power by human force is calculated as per reference of website

<https://www.ccohs.ca/oshanswers/ergonomics/push1.html>

The human hand pushing and pulling power is 100 W(watt)

Assuming weight of cycle is 100 kg and shaft radius 0.015 m and for 40 km/hr. acceleration $a = 11.11 \text{ m/s}^2$ (because 1 km/hr = 0.278 m/s^2)

Gear ratio is 1 : 1 having 200 mm diameter

A. Calculation of Sprocket & Chain

The sprocket teeth calculated and as per 60' rotation twice of handle the total rotation of each sprocket is calculated.

$$\text{It is calculated as per, rev. on last sprocket} = \frac{t_1}{t_2}$$

Where t is teeth on sprocket

$$\text{Then ratio as per, } \frac{(\text{rev. on last sprocket} \times 120')}{360'}$$

rev. on sprocket 2 is 0.8 by ratio,
 $\frac{(\text{rev. on last sprocket} \times 120')}{360'}$

Assuming 10 rowing operations in 1 minute

So, $10 \times \text{rev. on last sprocket}$

RPM of last shaft = 10×2.74

RPM of last shaft = 27.4 RPM

B. Maximum Power Generated

Now power by human force is calculated as per reference of website

<https://www.ccohs.ca/oshanswers/ergonomics/push1.html>

The human hand pushing and pulling Power is 100 W(watt)

The power on last shaft is calculated as below

$$\frac{P_2}{P_1} = \frac{t_1}{t_2}$$

$$P_2 = P_1 \times \left(\frac{t_1}{t_2} \right)$$

$$P_2 = 100 \times \left(\frac{44}{18} \right) = 244.45 \text{ W}$$

$$P_2 = P_1 \times \left(\frac{t_1}{t_2} \right)$$

$$P_2 = 244.45 \times \left(\frac{48}{14} \right) = 651.87 \text{ W}$$

Here 0.8 is rev. on sprocket which is calculated as above.

$$P = \frac{2\pi n t}{60}$$

$$t = \frac{(P \times 60)}{2\pi n}$$

$$t = \frac{(521.5 \times 60)}{(2 \times 3.14 \times 27.4)}$$

$$t = 181.75 \text{ Nm}$$

C. Calculation of Power Requirement

Compare with Newton's 2nd law of motion

$$F = m \times a$$

$$\text{And } T = F \times r$$

$$\text{So, } T = m \times a \times r$$

Assuming weight of cycle is 100 kg and shaft radius 0.015 m and for 40 km./hr. acceleration $a = 11.11 \text{ m/s}^2$ (because 1 km/hr = 0.278 m/s²)

$$T = 100 \times 11.11 \times 0.015$$

$$T = 17 \text{ Nm}$$

Here 17 Nm torque is required to run the cycle.
Gear ratio is 1 : 1 having 200 mm diameter

D. Calculation of Spiral Spring

The spring dimensions are as below which is calculated in IST spring design software by trial & error method.

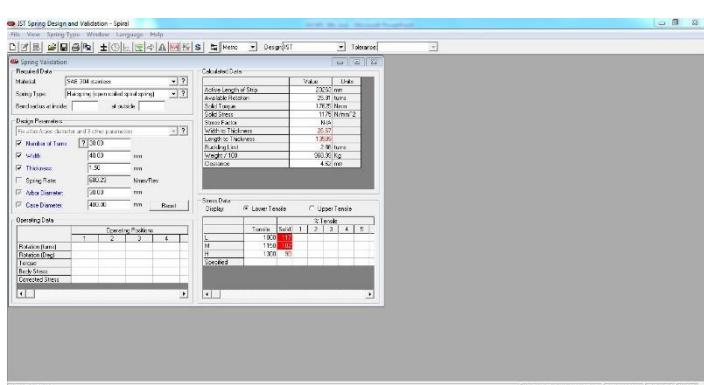


Figure 19: Result of torque & load by putting dimensions

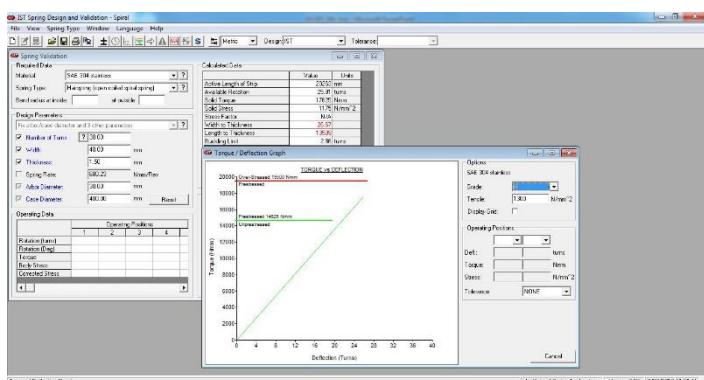


Figure 20: Torque vs. deflection graph of spiral spring

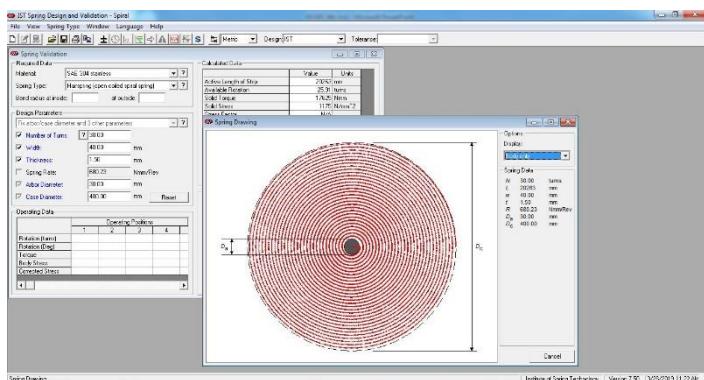


Figure 21: Dimensions of spiral spring

VII. CONCLUSION

Thus, we can conclude that, our cycle operated by hand and stores power in spiral spring and uses it to drive and gives more rest to driver. This cycle is operated by hand so that it can also use by physically handicap people. Utilize the spiral spring to store the potential energy and use it whenever required and when spiral spring drives the cycle the driver can take rest. Rowing motion is better option for workout so, that for sportsperson this cycle is best for workout. Use of particular spring for we can get high speed rather than regular and geared cycles. This cycle has highest speed then other cycles. By regular effort we can travel more distance by use of spiral spring. It is more efficient. By use of spiral spring in rowing cycle for replacing constant effort in regular cycle and use the power of spring and gives the rest while driving the cycle. We can drive this cycle in any road condition. By use of aluminum frame this cycle has low weight.

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Value of Spirituality, Family and Integrity in Islam and to the Bangsamoro

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Abstract- This paper presents the value of spirituality, Family and Integrity in Islam. It is also towards on the bangsamoro culture, tradition, customs, practice, institution, belief and socio-economic way of life.

Index Terms-Spirituality, Family, Integrity, Value, Islam and Bangsamoro.

I. INTRODUCTION

Integrity, family and spirituality are core determinants or bases upon which peoples' personality can be appropriately identified. People are regularly besotted by challenges and trials in life. These values will protect individuals from external deviant influences that undermine individual images and identities. They can also be used both by an individual to gauge or weigh his or her status in terms of belief on the Almighty God and by the people or community to guide them in establishing a model society as described in the Qur'an and *Sunnah*¹ (Traditions of prophet Muhammad S.A.W) of prophet Muhammad (S.A.)---a society which is free from indecency, social vices, crimes etc., and united in enjoining what is right and forbidding what is wrong.² (Qur'an, Ali-Imran, 3:10)

Particularly for the bangsamoro, these values, as they uniquely permeate personal and family conduct, are therefore, in the larger context, exceptionally crucial in advancing the welfare and development of the people and their communities.

The general description and explanation of **Integrity**, **Family** and **Spirituality** and at some point, touches on the bangsamoro culture. These values are envisioned to be a key component in transforming the attitudes and practices of the key actors and players in community development, particularly, in areas targeted by the project. It is another milestone of values and leadership training program which supports in the fulfillment of the vision mission of islam for the Bangsamoro people most importantly, in the over-all success of the aforesaid community development initiatives for Mindanao. Each of these values is supported by relevant Qur'anic verses and Sunnah of prophet Muhammad (S.A.W).

The main objective of the study is to clarify the values of integrity, family and spirituality and to identify the Qur'anic verses pertaining to integrity, family and spirituality and to express commitment to practice values of integrity, family and spirituality in the implementation of Values Leadership Training Program.

II. ON THE VALUES INTEGRITY

Integrity is a quality of excellence that manifest in a holistic and integral manner in individuals and organizations. Integrity is based on ethics and noble values and influences how people conduct their daily lives.

The concept of integrity in Islam is not exclusive to whom one leads but is a moral value that each of us must internalize in our hearts and minds to help us live clean, fruitful and pious lives.

2.1 Integrity of Individual

The harmony between what an individual says and does his or her actions should be in accordance with Islamic moral and ethical principles as well as Shari'ah-compliant regulations and public interest. They also reflect promptness, correctness and quality. The Almighty Allah said: "***It is most hateful in the sight of Allah that ye say that which ye do not.***"³ (Qur'an, As-Saff. 61:3)

Hence, every single word of an individual especially, policies of a leader should be deserving of honor and respect.

2.2 Integrity of Organizations

The integrity of an organization is reflected in the formulation and implementation of its code of ethics, client's treatment, and a system or work procedures, as well as in compliance with best practices.

The organization's code of ethics is constantly reiterated, internalized and upheld by members of the organization until it becomes second nature, and is ultimately transformed into what is commonly called "Corporate or Organizational Culture."

In this token, Prophet Muhammad (S.A.W) once said: "**Do you know who will go first on the day of resurrection to the shade of god...? Those who, when given what is right, accept it; when asked for something, give freely and who judge in favor of others as they do for themselves.**"⁴ (Narrated by Al-Tirmidhi)

The higher the economy, the better is the nation's prosperity as expressed in the Qur'anic verse 15 of Surah Sabah', "**Baldatunthayyibatunwarabbunghafour**" or "a good land and a forgiving Lord". The almighty allah said:

"There was, for Saba, aforetime, a sign in their homeland – two Gardens to the right and to the left. 'Eat of the sustenance (provide) by your lord, and be grateful to him: a territory fair and happy, and a lord oft-forgiving!'

In the process of fulfilling the above objective, the concept of jahl al-mas'lahah and daf' al'-Mafsadah (promoting man's well-being and preventing harm) serves as the principal guideline put forward by Islam for everyone to follow.

So well-encompassed and universal in nature is the concept that it can be applied to all aspects of the human life at all levels, be it individual, communal or organizational.

In other words, for an individual to achieve success in this world and the hereafter, he must abide by the Shari'ah law. The almighty Allah said:

"Whoever does righteous, whether male or female, while he is a believer – we will surely cause him to live a good life, and we will surely give them their reward [in the hereafter] according to the best of what they used to do."⁵ (Qur'an, An-Nahl. 16:97)

This verse denotes that all predicaments we face in our lives could be attributed to the fact that we are not truly compliant to the Qur'an and the Sunnah of prophet Muhammad (S.A.W). If we examine further their root causes, it points to none other than our disobedience to Allah's command to submit to him completely, sincerely and unconditionally. The almighty Allah said:

"so do you believe in part of the scripture and disbelieve in part? Then what is the recompense for those who do that among you accept disgrace in worldly life; and on the day of resurrection, they will be sent back to the severest of punishment. And Allah is not unaware of what you do."⁶ (Qur'an, Al-Baqarah. 2:85)

Integrity is regarded as the honesty and truthfulness or accuracy of one's actions. Allah's messenger (S.A.W)said: "**Be truthful. For Truthfulness leads to piety and piety leads to paradise if a man holds to truth and persists in it, he will be recorded with Allah as a truthful man. Beware of lying. For lying leads to wickedness and wickedness leads to hell. If a man lies and persists in it, he will be recorded with Allah as a liar.**"⁷ (Narrated by Sahih Muslim)

2.3 Integrity of Public Official

For holders of public office, integrity means carrying out the trust and responsibilities bestowed upon them in line with public interest. They are not allowed to misuse their self-interest, or for the interest of their allowed to misuse their power for their self-interest, or for the interest of their family or relatives. Should a conflict interest occurs, public interest overrides personal interest. Holders of public office must be transparent, sincere and accountable.

Integrity is like a mighty tree that stands out in the forest. Its roots are deep, supporting a tall and hardy trunk and its top is a crown of branches and green leaves. It blooms with large clusters of fruits in brilliant colors, ripe and ready to scatter its seeds. Birds and other animals find comfort perching on its secure branches.

III. ON THE VALUE OF FAMILY

IV.

The family is the primary unit of the community, the initial cell at the institutional level, and the essential bridge upon which the former generations of the native land cross to give birth to future generations. In truth, the family is the fundamental social unit through which the new-born child is first introduced to the world outside its mother's womb. As a consequence of this protected environment, the child learns the fundamentals of his language, values, norms of behavior, habits, psychological and social leniencies as well as many factors of his character. In Islam, considering the well-being of the "other" instead of just the "self" is a virtue so rooted in the religion that it is evident even to those outside it.

What does the home represent to the Muslim family? Is a place where family members can relate to one another and where they sincerely enjoy being together; where they have a sense of shared beliefs and values, and their behavior is based on Islamic principle? Is it a place where family members are protected, happy and kind to one another?

The home should not be just a place where people eat, rest and sleep; indeed, the home is the place where we spend most of our time, and where families spend most of their time together. It is the place where husbands and wives can be alone together. Therefore, the home is a place where families should worship together, and it should be based on Allah's (SWT) rules and guidance.

Allah (S.W.T) says:

"O you who believe! Save yourselves and your families from a fire whose fuel is men and stones; over it are angels stem and strong, they do not disobey Allah in what he commands them, and do as they are commanded."⁸ Qur'an, At-Tahrim. 66:6)

It has been reported by ibnAbiAldunia and others that, "**When Allah loves the people of a household, he introduces kindness among them.**"⁹ (Narrated by Sahih al-Jaami)

3.1 Model of a Perfect Society

"And from among you, there should be a party who invites to good and enjoin what is right and forbid what is wrong, and these it is that shall be successful."¹⁰ (Qur'an, Al 'Imran. 3:104)

"You are the best of nations raised up for (the benefit of) men; you enjoin what is right and forbid wrong and believe in allah. And if the followers of the book had believed, it would have been better for them; of them (some) are believers and most of them are transgressors."¹¹ (Qur'an, Al 'Imran. 3:110)

A good family order serves as a model for the society and its people and determines the future of nation.

Muslim families are at the crossroads today. The western model is not a suitable pattern for family life. Its style of family life has resulted in conjugal infidelity, large scale marriage breakdown, high rates of divorces, separations, broken homes, alcoholism, drug addiction, libertinism and the like.

Those who blindly mimic the western model where women are exploited to such an extent that they are treated merely as sex objectives must realize that they are transgressing Allah's instructions and the traditions of prophet Muhammad (S.A.W). The only solution to the Muslim family's predicaments is maintenance of Islamic family values. Islam builds the family on solid grounds, which are capable of providing continuity, security, mutual love and intimacy.

With a view to making the foundations of the family strong and natural, Islam not only recognizes but also lays emphasis on marriage, which is a wholesome pattern of lawful intimacy harmoniously blended with decency, morality and gratification.

IV ON THE VALUE OF SPIRITUALITY

God has created human beings purposely to worship him. He has revealed us the guidance (the Qur'an) so that we can identify what is right to follow and what is wrong to avoid. It also serves as our basis to strengthen our spiritual upliftment in order to become a pious community. And that piety should be reflected in our daily life, and in our society which redounds to the socio-economic development of our communities.

Spiritually establishes the unbreakable link between religion and daily life. Life, from an Islamic standpoint, is to be directed to allah. Life is an opportunity for worship and the remembrance of Allah.

There are numerous ayat (verses or signs) of the holy Quran that highlight the importance of spiritual purification. God talks of the nafs (self) and says:

“Whoever purifies it has succeeded; and failure is the lot of whoever corrupts it.”¹² (Qur'an, Ash-Shams. 91:10)

Furthermore, Prophet Ibrahim (Peace be upon him) is quoted in the Qur'an: **“The Day [of Judgement] Whereon neither wealth nor sons will avail, except who comes to allah with a sound heart.”**¹³ (Qur'an, Al-Ghashiyah. 88:89)

Moreover, God mentions the role of the Messenger Muhammad (S.A.W): **“A similar (favor you have already received) in that we have sent among you a Messenger of your own, rehearsing to you our signs, and purifying you, and instructing you in the book and the wisdom (al-hikma), and in new knowledge that beforehand you did not know.”**¹⁴ Qur'an, Al-Baqarah. 2:151)
The following hadith (record) is also of critical importance in this regard: **“allah shall not look at your bodies or your faces, but rather looks into your hearts.”**¹⁵ (Narrated by Sahih Muslim)

4.1 Prayer, A clear Manifestation of Spirituality

Prayer, or salat, was made obligatory for all Muslims, whether they be rich or poor, strong or weak, black or white, male or female. It is unique as a pillar of Islam because while the other four pillars were revealed on earth, prayer was revealed before the “Divine Manifestation” during the *Isra’wal-M’raj*.¹⁶ (Prophet Muhammad’s night journey from masjid al-haram in mecca to masjid al-aqsa in Jerusalem and ascension to heaven) of prophet Muhammad (S.A.W) prayer allows the believer to enrich his/her spirituality and cultivate the soul’s right to love and worship the creator, Allah. The almighty Allah said:

“Verily, I am Allah! There is none worthy of worship but I, so worship me and offer prayer perfectly for my remembrance.”¹⁷ (Qur'an, Ta-Ha. 20:14)

The importance of prayer is conveyed constantly in the Qur'an and was also stressed by the Prophet Muhammad (S.A.W): **“Know that among your duties, prayer is foremost.”**

4.2 Benefits or Values of Prayer

1. *Physical/health condition
 - Praying all the time stretches parts of our body.
2. *Punctuality
 - Able to train individual self to be punctual in time of prayer.
Surah: (nisa:103) **“surely prayer is a time ordinance for the believers.”**
3. *Leadership
 - Imam and the ma ‘mum established good relationship and teamwork in terms of imam (leading the prayer) and the ma ‘mum (following the imam).
4. *Prevent of a doings
5. *Develop unity
 - Regardless of what color, status, it promotes unity.

Allah says, **“Recite that which has been revealed to you of the book and keep up prayer; surely prayer keeps (one) away from indecency and evil, and certainly the remembrance of allah is the greatest, and Allah is the greatest, and Allah knows you do.”**¹⁸ (Qur'an, Al-‘Ankabut. 29:45)

The performance of prayer five times a day is considered vital to attain success in this life and the hereafter. Following the testimony of faith, performance of the prayers at their correct times and complete in bowings, prostrations and humility, will guarantee forgiveness from god and everlasting paradise. Muslims believe that the first matter that they will be brought to account for on the day of judgement is the prayer. If it is sound, then the rest of their deeds will be sound. And if it is bad, then the rest of his deeds will be bad.

Prayer provides a constant reminder of the essence of our creation and provides a direct connection to all, who links success and felicity to humanity in prayer. It emphasizes the proximity between religion and daily life, from an Islamic standpoint, is to be directed to Allah. Life is an opportunity for worship and the remembrance of Allah. Praying repeatedly throughout day and interrupting the daily activities brings about the realization of this concept. The believer, through prayer, acquires a spiritual awareness that he takes with him throughout all of life's endeavors.

Prayer purifies the heart and truly, through prayer, a believer attains spiritual devotion and moral elevation. Prayer not only gives a deep connection with god, but in prayer one establishes patience, humility and sincerity. Prayer provides a mean of repentance and is a powerful restainer from shameful and unjust deeds.

V. CONCLUDING REMARKS

The value of spirituality, Family and integrity can be used to strengthening faith, good attitude and promoting man's will-being and preventing harm serves as the principal guidance to add aspects of human endeavor here on earth even in the day of judgement.

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- ⁵(Qur'an, An-Nahl. 16:97)
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- ⁷(Narrated by Sahih Muslim)
- ⁸(Qur'an, At-Tahrim. 66:6)
- ⁹(Narrated by Sahih al-Jaami)
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- ¹¹(Qur'an, Al 'Imran. 3:110)
- ¹²(Qur'an, Ash-Shams. 91:10)
- ¹³(Qur'an, Al-Ghashiyah. 88:89)
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- ¹⁵(Narrated by Sahih Muslim)
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A Study of association between Body Mass Index and Severity of Acute Calculus Cholecystitis

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Abstract- The aim of this study to evaluate whether or not Body Mass Index (BMI) is associated with the severity of Acute Calculus Cholecystitis. In this study 50 patients were enrolled and categorized as obese ($BMI \geq 25 \text{ kg/m}^2$) and non-obese ($BMI < 25 \text{ kg/m}^2$). There was a significant association between BMI and severity of ACC ($p=0.01$). Similarly, the severity of ACC was more in obese female patients ($p=0.05$) whereas such association was not observed in obese male patients ($p=0.18$). Increased BMI is associated with severe form of ACC.

Index terms- Acute calculus cholecystitis, Body mass index, Obese.

I. INTRODUCTION

Gallstones are common biliary tract pathology which can lead to Acute Calculus Cholecystitis (ACC). Obesity, hypothyroidism, diabetes, insulin resistance, dyslipidemia and female gender are few of the established risk factors for gallstones.

There are many reports on association of obesity with gallstone, however its association with the severity of cholecystitis is lacking. Thus we aimed to find out if such association exist or not.

The objective of the study was to evaluate the association of severity of cholecystitis with Body Mass Index (BMI) and both the gender.

II. MATERIALS AND METHODS

This prospective observational descriptive cross-sectional hospital based study was conducted in the Department of Surgery of Manipal Teaching Hospital from July 2015- June 2018. The study was performed after approval from the Institutional Review Board and taking written, informed consent from all the patients. A total of 50 patients with Acute Calculus Cholecystitis (ACC), aged 18-65 years were included in the study. Patients on steroid, patients with preexisting thrombocytopenic condition, renal impairment, concomitant acute biliary condition like acute cholangitis, acute pancreatitis, acute hepatitis and immuno-compromised patients were excluded from the study.

Non random sampling technique was used. Based on the study carried out by Gomes et al, the incidence of ACC was 1-4% in patients with symptomatic gallstone [1]. Considering the prevalence rate as 3%; with 95% confidence interval with 5% allowable error, sample size was calculated using following formula:

$$n = Z\alpha^2 PQ/d^2$$

where n= required sample size

Z α = standardized normal deviate (1.96)

P= estimated proportion in the population (0.03)

Q= 100-P (if P is in %) (0.97)

d = allowable error (0.05)

The minimum sample size required was 45, total of 50 cases were taken into the study.

The Tokyo Guidelines (TG13) was used for grading the severity of ACC (Table 1) [2].

Table 1: Tokyo Guideline (TG 13).

Severity of ACC	Signs
Grade I (Mild ACC)	Mild inflammatory changes in the gall bladder with no organ dysfunction.
Grade II (Moderate ACC)	Associated with any one of the following conditions <ol style="list-style-type: none">1. Elevated WBC count ($>18,000/\text{mm}^3$)2. Palpable tender mass in the right upper abdominal quadrant3. Duration of complaints $> 72\text{ hour}$4. Marked local inflammation (gangrenous cholecystitis, pericholecystic abscess, hepatic abscess, biliary peritonitis, emphysematous cholecystitis)
Grade III (Severe ACC)	Associated with dysfunction of anyone of the following organs/systems <ol style="list-style-type: none">1. Cardiovascular dysfunction- Hypotension requiring treatment with dopamine $\geq 5\mu\text{g}/\text{kg}$ per min, or any dose of norepinephrine2. Neurological dysfunction- Decreased level of

	<p>consciousness</p> <p>3. Respiratory dysfunction- $\text{PaO}_2 / \text{FiO}_2$ ratio <300</p> <p>4. Renal dysfunction- Oliguria, creatinine $> 2.0\text{mg/dl}$</p> <p>5. Hepatic dysfunction – PT INR > 1.5</p> <p>6. Hematological dysfunction- Platelet count $< 100,000/\text{mm}^3$</p>
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The patients with $\text{BMI} \geq 25 \text{ kg/m}^2$ were categorized as obese and patients with $\text{BMI} < 25 \text{ kg/m}^2$ were categorized as non-obese. BMI was calculated by dividing the patient's weight in kilograms by the square of the height in meters. Height and weight were measured in standing position with light clothes and bare foot. We carried out this study to find out the association between BMI and severity of ACC.

Data was analyzed using SPSS (The Statistical Package for Social Sciences) version 21.0 software. Descriptive data are presented as frequency, mean and standard deviation. Chi-square was used to find out the association between BMI and Severity of ACC. Fishers exact was used to find out the association between gender and Severity of ACC. P value < 0.05 was considered statistically significant.

III. RESULTS

The demographic variables of the patients included in the study is presented in Table 2.

Table 2: Demographic Variables

Variables	Values
Age (years)	47.4 ± 13.9
Sex(Male/Female)	20 (40%)/ 30 (60%)
Body Mass Index (BMI) (kg/m^2)	25.4 ± 4.09

Data presented as mean \pm sd and number (percentage)

Out of 50 patients, 20 (40%) patients were non-obese and 30 (60%) patients were obese. Mild ACC was present in 17 (34%) patients, moderate ACC was present in 17 (34%) patients and 16 (32%) patients had severe ACC. There was a significant association between BMI and severity of ACC (Table 3). Similarly, the severity of ACC was more in obese female patients whereas such association was not observed in obese male patients (Table 4 and Table 5).

Table 3: Severity of Acute Calculus Cholecystitis according to BMI.

BMI	Mild ACC	Moderate ACC	Severe ACC	χ^2 Value	p value
<25 Kg/m ²	10(50.0%)	8 (40.0%)	2 (10%)	7.90	0.01
≥ 25 Kg/m ²	7 (23.3%)	9 (30.0%)	14 (46.7%)		

Data presented as number (percentage), analyzed by Chi square, p value ≤ 0.05 is considered clinically significant.

ACC: Acute Calculus Cholecystitis, BMI: Body Mass Index

Table 4: Severity of ACC according to BMI in female patients.

BMI	Mild ACC	Moderate ACC	Severe ACC	Fisher's Exact Value	p value
<25 Kg/m ²	8 (61.5%)	4 (30.8%)	1 (7.7%)	5.60	0.05
≥ 25 Kg/m ²	4 (23.5%)	6 (35.3%)	87 (41.2%)		

Data presented as number (percentage), analyzed by Fishers Exact, p value ≤ 0.05 is considered clinically significant

ACC: Acute Calculus Cholecystitis, BMI: Body Mass Index

Table 5: Severity of ACC according to BMI in male patients.

BMI	Mild ACC	Moderate ACC	Severe ACC	Fisher's Exact Value	p value
<25 Kg/m ²	2 (28.6%)	4 (57.1%)	1 (14.3%)	3.28	0.18
≥ 25 Kg/m ²	3 (23.1%)	3 (23.1%)	7 (53.8%)		

Data presented as number (percentage), analyzed by Fishers Exact, p value ≤ 0.05 is considered clinically significant

ACC: Acute Calculus Cholecystitis, BMI: Body Mass Index

IV. DISCUSSION

Obesity is an important risk factor for the development of cholesterol gallstone and gallstone related complications [3]. This study focuses on the severity of acute calculus cholecystitis and its association with BMI. BMI is an index of body fatness. The cut-off point of 25 kg/m² was used for defining obesity as proposed by International Obesity Task Force for Asia-Pacific region by WHO [4]. In obese individual there is increased production of cholesterol from liver which supersaturates the bile and results in formation of cholesterol gallstone. In addition, there is decreased sensitivity of gall bladder to cholecystokinin which decreases the motility of gall bladder. This leads to incomplete and infrequent emptying of bile and results in over-concentrated bile. These factors contribute for increased risk of stone formation in obese individual [5], [6].

Almost 10% of patients with asymptomatic cholelithiasis progress to develop some clinical symptoms and complications over 5 years [7]. ACC is a complication of cholelithiasis with an incidence of 0.5 % per year in asymptomatic patients.

We found that higher BMI was associated with severe form of acute cholecystitis. The probable explanation is that the incidence of gallstone is more in obese as compared to non-obese which place them at increased risk of developing associated complications, one of which is acute cholecystitis [4]. On further analysis, BMI was found to be positively correlated in obese female patients in terms of severity of ACC whereas no such evidence was seen in male patient.

It can be explained from the fact that fat in males have a protective anti-inflammatory role as evidenced by past studies [8], [9].

V. CONCLUSIONS

Obesity is a documented risk factor for the formation of gall stone and BMI is used as a tool to measure the body fatness or obesity. In our study we found a positive association of BMI and severity of ACC. This was confirmed in obese female patients whereas no such association was observed in obese male patients.

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Nutritional Composition of Species in the *Vernonia hymenolepis* Complex in Kenya

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Abstract- *Vernonia hymenolepis* species is a weed that is found in various parts of Africa and has traditionally been used as a vegetable because of its nutritional and medicinal value. The species complex in the genus *Vernonia* Schreber in Tropical East Africa were collected from Mt. Elgon (K3), Kakamega (K5) & Narok (K6) in Kenya and investigated to establish their proximate and micronutrient composition using traditional methods. Results revealed a high quality and quantity of nutritional elements. The leaves had a vitamin C content of up to 1.6g/100g and a mean content of 303.2mg, 242.3mg, 19.6g, 1.2g, 430.8mg and 133.8mg per 100g dry weight (d.w) of Na, K, Cu, Fe, Mn and Zn respectively. Protein levels in the leaves ranged from 11.2-18.1g/100g d.w whereas P and N were found to be 190-390 mg/100g d.w and 21.1-57.9g/100g d.w respectively. Both proximate and elemental significant differences were shown in species from K3 & K5 at $P<0.05$, except in moisture, N, proteins and Vit C. It is evident from the nutritional analysis that *Vernonia hymenolepis* species are highly packed with essential nutrients for good nutrition and can therefore contribute to dietary diversity to help curb malnutrition in the different regions where they grow and thus the need to domesticate them.

Index Terms- vernonia hymenolepis, nutritional analysis, Kenya

I. INTRODUCTION

1.1 Background

Vernonia Shreber (Ironweeds) is a core genus in the tribe Vernonieae which is one of the major tribes of the Asteraceae (Jeffrey & Beentje, 2000; Dematteis, 2002; Keeley, Forsman & Chan, 2007). It comprises about 1000 species (Robinson, 1999a; Robinson, 1999b; Robinson, 2007; Yeap *et al.*, 2010) which are known for being mostly perennial herbs or shrubs with intense purple flowers.

The distribution of *V. hymenolepis* ranges from Kenya into Uganda (Jeffrey & Beentje, 2000) and extends into Ethiopia (Smith, 1971; Jeffrey & Beentje, 2000), Cameroon and Sudan (Isawumi *et al.*, 1996; Jeffrey & Beentje, 2000). The species flower between December and July (Smith, 1971; Hyde, Wursten, Ballings & Dondyne, 2012). Several species of *Vernonia* are eaten as leafy vegetables (Afui, Tonjock, & Ndam, 2008). *Vernonia hymenolepis* is especially appreciated in Cameroon, where it is known as *bayangi* bitterleaf or *ndole* (Schippers, 2000, 2002; Ucheck Fomum, 2004). It is a vegetable which not only plays an important role in nutrition because of its quality and

quantity of organic and inorganic elements, but also possesses medicinal value (Schippers, 2000, 2002). It is commonly cultivated by resource poor farmers in Cameroon and other parts of West and Central Africa where it is cherished for its leafy shoots (Gockowski & Moulende, 2003; Afui *et al.*, 2008).

In East Africa, *Vernonia* is found in the wild and in Kenya it occurs in many parts of Western, Nyanza and Rift Valley Provinces. It is used as medicine for both human and livestock and locally is referred to as *musululitsa/luvilukitsa/ivindisi/shisavakwa/nandavulwa* (Luhya: Tiriki, Maragoli and Bukusu) respectively, mucatha (Kikuyu), chesoliet (Sabaot) and ormojase/ormosakwa (Maasai). The Maasai boil the roots in soup for preventive and curative medicinal purposes. Leaf decoctions and root extracts are used to treat fever, malaria, diarrhea, dysentery, typhoid, eye defects, cough, headache, stomach-ache, gastrointestinal dis-orders, sexually transmitted infections (e.g. gonorrhea and syphilis) and as a fertility inducer (Pers. Comm. with locals).

It forms a rich herbal flora of highland Kenya. It has also been documented as a potential tumor inhibitor (Kupchan, Hemingway, Werner, Karim, McPhail & Sim, 1968). *Vernonia calvoana* in Cameroon and Nigeria plays an important role in human nutrition, because of its high mineral content and it is also important medicinally (Fube & Djonga, 1987). However it is often confused with *V. hymenolepis* (Jeffrey, 1988) and sometimes treated as its synonym (Ucheck Fomum, 2004). The aim of this study was to determine the nutritional value of *Vernonia hymenolepis*. The use of local biodiversity to meet our food and nutritional needs requires not only accurate information on the identities of the plants that have the potential of being used as foods but also reliable and accessible data on their nutritional composition.

Generally there is still a dearth of information on their nutritional composition which has hindered their use as food and thus production. The removal of any hindrances to the exploitation of the entities in this species complex as vegetables will not only increase the range of foods available for use locally but will also offer new sources of nutrition especially for the rural poor and thus help mitigate against chronic under nutrition that is known to affect a huge proportion of the population in Sub-Saharan Africa.

1.2 Nutritional composition of *Vernonia*

Many studies on the nutritional composition of *Vernonia* have, to a large extent, been limited to *Vernonia amygdalina* Del. (Faboya, 1990). Leung, Busson and Jardin (1968) showed that 100g edible portion of the leaves of *V. amygdalina* contained a

substantial amount of water, energy, protein, fat, carbohydrate, fibre, ascorbic acid and minerals. Fube and Djonga (1987) in their study of *V. hymenolepis* and three other species of *Vernonia* revealed that the leaves of these species contained 22-27mg crude fibre, 15-20 mg ash, 10-13 mg cellulose and 15-885 ppm minerals such as iron, copper, zinc, manganese in 100g dry matter. They also reported that the quantity of protein in the four species of *Vernonia* eaten in Cameroon (i.e. *Vernonia colorata*, *V. calvoana*, *V. hymenolepis* and *V. amygdalina*) varied from 22.75–26.50 mg/100 of dry weight which indicated that it was a significant source of protein especially in the villages where children suffered from acute malnutrition. *Vernonia calvoana* was also found to be rich in minerals, particularly Iron and Manganese, and in cellulose. Faboya (1990) demonstrated that ascorbic acid decreased with storage time in *V. amygdalina* while Oshodi (1992) found that the dried leaves of *V. amygdalina* were rich in minerals, especially in phosphorus, and that the content of ascorbic acid was temperature dependent. Maundu, Ngugi and Kabuye (1999) documented the nutritional composition of *V. cinerea* and also noted that *V. amygdalina* was used as a vegetable in western Kenya where it is very common but not under cultivation. They further noted that *V. poskeana* Vatke and Hildebrandt, *V. appendiculata* Less, *V. colorata* and *V. perrottetii* Walp were also being used as vegetables. Ejoh, Tanya, Djuikwo and Mbofung (2005) determined the effect of processing and preserving Vitamin C and total carotenoid in the leaves of *V. calvoana* and other species of *Vernonia*.

1.2 Study area

This encompassed the *Vernonia hymenolepis* complex as occurring in three selected regions in Kenya (Mt. Elgon (K3), Narok (K6) and Kakamega (K5) where a substantial amount of flora was identified.

II. MATERIALS AND METHODS

2.1 Nutritional composition

Various analytical methods were used to investigate the moisture, ash, protein and mineral content of the leaves of *V. hymenolepis*.

2.1.1 Moisture

Ten grams of shredded fresh leaves was dried in a Memmert thermostatically controlled ventilated oven at 105°C for two hours to constant weight. The loss in weight was recorded as moisture content (AOAC, 1990; Okalebo, Gathua & Woomer, 2002).

2.1.2 Sample preparation for protein, ash and mineral analysis

Leaves were cut into tiny pieces and dried in a Memmert ventilated oven at 60°C for 5 days to constant weight. The dried leaves were then ground into powder and stored in airtight bottles for analysis (Okalebo *et al.*, 2002).

2.1.3 Crude protein

Crude protein content was determined using the Kjeldahl method. 0.2g of dried and pulverised leaf material was digested in 4.4 ml of a digestion mixture consisting of 2ml concentrated Sulphuric (VI) acid, Selenium catalyst, Lithium and Hydrogen peroxide until a clear digest was obtained (AOAC, 1984). The nitrogen content of diluted digest was determined colorimetrically

at 630nm according to Charlot (1964). The Kjeldahl digestion converts organic Nitrogen compounds in the plant tissue to the ammonium form, which is then determined colorimetrically. 0.20 ml of each standard sample digest and the blanks were transferred into clearly labelled test tubes using a micropipette. Five millilitres of reagent N1 (i.e. 34g Sodium salicylate, 25g Sodium citrate, 25g Sodium tartrate and 0.12g Sodium nitroprusside) was added to each test tube using a 5 ml dispenser and mixed well using a vortex mixer. Five millilitres of reagent N2 (i.e. 30g Sodium hydroxide and 10ml Sodium hypochlorite) was added to each test tube and vortexed. The mixture was left to stand for 2 hours for full colour development and absorbency measured at 650nm using a spectrophotometer. Protein was calculated as: Nitrogen content x 6.25 ((AOAC, 1990).

2.1.4: Fibre Content

Each of *V. hymenelopis* samples (5g) and 200 ml of 1.25 % H₂SO₄ were heated for 30 min and filtered with a Buchner funnel. The residue was washed with distilled water until it was acid free. 200 ml of 1.25% NaOH was used to boil the residue 30 min, it was filtered and washed several times with distilled water until it was alkaline free. It was then rinsed once with 10% HCl and twice with ethanol. Finally it was rinsed with petroleum ether three times. The residue was put in a crucible and dried at 105oC in an oven overnight. After cooling in a desiccator, it was ignited in a muffle furnace at 550oC for 90 minutes to obtain the weight of the ash.

2.1.5 Ash content

Ten grams of dried pulverised leaves were ignited slowly to a final temperature of 550°C for three hours in an ALPHA 1 Phoenix muffle furnace after being pre-ashed on a hot plate for 2 hours. The crucible containing the grey ash was removed, cooled in a desiccator and weighed. Ash content was determined by calculating the difference in weight of the crucibles before and after combustion (Okalebo *et al.*, 2002)

2.1.6 Minerals

The content of Sodium, Potassium, Copper, Iron, Phosphorus, Manganese, Zinc, in the leaves was determined using the dry ashing procedure as described by Association of Agricultural Chemists (AOAC, 1990). About 2 g of the dried and ground sample was pre-ashed in a crucible for about 2 hours until the sample was completely charred. The pre-ashed sample was then placed on a muffle furnace and ashed at 550°C for about 3 hours or until the ash was white. After ashing the sample was cooled and weighed. The ash was then dissolved in 10ml of 30% HCl and filtered through acid washed Whatman No. 541 filter paper into a 100ml volumetric flask. The filtrate was made up to the mark with deionised water. The solution was then used for individual mineral determination using VARIAN SPECTRA AA-200 atomic absorption spectrophotomer (Copper, Iron, Manganese, Zinc) and JENWAY PFP 7 flame photometer (Sodium and Potassium) (Okalebo *et al.*, 2002; Oboh & Masodje, 2009; Yeap *et al.*, 2010). Absorbance and concentration of the minerals was determined at 324.8nm, 213.9nm, 279.5nm, 248.3nm, 766.5nm wavelength for Copper, Zinc, Manganese, Iron and Potassium respectively. Flame type used was Air/Acetylene and Air/butane for atomic absorption spectrophotomer and flame photometer respectively.

Phosphorus content was determined using the Kjeldahl method. Dried and pulverised leaf material (0.2g) was digested in 2ml concentrated sulphuric (VI) acid in the presence of Selenium catalyst, until a clear digest was obtained (AOAC, 1990).

Five millilitres of the supernatant clear wet-ashed digest solution was pipetted into a 50ml volumetric flask. Twenty millilitres of distilled water and 10ml of Ascorbic acid reducing agent were added to each flask, beginning with the standards. The mixture was then made up to 50ml with water and left to stand for 1 hour for colour to develop fully. The Phosphorus content of the standards and diluted digest was determined at 880nm using a spectrophotometer (Okalebo *et al.*, 2002).

2.1.7 Vitamin C

Twenty five millilitres of Ascorbic acid standard solution was placed in a 125ml conical flask and 10 drops of 1% starch solution added to it. This solution was then titrated with iodine until a dark blue colour, signifying the end point of the reaction, was attained (the dark blue colour was supposed to persist for 20 seconds while swirling the solution).

A hundred gram of leaf sample was then ground with 50ml distilled water and the mixture strained. The filtrate was then made

upto 100ml in a volumetric flask by adding distilled water. The sample was titrated in the same way as the ascorbic acid sample described above (Fankhauser, 2009).

III. RESULTS

3.1 Proximate composition

The proximate composition of *Vernonia hymenolepis* leaves is shown in Table 1. The moisture content of the leaves ranged between 53.2% and 81.0% while that of proteins was on average 11.162 ± 2.719 g in 100g dry weight of leaves. The results also revealed a low ash (1.1658 ± 1.842 mg) & fibre (2.13 ± 2.23) content (Table 1).

3.2 Vitamins and minerals

The Vitamin C content of the leaves ranged from $6.715 \text{ mg} - 15.852 \text{ mg}/100\text{g}$ of raw sample and a mean of $11.204 \text{ mg}/100\text{g}$ dry weight. The mean mineral content was also noted as 0.303 mg , 0.242 mg , 0.0019 mg , 1.207 mg , 0.432 mg and $0.0134 \text{ mg}/100\text{g}$ dry weight for Na, K, Cu, Fe, Mn and Zn respectively.

Table 1. Nutritional composition of *Vernonia hymenolepis* leaves (100g).

Variable	Range	Min.	Max.	Mean	Std. Dev(\pm)	RDA (#)
Moisture (%)	27.8	53.2	81.0	73.4	7.2	0.7-0.8*; 1,3-1.7** ; 2.7-3.7*** (L/D)
Proteins(g)	11.490	6.604	18.090	11.162	2.7195	9.1*; 13-19**; 34-56*** (g/d)
Ash(g)	0.632	0.8760	1.5080	1.1658	1.842	
Fibre(g)	2.50	2.44	1.45	2.13	2.22	19-25**; 21-38*** (g/d)
Phosphorus (mg)	0.200	0.190	0.390	0.284	0.061	380-405**; 580-1055*** (mg/d)
Sodium (mg)	0.533	0.087	0.621	0.303	0.191	1.5-2.3**; 2.3-3.6*** (g/d)
Potassium (mg)	0.231	0.146	0.312	0.243	0.046	0.4-0.7*; 3.0-4.5**; 4.7***
Copper (mg)	0.0025	0.0056	0.0031	0.0019	0.0072	0.2-0.44*; 0.7-0.89**; 0.9*** (mg/d)
Iron (mg)	2.030	2.21	3.301	1.207	1.262	0.27-11*; 8-15**; 10*** (mg/d)
Manganese (mg)	1.188	0.12	1.199	0.432	0.334	0.003-15*; 800**; 1200***
Zinc(mg)	0.0505	0.016	0.0521	0.0134	0.0153	2-5*; 11**; 15*** (mg/d)
Vit C(mg)	91.37	67.15	158.52	112.04	2.745	40-50*; 15-25**; 45-90*** (mg/d)

Values are expressed as mean \pm SEM for 18 varieties

Cited from the United States Department of Agriculture (assessed via <http://www.nap.edu>)

*Infants; **children; ***adults

3.3 Comparison of the nutritional composition of *V. hymenolepis* leaves from different regions in Kenya

When compared, populations of *V. hymenolepis* from different regions in Kenya viz., Mt. Elgon, K3 (Bungoma, Trans Nzoia and Mt. Elgon), Kakamega, K5 (Kakamega, Vihiga and Kakamega-Nyanza, Kapsabet, Nabkoi and Nandi) and Narok, K6 (Nasampolai, Saktik and Bomet) showed differences in their nutritional composition. Populations from Mt. Elgon had the highest amount of ash (1.2645/100g d.w) while those from Kakamega had the highest amount of copper (0.0023/100g d.w) and Iron (1.472/100g d.w). The Kakamega populations also gave the highest amount of protein (13.036/100g d.w) and potassium (0.248/100g d.w) while those from Narok had the highest quantities of moisture (77.3%), phosphorus (3.0238mg/100g d.w), sodium (0.5641mg/100g d.w), manganese (0.0687mg/100g d.w) and vitamin C (11.59mg/100g d.w) (see Table 2).

Table 2. Comparison of the nutritive composition of *Vernonia hymenolepis* from three regions in Kenya.

Variable	Mt. Elgon (K3)	Kakamega (K5)	Narok (K6)
Moisture (%)	77.07	65.98	77.26
Ash(g)	1.2645	1.1206	1.0360
Proteins(g)	9.290	13.036	12.093
Fibre(g)	2.205	2.163	1.956
Sodium(mg)	0.224	0.233	0.564
Potassium(mg)	0.241	0.248	0.235
Copper(mg)	0.0019	0.0023	0.0013
Iron(mg)	1.330	1.472	0.565
Manganese(mg)	0.0454	0.0232	0.0687
Zinc(mg)	0.0115	0.057	0.0284
Phosphorus(mg)	2.891	2.652	3.0238
Vit C(mg)	10.30	11.40	11.59

At $p < 0.05$ there were no significant differences in the moisture, ash, phosphorus, potassium, copper, iron, manganese and zinc content of leaves from the Mt. Elgon (K3) and Narok (K6) populations and in ash, potassium, copper and iron content of the leaves from the Kakamega (K5) and Narok (K5) populations. There were significant statistical difference in all the variables investigated in the leaves from the Mt. Elgon (K3) and

Kakamega (K5) populations except in moisture, nitrogen, proteins and Vitamin C content at $P < 0.05$ (see Table 3).

Table 3. Comparison of the nutritional composition of *Vernonia hymenolepis* leaves from three regions in Kenya.

Variable	K3(Mt Elgon)		K5(Kakamega)		K6(Narok)	
	Mean (N=8)	Std. Dev)	Mea n)	Std. Dev)	Mea n)	Std. Dev)
Moisture (%)	0.509 ^a	0.34	1.035	1.11	0.53	0.36
Ash(g)	0.536 ^{a,b}	1.16	0.245 ^{a,c}	0.54	0.70	0.67
Fibre (g)	1.674 ^a	1.03	1.450 ^a	1.10	1.25	0.67
Phosphorus(mg)	0.082 ^{a,b}	1.12	0.307 ^a	1.01	0.29	0.80
Nitrogen(mg)	0.688	0.87	0.690	0.94	0.34	0.20
Sodium(mg)	0.410 ^a	0.71	0.363 ^a	0.85	1.36	0.26
Potassium(mg)	0.024 ^{a,b}	1.21	0.133 ^{a,c}	0.91	0.15	0.87
Copper(mg)	0.004 ^{a,b}	0.93	0.532 ^{a,c}	0.68	0.79	1.20
Iron(mg)	0.098 ^{a,b}	0.95	0.209 ^{a,c}	1.35	0.50	0.15
Manganese(mg)	0.066 ^{a,b}	0.97	0.598 ^a	1.07	0.76	0.19
Zinc(mg)	0.117 ^a	1.16	0.501 ^a	0.44	0.98	0.60
Proteins(g)	0.688	0.87	0.689	0.94	0.34	0.20
Vitamin C(mg)	0.319	0.34	0.075	0.00	0.14	1.36

Means sharing a common superscript are not significantly different at $P < 0.05$

Values are expressed as mean \pm SEM. Different superscripts (a, b and c) along the rows are significantly different from each other at < 0.05 .

IV. DISCUSSION & CONCLUSION

The nutritional analysis of *V. hymenolepis* revealed notable amounts of vitamins, ash, moisture, proteins, nitrogen, phosphorus and minerals making it a potential vegetable for dietary diversity. Although *V. hymenolepis* has a lower quantity of protein and other nutrients, it contributes to nutrition in rural diets where people suffer from acute malnutrition due to lack of sufficient nutrients. Generally, green leafy vegetables have low amount of proteins and

are usually taken with other foods. *Vernonia hymenolepis* can be a good source of Vitamin C when fresh rather than processed since vitamins are easily degraded (Ejoh *et al.*, 2005). However, its high moisture content (73.4%) may make it vulnerable to spoilage (Numfor, 1997; Fidelia., 2000). It is rich in proteins although less than what was noted in. *V. calvoana* (22.75–26.50 mg/100 of d.w (Fube & Djonga, 1978; Ejoh, Nkonga, Innocent & Moses, 2007). The vegetable has substantial amount of fibre and ash and consequently high mineral content, particularly iron and manganese. The few differences noted in a few elements from populations in different regions could be as a result of differences in physiological state before analysis as they were collected at different times and also due to differences in physiological state of plants before harvesting, habitats, edaphic and climatic conditions and human practices (Mbinglo, 1998; Ejoh *et al.*, 2007. Most of the collections were wild from roadsides, forest margins or disturbed environment. Pollution probably affects the nutritive composition of the plant. Fube and Djonga (1987) observed that propagation by seeds gave better results than stem-cuttings in *Vernonia calvoana*. Planting of the vegetables under similar conditions and harvesting them at the same time using the same method could realize more controlled environment and thus viable results in nutritional analysis.

There is therefore need to domesticate *V. hymenolepis* so as to provide cheap but nutritious indigenous vegetable options for rural population that can be adopted in family agricultural systems as a substitute vegetable. This could give the resource poor populations an alternative livelihood.

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Photographs showing *vernonia hymenolepis*.

Differences in Clinical studies in patients of Indeterminate leprosy and other Leprosy patients in Uttar Pradesh, India

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Abstract

Leprosy is one of the oldest human bacterial disease recognized by a Norwegian scientist Armauer Hansen working in Bergen in 1873. Leprosy is still one of the infectious diseases and major health problem of developing countries. Leprosy is caused by *Mycobacterium leprae*. *M. leprae* is pleomorphic, straight or slightly curved, rod shaped gram positive bacteria. It is strong acid fast bacilli and occur in the human host intracellularly. The present case control study was carried out with aim to study the suspected cases of indeterminate leprosy in clinically diagnosed patients in out patients department (OPD) of Gandhi memorial and associated hospitals. Department of Medicine at King George's Medical College, Lucknow. Study group consisting of 75 cases of indeterminate leprosy, 100 subjects of other groups of leprosy spectrum, i.e., tuberculoid leprosy to lepromatous leprosy (TT - LL), taken as disease control in this study. Since clinical findings is a prerequisite condition for further histopathological and immunological studies of suspected cases. The present case control study was carried out with aim to study the clinical aspects of all suspected subjects from the skin out patients department (OPD) of Gandhi memorial and associated hospitals. Department of Medicine at King George's Medical College, Lucknow.

Key Word: *Mycobacterium leprae*, indeterminate leprosy, Clinical

Introduction:

About 85% of Leprosy reported are in Asia and it is found that the majority (50% or more) of these cases are being detected at the stage when the only visible sign of the disease is a single lesion (Gupte, 1996 ; Peat et al., 1995; WHO, 1996). Although, it is well known that most of the single lesion paucibacillary (PB) cases may heal spontaneously without any specific treatment (Ekambaram & Sithambaran, 1977), a significant proportion of such cases may develop more severe disease and be at risk of developing nerve damage. Clinical criteria, e.g. single, hypo-pigmented or erythematous macules with vague margins and sensory impairment (Charles et al., 1997). Leprosy have broad spectrum of symptom. The clinical lesions, ranging from a small solitary hazy macule to widespread multiple shiny nodules. Indeed the manifestations

of leprosy are so varied and divergent that it is hard to believe that they are caused by one and the same micro-organism.

Since clinical findings is a prerequisite condition for further histopathological and immunological studies of suspected cases. The present case control study was carried out with aim to study the clinical aspects of all suspected subjects from the skin out patients department (OPD) of Gandhi memorial and associated hospitals. Department of Medicine at King George's Medical College, Lucknow.

Material and Methods:

Leprosy should be correctly diagnosed in its early treatable stage, long before irreversible damage to nerves has occurred. The diagnosis and successful treatment of early leprosy can be one of the most rewarding and gratifying experiences in clinical medicine.

a) Clinical Examination for Leprosy

After taking the patient's care history regarding the complaints, past treatment, duration family contact with leprosy and his/her work etc. suspected hazy areas must be viewed in a good light. Indeterminate leprosy in a dark skin is hypopigmented, sensory loss is present in the majority of leprosy patients and often occurs in the following order (Yawalkar, 1974).

Temperature → Light Touch → Pain & Pressure

Sensory deficit in the patches should be determined by touching the skin lightly with a wisp of cotton wool, a feather or the tip of a ball point pen. Touch the skin and ask the patient where he feels the touch. As the acuity of sensation varies from one part of the body to another the skin of contralateral side should be examined for comparison.

Heat sensation is tested with two test tubes – one containing hot water and the other cold, and pain sensation is tested by pin-prick. Because of the rich nerve supply to the skin of the face, sensory changes may be relatively less evident there than in other areas of the body (Binford, 1982).

The diagnosis of paucibacillary leprosy depends on these simple procedures. The presence of few, well demarcated chronic skin lesions associated with anaesthesia have suggested paucibacillary leprosy.

a.i) *Examination of Nerves*

Palpation of the commonly involved peripheral and cutaneous nerves for the presence of thickening and tenderness. They are the ulnar nerve near the median epicondyle, greater auricular, lateral popliteal and the dorsal branch of the radial.

a.ii) **Bacteriological Examination**

Skin smears should be taken from all patients suspected of having leprosy in any form (Leiker, 1983). Bacteriological examination of nasal and skin smears is essential for classifying cases whether they are multibacillary or paucibacillary. It is also essential for monitoring the progress and defining the endpoint of treatment. The glass slide should be absolutely clean. They should not be reused for making smears. It may give a false positive result (Chacko, 1980).

Observations and Findings

PART I : CLINICAL FINDINGS

All patients and disease controls had insidious onset of disease. Course of disease was progressive. Twenty five of 75 (33.3%) indeterminate cases gave a history of leprosy in the family. Twelve of 75 (16%) indeterminate cases gave history of close contact with leprosy patients either at school (2 cases) or living with leprosy patients (10 cases). Two of 75 (2.6%) Idt patients gave history of having suffered from leprosy in the past 3-4 years back for which they were treated and got cured but relapsed again.

Duration of symptoms : The duration of 75 indeterminate leprosy cases ranged from 1 month to 4 years (median = 12.09 months) and in 100 leprosy types duration of symptoms ranged from 2 months to 4 years (median = 12.4 months).

The age of the indeterminate leprosy patients ($n = 75$) ranged from 6 to 70 years (median age 23 years). Maximum number of cases were between the age group of 16 to 25 accounting for 38.7% of the total indeterminate leprosy cases (Table 1 Fig. 1).

Table 1 : Age distribution of indeterminate leprosy cases ($n = 75$)

S.No.	Age group (years)	No. of cases	% of total cases
1.	5-15	19	25.3
2.	16-25	29	38.7
3.	26-35	17	22.7
4.	36-45	2	2.7
5.	46-55	5	6.7
6.	56-65	2	2.7
7.	66-75	1	1.3

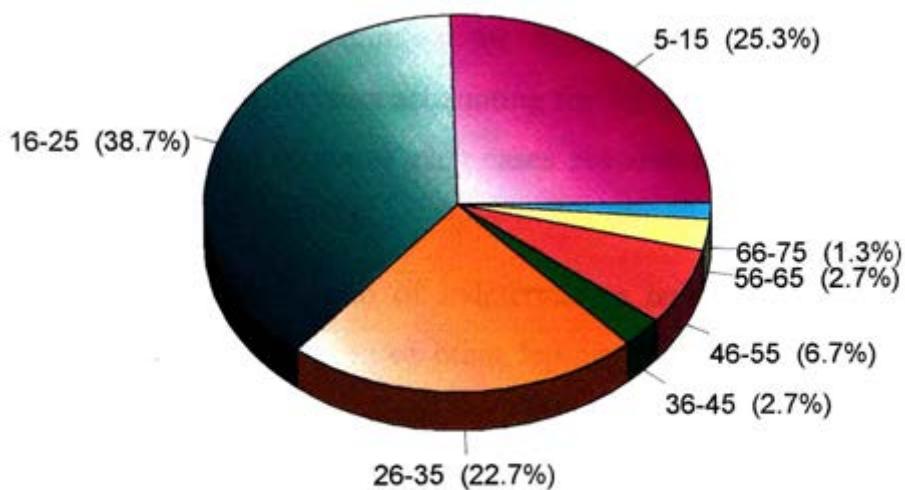


Fig. 1 : Age Distribution in Cases (Idt)

The youngest patients was 6 years male while the oldest patients was 70 years male with indeterminate leprosy.

The age distribution of other types of leprosy i.e. taken in our study as a disease control ($n=100$) ranged from TL (7 years to 60 years, median 25 years), BB (6 years to 50 years, median 26 years), BL (7 years to 58 years, median 26 years), LL (10 years to 65 years, median 32 years) (Table 2).

Table 2: Age distribution of different grades of leprosy patients (disease controls) individually ($n=100$)

Leprosy types	Age group (years)	Number	% of total types
TL ($n = 20$)	5-25	10	50
	26-50	9	45
	51-72	1	5
BT ($n = 20$)	5-25	12	60
	26-50	7	35
	51-72	1	5
BB ($n = 20$)	5-25	9	45
	26-50	11	55
	51-72	0	0
BL ($n = 20$)	5-25	9	45
	26-50	10	55
	51-72	1	0
LL ($n = 20$)	5-25	9	45
	26-50	6	30

	51-72	5	25
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The maximum number of subjects were in case of TL, BT, BB, BL & LL between 5-25 years accounting for 50%, 60%, 45%, 45% & 45% respectively, between 26-50 years accounting for 45%, 35%, 55%, 50% & 30% and between 51-72 years in above each cases accounting for 5%, 5%, 0%, 5% and 25% respectively.

Overall male-female ratio of indeterminate leprosy cases was 3.41:1, (Table 3)The male-female ratio of other leprosy types were TL (1.8:1), BT (2.3:1), BB (1:1), BL (2.3:1) and in LL (3:1) (Table 4 Fig. 2).

Table 3 : Sex distribution of indeterminate cases (n = 75)

Sex	No. of cases	% of total cases
Male	58	77.3
Female	17	22.7

Table 4 : Sex distribution of different grades of leprosy patients (Disease controls) (n = 100)

Leprosy types	No. of cases	Male	% of total cases	Female	% of total cases
TT	20	13	65.0	7	35.0
BT	20	14	70.0	6	30.0
BB	20	10	50.0	10	50.0
BL	20	14	70.0	6	30.0
LL	20	15	75.0	5	25.0

Table 4a : Clinical findings of cases of Indeterminate leprosy

Clinical Findings	Patients (n = 75)	
	No.	%
Skin Lesions		
Macule	42	56.0
Papule	24	32.0
Maculopapular	3	4.0
Patch	3	4.0

Macule with Maculopapular lesion	2	2.7
Macule with Papule	1	1.3
Nerve involvement		
Bilateral ulnar (BU)	6	8.0
Unilateral ulnar (UU)	11	14.7
Bilateral common peroneal (BCP)	1	1.3
Bilateral U + Unilateral CP	2	2.7
Unilateral U + Unilateral GA	1	1.3
Bilateral U + Unilateral GA	2	2.7
Bilateral U + Bilateral GA	7	9.3
Bilateral U + Bilateral GA + Bilateral CP	3	4.0
Unilateral U+Unilateral GA+Unilateral CP	1	1.3
Absent	41	54.7
Hypoanaesthesia	75	100
Colour of Lesions		
Hypopigmented (H)	67	89.3
Erythematous (E)	5	6.7
Mixed type (H+E)	3	4.0
Hair Loss : Present	55/75	73.3
Absent	15/75	21.4
Anhydrosis	16/75	21.3

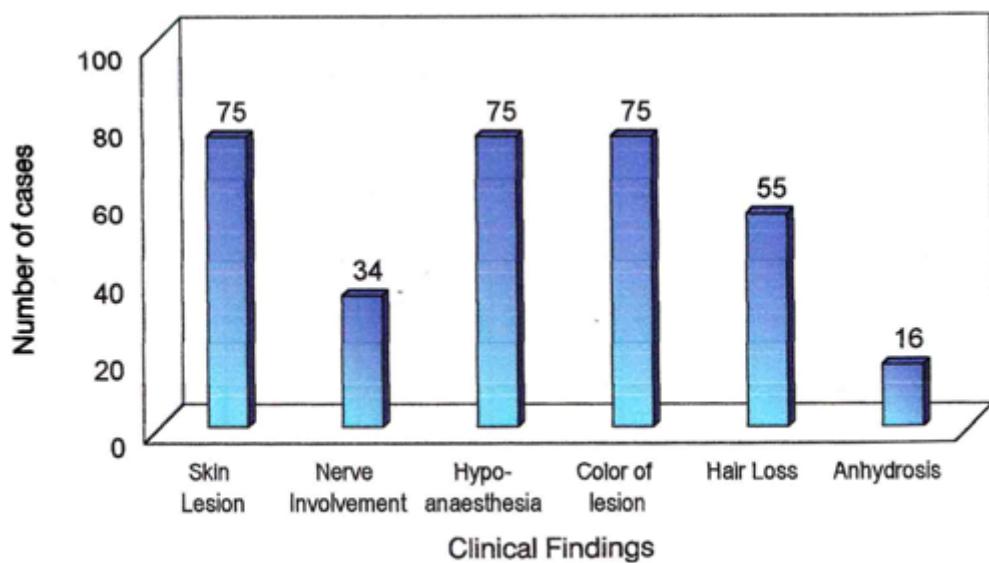


Fig. 2 : Clinical findings in cases (Idt)

Forty two of 75 (56%) indeterminate cases had macules. Twenty four of 75 (32%) cases had papules. Three of 75 (4%) cases had maculopapular lesions. Three of 75 (4%) patients had patches. Two of 75 (2.7%) patients had macule with maculopapular lesion and one other patient had macule with popular lesions (Table 4a, Fig. 2).

In case of other leprosy groups 9 of 100 cases (9%) had macular lesions. Five of 100 (5%) patients had both papule and maculopapular lesions. Three of 100 (3%) cases had plaques. Seven of 100 (7%) cases had macule with nodules. Thirty four of 100 (34%) cases had both patches and patches with macules. Only 3 of 100 (3%) cases had macules with popular lesions (Table 4 b).

Thickening of superficial nerves was detected in 34 of 75 (45.3%) Idt patients and absent in 41(54.6%) patients whereas in 100 disease controls only 78(78%) cases showed nerve involvement.

All the indeterminate patients and disease controls were hypoanaesthetic. Sixty seven of 75 (89.3%) patients had hypopigmented lesions. Five of 75 (6.7%) patients had erythematous lesions and only 3 of 75 (4%) patients had mixed type hypopigmented and erythematous lesions (Table 4a). In disease control groups 29 of 100 (29%) cases had hypopigmented.

Table 4 b: Clinical Findings Of Disease Controls (N = 100)

S.N o.	Clinical findings	TT (n=20)		BT (n=20)		BB (n=20)		BL (n=20)		LL (n=20)		Total (n=100)
		no	%	n o	%	n o	%	no	%	no	%	
1.	Skin Lesions											
	Macule	4	20	4	20	-	-	1	5	-	-	9
	Papule	3	15	-	-	-	-	1	5	1	5	5
	Maculopapular	-	-	1	5	1	5	2	10	1	5	5
	Plaque	2	10	-	-	-	-	1	5	-	-	3
	Macule with nodule	1	5	2	10	-	-	3	15	1	5	7
	Path	10	50	8	40	9	45	2	10	5	25	34
	Macule with nodule	-	-	-	-	-	-	1	5	2	10	3
	Path + Macule	-	-	5	25	10	50	9	45	10	50	34
2.	Nerve involvement											
	Bilateral ulnar (BU)	2	10	3	15	2	10	1	5	3	15	11
	Unilateral ulnar (UU)	-	-	2	10	8	40	6	30	1	5	17
	Unilateral common peroneal (UCP)	-	-	-	-	-	-	-	-	1	5	1
	Unilateral greater auricular (UGA)	1	5	-	-	1	5	-	-	-	-	2
	Bilateral U + Bilateral CP	1	5	1	5	-	-	1	5	1	5	4

	Unilateral U + Bilateral CP	1	5	-	-	-	-	2	10	1	5	4
	Bilateral U + Unilateral CP	1	5	1	5	-	-	-	-	-	-	2
	Unilateral U + Unilateral GA	2	10	1	5	2	10	-	-	1	5	6
	Bilateral U + Unilateral GA	1	5	2	10	1	5	-	-	-	-	4
	Bilateral U + Bilateral GA	5	25	5	25	-	-	-	-	2	10	12
	Unilateral U + Bilateral GA	1	5	-	-	2	10	3	15	-	-	6
	Bilateral U + Bilateral GA + Bilateral CP	-	-	2	10	-	-	-	-	1	5	3
	Bilateral U + Bilateral GA + Unilateral CP	3	15	2	10	-	-	-	-	-	-	5
	Unilateral U + Unilateral GA + Unilateral CP	-	-	1	5	-	-	-	-	-	-	1
	Absent	2	10	-	-	4	20	7	35	9	45	22
3.	Anaesthesia											
	Hypoanaesthesia	20	100	20	100	20	100	20	100	20	100	100
4.	Colour of lesions											
	Hypopigmented (H)	10	50	8	40	7	35	2	10	2	10	29
	Erythematous (E)	6	30	6	30	10	50	12	60	14	70	48
	Mixed type (H+E)	4	20	4	20	3	15	6	30	4	20	21
5.	Hair loss											
	Present	12	60	11	55	8	40	16	80	18	90	65
	Absent	8	40	9	45	12	60	4	20	2	10	35
6.	Anhydrosis	11	55	14	70	12	60	16	80	20	100	73

(48%) cases had erythematous lesions and only 21 of 100 (21%) cases had mixed type (hypopigmented and erythematous) lesions (Table 4b).

In addition, 16 of 75 (21.3%) indeterminate cases had anhydrosis and 55 of 75 (73.3%) indeterminate cases had hair-loss (Table 4a). Other leprosy groups of 100 cases showed 73 (73%) anhydrosis and 65 (65%) hair loss (Table 4b).

Conclusion

It was concluded that correct diagnosis of indeterminate leprosy from other leprosy groups of spectrum could be made if results of clinical, histopathological, bacteriological and immunological were interpreted together. According to Sadeghi et al. (2000) lack of clinical suspicion and unfamiliarity with the histology of Idt leprosy delayed diagnosis and treatment. Leprosy should be considered in the differential diagnosis of patients presenting with unusual rheumatic and persistent cutaneous manifestations. The age of indeterminate leprosy patients ranged from 6 to 70 years (median age 23 years). Over all male female ratio

was 3.41.1. Duration of symptoms in indeterminate leprosy cases, ranged from 1 month of 4 years (median, 12.09 months).Twelve of 75 (16%) indeterminate cases gave history of close contact with leprosy patients.Forty two of 75 (56%) indeterminate patients had macules. Twenty four of 75 (32%) indeterminate cases had papules.The most interesting finding was the detection of neural involvement in 34 of 75 (45.3%) indeterminate patients and 78% disease control group, suggesting tropism of *M. leprae* for nural tissue. Sixty-seven of 75 (89.3%) indeterminate cases and 29% disease control group had hypopigmentation, suggesting involvement of melanocytes. Presence of anhydrosis in 16 of 75 (21.3%) Idt cases and 73% disease control group suggests involvement of sweat glands i.e. sign of autonomic nerve damage. The significant differences in clinical parameters of indeterminate and other leprosy cases suggest the requirement of histopathological and immunological studies for early diagnosis of leprosy in general and Indeterminate leprosy in particular. The early diagnosis and treatment of leprosy at indeterminate stage should be beneficial to reduce and to eradicate the leprosy from the community.

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A Descriptive Study to Assess the Knowledge Regarding Rights of Mentally Ill Patients among GNM Interns Students of Selected Nursing Colleges at District Sangrur, Punjab, 2014.

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Abstract- Mental health and rights have explicit intrinsic connections and have emerged as powerful concepts within the rights based approach especially so in backdrop of the weakening public health system, unregulated growth of the private sector and restricted access to health care systems leading to a near total eclipse of availability and accessibility of universal and comprehensive healthcare.¹ **Aim:** To assess the knowledge regarding rights of mentally ill patients among GNM Interns of selected nursing colleges at district Sangrur. **Method and Material:** Convenient sampling technique was used to select the 60 samples for the study. A self structured knowledge questionnaire was used to collect data. **Statistical Analysis:** Descriptive and inferential statistics was used to analyze the collected data. **Result:** A descriptive study was conducted on 60 G.N.M Interns students of Lifeguard College of Nursing, National Institute of Nursing, Guru Nanak Dev Dental College, Sangrur district in the month of January 2014 to assess the knowledge regarding rights of mentally ill patients. **Conclusion:** The finding of the study shown that maximum 50% students had average knowledge whereas, 35% students had below average knowledge and 15% students had good knowledge about the rights of mentally ill patients.

Index Terms- Assess, Knowledge, Rights, Mentally ill Patient.

I. INTRODUCTION

“A right delayed is a right denied.”

Dr. Martin Luther King, Jr.

“Health for all” was the global goal to be achieved at the end of 20th century. Health being a precious possession of all human beings is an asset for an individual. But often its meaning is misunderstood and misinterpreted by many people.² Thus World Health Organization defined health as a state of complete physical, mental, social and spiritual well-being and not merely an absence of disease or infirmity. Health is the essence of productive life, and not the result of ever increasing expenditure on medical care. It is a world-wide social goal and is multidimensional viz. the physical, the mental, the social, the spiritual, the emotional.³

Mental health today is recognized as an important aspect of one's total health status and is a basic factor that contributes to the

maintenance of physical and social effectiveness. It refers to such abilities as of making decisions, of assuming responsibilities in accordance with one's capacities, of finding satisfaction, success and happiness in the accomplishment of everyday tasks of living effectively with others of showing socially considerate behavior.⁵ **World Health Report (2001)** stated that mental illnesses account for 12% of the global burden of disease. Nearly 450 million people are estimated to be suffering from mental illnesses globally, yet only a small minority of them receives even the most basic treatment.⁶

About 2-5% of India's population suffers from some form of mental or behaviour disorder. Around 1% has a serious form of mental disorder requiring urgent care at any one point of time. No less than 10-15% of those attending general health facilities have a common mental disorder.⁷ Mental illness is treatable and the symptoms of mental illness often can be controlled effectively through medication and/ or psychotherapy. But sometimes the symptoms of mental illness may go into remission, and for some people it causes continuous episodes that require ongoing treatment.⁷

The World Health Report (2001), highlighted that stigma and discrimination are the main obstacles the mentally ill facing today and it is the shame and fear of this discrimination that prevents the mentally ill from seeking help and care for disorders.⁸

Ill-treatment of mentally ill patients is more or less a global phenomenon. Lack of mental health treatment is most severe in less- developed countries, whereas, in developed countries, roughly half of those with severe illness get no care at all. Although attention to human rights in India has been improving over past decade, human rights situation of persons with mental disorders is still far from satisfaction.⁸

The knowledge of the rights and freedoms, of oneself and others, is considered as a fundamental tool to guarantee the respect of all rights for each and every person. The major goal of knowledge of rights of mentally ill patients should not only aim at producing trained professionals but also cultivating a sense of higher purpose in them. Mentally ill patients should not be ill treated during their stay in hospital as well as in community setting.

All human beings are born free and have the right to be treated with equality and dignity but we sometimes we come

across stories about the way mentally ill are treated in the community and various mental health settings. Few examples of violation of human rights of mentally ill patients that are abuse, unnecessary or illegal restraining or seclusion and neglecting their basic needs and not providing them the basic facilities as any other patient will get who is having any other illness other than the psychiatric one. As mentally ill patients are denied their rights. Thus we need to assess the knowledge of rights of mentally ill patients among nursing students to ensure that basic rights are surely enforced in mental health setting.

II. MATERIAL AND METHODS

Study design and sample

A Descriptive research design was used for the study. Convenient sampling technique was used to select the students from Lifeguard College of Nursing, National Institute of Nursing, Guru Nanak Dev Dental College of district Sangrur for research study.

Data Collection and study tool

Prior to data collection the researcher introduced her and explained the purpose of the study to the participants. They were assured for the confidentiality of their identity and response. Research tool was consisted of selected Socio-demographic variables and self structured knowledge questionnaire about rights of mentally ill patients. First part of the tool consisted of 6 items and second part of research tool that was self structured knowledge questionnaire consisted of 30 items. Each correct answer was awarded with 1 mark and each wrong answer was awarded with 0 mark. The minimum score was 0 and maximum score was 30.

RESULT SECTION-1

Socio-demographic characteristics of sample

There was no association between knowledge regarding rights of mentally ill clients with selected socio-demographic variables.

Variable	N	%
1.Age (in years)		
a.20-25	59	98.33%
b.26-30	01	1.67%
c.>30	0	0
2.Religion		
a. Sikh	42	70%
b. Hindu	10	16.67%
c. Christian	02	3.33%
d. Muslim	06	10%
3.Gender		
a. Male	09	15%
b. Female	51	85%
4.Education		
a. +2 Arts	55	91.67%
b. +2 Medical	02	3.33%
c. +2 Commerce	0	0
d. +2 Non-medical	03	5%
4.Occupation of Father		
a. Agriculture	40	66.66%
b.Doctor	04	6.67%
c.Lawyer	04	6.67%
d.Teacher	12	20%
e.Any other	0	0
5.Occupation of Mother		
a.Homemaker	52	86.67%
b.Teacher	04	6.67%
c.Doctor	03	5%
d.Any other	01	1.66%

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Brain Storm Optimization for Energy-Saving Routing Algorithm in Wireless Sensor Networks

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Abstract- There are vast application ideas in Wireless sensor networks (WSNs) but their prime disadvantage is that the energy of nodes are limited and energy cannot be supplied. Most traditional routing protocols encounter complications in WSNs. In recent times, thorough study of brain storm optimization (BSO) algorithms has been applied in many fields and now we use it to solve routing problems. Initially, the low energy adaptive clustering hierarchy (LEACH) is considered using fundamental operations and then optimized using BSO to extend the lifetime of the WSN. The proposed routing algorithm relies on a novel fitness which considers energy and distance. The outcome of LEACH is evaluated and compared; obtained result shows that the proposed approach performs more effectively.

Index Terms- Wireless Sensor Networks, Brain Storm Optimization, Routing Algorithm.

1. Introduction

A Wireless Sensor Network (WSN) interconnect wirelessly following an ad hoc configuration through a network of tiny embedded devices called sensors. They are located strategically inside a physical medium and are able to interact with it. As a result, the sensor calculates its needed limits from its surroundings and delivers the detected information [4]. The sensor node sends message to the entire network but however the network topology can be altered continuously and the nodes are likely to fail. However, we should keep in mind that nodes should be independent and repeatedly they will be ignored. This kind of device (sensor node) has limited power, low computational capacities and inadequate memory. Although scalability is the most considered problem in WSNs, their connection strategy for communication and the limited energy to supply the device. Energy efficiency is an important topic in wireless sensor network, which can boost the network for the next months need or even years without liability [2]. Most of the work in energy saving routing only focus on path detection technique based on the largest energy level, the lowest energy consumption, or the minimal hop [3]. These methods can reduce energy consumption in terms of optimization, its dense environment and the high risk group jamming which also should consider the energy-aware routing. Because it will not only affect delay and packet loss of the network performance but then also one of the most significant reasons which leads to extreme energy consumption.

Usually, optimization is about finding the “best available” solution(s) for a known problem. The two basic problems studied in optimization are unimodal and multimodal problems. A unimodal problem has only one optimum solution while a multimodal problem has several or numerous optimum solutions, of which a portion are local optimal solutions. Evolutionary optimization algorithms, or simply the evolutionary algorithms (EA), are mostly hard to find the global optimum solutions for multimodal problems due to the feasible occurrence of the premature convergence [1]. To reach equilibrium, the system adjusts its algorithm parameters. BSO is a new kind of SI algorithm and it is intuitive to think that BSO should be superior to other SI algorithm because BSO emulates the most intelligent animal in the world (human being) instead of simple objects such as ants in ACO, birds in PSO, bees in HBO, and bacteria in BFO. The BSO algorithm proposed by Shi is motivated by the following intelligent behaviors [9]: once human being face a hard problem which every single person may find difficulty in solving, group of persons will get together to brainstorm. These persons are generally with diverse background and they come together for a brainstorming process, which helps them to interactively collaborate to generate great ideas. This manner, the problem can be solved with high chance. Shi has successfully designed a BSO by emulating this brainstorming process in human being to solve problems and conduct simulations on two conventional benchmark functions to confirm its effectiveness and importance in solving

optimization problems [9]. The sensor network model illustrated in Fig.1 consist of one base station and a number of sensor nodes deployed over a large topographical area. All the sensors and the base station can either be stationary or moving. Data are transferred from sensor nodes to the sink through a direct or clustered communication pattern.

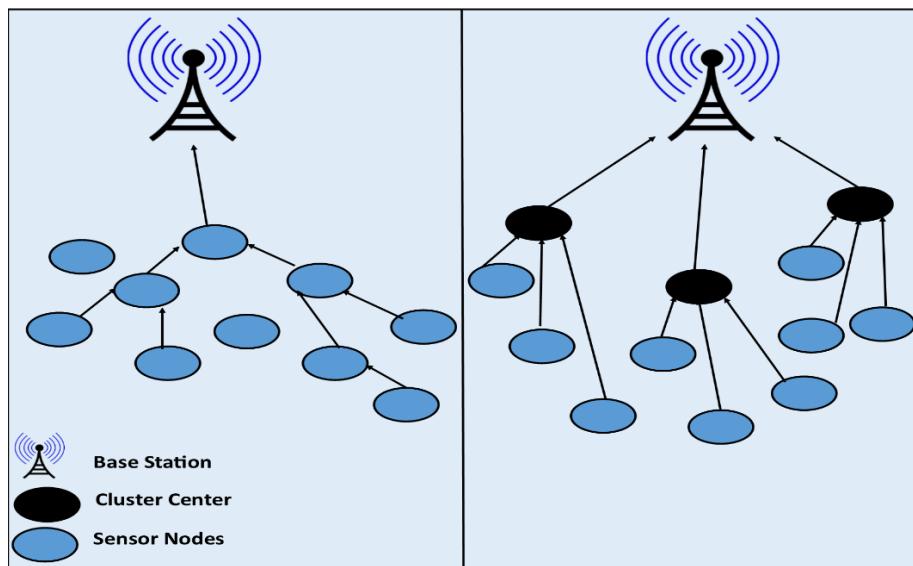


Fig.1 An Example of Direct and Clustered WSN

The essential contributions of this paper are summarized as follows:

- i. We applied the modified brain storm optimization algorithm to create the routing structure.
- ii. We derive a fitness function for the system considering energy and distance.
- iii. We use the BSO-LEACH for the routing structure to compare the LEACH algorithm.

The remaining part of this paper is organized as follows. Summary of related work is described in section 2. In section 3, the Modified Brain Storm Optimization Algorithm is comprehensively explained. Wireless sensor network energy-saving routing using BSO-LEACH is presented in Section 4. Section 5 basically presents the simulation and results considered in the communication structure. Finally, the conclusion is drawn in Section 6.

2. Related Work

Problems such as memory, limited energy, communication link failures, and computational constraints are the few challenges in WSNs [6]. Mostly, formulation in WSN is done through multidimensional optimization problems, and approached through bio-inspired techniques. Low energy adaptive clustering hierarchy (LEACH) is one of the topmost principal approach for clustering [11]. Its purpose is to preserve the energy for an extended time. Other authors have been able to develop LEACH which can be found in [14, 15]. In the communication phase, each sensor transmit data to the cluster head (CH) then from the CH to the BS. In the real scenario, BS located very far from the transmission range of CH. In [13], it addresses WSN issues such as clustering, optimal deployment, node localization, and data-aggregation. Also, ant colony algorithm optimization algorithm has been attempted to solve energy depletion problems for wireless sensor network. In [8], their research permitted every node in the WSN to recover the distance and residual energy of the neighbor nodes. An energy-saving routing architecture with a uniform clustering algorithm is proposed in [16] to reduce the energy consumption in wireless body sensor networks. A centralized and cluster-based method was applied to create a cluster-tree routing structure for the sensor nodes. Z. Ren et al in [17] presented an in-depth study of particle swarm optimization (PSO) algorithm routing problem in WSNs, it then proved that the algorithm can work better to improve the performance of the network. In [18], an Enhanced PSO-Based Clustering Energy Optimization (EPSO-CEO) algorithm for wireless sensor network was proposed which basically considers clustering and cluster head selection for minimizing the power consumption in the WSN.

In [5], the cluster based WSN architecture defined an effective way to optimize the energy consumption by implementing an energy efficient scheme amongst the participating nodes for major events such as design of the hierarchical structure on the consistent interval and the data communication from a node to the base station. In the stated quality of service specification (QSS), the result of the proposed work are connected with the one acquired through the existent low energy adaptive clustering hierarchy (LEACH) and the deterministic stable election protocols (D-SEP). The total progress gain achieved by the proposed work is 31% for LEACH and 10% for D-SEP at specified QSS. In [19], firefly algorithm was applied in solving routing problems. Additionally, a fitness function based on residual energy, node degree and distance was used. In [20], shortest path routing protocol involves an address forwarding in the network. Genetic algorithm through superiority theory is used to achieve energy efficient routing by means of minimizing the path length and thus maximizing the life of the network.

In the field of Computational Intelligence (CI), many algorithms have been inspired from different swarms including insects, animals, and birds. Nature inspired artificial intelligence (AI) methods based software approaches presents a reasonable and quick solution for performance optimization of WSNs [25, 26, 27, 28, 29]. Ant colony optimization algorithm (ACO) have been suggested based on the improvement of LEACH protocol consisting of cluster-heads and sink nodes in a direct communication [21, 22]. The methodology whereby cluster formation and routing is conducted in WSN have been outlined based on genetic algorithm [23]. These algorithms are far and wide utilized in explaining numerous of optimization problems. Increasing the battery life of WSNs is important in enhancing the implementation of WSN. Therefore, in [24] genetic algorithm have been implemented independently on energy models for data communication of WSNs with the objective to find out the optimal energy consumption conditions. BSO concentrates on the cluster centers and allocates them the uppermost priority, it could fall in local optima like any other swarm algorithm. The modified version of BSO proposed is entitled Fuzzy Brain Storming Optimization (FBSO) algorithm [7]. Moreover, the BSO and FBSO have been applied in Wireless Sensor Networks (WSNs) for the Energy Topology Control (ETC) problem. The problem is formed to fit the BSO and FBSO algorithms requirements.

3. Modified BSO Algorithm: A Brief Introduction

In brain storming optimization algorithm [10], the solutions are separated into several clusters. The next iteration always retains the best solution from the previous solution. However, new individuals have the tendency to be created based on one or two individuals in clusters. The usage of a solution becomes superior when the new individual is nearby to the best solution. In Fig. 2, a distinctive brainstorming process is presented. In Osborn's Rules, the four rules tries to better ideas by generating more of them, never criticize any idea produced, unusual ideas are always welcomed and finally stand the tendency to combine and improve ideas. The total population is related to every sensor node and per individual idea in the BSO is the node. In the bounds of the solution space, an individual idea is at random set to a suitable starting condition. A population size of n is considered when a fixed number of n ideas are generated for owners to pick good ideas from.

During each generation, all the ideas are first grouped into k clusters using k -means clustering approach, and then the paramount one in each cluster is selected as the cluster center. Rarely, a randomly selected center is substituted with a new generated idea with a probability of preplace , keeping the swarm from local optimum. Firstly, BSO selects one or two clusters randomly with predetermined likelihood in place of ideas generated by other ideas. The uppermost superiority is known to be the cluster center chosen, if not, select another idea in the cluster. On the other hand, if a new idea is created based on ideas generated by other ideas, it can be written as

$$y_{ij}^{new} = y_{ij}^{old} + \xi N(\mu, \sigma) \quad (1)$$

Else, if a new dependent idea is generated by two existing individuals, the resulting solution is formulated as

$$\begin{aligned} y_{ij}^{new} &= y_{ij}^{old} + \xi N(\mu, \sigma) \\ y_{ij}^{new} &= \omega_1^* y_{ij}^{old1} + \omega_2^* y_{ij}^{old2} \end{aligned} \quad (2)$$

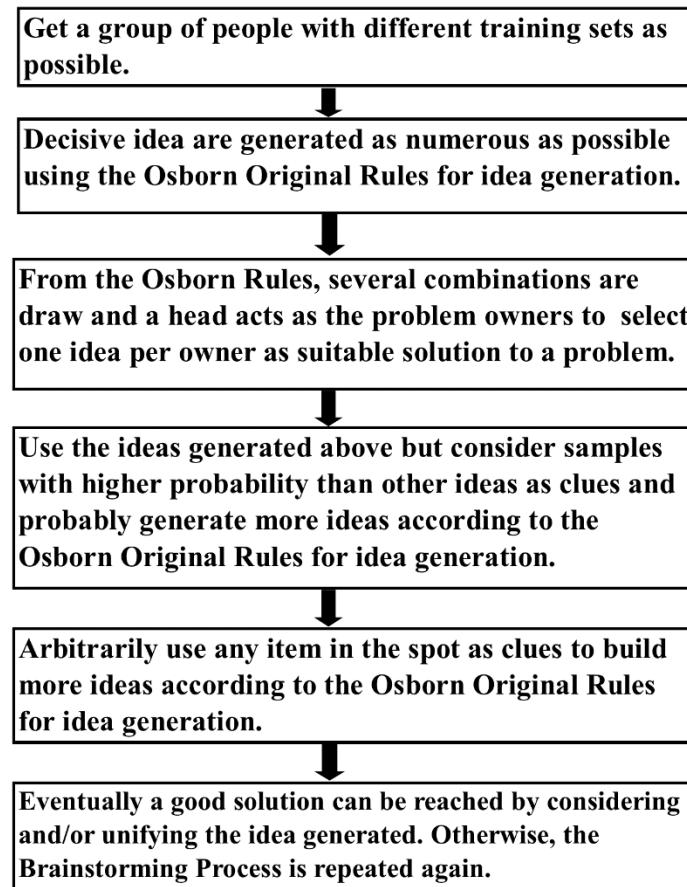


Fig 2. The Brainstorming Process

where y_{ij}^{new} and y_{ij}^{old} are the j th dimension of i th individual of y^{new} and y^{old} , respectively; with mean μ and variance σ the Gaussian random value is given as $N(\mu, \sigma)$; ω_1 and ω_2 are weight values of the two ideas, respectively; and ξ is an regulating factor slows down the convergence speed as the evolution goes, which can be expressed as

$$\xi = rand * logsig\left(\frac{0.5*I_{max}-I_{cmin}}{k}\right) \quad (3)$$

where $rand$ is a random value between 0 and 1. The I_{max} and I_{cmin} is the maximum number of iteration and current minimum number of iteration respectively. The $logsig$ is a logarithmic sigmoid transfer function, and such form is positive for global search at the start of the evolution and improves local search ability when the process is approaching to the end. Moreover, k is a defined to be a parameter for varying slopes of the $logsig$ function. The newly generated idea is weighed, and if the fitness value is more suitable than the current idea, the old idea will be replaced by new one. Once the newly generated idea is created, it is then considered. Afterwards, the crossover operation is conducted and the best idea among the group is selected to update the old one. Mostly, the described process above is repeated up to n new individuals have been created to finish one generation. The iteration stops if and only if the maximum number of iterations is reached. To end, the outcome of the final solution to the problem is weighed to be the optimal idea.

4. WSN Routing Based on BSO-LEACH

Derivation of fitness function: In general, the suggested fitness of a solution generated should improve the search method to give more computational resources in time and/or space [1]. Therefore, we considering objectives such as residual energy and Euclidean distance.

In data communication, next hop receives and aggregates data then transmitted to the BS. Therefore, higher residual energy next-hop should be optimal as possible, where E_i represents the energy of each sensor and E_{Ci} represents the total residual energy of all the sensor nodes within the cluster and p represents the number of nodes in the cluster. So, our first objective with respect to residual energy is F_1 minimized as:

$$F_1 = \frac{E_i}{\sum_{i=1}^p E_{Ci}} \quad (4)$$

The euclidean distance in the middle of the cluster center (CC) and its members and from the CC to the BS should be minimum so that it uses less amount of energy. And so, it's crucial to reduce the distance between CC and BS, where s_i is the source node, CC_i is the cluster center and BS is the base station. However, this has the tendency to improve the network lifetime. So, the second objective with respect to distance is F_2 minimized as:

$$F_2 = \frac{dis(s_i, CC_i)}{\sum_{i=1}^p [dis(CC_i, BS) + dis(s_i, CC_i)]} \quad (5)$$

The fitness function can be calculated using the formula given in equation 8. The Residual energy F_1 and Euclidean distance F_2 is given in equation 6 and 7 respectively.

$$\text{Fitness Value: } F = F_1 + F_2 \quad (6)$$

The LEACH protocol arranges its sensor nodes hierarchically in clusters, together with a cluster head (CH) for each [30]. The CH of the LEACH is elected starting with a probability which is defined by a random number chosen between 0 and 1. The task of CH alternates all the sensors to avoid a single sensor node draining all its battery. The threshold T_n is given in equation 7 which is matched up to the preferred random number.

$$T_n = \begin{cases} \frac{\rho}{1-\rho*(r*mod\frac{1}{\rho})}, & \text{if } n \in G \\ 0, & \text{Otherwise} \end{cases} \quad (7)$$

where ρ is the desired percentage of CCs, r is the current round, and G is the set of nodes that have not been cluster-heads in the last $1/\rho$ rounds.

The operation of LEACH protocol consists of several rounds with two phases in each [31]: Set-up Phase and Steady Phase. The algorithm for LEACH protocol is analyzed by the following procedures.

Step 1: Setup Phase- In the early phases, each potential node stand the probability to be picked spontaneously to become a cluster head (CH). The CH picking stage for the nodes is taken into accounts. The CH is chosen depending on the threshold value T_n . The advertisement phase is when the CHs alert their neighboring node with an advertisement packet that they are now CHs. The non-CH nodes with the strongest signal strength is taken by the advertisement packet. Then in the cluster setup phase, the ordinary member nodes alert the CH that they are now a member to that cluster with "join packet" having their own IDs making use of CSMA. Later in the cluster-setup sub phase, the CH have an objective knowledge of the number of member nodes and their IDs. Conditionally, intra-cluster members receive messages, the CH produces a TDMA schedule, proceeds by taking a random CSMA code, and then forwards the TDMA table to cluster members. The steady-state phase follows next.

Step 2: Steady-state Phase- In the second and final phase of the LEACH, the cluster nodes send their data to the cluster head. The cluster members in each cluster communicate only with the cluster head by way of a single hop communication. The cluster head performs aggregation properties by collecting data and forwarding it to the base station either directly or through other cluster head together with the static route well-defined in the source code as shown in the clustered WSN of Fig. 1 [31]. As soon as the specified interval is over, the whole network starts from the Set-up phase again.

Algorithm for routing: Steps to find out proximate optimum route;

Step 1. Initialize the node $N_i = \{\forall_i, 1 \leq i \leq S_m, S_m$ is m potential number of solutions (nodes), maximum iterations I_{max} , Pro1, Pro2, Pro3, and number of cluster.

Step 2. Cluster m solutions into l clusters.

Step 3. Compute the fitness value of each node in the cluster using equation 6.

Step 4. Rank outcomes in each cluster and set the best one as cluster center.

Step 5. New Node Generation:

i. With probability Pro1, replace the selected clusters with randomly generated nodes.

ii. With probability Pro2, randomly pick a cluster; otherwise pick two clusters.

iii. With probability Pro3, pick the cluster center(s) and go to (iv); otherwise chose other nodes from the previously selected clusters; those node(s) represent the old nodes

iv. Generate new node using equation 1; then go to Step v.

v. Evaluate the newly initiated nodes and the old ones; then elect the best node to replace the old one, if any.

vi. If p nodes are updated, go to step 6; otherwise, go to (i).

Step 6. If the current number of iterations $< I_{max}$, go to Step 3.

Step 7. Evaluate the current solutions and then terminate.

The energy model considered in [11, 12] has the function of calculating energy loss of all other sensor nodes in the network. The two channel propagation models used are the free space (d^2 power loss) for direct transmission and the multipath fading channel (d^4 power loss) for packet transmission via multihop. Therefore, the energy drained for this transmission with l -bit packet over distanced d is calculated as:

$$E_{Tx}(L, d) = \begin{cases} L \cdot E_{elec} + L \cdot \varepsilon_{fs} d^2, & d < d_0 \\ L \cdot E_{elec} + L \cdot \varepsilon_{mp} d^4, & d \geq d_0 \end{cases} \quad (8)$$

where ε_{fs} is free space energy loss, ε_{mp} is multipath energy loss, d is distance between source node and destination node, and d_0 is the threshold distance:

$$d_0 = \sqrt{\frac{\varepsilon_{fs}}{\varepsilon_{mp}}} \quad (9)$$

The energy spent for the radio to receive this message is found in equation (10) where E_{elec} implies the energy dissipated per bit to run the transmitter or the receiver circuit. It is influenced by factors like filtering, modulation, digital coding and spreading of the signal.

$$E_{RX}(L, d) = L \cdot E_{elec} \quad (10)$$

5. Simulation and Results

For performance evaluation, the simulations were carried out using Matlab and specific intervals were given for individual plots. In this paper, the residual energy of the network, data packets received at BS, and the number of alive nodes are taken into consideration. It is compared with the BSO-LEACH algorithm and the traditional LEACH algorithm.

BSO Parameters	Value	LEACH Parameters	Value
Deployment Size	100m * 100m	Node deployment	Random
Total Nodes	100	BS Location	50 * 50
Number of iterations	200	Initial Energy	1J
Number of ideas	50	Packet size	500bytes
Number of clusters	5	d_o	30m
Prob. of renewing the cluster center,Pro1	0.4	E_{elec}	50nJ/bit
Prob. of choosing one center,Pro2	0.4	ε_{fs}	10pJ/bit/m ²
Prob. of picking the cluster center,Pro3	0.2	ε_{mp}	0.0013pJ/bit/m ⁴

Table 1. Node distribution Parameters

Figure 4 displays the residual energy versus number of iterations for the LEACH and BSO-LEACH protocols. The two protocols showed a steady fall of energy, but LEACH has a consistent decrease with the number of iterations until iteration 180 because it maintains the same members in each cluster and a new CC is selected only if the current one

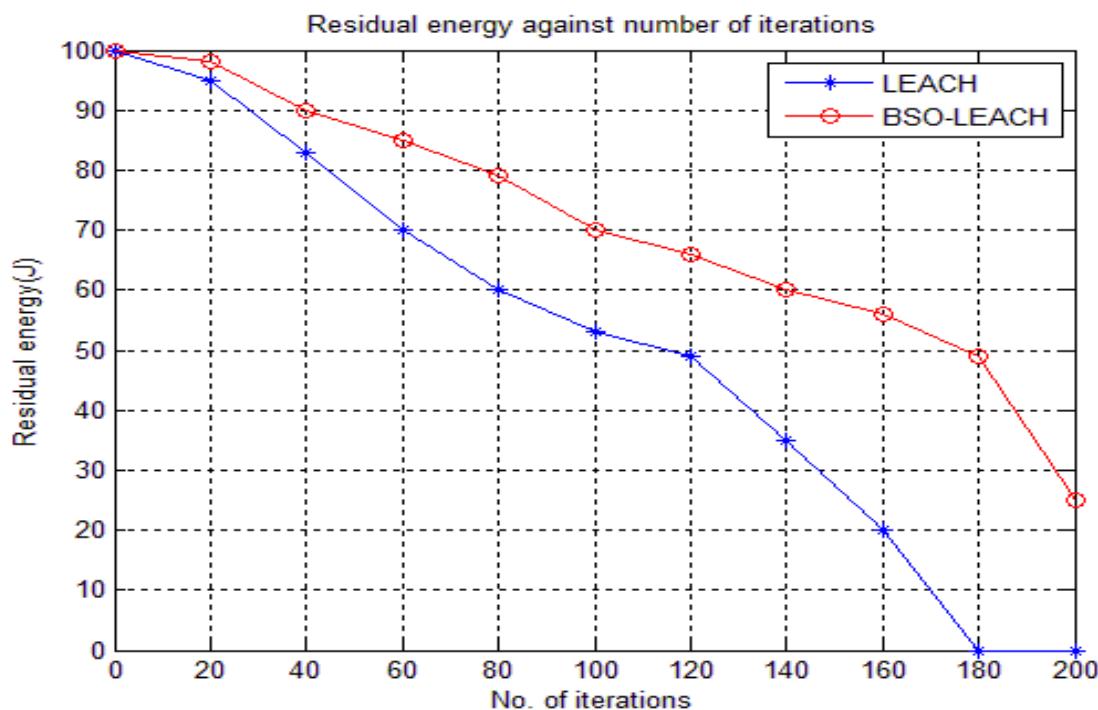


Fig 4: Residual energy against number of iterations

ran out of energy, unlike the BSO-LEACH which usually change the clusters. This difference leads to more control packets, therefore it can be concluded that more energy is consumed on the part of LEACH. When comparing LEACH and BSO-LEACH, we show that LEACH consumes more energy than BSO-LEACH because more data is sent to the BS and massive amount of control packets especially to discover the CCs.

In figure 5, the graph shows amount of data received at the base station against the number of iterations. The simulations show that LEACH and BSO-LEACH have more data delivery to BS, especially BSO-LEACH due to good cluster formation in the network, which ends up delivering more data to the base station. On the other hand, LEACH and BSO-LEACH protocols deliver almost the same amount of data during the initial steps up to iteration 40 because both usually reutilizes the clusters with the same members, so the same data delivery was set in each iteration. On the contrary, it is generally known that network lifetime can be extended to the paramount value by minimizing the energy consumption as much as possible. Therefore, the BSO-LEACH is measured to be better than the LEACH protocol.

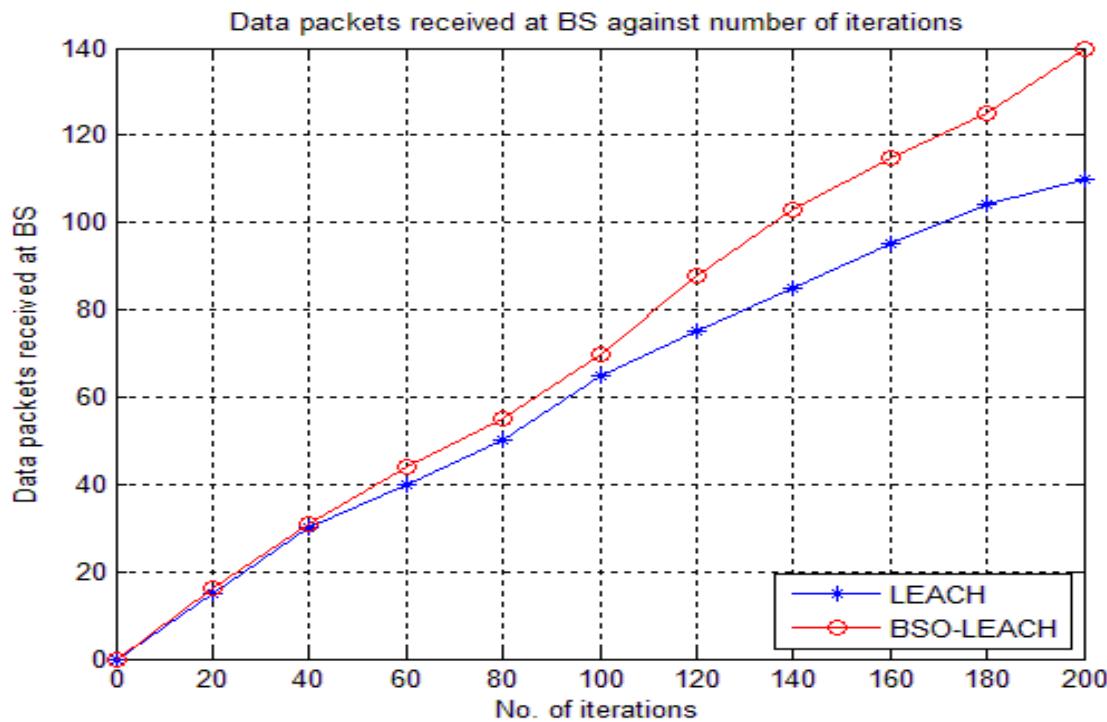


Fig 5: Data packets received at BS against number of iterations

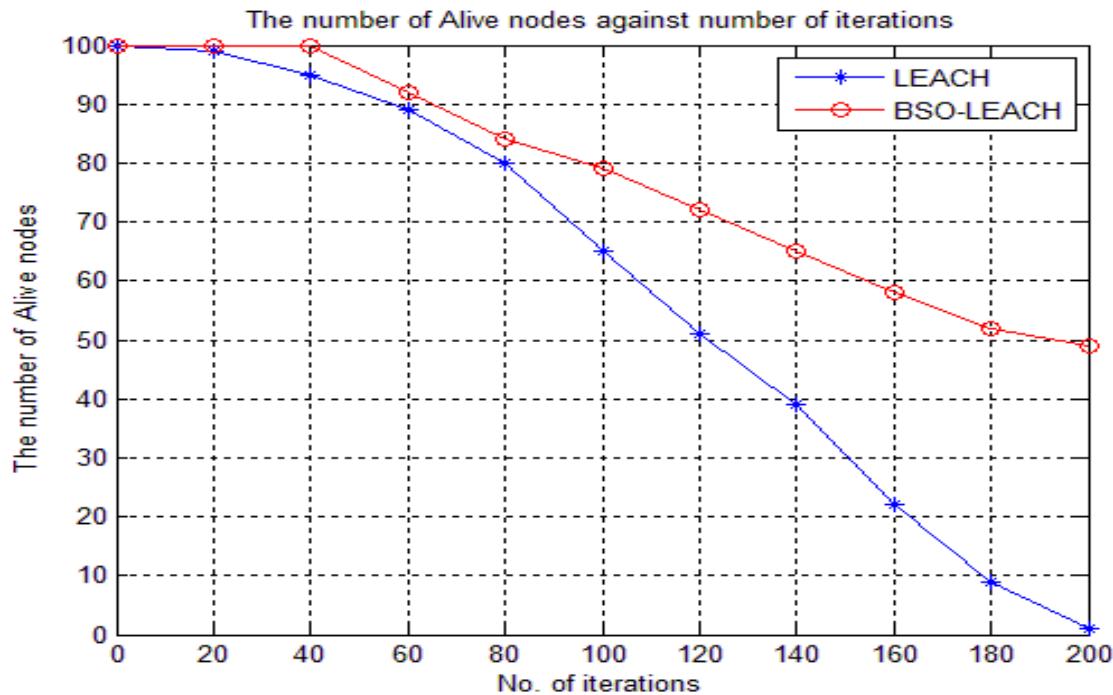


Fig 6: The number of alive nodes against number of iterations

Figure 6 presents the number of nodes that remain alive over the number of iterations. We observed that after the first 20 iterations the number of live nodes for LEACH protocols decrease because it has not changed the CC only after it runs out of energy. Due to the way of CCs selection and the aggregation of data delivered, BSO-LEACH protocol

shows decrease suddenly after 40 iterations as compared to the LEACH protocol. Apart from the BSO-LEACH, we can realize that there is immediate loss of nodes when half of the nodes are already not alive.

6. Conclusion

This paper compares LEACH protocol and BSO-LEACH protocol considering their cluster formation and cluster center formation. Here, the BSO algorithm and the normal LEACH algorithm were used to solve energy saving problems in WSNs. After continues cluster center replacement, the energy of the node falls to minimum limit. The BSO-LEACH algorithm efficiently helped in saving the nodes energy in each iteration for a longer lifetime. Therefore, the cluster center with higher energy connects better to the base station. During the very last cluster center replacement, the energy of the entire network drops to a certain point. At the end, it was seen that the BSO-LEACH algorithm performed a little actively than the traditional LEACH algorithm.

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Difficulties Encountered in Solving Quadratic Equation of the Grade 9 Students: Basis for Constructing Instructional Materials

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Abstract- The study focused on the difficulties encountered in solving quadratic equation of the grade 9 students in Taligaman National High School. This study aimed to determine the difficulties encountered in solving quadratic equation of the grade 9 students. This study used descriptive research procedure which tested the hypothesis or answer question concerning the current status. In gathering the data needed, a survey questionnaire was used to 121 respondents randomly selected from grade 9 students in Taligaman National High School. The researcher used the random sampling design. On the analysis of data some statistical measures were used. The percentage were utilized to answer the respondent profile and the mean which was used to determine the level of student learning attitudes and teacher competency. In the level of determine difficulties encountered in solving quadratic equation the percentage statistical tool were used. This study concluded that the student profile, student learning attitude towards mathematics and teacher competency is not merely contribute to the difficulties encountered by the student in solving quadratic equation. Thus, the topic quadratic equation alone is difficult for some students or there is probability that the greater effect of the difficulties encountered by students are not included in the study. Based from this conclusion, the researchers suggested that the teacher may adopt the enhanced instructional materials provided by this study to decrease or enhance the skills of the students in the difficulties encountered in solving quadratic equation of the student.

Index Terms- Quadratic equation solving, least learned competency , Instructional Materials .

I. INTRODUCTION

Most of the people have persistent trouble with basic mathematics because people like different things. There is nothing that is universally liked by every human being. Math is no exception. Many people do not believe Mathematics is essential to living a modern life and resent being forced to study an abstract science. Some students feel like math is a foreign language in which they can't orient themselves since math is cumulative and they forgot something they learned a while ago and now becomes totally lost.

One of the most thing to do is teach children how important Mathematics in the modernization of the society. Explain to them that mathematics serves as a fundamental foundation that is used in real life situations. It is also a way to interpret and evaluate ideas, considered as a method of logical reasoning unique to man. Mathematics as a school subject, it must be learned expansively and with much depth but unfortunately most of the students find mathematics difficult to deal with. Usually, students lack the ability to easily connect the conceptual concepts of mathematics in reality.

Math requires deductive reasoning, and passive learners often struggle with this kind of active problem solving. Students with memory and attention problems also may struggle as both skills are necessary for mathematical aptitude (Cadiz 2016). Through the years, and probably through the centuries, teachers have struggled to make math meaningful by providing students with problems and examples demonstrating its applications in everyday life.

Sometimes, teacher has a great influence why students hate mathematics because math teachers often do not inspire their students with an appreciation for the beauty of mathematics, instead teaching by rote memorization. Educators are foremost believes in the old cliché: "Experience is the best teacher." A natural part of learning if this be true is the occurrence of personal knowledge or personal involvement. So teaching Mathematics is necessary to the teacher to have the capacity to deal with the learner, instruct, mold, and facilitate them in order to learn best.

There is another instruction we can use in teaching Mathematics, the Direct Instruction. Direct instruction is a teaching model which is aimed of helping student master basic skills and knowledge that can be taught in a step-by-step fashion. Often times it is described as "Straight forward and can be mastered in relatively short of time" on how to solve math problems using mathematical equations (Salandanam, 2000). The teacher should taught the students how to solve problems by following a step-by-step process. By that, they will have the idea on how to solve problems easily and perform well.

Mathematics instruction give the students opportunity to learn and to be able to perform Math problems easily. They can understand and can do Math by following instructions. Teachers and students must have cooperation, for them to understand each other well. Difficulties can be avoided if they will learn how to follow simple instructions that you gave them. Instructions shall

be follow, for them to have wide understandings and can help them lessen their difficulties in Mathematics.

II. CONCEPTUAL FRAMEWORK

This study was anchored on the theory of Bruner's that there are factors that influence the performance of the students in Mathematics. This study theorize further that students' profile, student learning attitudes, and the teachers competency as perceived by the students are contributory factors to the learning difficulties of the students. This was supported by various theories.

Constructivism has become a mainstream theory in educational policy and practice scene and as a result national standards documents influencing the curriculum, are affected. Realistic mathematics education builds upon the principles of the constructivist learning theory. Central within realistic mathematics education is the assumption that mathematics is a human activity which contrasts with mathematics as a well-organized deductive system. In other words, mathematics is viewed as a process in which the student is engaged.

Experiential learning as advocated by David Kolb is learning that occurs by making sense of direct everyday experiences. Experiential learning theory defines learning as "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience" (Kolb, 1984, p. 41). Students' experiences on learning mathematics in school and in their homes will really affect the students' knowledge acquisition of the subject. The mathematics curriculum allows for students to learn by asking relevant questions and discovering new ideas. Discovery and Inquiry-based learning (Bruner, 1961) support the idea that students learn when they make use of personal experiences to discover facts, relationships and concepts.

Jerome Bruner's theory rest on the theme that learning is an active process in which the learners create new ideas based on their prior knowledge. The learner selects and transform details, constructs hypothesis, and makes decisions to do so. According to Tall (2003) students have difficulties with mathematics. He

classified these difficulties as genitive difficulties in learning analysis. Students experienced difficulties in learning math because of their computational weaknesses, their inability to create meaningful connections, and analyze word problems; how to translate it and effectively visualized math concepts.

A favorable attitudes of a student towards a particular subject influence a lot on his interest to learn. She/he learns faster in areas that she/he is interested most and takes for granted the subject that they like best. In addition the teacher academic trainings increases there is a possibility that she/he would prefer to be alone in her/his task, while teacher with lower educational level might prefer to close supervision and explicit instruction from the supervision to be able to perform well in their teaching task. The teacher has the basic responsibility in translating and implementing educational objectives into functional and valuable learning experiences for the student. The success of a student is usually measured in terms of achievements in classroom work particularly in his academic subject (Acero, 2004).

Learning outcomes of the students reflect the quality of teaching learning process. Their relationship with learners, the materials they used and procedure they follow can be observed and used to the advantages of uplifting the teaching learning process. The classroom, which is the formal learning area, must be managed effectively by the teacher in order to achieve the desirable attitudes and behavior of learners. Teaching methods as well as communication skills by the teacher greatly enhance the teaching learning process. Such could be cited as the variables that would indicate the teaching performance of the teacher. However, the nature of the learners must be also considered as there is fact that each individual is unique. (Exclamador 2006).

Schematic Diagram

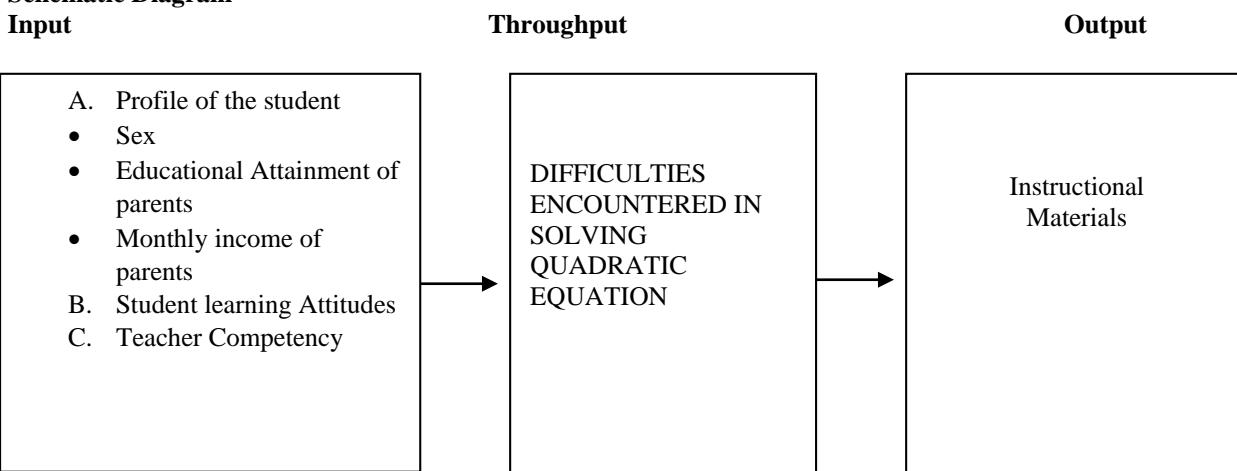


Figure 1. The schematic diagram showing the variables of the study

III. METHODOLOGY

The descriptive research was used in this study. It seeks to determine the learning difficulties of student in solving quadratic equation. It involves collecting data in order to answer the question concerning the current status of the subject of the study.

This study was conducted at Taligaman National High School as one of the popular public schools in Butuan City. The school is located at P-1 Taligaman, Butuan City near in National Highway of Butuan to Davao road. Taligaman National High School teaches students in junior and senior high school. It has a total of 33 rooms – 29 of which are for instructional purposes and the remaining 4 for non-instructional purposes. All in all, the

school has at least one canteen, clinic, computer lab, general academic classroom, home economics, industrial/workshop, laboratory, library, and office plus the senior high school building that is currently under construction. The all of the instructional rooms are standard rooms, meaning they meet the DepEd's guidelines for safety and usability. As to school year 2016-2017 Taligaman National High School is awarded as Top 3.

This study involved all 241 students from five sections. The student who were considered as participant of the study were randomly selected from different section having a sample size of 121. Sample size is the 50% of the population of the Grade 9 students in Taligaman National High School.

Table 1. The Total Number of Participants

Section	Population	Sample Size		Total
		Male	Female	
Dalton	48	16	8	22
Avogadro	48	7	17	24
Lavoisier	49	16	8	22
Chadwick	47	11	13	24
Rutherford	49	4	21	25
Total	241	54	67	121

The researchers aimed to have all the Grade 9 students of Taligaman National High School as the population of the sample. Therefore, the researchers get 50% of the population which 121 as the sample size. The participants were randomly selected in every five section.

The main instrument used to obtain the needed data and information in this study is survey questionnaire. The questionnaire consists of profile of the student, learning attitude of the students towards mathematics and the teacher competency as perceived by the students. The participants were required to answer all the questions involving quadratic equation. On the validity and reliability of instrument the questionnaire was validated by our adviser. The pilot test was conducted at Basag National High School and Ampayon National High School and the data gathered was undergone series of statistical analysis and obtain .825 of reliability index.

Before the questionnaire was given to each of the participant, a letter made by the researchers noted by the adviser and the college dean was given to the principal of TNHS requesting permission for the researchers to gather the data needed for the study. The principal guided the researchers to the math teachers and to the five section of Grade 9.

The researchers then made a short presentation about the study, and then provided each student with survey questionnaire. Participant filled out the questionnaire assuming that they have answered it truthfully with the guidance of the researchers.

Scoring and Quantification of Data

The data was gathered from the respondents were quantified for statistical treatment. The following quantification was utilized:

A. Educational Attainment of Parents were group according to:

Level	Verbal Description
-------	--------------------

1	Elementary Level
2	High School Level
3	College Level
B. Student learning attitudes and teacher competency Level	Student learning attitudes and teacher competency
1	Mean Interval
2	1.00-1.50 Disagree
3	1.51-2.50 Moderately
4	2.51-3.50
5	Moderately Agree
Agree	3.51-4.50 Strongly
C. Difficulties encountered in solving quadratic equation of the students	Difficulties encountered in solving quadratic equation of the students
1	Verbal Description
2	Very Easy
3	Easy
4	Moderately
5	Difficult
5	Difficult
5	Very Difficult

Statistical Tools

In analyzing the gather data, the following statistical tools were utilized in the study: The percentage is used to describe the profile of the respondents and the level of difficulties encounter in solving quadratic equating of the respondents. The Mean use to describe in perception of the Grade 9 students on their learning attitudes towards Mathematics and the teacher competency.

PRESENTATION, ANALYSIS, AND INTERPRETATION OF DATA

Problem 1. What is the profile of the student in Taligaman National High School in terms of Sex, Educational attainment of parents and Monthly Income of Parents?

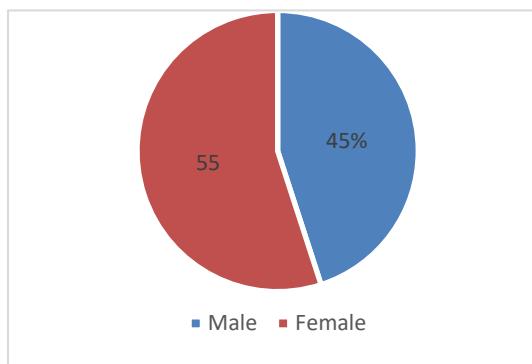


Figure 1 showed the percentage distribution of the sex profile of the respondent. Most of the respondents are female with the population of 55% and the rest is the male with population of 45%.

Figure 1: Distribution of respondents across sex

Figure 2 showed the frequency distribution of the family income of the respondents. Majority of our respondent family income were on below 10K and only few have a family income of 10-15K Above.

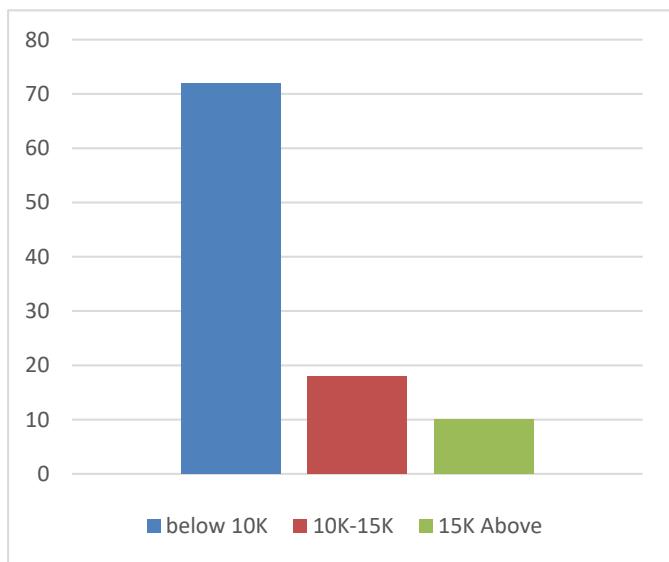


Figure 2: Distribution of respondents as to average monthly income.

Table 1: Percentage of distribution of respondents across Parents' educational attainment

Mother	Elementary Level	Father	High School Level	College Level
Elementary Level	14.88	11.57	Sayon ra ang topic pero kung isud na gami na topic wala nay gana mag tuon."	0.83
High School Level	13.22	33.06		5.79

College Level	0.83	7.44
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Table 1 presented the percentage distribution of respondents' educational attainment. It showed that most of their parents are high school level which attained the highest percentage of 33.06. It followed both parents are elementary level which is 14.88% and a parents who are college level which gained 12.40% respectively.

Problem 2. What is the level of the student learning attitudes towards mathematics?

The below result data shows that the respondents have an average learning attitude towards mathematics that is moderately agree (3.32).

Table 2: Level of students' attitudes towards mathematics

Variable	Mean	Verbal Description
1. like working out a concrete everyday application of math.	3.29	Moderately Agree
2. I like working with friends and classmates on Math assignments.	3.80	Agree
3. I feel good in getting ready for Math test.	3.50	Moderately Agree
4. I like to know the Math result on which I expected to do well.	3.69	Agree
5. I always look forward to learn more about Mathematics.	3.50	Moderately Agree
6. I like solving on Mathematics assignment.	3.26	Moderately Agree
7. I take down notes during lectures/discussion.	3.92	Moderately Agree
8. I study at night before the Math examination.	2.98	Moderately Agree
9. I do review and study on a particular topic in Mathematics.	2.71	Moderately Agree
10. I spend much time to study my Math lesson every night.	2.58	Moderately Agree
Overall	3.32	Moderately Agree

As to willingness to learn mathematics the above data tells us that the students like working with friends on Math assignments (3.80), they also like to know the Math results on which they expected to do well (3.69). However, students hesitant in working out a concrete everyday application in Math (3.29) because most of them said that not all topics in Mathematics has a concrete application. The student feel good in getting ready on Math (3.50) because not all student prepared in taking Math examination and according to them "dili sila ganahan mag study mao ra gihapon lisod ang mga question naihatag sa ilang teacher", therefore, the questions are not appropriate to the different levels of the students' understanding. The student always look forward to learn more about Mathematics with mean of 3.50 which is moderately agree because students said that "nindot lang mag practice ug solve kung sayon ra ang topic pero kung isud na gami na topic wala nay gana mag tuon."

As to manner of the student in studying the lesson in Mathematics they take down notes during the discussion/lectures (3.92). Students like solving on Mathematics assignment, they study at night before the Math examination, they do review and advance study on a particular topic in Mathematics and spend much time to study my Math lesson every night with the mean of (3.26), (2.98), (2.71), (2.58) respectively, which is moderately agree because some of the students were too lazy and they need self-motivation and time. "Dili ko mag hatag ug daku nga time sap ag tuon sa Math kay kapoy man gud naa pud uban dile jud ko kabalo mag answer, ganahan lang ko mag tuon ug mag practice kun kabalo ko ana nga topic", student said. Moreover, according to the students not all of them have their own learner's module where they can practice solving that's why Mathematics is difficult for them. It implies that there are difficulties encountered by the students based on the interview with the students.

Problem 3. What is the level of teacher competency as perceived by the students?

Result shows the mean distribution of the teacher competency as perceived by the students. The overall average of teacher competency as perceived by the students is agree (4.45).

Table 3: Level of teachers' competencies as perceived by the students

Variable	Mea n	Verbal Descripti on
1. My Math teacher presents a particular topic from concept to example and vice versa.	4.52	Strongly Agree
2. My Math teacher presents the lesson logically.	4.52	Strongly Agree
3. My Math teacher explains the lesson very well.	3.74	Strongly Agree
4. My Math teacher cites examples in real life situation in presenting Math.	3.31	Agree
5. My Math teacher is willing to explain a problem in second time if student do not understands.	4.66	Strongly Agree
6. My Math teacher employs a different group activities/work such as problem solving and brainstorming.	4.43	Agree
7. My Math teacher asks question to an individual student.	4.31	Agree
8. My Math teacher is aware of our diverse needs.	4.26	Agree
9. My Math teacher is aware of the variety of IT/resources.	4.09	Agree
10. My Math teacher assesses our learnings at the end of the topic.	4.65	Strongly Agree
Overall	4.45	Agree

Student responded strongly agree that their Math teacher presents a particular topic from concept to example and vice versa (4.52), presents the lesson logically (4.52), explains the lesson very well (4.47), willing to explain a problem in second time if student do not understand (4.66) and assesses their learnings at the end of the topic (4.65). It reveals that Math teacher competency as perceived by the student has the capability to present the particular topic definitely and clearly. From concept to example, logically and well explained. Passionate teacher reflected also in the table, in a way that the teacher willingly to explain a problem in second time if student do not understand and assesses the learning's of the student in every topic.

Somehow the students are also agree that when citing examples in real life situation in presenting Math (4.31), employing different group activities/work such as problem solving and brainstorming (4.43), asking question to an individual students (4.31), aware of student diverse needs (4.26) and aware of the variety of IT/resources (4.09) as the respond of the student in each indicator. It implies that the level of teacher method of teaching was moderately effective as perceived by the student and the teachers' strategies had a big impact to the students learning towards Mathematics.

Problem 4. What is the level of difficulties encountered of the Grade 9 students in Taligaman National High School in solving quadratic equation?

Note that easy to very easy when compressed less than 50% of the student participants, hence the majority found the topic at least moderately difficult.

Table 4: Percentage Distribution on the level of difficulties in solving quadratic equations

Difficulties	Extent of difficulty				
	Very Easy	Easy	Moderately Difficult	Difficult	Very Difficult
1. Solving quadratic equation by (extracting square roots, factoring, completing the square, quadratic formula).	9.09	28.93	28.10	16.53	17.36
2. Solving the nature of the roots of a quadratic equation.	8.26	32.23	33.06	19.83	6.61
3. Solving the sum and the product of roots of quadratic equation.	6.61	35.54	30.58	15.70	11.57
4. Solving equation transformable to quadratic equation.	0.83	23.97	44.64	19.01	11.57
5. Solving word problems involving quadratic equation.	0.00	19.01	35.53	23.97	21.49

Results showed that in solving quadratic equation by (extracting square roots, factoring, completing the square, quadratic formula), most of the student found it moderately difficult. More precisely, the majority found the topic either very difficult (17.36), difficult (16.53) and moderately difficult (28.10). In solving the nature of the roots of a quadratic equation most of the student found it moderately difficult (33.06), difficult (19.83), very difficult (6.61). In solving the sum and the product of the roots of quadratic equation most of the students found it moderately difficult (30.58), difficult (15.70) and very difficult (11.57). In solving equation transformable the quadratic equation most of the students found the topic moderately difficult (44.63), difficult (19.01) and very difficult (11.57). In solving word problems involving quadratic equation the majority found the topic moderately difficult (35.54), difficult (23.97), and very difficult (21.49).

According to the students that the researchers interviewed to make easier for them in solving the above mentioned topic they said that “Ganahan mi mag solve ana nga mga topic kung naa me basihan nga example bisan isa lang para Makita namo ang process kay pag mag quiz man gud me kay ipa close ni maam ang amu ge pang copy”, it implies that the students favored in solving equations if detailed example is provided. Moreover, individual worksheet is necessary for them than just post the problem in the board to avoid distractions especially when somebody is roaming around for any reason. They also like to write their output in the provided worksheet.

IV. CONCLUSION

Based on the findings of the study, the following conclusions were drawn:

The respondents of this study were mostly female with 50%. For the educational attainment of parents mostly are in the high school level, the result found out that this indicator did not affect to the learning difficulties of the students in solving the quadratic equation. Furthermore, the parents' monthly income falls in below 10K. This implies that the students in Taligaman National High School belonged to the poor family.

On the level of learning attitudes towards Mathematics of the respondents, it has been found that the students have moderately agree to the statement in every indicator. Thus, it implies that the students have a moderately skillful towards the Mathematics subject. Since the level of teacher's competence as perceived by the students is very high, this means that teacher's effectiveness in teaching was good as perceived by the students.

For the level of difficulties encountered in solving quadratic equation, almost of the student find it difficult this implies that student needs more practice in solving problems involving quadratic equations.

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The Impact Of Political Stability On Foreign Direct Investment In South Asian Countries Focusing On Afghanistan

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ABSTRACT

The main objective of this research paper is to postulate the relationship between political stability and Foreign Direct Investment (FDI) through panel and time series data analysis for the period of 1996-2017 in South Asia and Afghanistan respectively. This study uses the multiple regression models represented by Generalized Method of Moments (GMM) for South Asia as well as VAR and OLS for Afghanistan. Foreign direct investment is taken as dependent variable and political stability as independent variable including key control variables such as control of corruption, trade openness, and government expenditure. The regression result based on GMM revealed that political stability has positive impact on FDI inflow in South Asia and the rest of control variables such as control of corruption, trade openness are also significant with negative and positive relationships in turn. Furthermore, the findings of VAR and OLS showed that political stability and control of corruption have positive and negative impacts on FDI inflow in Afghanistan but trade openness and government expenditures are not even marginally significant. It is suggested by the result of the study that South Asian countries including Afghanistan are supposed to increase the level of political stability for attracting more FDI inflows through establishing appropriate policies and mechanisms.

Key Words: Foreign Direct Investment (FDI), Political Stability, Control of Corruption, Trade Openness and Government Expenditures.

I. INTRODUCTION

South Asia consists of eight nations such as India, Bhutan, Afghanistan, Pakistan, Sri Lanka, Maldives, Bangladesh, and Nepal. This region is located in a key geographical position because it parts numerous land and sea connections with the Middle East, Central, and East Asia. South Asia is very prominent due to many religions, ethnic groups, cultures, languages that make South Asia notable of volatility in terms up income inequalities, religious conflicts, and other remarkable problems (JICA 2011). More to the point, South Asia is attractive as the world rapid regional economy in providing high quality products and unique services in various fields. South Asia encompasses the world second most populated countries which over all covers 22% of world population. Besides, South Asia is a household of the highest level of illiteracy, poverty, conflict, scarcity, and disease. There have been weak and solid political and social issues such as war, legitimacy, democracy, governance, insurgency, and empowerment that affected the social and political environment (Asia 2008).

Afghanistan geographically a south Asian country is known to be a part of the central Asia recently due to its significant topographical location such that connects central Asian countries with South Asia and playing role as an untroubled shortcut overpass between the two regional spots in Asia. Although Afghanistan is known as the world poorest and insecure country but there have been seemed fewer economic and social developments recently. Due to political instability and security concerns, economic progress is slow down but only agriculture as the main source of economy that employs 80% of workforce and contributes less than half of GDP progressed in the last 16 years. There is also little progress in national manufacturing and service but still, it is not well enough to contribute in the empowerment of Afghan economy. The most remarkable issues in Afghanistan are insecurity, unemployment, weak economy, weak governance, weak law enforcement, and more corruption (Congress 2008).

Problem Statement

Foreign direct investment is noticed as the foremost stimulation to the economic growth especially in developing countries that mainly deals with financial deficiencies, technology, and skills. In fact, FDI contributes to the growth of host countries' economies via various

channels such as involving internal resources for investment, transferring capital information, allocating technology, skills, innovations, capacity, organizational, and managerial practices to the host countries. Besides, it supports the implementation and development of economic policies and strategies of regimes. FDI is also a vital basis for integrating domestic economies to global economies (Calderón 2016). In 2015, FDI inflow increased by 36% globally equals \$1.73 billion that most of the FDI was through extreme movement of cross border mergers and acquisitions in developed countries especially in United States (Imtiaz 2017).

The inflow of FDI in South Asia has been raised since 1980s with some ups and downs but later, it has got a gradual rise due to a few improvements in adopted policies. The strong push of FDI into South Asia had significant and positive impacts on economic and export growth beyond harming the domestic investment. The economic crisis of 2008 troubled the FDI inflow in South Asia such that low decline was noticed during the crisis (Sahoo 2006). South Asia became a key destination for FDI due to constant changes, and liberalizing approach to FDI in refining the FDI policy charters such as bilateral trade agreements, and investment incentives. It is worth mentioned that some foreign investors were not allowed because of some limitations in industries especially in manufacturing and services which were reserved and that is why there are still delays in FDI procedures. Thus, a huge volume of FDI inflow to South Asia is negligible recently (Shariat 2017). In one hand, South Asia is hungry of attracting more FDI for its economic benefits but on the other hand, South Asia applies strict legal and regulatory environment, and further, it lacks of proper policies implementation. In spite of all those attempts towards attracting FDI into South Asia, there are still basic and remarkable challenges for upsetting down the inflow of FDI. For example, lack of political stability, much diverse negotiation between governments and foreign investors, absence of physical infrastructure and skilled labor, shortage of promotional measures, challenges in visa and repatriation processes, deficiency of one window system, the non-activated board of investment, no monitoring of investment mechanism, and lack of transparent policies. Finally, one can argue that still, the inflow of FDI deals with challenges that must be removed or lessened (Sigdel 2004).

It has been a history that political instability became a major obstacle to the attraction of FDI inflow into South Asia. Numerous international investors are interested to invest in South Asia but due to political instability, they are discouraged to invest in spite of all other investment return risks. For instance, Zohaib Akhtar and Hafiz Muhammad Yasin claimed in their research study that political instability in Pakistan, Sri Lanka, Nepal, and Bangladish decreased the volume of FDI inflows. It is added that there have several terrorist attacks, political institutions, and volatile security situations that push out the desires of international investors. Besides, India seemed politically stable compared to other South Asian countries but still it is not trusted for safe FDI (Yasin 2015). Besides, Samridhi Bimal also proved that political instability is a major hitch for the FDI inflow in South Asian countries. He argued that current existence of political instability in South Asia discouraged more amount of FDI inflow recently because many investors are scared of volatile insecurity and political groups that are against states governments (Bimal 2017). So it should be argued that political instability is negative major factor of FDI inflow in South Asian countries.

Afterward, the long unceasing cold war and devastation, Afghanistan became a home for both internal and foreign direct investments because it is a virgin market and investors are the first movers but due to lack of financial deficiencies and security threats, it remained expelled. Afghanistan needs investment almost in every sectors such as industry, construction, exports, agriculture, and mining as they are suggested by the investment incentive policy of Afghanistan (U.S 2015). According to International Monetary Fund 2018 report, the overall FDI is 0.5% as total percentage of GDP which is seemed much more less compared to other countries in the same category (IMF 2018). Up to date, significant number of foreign countries invested in different economic sectors of Afghanistan such as South Africa, Turkey, United Arab Emirates, Canada, United States, Pakistan, Iran, England, China, Netherlands, and India, however, the volume of such FDI is not well enough to meet the needs of Afghan economic development (group 2005). In spite of all attempts toward attracting FDI into the country, Afghanistan still incapacitated to invite quit enough FDI because of inappropriate legal framework for investment, weak tax regime, poor reforms in custom administration, lack of good infrastructure quality and high costs, composite property market, lack of government effectiveness, insecurity and political instability, and fragile financial market (group 2005). The recent hopes and FDI opportunities are Turkmenistan- Afghanistan, Pakistan and India (TAPI) natural gas pipeline project, Chabahar Port agreement among Afghanistan, India, and Iran, the CASA 1000 electricity transmit project, Belt and Road, and special Railway transportation of commercial goods between Afghanistan and Uzbekistan (WBG 2016).

Political instability is the biggest concern toward FDI inflow into Afghanistan since long before. Afghanistan is insecure due to different insurgency groups and bad neighbor's interventions that made the country center of war and terrorisms. Afghanistan is the best option for FDI compared to other South Asian countries but due to political instability, it cannot attract FDI into the country. International investors are interested to invest in Afghanistan but afraid of security challenges. For example, Jehanzeb Khalil, Saima Perveen and Zahid Ali showed in their research study that Afghanistan incapable of attracting FDI due major security hitches. They put the example that China wants to invest in Afghanistan but hesitant due to widespread insecurity and corruption. They provided that Afghanistan is the best opportunity for international investors to invest in mines and infrastructures but it is complicated to ensure the security that affect the value and return of investment (Jehanzeb Khalil 2015).

The following table shows the FDI inflow in South Asian countries from 1996 – 2017.

Table: 1

FDI Inflow in South Asia in Millions of Dollars (1996-2017)								
Coun	AFG	Ban	Bhu	Ind	Mal	Ne	Pak	Sri
1996	0.7	231.6	1.4	2 525.	9.3	19.2	439.3	133.0
1997	- 1.5	575.3	- 0.7	3 619.0	11.4	23.1	711.0	433.0
1998	- 0.0	576.5	-	2 633.0	11.5	12.0	506.0	150.0
1999	6.0	309.1	1.1	2 168.0	12.3	4.4	532.0	201.0
2000	0.2	578.6	-	3 588.0	22.3	- 0.5	309.0	175.1
2001	0.7	354.5	-	5 477.6	20.5	20.9	383.0	81.9
2002	50.0	335.5	2.4	5 629.7	24.7	- 6.0	823.0	192.0
2003	57.8	350.3	3.4	4 321.1	31.8	1.8	534.0	198.7
2004	186.9	460.4	8.9	5 777.8	52.9	- 0.4	1 118.0	223.0
2005	271.0	845.3	6.2	7 621.8	73.2	2.5	2 201.0	272.0
2006	238.0	792.5	72.2	20 327.8	95.2	- 6.6	4 273.0	480.0
2007	188.7	666.4	40.2	25 349.9	132.4	5.9	5 590.0	603.4
2008	46.0	1 086.3	10.1	47 102.4	181.3	1.0	5 438.0	752.2
2009	197.5	700.2	25.6	35 633.9	158.0	38.5	2 338.0	404.0
2010	54.2	913.3	75.5	27 417.1	216.5	86.6	2 022.0	477.6
2011	57.6	1 136.4	28.6	36 190.5	423.5	95.5	1 162.0	955.9
2012	47.2	1 292.6	49.1	24 195.8	228.0	92.0	859.0	941.1
2013	37.6	1 599.2	13.7	28 199.4	360.8	71.3	1 333.0	932.6
2014	43.5	1 551.3	31.6	34 582.1	333.4	30.2	1 868.0	893.6
2015	163.1	2 235.4	17.1	44 064.1	298.0	51.6	1 621.0	679.7
2016	85.7	2 332.7	- 12.7	44 480.6	456.6	106.0	2 479.0	897.0
2017	53.9	2 151.6	10.3	39 916.1	517.5	198.0	2 806.0	1 374.9

Source: world Development Indicators: <https://data.worldbank.org/indicator/BX.KLT.DINV.WD.GD.ZS>

According to table 1, India comes as the top country in South Asia in terms up attracting FDI, Pakistan second, and Bangaladish as the third FDI inflow influencer. On the other hand, Bhutan is the least FDI influencer in South Asia and Afghanistan comes as the second least influencer in South Asia. In general, the South Asian countries are not better in attracting FDI inflow because the current amount of FDIs inflow covers very less parts of their GDPs. One can argue that South Asia needs much more of FDI to meet its need for economic growth recovery.

Objective of the Study

The main objective of this study is to empirically explore the relationship between political stability and FDI inflow into South Asia as well as Afghanistan. There exists numerous factors that affect the FDI inflow in South Asia including Afghanistan but only a few control variables are included in the study such as control of corruption, trade openness and government expenditures. This study uses both panel and time series analysis for the period of 1996-2017 in both focused regions.

II. THEORETICAL FRAMEWORK

Hypothetically, political stability is referred to the capacity of governments for reaching into inland societies and exposing the dynamic resources to assist in the context of FDI. High level of political stability infers that the government is capacitated in terms up of providing physical infrastructure, political institutions, and summon human capitals to confirm a suitable and profitable investment environment. Hence, political stability signals to invite international investors for favorable investments with freely moving capitals and receiving fair returns on investment (KUGLER 2008). Quan Li discovered a new theory regarding the political instability impact on FDI through three sub-sections. First, political instability and violence stimulate investment behaviors via rational expectations and uncertainty. Second, the new theory suggests the effects of various types of political violence such as civil war, regional war, and international terrorism. Third, FDI inflows are resulted from two different but correlated decisions such as the choice of location and the decision of investment amount. Besides, Mac Greggor and Walter (1977) and Aharoni 91996) verified that political risk and stability are central concerns in taking investment decisions (QuanLi 2006).

III. LITERATURE REVIEW

Huong Giang investigated the institutional determinants of FDI in Vietnam through a panel data analysis for the period of 2005-2015 using simple multiple regression model. The results rendered the conclusion that political stability positively affects the FDI inflow in

Vietnam and it is worth mentioned that political stability is strongly significant in connection to FDI beside other factors affecting FDI (Giang 2017).

Petar Kurecic and Filip Kokotovic studied the relevance of political stability on FDI in small, developed and instable threatened economies through a VAR and ARDL models using Panel data analysis for the period of 1996 to 2014. The inferences of the paper found no relationship between political stability and FDI which concluded that political stability is not significant. The study does not suggest that political stability is supposed to attract the inflow of FDI in developed and large economies. On other hand, it is discovered that there exists a positive relationship of political stability with FDI in small economies which this result is very different and contradictory compared to other research studies (Kurecic 2017).

Zohaib Akhtar and Hafiz Mohammad Yasin conducted an analytical study to discover the impact of terrorism and political instability on FDI in Pakistan through a case study in South and East Asian countries. The panel data analysis for the period of 1996 to 2010 was used by applying simple function and econometric multiple regression models. The findings of the study suggested that political instability mainly affects FDI inversely and obtained a strong and significant relationship. It is worth mentioned that countries with solid political stability attract large amount of FDI inflows (Yasin 2015).

Kim Haksoon reconnoitered the impact of political stability on FDI in high and low political stable countries via panel data analysis for the period of 1990 to 2002 using multiple regression model with significant different estimations test such as pooled, random and GLS tests. The result is completely different from other studies which states that host countries with high political stability tend to increase higher FDI outflow which is a positive relationship in terms up FDI outflow but countries with low level of political stability attracts high volume of FDI which is a negative relationship in terms up inflow (Haksoon 2010)

Abdul Malik Nazeer and Mansur Masih researched the impact of political instability on FDI and economic growth in Malaysia through a panel data analysis for the period of 1984-2013 using ARDL econometric model for the purpose cointegration. The study revealed that there exists a strong and a negative significant relationship between political instability and FDI such that political instability discourages FDI adversely. On the hand, political stability encourages FDI in high volume (Masih 2017)

Michal Madr and Ludek Kouba explored the answer for the question of "Does political environment affect inflows of FDI evidenced from emerging markets?" This study applied the panel analysis for the period of 1996-2012 using simple multiple regression model. The conclusion from the result suggests that political environment effect on FDI and elaborated that political instability is significant and inversely associated with FDI in emerging markets. It is worth mentioned that political instability discourages FDI in 78 countries studied in this research absorption (Kouba 2015).

Mashrur M. Khan and Mashfique Ibne Akbar studied the impact of political risk on FDI in 94 middle and high income countries through a panel data analysis for the period of 1986-2009 using simple multiple regression model. The result presented two different conclusions: First, the relationship between political risk and FDI is weak and negative for high income countries but second, the relationship for upper middle income countries is strong and negative. The verdict of this paper advocates that political risk slows down FDI inflow in both high and middle income countries but differs in volumes (Akbar 2013).

Anwar Salem Musibah researched political instability and attracting FDI in a comparative analysis of Middle East and North African countries through a panel data analysis for the period of 2000-2016 using multiple regression model. This research provided that political instability is the core driver of FDI in either ways such that political stability increases FDI and political instability reduces FDI. This research paper determines that there exists a strong negative significant relationship between political instability and FDI and vice versa, strong positive relationship with FDI in focused African countries (Musibah 2017)

Ahmed Berhan Abdella, Navaz Naghavi and Benjamin Chan yin Fah discovered the effect of corruption, trade openness, and political stability on FDI in BRIC countries (Brazil, Russia, India, and China) through a panel data analysis for the period of 2002-2016 using ARDL analysis with several estimation tests. The researchers came up with a positive and significant relationship of political stability on FDI in the long run and suggested that political stability mainly drives up FDI in BRIC countries (Abdella 2018).

Ali Al-Sadig discovered a negative relationship between Corruption and FDI through studying the effect of corruption on FDI inflows in the panel data analysis for the period of 1984-2004 in 117 countries. The researcher used multiple regression model with significant estimation tests such as fixed effect and random effect models. The findings shows that the relationship of corruption is negative but insignificant when high income countries are included. On the other hand, it is significant when high income countries are excluded. The result states that the existence of corruption is a negative driver of FDI because it reduces the volume of FDI in focused countries. Besides, the control of corruption increases the attraction of FDI (Al-Sadig 2009).

Norashida Othman, Zulkorain Yusop, Moham Mansor Ismail and Gul Andaman investigated the impact of government expenditure on FDI inflows in Asian -5 countries (Malaysia, Indonesia, Singapore, Thailand and Philippine) through a panel data analysis for the period of 1982-2016 using Pooled Mean Group (PMG) estimation method. The result of this study declares that government expenditure

subsidizes a positive relationship with FDI and states that if the government expenditure is increased, the volume of FDI increases too. However, the relationship of government expenditure is negative in previous research studies (Othman 2018).

Adina Dornean and Dumitru Cristian Oanea explored the impact of fiscal policy on FDI in the context of the crisis evidenced from central and Eastern European countries through a panel data analysis for the period of 1995-2012 using multiple regression model. The conclusion from this research paper states that government expenditure has got a positive relationship with FDI which can attract more FDI for the purpose of regaining of economies affected by the crisis. However, this relationship is different compared to its previous literature review (Dornean 2014).

Tonia Kandiero and Margaret Chitiga investigated the relationship of trade openness with FDI in 50 African countries through a panel data analysis for the period of 1980-2001 using multiple regression analysis. The result of this paper states that more trade openness encourages more FDI in the focused countries and this declares a positive and significant relationship between trade openness and FDI. It is recommended that the relevant countries are supposed to focus on investment tax, wages, and institutional framework besides trade openness. The finding of this research paper is quite similar to other previous findings (Chitiga 2006).

Kunofiwa Tsaurai studied the impact of trade openness on FDI in Zimbabwe through panel data analysis for the period of 1980-2013 using cointegration test. The finding of this research paper is quite different compared other previous research. The result shows that there is no long relationship between trade openness and FDI inflow in focused country. Besides, the result of this research study is also different from its literature review (Tsaurai 2015).

Research Gap

Throughout literature review, the researcher found a few remarkable gaps in the study of the impact of political stability on FDI inflow in South Asian countries including Afghanistan. First, this issue is not studied much especially in South Asia and also Afghanistan which is the first gap to find how political stability influences FDI inflow in South Asia. Second, many research conducted time series analysis in one country but this paper used both panel for South Asia and time series for Afghanistan in comparison to other South Asian countries. Third, numerous researchers found both statistically and economically insignificant relationships of political stability and FDI which is another big gap in this study. Fourth, fewer research studies found both negative and positive relationships between political stability and FDI but this paper observes the positive relationship. Fifth, this research paper is different in terms of time period which might affect the inferences compared to previous research studies. Sixth, the estimation method of regression in this research study is also different because GMM, ARDL, and VAR are various techniques that are not used in previous studies. Filling and finding these gaps is the motivation to work on this problem and suggest the appropriate policies implications.

IV. RESEARCH METHODOLOGY

This research paper observes the secondary data through panel data analysis for South Asian countries because it studies the assigned title in multiple individuals (South Asian countries) in the period of 22 years (1996-2017). The data for the dependent variable such as FDI and independent variables such as political stability, control of corruption, total trade, economic growth, and general government expenditures are taken from the World Bank Indicators. Besides, there is also a special focus on discovering the relationship of political stability with FDI in Afghanistan. In order to explore this relationship, the time series analysis is used for the same period (1996-2017). It is worth mentioned that that panel data analysis contains "i" that stands for identity such as country and individuals and "t" for time period such that these make panel data analysis different from time series analysis. On the other hand, time series includes only "t" for time periods in the featured model and not "i" because there exists only one country or individual.

Econometric Model

This study practices the multiple regression models both for South Asia and Afghanistan because this research paper attempts to find the relationship of one dependent variable with multiple independent variables. First, this study model expresses FDI inflows as a function of political stability (PolStab), control of corruption (ConCorrup), trade openness (TradeGDP), and government expenditures (GovExp). Second, to test the hypothesis and show the relationships, a simple multiple regression model is applied.

Model 1: (Panel Data Analysis) for South Asian Countries

Simple function: $FDI = F(PolStab, ConCorrup, TradeGDP, GovExp)$1

Plain Form: $Y_j = \beta_0 + \beta_1 X_{1j} + \beta_2 X_{2j} + \dots + \beta_n X_{nj} + \varepsilon$ 2

Featured Form: $\beta_0 + \beta_1 (PolStab)_{it} + \beta_2 (ConCorrup)_{it} + \beta_3 (TradeGDP)_{it} + \beta_4 (GovExp)_{it} + \mu_i + U_{it}$3

Model 2: (Time Series Analysis) for Afghanistan

Featured Form: $\beta_0 + \beta_1 (\text{PolStab})_t + \beta_2 (\text{ConCorrup})_t + \beta_3 (\text{TradeGDP})_t + \beta_4 (\text{GovExp})_t + U_t$3

i: 1, 2....., *N*(8)

t: 1, 2....., *T*(22)

Where (Both Models)

β_0 : The intercept or constant amount

$\beta_1 - \beta_4$: The coefficients of the assigned regressors

FDI: Foreign Direct Investment measured in percentage of GDP

PolStab: Political stability measured in the likelihood of political instability, violence, and terrorism which is measured as index

ConCorrup: Control of corruption which is measured as an index

TradeGDP: The trade openness measured in percentage of GDP

GovExp: The government expenditure is measured in percentage of total GDP

μ_i : The unobserved effect error

U_{it} : The general error term or *idiosyncratic error*.

Hypothesis

H_0 : There exists no significant relationship between FDI and political stability
 H_1 : There exists a significant relationship between FDI and political stability

H4: There exists a significant relationship between PDI and political stability

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$$110. \quad p_1 - p_2 - p_3 - p_4 = 0$$

H1: at least one $\beta_i \neq 0$

Variables Justification and Expected Signs

Foreign Direct Investment is the inflow of investment into host countries that is the sum of short and long term equity capital and reinvestment earnings which is measured in percentage of GDP (World Bank 2019). Besides, FDI is believed as the foremost economic factor that affect the economic growth in countries that suffer from lack of economic growth. The attraction of more FDI inflows into the countries enhance labor skills, innovations, production, and technology. Countries that experienced high volume of FDI inflows are running the fastest economies in the world.

Political stability is the absence of violence and terrorism that is measured in the likelihood of political instability, violence, and terrorism ranked between -2.5-2.5 which means that a country with 2.5 marks contains complete political stability and vice versa (World Bank 2019). More importantly, political stability is positively related with FDI which means that the increase in political stability will increase the attraction of FDI into that country. Foyzur Rahman Jewel discovered in a research study in Bangladesh that political stability has positive impacts on FDI in the long run but it is also added that there is not relationship between political stability and FDI in the short run (Jewel 2015). Furthermore, Bakhtiar Molaie and Azad Ahmadi explored the relationship of political stability and FDI in three country groups such as developed, developing and least developing. He discovered that the effect of political stability on FDI is positive in both developed and developing countries but not in least developing countries. So based on these analysis, it is expected that political stability is positively correlated with FDI with positive coefficient sign (Bakhtiar Molaie 2013).

Control of corruption is the miss use of public power in terms up of private gain, petty and grand cash, and capture and it is ranked between -2.5-2.5. The more a country has marks close to 2.5, the more control of corruption exists in that country and vice versa (World Bank 2019). Although, it is believed that control of corruption is a positive factor of FDI, still, many researchers found out both positive and negative relationship between control of corruption and the inflow of FDI. Besides, strict mechanisms and investment policies also discourage FDI inflow in such countries. Leon Zurawic and Mohsin Habib discovered a negative relationship of control of corruption and FDI but argued that this relationship is different in the last 25 years of the study (Zurawicki 2010). Based on these indications, this study attempts to discover the negative relationship of control of corruption and FDI because tolerable level of corruption pays the way to pull FDI inflow into countries.

Trade openness is the sum of imports and exports of goods and services and it is measured in percentage of GDP (World Bank 2019). In other words, it is actually exports minus imports which equals to trade openness. Countries with high amount of trade have great benefits because it indicates that these countries are good in labor skills, technology, and production which justifies that these countries export a lot compared to imports. One reason could be the existence of high volume of FDI and vice versa. Still, it is believed that more trade in a country pulls more FDI into that country. Valeriano Martínez San Román, Marta Bengoa Calvo and Blanca Sánchez-Robles

Rute came with the conclusion that an increase in trade openness enhances the inflow of FDI into European countries in a situation when all border bureaucracy and cross border barriers are removed. They discovered that there exists a positive relation between trade and FDI (Román 2009). So based on literature review and this analysis, the expected sign of total trade in this research paper is positive.

Finally, general expenditure is the expenses on investment, health, education, security, administration, and goods and services and it is measured in percentage of total GDP (WorldBank 2019). One can argue that more volume of government expenditure tends to decrease the level of FDI because the states themselves investing in different sectors which is why it discourages FDI inflow. If the states invest, then there will be no profitable opportunities for FDI into those countries. Ahmad Mohammad Obeid Gharaibeh discovered negative but insignificant relationship of government expenditures on specific sectors in the research study in Bahrain. He came with the argument that government expenditure is not significant but claimed that it may affect negatively the inflow of FDI in Bahrain (Gharaibeh 2015). On the other hand, Norashida Othman, Zulkornain Yusop, Gul Andaman and Mohd Mansor Ismail discovered in a research conducted in 5 Asian countries such as Malaysia, Indonesia, Singapore, Thailand and Philippine that the government expenditures have positive impacts on FDI inflow. This means that there is a positive relationship between government expenditure and FDI in Asian 5 countries. Although the relationship between government expenditures and FDI is both negative and positive, this paper expects a negative relationship of government expenditures and FDI (Othman 2018).

Table 2: Summary of the Variables Description and Their Expected Signs

Variable	Description	Expected Sign	
		Pos +	Neg -
FDI	Foreign Direct Investment	✓	
ConCorrup	Control of Corruption		✓
PolStab	Political Stability	✓	
TradeGDP	Trade	✓	
GovExp	Government Expenditures		✓

Source: Author self-made

V. DIAGNOSTIC AND ESTIMATION METHOD

Significant diagnostics tests such as multicollinearity, autocorrelation, and unit root tests are used for the purpose of fitting the data into model but cointegration and Vector Autoregression tests are applied for discovering the short and long term relationships between dependent and independent variables. For the purpose of discovering good inferences, GMM estimation technique is applied through lagging step one because it is believed that general government expenditure is assumed to be endogenous however quit relevant instrumental variables are instrumented such as expenses on investment, education, and health which did not give good inferences because they were not fitted instruments. In addition, the panel data analysis suggests fixed effect estimation for removing country individual fixed effect and time invariant variables that create endogeneity problem but random effect estimation for eliminating serial correlation and using time invariant variables. Since this data set did not have time invariant observations, and serial correlation, so that is why fixed and random effect estimations are not applied in this research study.

Multicollinearity (VIF)

The best way to assess multicollinearity is used to variance inflation factor (VIF) which shows that how much the variance of the coefficient of regressors is increased. If the VIF is equivalent to 1, there exists no multicollinearity, but if the VIF is bigger than 1, then there is a slight multicollinearity. If the VIF for a variable is greater than 5 to 10, it shows a high multicollinearity which is a problem and must be removed from the model (Akinwande 2015). The VIF for a single predictor variable is expressed in following function:

$$VIF = r_{ii} + \frac{(1)}{1 - R^2}, i = 1, \dots, P$$

In the above function, R^2 is the coefficient of multiple correlation in regression between X_i and $P-1$ is predictor variables. In multiple regression model of P regressors (X_i), variance inflation factors are diagonal elements (r^{ii}) of the converse of the correlation matrix (R_{pxp}) of the p regressors (Murray 2012).

Test for Stationarity

As per a researcher, it is important to check for stationarity and non-stationarity of the variables such that stationarity is the condition of Classical Linear Regression Model (CLRM). A variable that its statistical properties such as mean and variance do not change over time is called stationary variable, if not, is called non-stationary. The existence of non-stationary variable gives spurious regression result and besides, R-Squared and t-statistics will be overestimated and misleading (Ly'ocs 2009).

Autocorrelation

Autocorrelation is a problem when the observation of one variable is correlated with another variable in their disturbances which the results of OLS are still linear, unbiased, and reliable but not efficient. This research paper uses the Wooldridge test which the decision rule for Wooldridge test is that Null hypothesis (H_0): there is not Serial correlation but H_1 : there is serial correlation. Besides, the null hypothesis is rejected when the p-value is less than significance level (5%) otherwise do not reject (Toturial 2018). If the variables are stationary or in other words, they are well defined values for both mean and variances, then the following function fits the definition:

$$R(s, t) = \frac{E\{(X_t - \mu_t)(X_s - \mu_s)\}}{\sigma_t \sigma_s}$$

Where E is expected value operative and the values should lie between (-1, 1,) which -1 points to anti-correlation and 1 shows perfect correlation. But if the X_t is the second order stationarity via first difference, then the following function time-lag function justifies the definition (Autocorrelation 2008).

$$R(T) = \frac{E\{(X_t - \mu)(X_{t+T} - \mu)\}}{\sigma^2}$$

Cointegration (ARDL)

Cointegration is an econometric theory that discovers the short and long run relation between and among variables over time series through making solid algebraic and economic base for error correction model. Discovering cointegration is vital pace for clarifying expressive long run relationships. There exists several tests for cointegration but Autoregressive Distributed lag is as best among them. The best way to show ARDL in formula is as follow:

$$\Phi(L, P) = \sum \beta_i L^i X_i + \delta W_t + u_t$$

Where the X_i lag operative and W_t is vector of defined variables such as the intercept term, time trends, seasonal dummies, or exogenous variables with the fixed lags. In each case, the maximum order of lags is preferred by the researcher (Nkoro 2016).

Generalized Method of Moments Estimation (GMM)

Generalized Method of Moments Estimation (GMM) is adapted to a wide range of problems in econometrics such as heteroscedasticity, serial correlation, nonlinearities and lag instrumenting. Cragg (1983) discovered the improvement of OLS in the presence of neglected heteroscedasticity by using GMM. Hansen's (1982) proved that GMM gives reliable estimates under weak assumption and added that optional instrumental variables in all three types of data analysis such as panel, time series and cross sectional are casted as GMM estimator. The use of lagged values of both dependent and independent variables provide more sense when estimating rational expectations because afterward, the error term is not correlated with all variables in early time periods in the assigned equation. Finally, GMM could be applied often in models having unobserved effects when the regressors are assumed to be not strictly exogenous after controlling the unobserved effects. In such cases, GMM with supplementary moment conditions provides more reliable estimates than 2SLS method (M.Wooldridge 2001).

Vector Autoregression

Cooley and Dwyer stated that Vector Autoregressive (VAR) is an eye-catching study tool for the purpose of distinguishing dynamic relations of between variables without taking to plea economic theory (AWOKUSE 2003). In fact, VAR lets scholars to study the importance of one variable in forecasting another variable through its past values which is specified as linear function of its own and another variable past lags (Stata 2013). Besides, VAR is very useful for catching the co-movements among variables in describing data, information, and interpretation of the regressors (McGuire 2011). In this research study, VAR is used to discover the long run relationship among variables and predicting their upcoming values. Furthermore, using VAR provides justification for the importance of assigned variables in the study of Afghanistan. Generally, VAR for given vector of X_t is expressed as below;

$$X_t = \sum_{i=1}^k B_i X_{t-i} + C Z_t + U_t$$

Where both X_t and U_t are random vectors but Z_t is the vector of non-stochastic variables and finally, B_i and C are the correct matrixes of coefficients (AWOKUSE 2003).

VI. DIAGNOSTIC TESTS AND REGRESSION RESULTS

Summary statistics is a general and expressive summarization of all the focused variables such as means, median, standard deviation, and minimum and maximum number which is the first glance for a researcher to figure out a good understanding of the data. Besides, it helps a researcher that how big and small numbers are included in the data set that may affect or mislead the mean and median of a variable.

Table 3: Summary Statistics

Variable	Obs	Mean	Std.Dev	Min	Max
FDI	176	1.579528	2.22864	-.19127	15.26593
ConCorrup	176	-.5183396	.77644	-1.6382	2.893845
PolStab	176	-9687735	1.1678	-3.1099	1.283388
TradeGDP	176	60.12654	37.94966	0	184.0933
GovExp	176	9.554745	5.547751	0	21.94472

Source: Computed from WDI Data via Stata

The mean shows the central trend in a data set but still, there is not good or bad means because it just measures the central point in data set. Very big and very small means indicate that the observation contains big or small data points. In table 3, trade openness has the highest mean which is 60.12654 but the smallest mean is -.50183396 for control of corruption. The most remarkable point in summary statistics is the standard deviation that show how much the data point is spreaded from its mean which the small is the best but the big is the worst. In the above table, trade openness has the highest standard deviations which is 37.94.

Table 4: VIF Test

VIF Test		
Variable	VIF	1/VIF
ConCorrup	4.47	0.223490
PolStab	3.08	0.324629
TradeGDP	2.10	0.476048
GovExp	1.06	0.945548

Source: Computed from WDI Data via Stata

Following table 4, it is seemed that the correlations of specified variables are lesser than the maximum limit of the VIF which is 5. This means that the assigned model does not suffer from multicollinearity problem. The highest correlation is expressed by control of corruption which is still not supposed to be removed from the model. Thus, multicollinearity is not existed in this regression model.

Table 5: Autocorrelation

Wooldridge Test for Autocorrelation in Panel Data	
H0: no first-order autocorrelation	
Prob> F=	0.1752

Source: Computed from WDI Data via Stata

Following table 5, the null hypothesis is not rejected in favor of alternative. Since the result of this research shows that p-value is greater than significance level and we do not have enough evidence to reject the null hypothesis. Finally, it is argued that the model does not have autocorrelation.

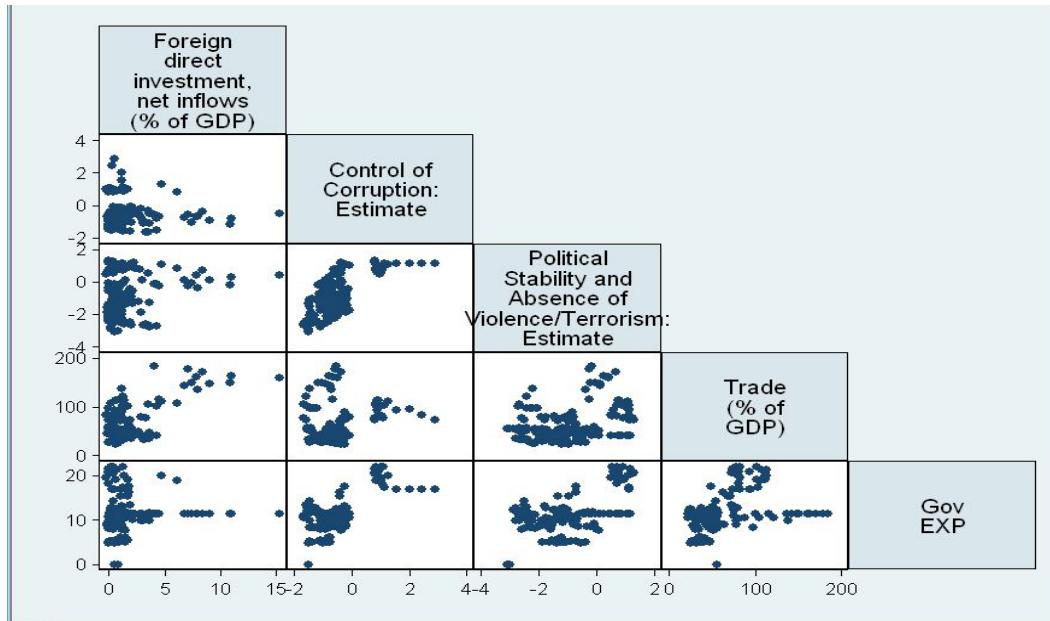
Table 6: Unit Root Test

Variables	T- Statistic	P-value	Stationary Result
FDI	-5.6464	0.0000	1(0)
ConCorrup	-2.6216	0.0006	1(0)
PolStab	-2.9035	0.0029	1(0)
TradeGDP	-4.2020	0.0001	1(1)
GovExp	-3.5704	0.0002	1(0)

Source: Computed from WDI Data via Stata

According to table 6, all the variables except trade openness are stationary in levels because all the p-values are less than significance level which is 5% although it happens very rarely when all the variables are stationary. It is worth mentioned that if a variable is non-stationary, then it is vital to alter the same variable to stationarity by the first difference method such as trade openness in this study.

Figure 1: The Correlation between Dependent and Independent Variables in Graph



Source: Computed from WDI Data via Stata

Beforehand, running other econometric analysis, it is very essential to show a graphical display of rough correlations between dependent and independent variables in selected regions. For this purpose, scatter plot matrix is the best way to exhibit this relationship. Regarding, Figure 1, the focused variable (political stability) and other control variables have a linear relationships with FDI but of course there exists some outliers too. It is rare to happen that all the data should be without outliers. Besides, one can picture the internal relationship of any two variables put side by side in diagonal shape but the very important pinpoint is the correlation between dependent and independent variables. It is believed that in this scatter plot matrix, the dependent variable (FDI) has acceptable correlations with independent variables such as control of corruption, trade and government expenditures in this study.

Table 7: Cointegration (ARDL) Result

FDI	Coef.	Std. Err.	Z	P> z
PolStab	.3970328	.3116519	1.27	0.203
ConCorrup	-.6517345	.3817745	-1.71	0.088
TradeGDP	-.0334097	.0152527	-2.19	0.028
GovExp	.1127242	.066414	1.70	0.090

Source: Computed from WDI Data via Stata

Following the table 7, it is revealed that control of corruption, economic growth, and government expenditures are significant except political stability but it is a stationary variable that is believed to have significant relationship with FDI in other estimation tests. The big concern is the relationship of non-stationary variable such as trade openness but it is significant at 2.8% significance level which is assumed to have relationship in other estimation tests such as OLS and GMM too. Finally, it is argued that all the focused variables have fair connections with FDI especially in the long run which is an important assumption of linear regression model in econometrics.

GMM Estimation Result for South Asia

The rationale behind using GMM estimation is that both control of corruption and government expenditures were believed to be endogenous variables in OLS and that the result was not reliable for final decisions. Control of corruption is the index and that is why finding the correct instrument was a big challenge. Next, a few instrumental variables such as total investment, expenditures on education

and health were tried as instruments through 2SLS for government expenditures but did not give good inferences. So then it was very vital to apply GMM estimation which provided good reliable result. In the application of GMM, both control of corruption and government expenditure were taken as endogenous variables and the rest as exogenous variables with lagging 1.

Table 8: GMM

<i>GMM Estimation</i>					
Number of Obs: 176					
Groups: 8					
Prob > F = 0.0000					
FDI	Coef.	Std.Err	T	P>/Z/	95% Conf Intv
FDI L1	.4713476	.0552442	8.53	0.000	.3630711 .5796242
PolStab	.2920073	.1643576	1.78	0.076	-.0301278 .6141423
ConCorrup	-.4828432	.2391786	-2.02	0.044	-.9516245 -.0140618
TradeGDP	.026589	.003681	7.22	0.000	.0193745 .0338036
GovExp	-.0484943	.0380468	-1.27	0.202	-.1230648 .0260761
Cons	-.201441	.5217849	-0.39	0.699	-1.224121 .8212385

Source: Computed from WDI Data via Stata

The first important pinpoint in a regression result is to show the dimension of standard error because it shows that how much the data is spreaded from the mean of the data and it also affects directly the coefficient of the variable. The bigger the standard error, the bigger the coefficient of the variable and the worst the regression result for the relevant variable and the smaller the standard error, the better the result because it will give smaller coefficient. In table 68, political stability has the biggest standard error but total trade has the smallest standard error.

According to GMM result, the political stability as the focused and main independent variable is significant at 7.6% significance level with a positive relationship with FDI which means that the increase in political stability will increase and attract more FDI into the South countries. This result is line with Huong Giang (Giang 2017), Ahmed Berhan Abdella, Navaz Naghavi and Benjamin Chan yin Fah (Abdella 2018), and Michal Madr and Ludek Kouba (Kouba 2015) who found that political stability is strongly significant such that political stability positively affects FDI inflow in Vietnam and Brazil, Russia, India, and China (BRIC) countries respectively. The researchers provided that the political stability consists a positive and significant relationship with FDI in the long run and suggested that political stability mainly pushes up FDI in Vietnam and Brazil, Russia India and China countries. On the other hand, many researchers such as Zohaib Akhtar and Hafiz Mohammad Yasin (Yasin 2015), Abdul Malik Nazeer and Mansur Masih (Masih 2017), Mashrur M. Khan and Mashfique Ibne Akbar (Akbar 2013) studied the same issue inversely like the impact political instability on FDI in Pakistan, Malaysia, high and middle incomes countries which came up with inverse relationship of political instability with FDI. The main conclusions from these research studies suggest that political instability is significant with weak and strong negative relationships with FDI. It is added that political instability discourages FDI inflow into the host countries which is the vice versa relationship of political stability with FDI. Furthermore, Kim Haksoon (Haksoon 2010) explored a different analysis of political stability in terms up FDI outflow and inflow in high and low stable countries. He exposed that host countries with high political stability tends to increase higher FDI outflow which is a positive relationship in terms up FDI outflow but countries with low level of political stability attracts high volume of FDI which is a negative relationship in terms up inflow. Petar Kurecic and Filip Kokotovic (Kurecic 2017) proved that no relationship exists between political stability and FDI in small, developed economies and threatened economies. He concluded that political stability is not significant and does not suggest that political stability is supposed to attract the inflow of FDI in developed and large economies.

The rest of control variables such as control of corruption is significant at 5% significance level with negative relationship with FDI as it indicates that an increase in control of corruption will tend to reduce the attraction of FDI into South Asian countries. The result of this research study is the same with research conducted by Ali Al-Sadig who discovered that corruption and FDI are inversely linked in 117 countries. Besides, it is justified that control of corruption is insignificant only in high income countries but significant when high income countries are excluded in the study. The author argued that the existence of control corruption is a negative driver of FDI because it reduces the volume of FDI in focused countries (Al-Sadig 2009).

More to the point, trade openness is significant at 1% significance level with positive relationship with FDI which means that an increase in trade openness will increase FDI in South Asian countries. A relevant research study conducted by Tonia Kandiero and Margaret Chitiga declared a positive and significant relationship between trade openness and FDI in 50 African countries. It is suggested that trade openness encourages more FDI in the focused countries. It is recommended that the relevant countries are supposed to focus on investment tax, wages, and institutional framework besides trade openness (Chitiga 2006). On the other hand, Kunofiwia Tsaurai came

up with a different result which shows that there is not long relationship between trade openness and FDI inflow in focused country (Tsaurai 2015).

Finally, government expenditure is not significant even after removing endogeneity through GMM but it has negative relationship with FDI as it was expected. Adina Dornean and Dumitru Cristian Oanea indicated that government expenditure is significant and has got a positive relationship with FDI in central and Eastern European countries which can attract more FDI for the purpose of regaining of economies affected by the crisis (Dornean 2014). Although, it is not significant but still, one can argue that government expenditure tends to reduce the attraction of FDI in South Asian countries due its negative relationship with FDI. It is worth mentioned that the negative sign of government expenditures is important in this study and that is why it is not removed from the regression model. Overall, significant changes brought after running GMM compared to simple OLS such as decreasing the coefficient of control of corruption and making government expenditures marginally significant.

FOCUS ON AFGHANISTAN

Table 9: Vector Autoregression

FDI	Coef.	Std. Err.	Z	P> z
PolStab	1.730415	.9349217	1.85	0.064
ConCorrup	-4.506796	1.090762	-4.13	0.000
TradeGDP	.0533163	.0102191	5.22	0.000
GovExp	.3790205	.1348408	2.81	0.005

Source: Computed from WDI Data via Stata

According to the result of VAR, all the four variables such as Political stability, control of corruption, trade openness and government expenditures are significant at less than 5% significance levels. This test provided that all the independent variables have the expected relationships with FDI except government expenditures. The conclusion from this test states that both macroeconomic and government policies play a significant role in attracting FDI into Afghanistan.

Table 10: Ordinary Least Squared Estimation

<i>OLS Estimation</i>						
Number of Obs: 176						
R-squared = 0.4871						
Adj R-squared = 0.3664						
Prob > F = 0.0000						
FDI	Coef.	Std.Err	T	P> Z 	95% Conf Intv	
PolStab	.8579319	.3037126	-2.82	0.012	-1.498709	.2171545
ConCorrup	-2.97065	1.459726	-2.04	0.058	-6.050403	.109104
TradeGDP	.0060191	.0792272	-0.08	0.940	-.1731739	.1611357
GovExp	.1532902	.1314436	1.17	0.260	-.1240316	.430612
Cons	-4.591681	2.142053	-2.14	0.047	-9.111019	-.0723432

Source: Computed from WDI Data via Stata

Since Afghanistan is one of the South Asian countries, that is why one of the main objectives of this study is to discover the impact of political stability on attracting FDI into Afghanistan. For this purpose, only simple OLS estimation is applied and remarkably, it provided fair results. The political stability as the focused independent variable is significant at 1.2% with positive relationship with FDI attraction which indicates that more political stability will increase the volume of FDI in Afghanistan which is quite the same as in South Asian countries. This result is the same with Huong Giang research findings conducted in Vietnam as it showed that political stability is extremely significant with positive relationship with FDI (Giang 2017). Besides, Ahmed Berhan Abdella, Navaz Naghavi and Benjamin Chan yin Fah (Abdella 2018) and Michal Madr and Ludek Kouba discovered similar conclusions in the role of political stability in attracting FDI in Brazil, Russia, India, and China (BRIC) countries (Kouba 2015). They claimed that political stability is the major attracting determinant of FDI in BRIC countries. On the other hand, the result of this research paper is not the same with Petar Kurecic and Filip Kokotovic research work who proved that no relationship between political stability and FDI exists in small, developed economies and added that instability threatened economies (Kurecic 2017). It is concluded that political stability is not significant and does not suggest that political stability is supposed to attract the inflow of FDI in developed and large economies.

Moreover, control of corruption is significant at 5.8% significance level with negative coefficient sign which means that more control of corruption will reduce the volume of FDI in Afghanistan. Ali Al-Sadig concluded that corruption and FDI are inversely linked in 117 countries which the result is the same as in this research study, however, it is pointed out that control of corruption is insignificant only in high income countries but significant when high income countries are excluded. The author reasoned that the existence of corruption is a negative driver of FDI because it reduces the volume of FDI in focused countries (Al-Sadig 2009).

On the other hand, government expenditures and trade openness are not significant even at 10% significance level with positive and negative signs. The signs of both insignificant variables are the same as expected in this study. This means that government expenditures and trade openness do not attract the FDI inflow in Afghanistan. On the contrary, Tonia Kandiero and Margaret Chitiga studied the impact of trade openness on FDI in 50 African countries. It is concluded that trade openness encourages more FDI in the focused countries (Chitiga 2006). Finally, government expenditure is not significant in the study of Afghanistan but it has positive relationship with FDI similar to literature review. Adina Dornean and Dumitru Cristian Oanea showed that government expenditure is significant and has got a positive relationship with FDI in central and Eastern European countries (Dornean 2014). Although, government expenditure is not significant but still one can argue that government expenditure tends to increase the attraction of FDI in Afghanistan due its positive relationship with FDI.

1. CONCLUSION

This study used the panel data analysis for discovering the impact of political stability in South Asian countries (India, Pakistan, Sri Lanka, Bhutan, Nepal, Maldives, and Afghanistan), and meanwhile a time series examination for studying the same issue in a special focus on Afghanistan for the period of 1996-2017. The assigned model is the multiple regression model in the study of both topographies. Various diagnostic tests for ensuring the data fitness and detecting model specification problems are applied such as VIF, autocorrelation, Unit root, and ARDL tests. For estimation purpose, simple OLS and GMM regressions are applied for South Asian countries but for Afghanistan, VAR and simple OLS estimation tests are used in this study.

The findings of this study in South Asian countries showed that political stability and trade openness are significant and have strong positive relationships with FDI but control of corruption is significant with a negative relationship with FDI which these results are similar with existed literature review. On the hand, government expenditures is insignificant but the negative expected sign is important in this study that is why it is not removed. It is suggested by the result of the study that political stability, control of corruption, and total trade openness attract FDI into South Asian countries except government expenditures. Focusing in Afghanistan, results indicated that only political stability and control of corruption are significant and showed positive and negative relationship with FDI respectively which this result is similar with previous literature review. The other two macroeconomic factors are insignificant and both showed positive relationships with FDI which are much different from existed literature review. One can argue that only social and political policies can attract FDI into Afghanistan, not macroeconomic determinants.

2. POLICY RECOMMENDATIONS

Since FDI becomes an important factor for economic development and globalization both in South Asia and Afghanistan, that is why, it is increase will enhance the economic status quo in both regions. As the study suggested that increasing political stability will increase the attraction of FDI in South Asia including Afghanistan, so the relevant governments of South Asia and Afghanistan are supposed to increase the level of political stability for the purpose attracting FDI and contrariwise, the same regions should avoid any political barriers such as insecurity, violence and terrorist assaults that prevent the desirability of FDI. Besides, the relevant states should adopt policies and strategic mechanisms for conveying political stability into the focused countries.

More to the point, more control of corruption is believed to increase FDI attraction but it is vice versa. Due to strict rules, regulations, and policies toward FDI pull, it is discovered that the increase of control of corruption will decrease the desirability of FDI in South Asia and also in Afghanistan. So it is suggested by the results of the study that so much control of corruption is a problem for FDI attraction. So it is concluded that South Asia and especially Afghanistan are not supposed to completely remove the level of corruption because not much but a little corruption probability helps FDI attraction. This negative correlation is discovered in many previous studies conducted on the same issue.

Next, the increase in trade openness supports the FDI attraction in South Asian countries but it is not true in Afghanistan. It is worth mentioned that South Asian countries should provide facilities and appropriate mechanisms to increase the level of trade openness but Afghanistan is not supposed to do so, as it is suggested by the result of this study.

Finally, government expenditure is not significant both in South Asia and Afghanistan which the findings of this study do not suggest any recommendations toward the increase and decrease of government expenditure but in previous studies, the government expenditure discourages FDI in other research focused studies.

In sum, the governments of all South Asian countries are endorsed to provide and adopt specific policies and mechanisms for increasing political stability, controlling of corruption, and increasing trade openness because these are assumed to be the major FDI inflow influencers as suggested by this study.

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Opportunistic Colposcopic Evaluation of Cervical Lesions for Detecting Early Malignancy

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Abstract- Background: Cervical cancer is very frequent, being the second most common in women worldwide and the second most common of genital tract cancers in India. Around 80% of Carcinoma cervix incidence is in developing countries. **Aim:** To inspect the squamo-columnar junction of the cervix and identify suspicious areas by using colposcope for early detection of cervical cancer. **Objectives:** Through colposcopic screening, carcinoma cervix can be detected at an earlier stage. Appropriate measures can be taken for early and correct management at the right time. These measures will ultimately contribute to early diagnosis and better prognosis of carcinoma cervix. **Material & methods:** The study is an opportunistic study consisting of 100 women of age group between 30-50 yrs with clinically suspicious cervix, discharge per vaginum, inter menstrual bleeding or contact bleeding attending outpatient section in Dept of Obstetrics & Gynaecology at a tertiary care centre in eastern India from June 2012 to October 2014. All these patients were examined and findings noted using Colposcope & 5% acetic acid. The colposcope used in this study was BPL stereo-photo-colposcope model No. DVC-6000 with magnification of 15-30x. **Results:** We registered 43 cases, in which the diagnosis was made by colposcopy. 27% of the women among the study group had hypertrophy of cervix with congestion, 12% had erosion. Majority of CIN occurred in the age group, 30-40 yrs. Incidence of CIN is found more in women of high parity (p3 or more). Among the CIN; 11 cases had CIN1, 7 cases had CIN 2, and 3 cases had CIN 3. 6 cases were diagnosed to have invasive carcinoma. Colposcopy showed sensitivity of 91%, specificity of 74%. Positive predictive value and negative predictive value of colposcopy were found to be 60% and 85% respectively. Accuracy of colposcopy was found to be 87% which is comparatively more than pap smear. Accuracy is high with high grade lesions than with low grade lesions. **Conclusion:** This study demonstrated high accuracy and correlation between colposcopy and histology comparable with similar studies in the literature. We also demonstrated the usefulness of colposcopy as a screening test in preclinical cervical carcinoma, the main goal being- the identification of high grade lesions which are true precursors of invasive carcinoma and require treatment.

Index Terms- CIN, Carcinoma cervix, Colposcope, Acetic acid, High grade lesion, Low grade lesion

I. INTRODUCTION

Cervical cancer is very frequent, being the second most common cancer in women worldwide and the second most

common of genital tract cancers in India and also worldwide (WHO 2009).

Around 80% of Ca cervix incidence is in developing countries (1). In India it is 20-35/one lakh women between 35 to 64 yrs (2) and in developed countries – 1-8/ one lakh women (2). India accounts for one fifth of the world's burden of carcinoma cervix (3).

Age standardized mortality rate for Carcinoma cervix in India is 17.4/ one lakh- highest in south Asia (4). Recent studies clearly substantiate the view that Carcinoma cervix develops from well defined precursor lesions over a variable period of time and that it is preventable and curable if detected in early or pre-invasive stage. The detection of these precancerous lesions is of utmost importance. Premalignant lesions are characterized by abnormal cellular/ epithelial architecture in the areas surrounding the SCJ of uterine cervix (7), and are microscopically characterized as a spectrum of events progressing from cellular atypia to various grades of dysplasia and finally to cancer.

II. IMPORTANCE OF COLPOSCOPY

The unique accessibility of uterine cervix to direct visualization and the possibility of cellular and tissue sampling has permitted intensive investigation on cervical lesions. Since early detection predicts better prognosis, one of the most effective ways of preventing and controlling cervical cancer is, by regular screening & early diagnosis.

Measures of prevention are crucial, given the fact that only 11.62% of women of developing countries have ever been screened for cervical abnormalities (9). Studies showed existing screening services cannot effectively cover the female population at risk, in rural areas of India (10). Colposcopy is the examination of cervix and vagina with an instrument designed to study epithelium of cervix and vagina *in vivo* under adequate illumination and magnification.

The value of colposcopy has been recognized mainly in the evaluation of abnormal smears. In the presence of an abnormal cytological smear, a tissue diagnosis is essential before proceeding with definitive treatment. Colposcopy is more than a simple intermediate link between cytologic screening and histologic diagnosis (11).

Cytology (pap smear) is the laboratory method, while Colposcopy is the clinical method, the two complementing each other.

The main purpose of Colposcopy is to detect intraepithelial neoplasia and early neoplasia of the cervix. It is also used to diagnose lesions due to HPV infection, as these are now regarded as precursor lesions of

cervical neoplasia, and also because they can coexist with areas of CIN. Premalignant lesions of Carcinoma cervix are..ASCUS, LSIL and HSIL according to BETHESDA system of classification.

Colposcopy with directed biopsy is described as the reference investigation or 'gold standard' for the diagnosis of cervical precancer(12). Precancerous lesions include various grades of dysplasia or CIN before progression to Carcinoma.

Aims & objectives

To inspect the squamo columnar junction of cervix and identify suspicious areas by using colposcope, for early detection of cervical cancer as an opportunity for our out patients.

- Carcinoma cervix can be detected at an earliest possible stage.
- So that, appropriate measures can be taken for early and correct management at the right time.
- These measures will ultimately contribute to early diagnosis and better prognosis of Carcinoma cervix. Introduction of new colposcopic classification and grading system makes interpretation of colposcopic findings easier and simpler(14).

III. MATERIAL & METHODS

The study is an opportunistic study consisting of 100 women of age group between 30-50 yrs attending outpatient department in a tertiary care centre from june 2012 to october 2014 including patients with-clinically suspicious cervices, discharge per vaginum, intermenstrual bleeding and patients with contact bleeding.

Coloscope & 5% Acetic acid are used for the examination of the cervix.

The COLPOSCOPE used in this study was BPL stereo photo colposcope model no DVC-6000. An informed consent was taken. Patients were asked to empty the bladder and were put in dorsal position. Cervix was exposed using a cusco's speculum and examined under illumination through the colposcope with focal length adjusted to 22-25 cm.

Normal saline was used to remove the mucus, then cervix is examined with green filter and saline application,for better visualisation of blood vessels. Then examination of cervix for 2 minutes after applying 5% acetic acid visualizing Squamo Columnar Junction (for any lesions, acetowhite areas and vascular changes).

Patients' characteristics such as age, menstrual history, parity, presenting complaints, clinical appearance of cervix, and colposcopic findings were recorded. Statistical analysis was carried out by calculating sensitivity, specificity, positive predictive value, negative predictive value, and diagnostic accuracy for colposcopy.

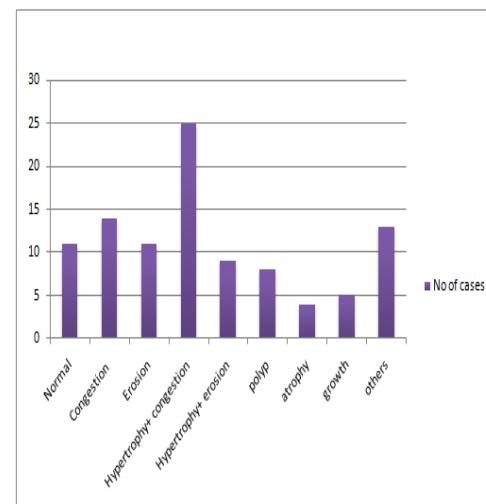
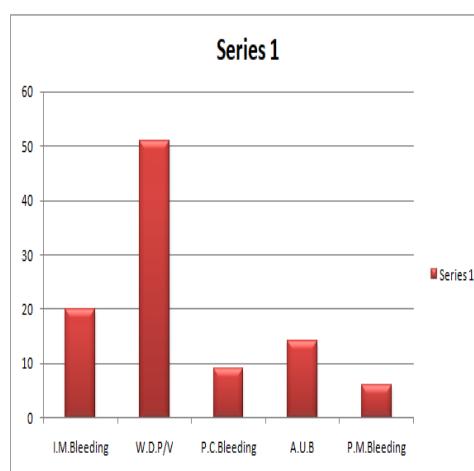
IV. OBSERVATIONS & RESULTS

From the 100 patients examined, 10 patients demonstrated no abnormal findings on colposcopic visualization , that did not

require biopsy for Histopathological examination. Remaining 90 patients underwent colposcopic examination followed by biopsy. These patients represent our study group. Mean age-36.3 yrs, mean parity-3.3. Most common symptom was white discharge p/v followed by intermenstrual bleeding. Most common colposcopic finding was acetowhite patch.

Most common symptoms
Clinical appearance of cervix
Chart No.2

Chart No.1

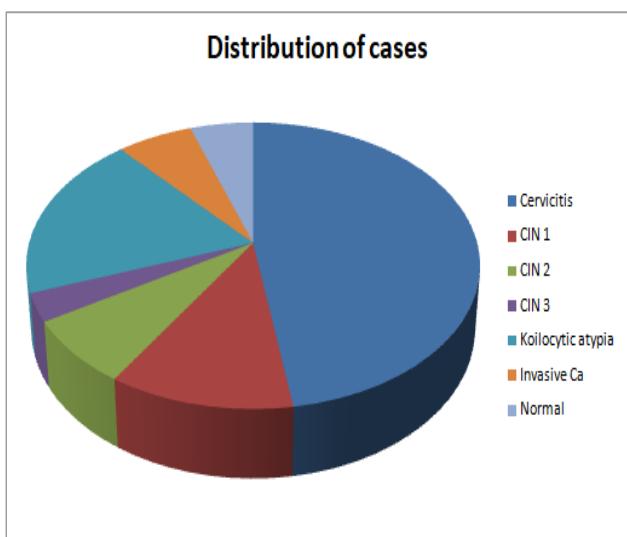


COLPOSCOPIC FEATURES among study group
Table No.5

Colposcopic features	No. of cases	Percentage
<i>Normal</i>	10	10%
<i>Erosion cervix</i>	16	16%
<i>Acetowhite areas</i>	33	33%
<i>Inflammatory changes</i>	15	15%
<i>Polyp</i>	8	8%
<i>Atypical vessels</i>	5	5%
<i>Punctations</i>	3	3%
<i>Mosaic patterns</i>	2	2%
<i>Leukoplakia (keratosis)</i>	5	5%
<i>Others</i>	6	6%

Distribution of cases(n=100)		
Age	30-40yrs 40-50yrs	70 30
Parity	P2or less P3or more	33 67
AW area within TZ (n=33)	Flat aceto White area Dense aceto white area	27 6

Distribution of cases based on HPE findings



Statistical analysis

This study was an opportunistic study conducted in the department of obstetrics and gynaecology on 100 women who came to out patient department with various symptoms, 100 women were randomly selected from the patients attending gynaecology out patient section. Colposcopy and biopsy were done for all cases who needed the same. The results were tabulated and analysed.

Statistical analysis

True positives	27
True negatives	63
False positives	13
False negatives	3
Sensitivity	91%
Specificity	74%
PPV	60%
NPV	85%
Accuracy	87%

In our study it is demonstrated that, colposcopy performed equally good in predicting both low grade and high grade lesions.

Positive predictive value of colposcopic impression is better as the cervical lesion is more severe.

We registered 43 cases in which, the diagnosis was made by colposcopy which include acetowhite area, abnormal vessels, punctations & mosaic pattern. Out of these 43 cases, 27 patients showed abnormal HPE findings. Among them, 11 cases were diagnosed as CIN1, 7 cases as CIN2, 3 cases as CIN3 out of 90 cases in the study group. In low grade lesions positive predictive value is poor because biopsy was done only in selective cases.

All these patients were asked to come for follow up, but only 9 of them have come back for follow up. CIN 1 cases were advised follow up every 3-6 months for periodic pap smear and repeat biopsy if the smear is abnormal. CIN 2 & 3 cases were advised repeat biopsy and if repeat biopsy confirmed the diagnosis, were advised locally destructive procedures like Cautery and/or Cryo. If the family is completed, they were advised hysterectomy depending upon the needs of the patient and availability of resources. The patients with microinvasive or invasive carcinoma were advised hysterectomy or referred for radiotherapy.

Colposcopic findings and correlation.

Colposcopic aspects of the selected cases showed a variety of issues that can be found isolated, or associated with other findings.

1) Acetowhite patch 2) Punctations 3) Mosaic pattern 4) Leukoplakia(keratosis)

5) Abnormal vessels

1) acetowhite patch- Epithelium which looks normal, but turns acetowhite after application of 5% acetic acid within 1-2 minutes. These can be differentiated into 2 categories a) LSIL-CIN1 and condylomas. b) HSIL- CIN2, CIN3 and CIS.

LSIL – Elements suggestive of LSIL- Acetowhite epithelium which appears slowly and disappears slowly, has shiny irregular outline (geographical), and feathery borders sometimes accompanied by satellite lesions. Vessels are fine, uniform, separated and arranged in vertical or horizontal network.

HSIL- Elements suggestive of HSIL- Acetowhite epithelium develops rapidly and disappears slowly with net limits and dirty white colour. Vessels have an irregular design with increased intercapillary distance.

The most significant association between colposcopic changes and histological grading was thick acetowhite epithelium with colour variations (internal border). Other changes seen were coarse mosaic and fragility of the tissues.

Invasive cancer- Invasive cancer of cervix is the result of progressive development over a long time of precursor lesions that begin at the squamo columnar junction. Invasive carcinoma was diagnosed on colposcopic examination at the pre-clinical stage at which, genital symptoms and clinical examination are unable to suggest the diagnosis.

Whereas in clinical stage(Frank cancer)- gynaecological examination is sufficient, colposcopy is unnecessary, punch biopsy being carried out directly.

2) Punctations- Thick acetowhite epithelium with vascular spots on surface with variable distribution and site. Corresponds to simple dysplasia and CIN1. (fig.4)

3) Mosaic pattern- Looks like pavement areas composed of rectangular fields-square or polygonal blocks of tissue separated by dilated vessel lines. (fig 2,3)

4) Keratosis(leukoplakia)- Simple shape, hypertrophied or warty raised lesion. Colposcopic appearance is pearly white, irregular surface, single or multiple plaques corresponds to CIN1, CIN2 or CIN3.

CIN may be suspected after colposcopic examination. The final diagnosis (CIN, and respective degree) is made on the cervical tissue specimen, depending on the histological features concerned with differentiation, maturation and stratification of cells and nuclear abnormalities.

5) Abnormal vessels- These show haphazard shapes, great variation in caliber with abrupt changes in direction and caliber, often forming acute angles also with increased and variable intercapillary distance. (fig 3)

Clinically, features suggestive of invasion- Fragile tissue, irregular contour, ulcerated areas, atypical vessels, spotting on touch and monstrous ectopy etc. Colposcopic features suggestive of invasive cancer(18) are:1)Irregular surface contour,erosion ,or ulceration 2)Dense acetowhite change 3)Coarse mosaic and punctuations 4)Atypical vessels

Fig.2 coarsemosaic,punctuations&abnormal vessels

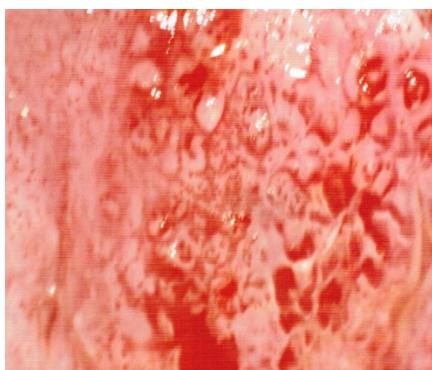
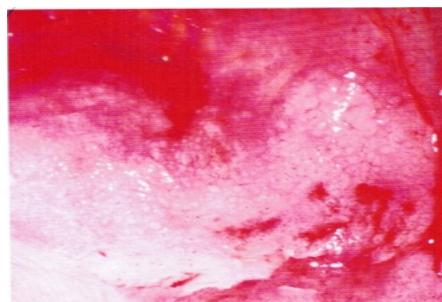
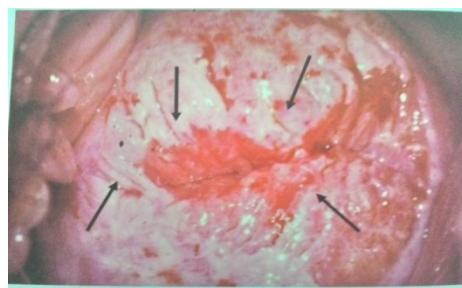
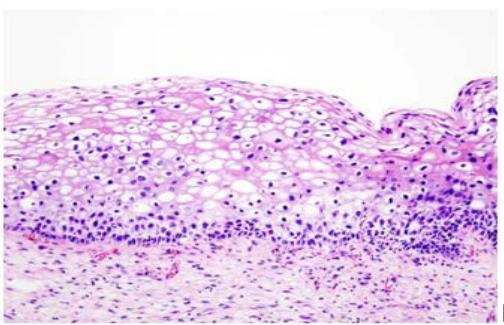


FIG 3.Dense acetowhite areas suggestive of high grade lesion

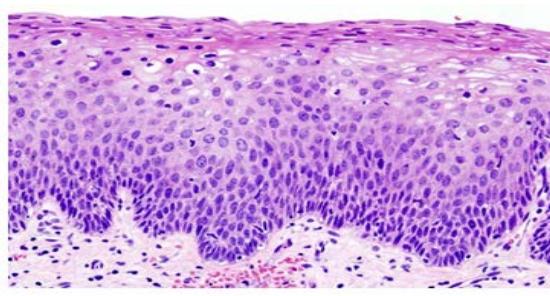


Histological changes



CIN-1 with koilocytic Changes

Fig.4



CIN-2

Fig.5

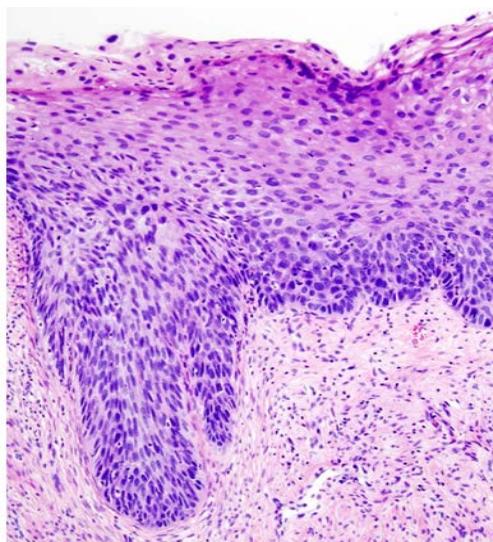


Fig.8-CIN-3

CIN-1- there is good maturation with minimal nuclear abnormalities and few mitotic figures. Undifferentiated cells are confined to the deeper layers(lower one third) of the epithelium(fig 4)

CIN-2- Is differentiated by dysplastic cellular changes mostly restricted to the lower half or lower two thirds of epithelium with more marked nuclear abnormalities than in CIN1. Mitotic figures may be seen throughout the lower half of the epithelium. (fig 5)

CIN-3- Differentiation and stratification may be totally absent or present only in the superficial quarter of the epithelium with numerous mitotic figures. Nuclear abnormalities extend throughout the epithelium. Many mitotic figures have abnormal forms.(Fig.6)

V. DISCUSSION

In our study it is demonstrated that, colposcopy performed equally good in predicting both low grade and high grade lesions. Positive predictive value of colposcopic impression is better as the cervical lesion gets more severe. We registered 43 cases in which, the diagnosis was made by colposcopy.

Out of these 43 cases who also underwent biopsy from the abnormal area, 27 patients showed abnormal HPE findings. Among them, 11 cases were diagnosed as CIN1, 7 cases as CIN2, 3 cases as CIN3 out of 90 cases in the study group. 6 cases were diagnosed to have invasive carcinoma. In low grade lesions positive predictive value is poor because biopsy was done only in selective cases. All these patients were asked to come for follow up, but only 9 of them have come back for follow up.

CIN 1 cases were advised follow up every 3-6 months for pap smear and repeat biopsy if the smear is abnormal.

CIN 2 & 3 cases were advised repeat biopsy and if repeat biopsy confirmed the diagnosis, were advised locally destructive procedures like Cautery and/or Cryo. If the family is completed, they were advised hysterectomy depending upon the needs of the patient and availability of facilities.

The patients with microinvasive or invasive carcinoma were advised hysterectomy or referred for radiotherapy. Colposcopy incurred fewer false negatives(3 patients), giving a general accuracy rate of 87%.

Out of the 100 women, 90% of them had never been screened for carcinoma cervix. Similarly one study reported that despite the fact that more than 80% of cervical cancer cases are in developing countries, only 5% of women had ever been screened

for cervical abnormalities. It is predicted that figures are expected to be double by 2020, if no action is taken.

Age above 36 yrs and parity above 3, was significantly related to positive biopsy results. Thus patients age and parity may be helpful for selecting them for colposcopy. Low socioeconomic status had a definitive role on the development of dyskaryosis as demonstrated by Vaidya (26).

STUDY	SENSITIVITY	SPECIFICITY
Sankaranarayanan et al(VIA)	96%	65%
Ghaemmaghami et al	91%	13%
Present study	91%	74%

STUDY	ACCURACY
Massad et al	80%
Stafi.A et al	80%
Present study	87%

Sankaranarayanan et al(4) have shown specificity of VIA and cytology 65%vs 90%respectively; sensitivity estimate was 96% vs 62%. Considering false negative pap smears, and the failure of patients to have routine pap test repeated every 4-6 months, it is a weak diagnostic method .

In a study of ASCUS pap smears performed at the Imam Khomeini hospital, biopsy and endocervical curettage showed LSIL in 14 cases, HSIL in 16 and invasive carcinoma and endometrial carcinoma in one case each(Melnikow et al 1995)

In a study of 86 patients with abnormal colposcopy, Allameh et al reported that 83.7% were normal ,7% had LSIL, 5.8% had HSIL and 3.5% had cancer of cervix(Allameh et al 2009). In a similar study conducted in Iran, Ghaemmaghami et al 2005 reported a sensitivity of 91%, specificity of 13% based on ASCUS results.

Singh et al had reported visual inspection after acetic acid application being highly sensitive 93.1% but less specific(35). Oleniyan et al did a meta analysis of 8 longitudinal studies and compared the correlation of colposcopic impression with biopsy results(26).

In our study regarding the clinical appearance of cervix, most common finding was hypertrophy of cervix with congestion 27% (25/90), followed by erosion 12%(11/90). CIN was found in 23% of cases (21/90), among them 14%(3/21) were CIN3. Microinvasive/invasive carcinoma was evident in 18% of cases among acetowhite positive cases (6/33).

Adams et al noticed in their study that the true sensitivity of the whole diagnostic process of colposcopy + biopsy is low because biopsies were not performed in all cases(27).

Stafi A and Mattingly RF prospectively evaluated the colposcopic impression in 282 patients and compared from the histology, then subsequently recommended a minimal proficiency level of 80% for colposcopic accuracy to show proof of colposcopic competency (28).

In present study sensitivity is 91%, specificity is 74%, Positive predictive value-60%, negative predictive value-85% and overall accuracy is noted to be 87%.Massad et al reported accuracy of 80%. M.GOPAL et al demonstrated that PPV & NPV of colposcopy were found to be 48% and 96% respectively.

When interpreting values from different studies we might take into consideration that the performance and accuracy of colposcopy depends largely on the training, expertise and skills of the colposcopist and that accuracy of cytology requires laboratory services and skilled cytologists.

When deciding which test to use for screening, specificity must be taken into account because, tests with low specificity when applied to a healthy population with a very low prevalence of disease, will result in a high proportion of false positive test results(29).

The most important role of these tests is to identify the women with HSIL lesions that require treatment, because the low grade lesions are frequently regressive(30).

Summary

Present study was an opportunistic study on100 symptomatic women. We registered 43 cases, showing significant changes on colposcopy.

27% of the women among the study group had hypertrophy of cervix with congestion,12% had erosion.

Majority of CIN occurred in the age group 30-40 yrs.Incidence of CIN is found to be more in high parity women(p3 or more).

Among the CIN; 11 cases had CIN1, 7 cases had CIN 2, and 3 cases had CIN 3. 6 cases were diagnosed to have invasive carcinoma. Colposcopy showed sensitivity of 91%, specificity74%. Positive predictive value and negative predictive value of colposcopy were found to be 60% and 85% respectively. Accuracy of colposcopy was found to be 87% which is comparatively more than with pap smear. Accuracy is good with both high grade & low grade lesions

VI. CONCLUSION

This study demonstrated high accuracy and correlation between colpocopy and histology comparable with similar studies in the literature.

Specificity is low in our study probably because all symptomatic women were made to undergo biopsy, except for the few women who did not show any abnormal colposcopic findings.

We also demonstrated the usefulness of colposcopy as a screening test in preclinical cervical carcinoma, the main goal being- the identification of high grade lesions which are true precursors of invasive carcinoma and require treatment.

Advantages of colposcopy

- 1) Localizes lesion.
- 2) Evaluates the extent of lesion.
- 3) Differentiates between inflammatory atypia and neoplasm.
- 4) Differentiates between non invasive/invasive lesions.
- 5) Enables follow up.

Disadvantages of colposcopy

- 1) Inadequate for detection of endocervical lesions and needs endocervical curettage.
- 2) Needs more expertise.
- 3) More expensive.

Given the high accuracy(87%) demonstrated in present study, we strongly recommend colposcopy as a screening test for women in child bearing age group, regardless of their previous screening status. Colposcopy is useful in estimating lesion grade, and management decisions for the same require biopsy.

List of abbreviations

CA – carcinoma

TZ- transformation zone

AW area- Acetowhite area

SCJ- squamo columnar junction

LSIL – low grade squamous intrepithelial lesions

HSIL – high grade squamous intraepithelial lesions

CIN – cervical intraepithelial neoplasia

PAP smear – papanicolaou smear

HPE – histopathological examination

LBC – liquid based cytology

ECC - endocervical curettage

PPV – positive predictive value

NPV – negative predictive value

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Mythimna L. - Album L. – Biological and Ecological Properties of White Linear Moth

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Abstract- This article involves the information on the biological and ecological features of the white linear moth butterfly. The white linear moth can develop in two full generations and can conduct winter at the stage of adult worm of third generation in the Tashkent region. White linear moth's one generation develop during 65-70 days. They damage agricultural crops such as cotton, carrots, and corn, barley and wheat plants. This moth is also a pest of agriculture.

Index Terms- Moth, larvae, egg, imago, butterfly, environment, biology, ecology, *Mythimna L.*

I. INTRODUCTION

The actuality of the theme: Among the agricultural pests, the most main family belongs to Noctuidae. Despite various measures against to them, moths have been damaging to the crops for some years. But it should be noted that not all the moths are harmful. Among them there are some species included in the Red Book. For example, *Charidea delphini L.*, *Catocala fraxini L.* are Red Book species.

The studied level of the problem. In recent years, great attention is paid to finding new ways of protecting plants against pests. These methods should help to reduce the use of insecticides or abstain from self-injury. The study of the relationship between phytophage insects and nutritional plants is a matter of current research. Therefore, it is necessary to reconsider the strategy of plant cultivation.

The result of research work. Insects, including of the moths family, are adapted to live in a variety of climatic conditions, all of which are phytophages, which are fed by the leaves, roots, stems and fruits of plants. Naturally, depending on their living conditions, they differ greatly with their external structure, biological and ecological properties.

The all family of moths is subdivided into two ecological groups. The groups of plants live on the soil, which is the group of species nourished by roots, and the groups of nourishing with the soil surface. Why do we name the tunnel butterfly? Because of these butterflies live from got dark until the morning, and especially they are active in the evening and at night. Adult life cycle, which is the time of flight of butterflies, it depends on environmental factors. It is particularly important that the temperature (t° C) and the length - shortness of the day is important. The activation of the moths occurs at a specific temperature in every species. Early spring species start to fly when

the temperature is + 10 - 12 $^{\circ}$ C, and hot like species are activated only when the temperature exceeds +20 $^{\circ}$ C.

Hot days in Tashkent will continue from early spring to late autumn, so many moths are polycyclic and develop in two or more generations. Developing species in one generation, in the summer, will pass the diapason.

Phenomenology of moths is also highly dependent on nutritional plants. Worms of early spring species eat the ephemeras and weed grasses. The more activated species can eat, especially the agriculture crops.

As a result of our research we found 18 species of tunnel butterflies in the territory of Tashkent city. They belong to the following families: Noctuinae, Hadeniae, Plusiniae, Jaspidae and Helothinae. A brief overview about biology, food plant and distribution are given by a number of specialists (Kojanchikov, 1937; Chechkin, 1965, Merjeevskaya, 1967, Sukharyeva, 1970, Shek, 1975, etc.) on adopted systematics [3].

Worms of white linear tunnel eat everything, a polyphage. They damage agricultural crops such as cotton, alfalfa, corn, barley, wheat. White linear tunnel - *Mythimna L. – album L.* belongs to the Hadeniae subfamily of moth's family (Noctuidae). According to our observations, the size of a butterfly is 30-35 mm, when spread its wings. The previous wings are gray, transverse lines and spots are not seen. In the middle of the previous wing, there is a white dot linear in the shape of 1. The back wings are gray. The butterfly flies in beginning of May to the end of September. It is widely spread in Europe, North Africa, Turkey, Iran, Altai, Central Asia and Kazakhstan.

In the condition of Tashkent region, medium and old age worms live under plant remedies. In early April, the worms come out of wintering and begin to feed with herbs. At the same time the leaves of cotton plant, corn, alfalfa and other crops will be extremely damaged by worms. The butterfly of worm puts egg one by one on the lower and upper parts of the leaves of the plants.

White linear tunnel has two full generations in the Tashkent region and it was observed that the third generation is wintered at the worm stage (Table 3). The butterflies of their first generation start flying in early May. At this time they are fed with the flower nectar and juice of early blooming plants. Butterflies of their first generation live between 15 and 17 days. Eggs develop for 12 to 14 days, worms for 25 to 28 days and pupas develop for 15 days.

The butterflies of the second generation will fly 17-18 days from the beginning of July. Eggs develop 7 - 10 days. We have observed that the worms of this generation developed for 30-

35 days. In our view, the reason for the development of so many times is that it is caused by the heat of the air and the lack of moisture. The development of the pupa will last for 15 days as the first generation [1].

The butterfly of its third generation flies from the first five days of September to the beginning of October. The developments of the third generation are wintered from the end of September to the end of October, middle and the adult aged worms in the November.



Picture 1. *Mythimna L. – album L.*

One of the most important and characteristic feature of the white linear life cycle is the transition to the summer diapason at the imago stage. Flight time in southern Tajikistan is observed from mid-May to the beginning of June and in the middle, the first ten days of June until mid of July lasts in Samarkand, from mid-June to mid-July in Azerbaijan. This period occurs during the period of butterflies feeding and their fertilities. At the same time, the butterflies go to diapason, which in Central Asia, in Kazakhstan until the end of August, until the beginning of September in Azerbaijan, then begins the 2nd period of the flight, and this period continues until the autumn. During this time, the pair of butterflies and egg laying will take place. This flight period

breakthrough in the wild moth, sometimes it strengthens the 2nd generation. This moth gives 1 generation everywhere. Females leave the diapause period and lay eggs in 10- 20 days. The diapause period ends on August 20, in Samarkand. In the second half of September, they lay eggs. The maximum number of eggs is 738.

According to S.V. Aliyev's data, at temperature + 20.5 - 21 ° C in the laboratory conditions, one female butterfly lays from 528 to 634 eggs. The worms of this moth are wintered in the egg. The worms leave the egg shells in the end of March or April. Their worms live in the soil. They age is 6 and can develop during 35-45 days [2].

They turn into pupa in the depth of 6-15 cm of soil. The nymph state is 5-8 days, and pupa period is 20-35 days. It does not exceed 2 weeks in Tajikistan. The worms are fed with about 50 plants, many of which plants are cultivated. They primarily eat the wild plants between cultivated plants. From agricultural plants such as corn, alfalfa, cotton plant, sunflower, tobacco, sugar beet, cabbage, cucumber, watermelon, melon, barley, wheat, brown, linen leaves or buds are damaged.

The worms feed with plants in the evening. Often old aged pests (IV - VI) will damage to the plants. They feed seedlings, grasses, grains, leaves, and occasionally take the remains of the plants into the soil. The worms are found near damaged plants in the soil during the daytime.

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The Main Problems of Youth Employment in Uzbekistan and Their Solution

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Annotation - This article describes the main problems of youth employment in Uzbekistan and their solutions. In addition, the problems of unemployment among young people as a whole are analyzed.

Index Terms- the urban population, employment, the rural population, working age, Youth Policy, the reform, development, priority areas, unemployment, promotion.

I. INTRODUCTION

Recognizing the problems of employment, the Government of Uzbekistan attaches high priority to the creation of decent jobs and the promotion of employment. Thus, increasing the level of employment by creating new sustainable jobs is one of the most important areas of social development in the framework of the Action Strategy for the five priority areas of development of the Republic of Uzbekistan for 2017-2021. At the same time, the creation of sustainable and decent jobs for such categories of the population as women and youth is of particular importance.

As to April 1, 2018, the number of the resident population of the Republic of Uzbekistan, according to preliminary data, amounted to 32,763.7 thousand people and increased from the beginning of the current year by 107.0 thousand people, or 0.3%. At the same time, the urban population amounted to 16,583.0 thousand people (50.6% of the total population), and the rural population - 16,180.7 thousand people (49.4%).

In 1991-2017 Also observed significant changes in the age structure of the population of the republic.

For example, in 1991 the population under working age (0-15 years old) made up 43.1 percent of the total population of the republic; people of working age (men aged 16-59 years, women 16-54 years old) - 49.1 percent older than working age. (men aged 60 years and older, women 55 years and older) - 7.8 percent.

On January 1, 2017 this indicator was equal to 30.1 percent, 60.5 percent and 9.4 percent respectively. (Table . 1)

Table. 1 Information on the age structure of the permanent population of the Republic of Uzbekistan (thousand people).

	1991 y .		2011 y.		2017 y.	
	specific number	gravity, %	specific number	gravity, %	specific number	gravity, %
Total population	20607,7	100,0	29123,4	100,0	32120,5	100,0
including:						
younger than working age	8883,7	43,1	9099,3	31,3	9665,7	30,1
at working age	10122,5	49,1	17804,7	61,1	19440,8	60,5
older than working age	1601,5	7,8	2219,4	7,6	3014,0	9,4

Source: The state committee of the Republic of Uzbekistan on statistics

In Uzbekistan, young people have a special place in the process of forming a legal democratic state and civil society. It is well known that the majority of the population of Uzbekistan are young people under the age of 30 years. Recognizing that the youth is a decisive force in the modernization of society, the state pays special attention to the education and support of the young generation.

This is reflected in the Law of the Republic of Uzbekistan "On State Youth Policy", in fulfillment of which about half of the state budget of the country is spent on social protection of young people, on the education and upbringing of the young generation, creating conditions for a healthy lifestyle. In Uzbekistan, special attention is paid to the development of sports, culture, art and other spheres of spiritual life, with the goal of educating physically strong and morally rich young people.

In addition, such an organization, the Union of Youth of Uzbekistan, has been created in Uzbekistan. This is a youth organization that is engaged in consistent and effective implementation of the state youth policy, full support for young

people, fundamental reform of the system of protection of their rights and legitimate interests, taking into account the opinions and suggestions of the general public, especially young people. The Union of Youth of Uzbekistan is entrusted with a number of important new tasks to increase the activity of young people in the reform process, carried out within the framework of the Actions Strategy of the Republic of Uzbekistan in 2017-2021.

In Uzbekistan, young people are the most dynamic part of the labor force. This age category has increased mobility, potential abilities for fast learning, non-standard thinking. However, in accordance with the data of the International Labor Organization, the unemployment rate in the republic in 2016 exceeded 7%, and the unemployment rate among young people aged 15-24 years was more than 16%. Thus, on average, the youth unemployment rate exceeded the unemployment rate among adults (25 years and above) by almost 2.5 times.

The causes of youth unemployment are: high demographic pressure on the labor market; insufficient supply of new jobs in the labor market of Uzbekistan; insufficient level of cognitive and non-cognitive skills of young people, received in colleges and lyceums and which are important for the formation of skills to make rational decisions in problem situations; low youth productivity due to lack of work experience; insufficient level of competence among young persons who have graduated from vocational schools.

Further employment of the population, especially young people, can be achieved in the following main areas:

- the study of the state, problems, their causes and consequences in the field of youth employment;
- development of practical recommendations for solving problems of reducing youth unemployment;
- reduction of informal employment through the accelerated creation of sustainable and high-performance jobs;
- increasing the level of employment in existing workplaces due to advanced training and reprofiling in accordance with the requirements of enterprises-employers;
- improving the competitiveness of the population in the global labor market by increasing knowledge and skills. It is necessary to introduce the practice of distributing university students studying on a budgetary basis, improving the activities of marketing departments;
- In vocational colleges, to ensure a closer link between their specialization and placement with the directions and parameters of transformations that provide for the accelerated development of new sectors of the economy;
- to create in all areas specialized vocational colleges for the preparation of production managers in the sphere of small and medium business, etc .;
- to introduce into the practice of personnel activities of enterprises the timely formation of orders for the training of specialists of relevant professions in vocational colleges.

The implementation of the recommendations will allow to successfully solve the problems of the development of the labor market of Uzbekistan.

Providing youth employment remains a priority for the government. According to statistics, in 2017, 438.5 thousand out of 477.7 thousand college graduates or 91.8% were employed. But how correct are these numbers? "If we have employed all college graduates, where do unemployed young people come from?"

The Ministry of Employment and Labor Relations, the Ministry of Finance, the Ministry of Economy and the Association of Craftsmen were instructed to create the necessary conditions for young entrepreneurs, especially girls, in the field of handicraft.

From January 1, 2018, income tax for graduates of academic lyceums, vocational colleges and universities, graduated from educational institutions no later than three years ago and first applying for jobs, will be reduced by 50% in the first year, and by 25% in the second and third years.

The Youth Union will partially (35–40%) cover the cost of contracts in universities to its most active members, whose performance is 85% or more.

Annually, 140 active employees who have worked in the Youth Union system for at least three years and expressed a desire to purchase housing in a mortgage will be paid 25-30% down payment.

Proposals for the construction of affordable housing for young families will now be prepared by the heads of the district departments of the Youth Union.

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The Federal Character Principles in Nigerian Public Service Exercise Towards An Output Efficiency At The National Planning Commission (NPC)

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Abstract- The main purpose of this research work was to examine the federal character principles in Nigerian public services exercise towards an output efficiency at the national planning commission (NPC) its relationship with the recruitment exercise in the public service. This was prompted by the fact that there is growing disenchantment in some quarters about the implementation of the federal character principle, which they believe leads to the violation of the merit principle and lowering of standards in the recruitment of personnel into the public service which will serve as a way of recruiting and promoting less competent staff into the service resulting inevitably to poor performance. Therefore, the objectives of the study stressed the following; To examine the extent to which the federal character is jeopardizing merit in the recruitment and of personnel in the public service; To identify probable problems in the application of the federal character principle on the recruitment of personnel into the public service; To examine the overall implications of federal character principle on the recruitment exercise in the public service. In conclusion we can agree that recruitment exercise in NPC Abuja is based on federal character principle, the application of federal character principle system jeopardize the merit in the recruitment exercise at NPC Abuja. The work attempted to uncover the critical issue involved in the federal character principle system through the review of related literature on the functions of the federal character commission, composition and powers of the commission, general principle and formulae for recruitment process, federalism and the federal structure of Nigeria. Etc. From the finding of the research work the researcher discovered that the federal character principle system has some deficiencies. The actual application of the federal character principle negates the merit system of civil/public service in which the NPC is not an exception since appointments and promotion are not always based on merit. The research recommended that the application of merit system or meritocracy should become the Linchpin in the recruitment of personnel into the Nigerian public service in order not to endanger standards and professionalism. It was also recommended that there is the need to strike a balance between the applications of federal character principle in public services.

Keywords- Federalism, Federal character, National planning commission, Public services.

I. INTRODUCTION

This world today is increasingly seen as political arrangements that afford an opportunity for the myriad diversities within a political system to find legitimate expression. Elazar (1993) has rightly opined that the federal principle is intrinsically an expression of political diversity and accommodation without in any way undermining the basic commitment to the sovereignty of the nation. Shastri, (2001:1).The federal character principle which was enshrined in the 1979 Constitution of Nigeria seeks to ensure appropriate linguistic, ethnic, religious and geographic diversity of the country. The introduction of federal character policies in Nigerian state is to foster unity, peace, equal ability to equal access to state resources and promote the integration of the less advantage states for better improvement and good conditions of living in the country (Bamidele and Ikulege, 2004). Nigeria is a federal society comprising 36 states structure with a population of more than 180 million people and has more than 250 ethnic groups, which necessitate an arrangement that could accommodate people from the different segments of the country in the public bureaucracy (Gberekwe, 2012:187-210). The notion of federal character presupposes the existence of a federal society. However, as a federal state, Nigeria is faced with the challenge of how to imbibe the principle of federalism in practice. As a result, the system was introduced into the Nigerian public service in 1958 by the government “to ensure equitable representation of the various groups in the country” (Tonwe and Oghotor, 2009:235). The federal character system as enshrined in the constitution of Nigeria is to ensure equitable distributions of bureaucratic and political roles in the public service at federal, states and local government levels. The objectives of the policy are to foster national unity and give every Nigerian a sense of belonging in the country. In support of this view Usman(2004:117) said that it was an effort to readdress the unbalanced structure and ethnic domination in government so that national integration could be achieved. The federal character principle which is implemented under the federal character commission is therefore designed and initiated to correct adverse impact resulting from opportunities and

resources provided by the federal government to the citizens of the country that appears neutral but have a discriminatory effect on a protected group. The federal character principle is therefore structured to ensure strong and indivisible nation based on justice and fairness, while also ensuring that a sense of belonging of all Nigerians is still maintained. As laudable as the above policy maybe, and the empowerment of the concept in the nation's constitution, its application has remain a debatable topic to which some critics have claimed that the policy comprise the merit system which will create an enabling environment for those that are only qualified to be employed into the Nigerian civil service, thereby fostering quality service rendering for the development of the country.

Bodunrin (2003) also in assessing the Federal Character from the merit perspective asserts that the federal character principle is counter-productive. Therefore it is important to note that, efficient manpower utilization is determined through effective credible recruitment. But Idumange(2008) specifically lists two areas where the Federal government has been most successful in implementing the federal character principle; The National Youth Service Corps(NYSC) and recruitment into the Armed Forces. Thus this ensures Nigerians get their own share of the 'national cake' rather than agitations which has prevented another civil war in the country.

To further consolidate on the gains of the system, the Federal Military Government of Generals Murtala Mohammed and Olusegun Obasanjo in the drafting and approval of the 1979 constitution of the Federal Republic of Nigeria during the transition to civilian rule (1976-79) introduced into the Nigerian political and administrative landscapes the principle of federal character (Ekeh, 1989:19). Federal character principle sought to give "opportunities in education and employment, usually at the point of entry, to disadvantaged groups and areas to enable them compete and catch up with more advanced areas and sectors of the nation " (Ekeh, 1989:38).

Also the annual reports from the publications of the federal character commission shows that a lot of complaints arose as a result of breach of federal character principles by some establishments for example in the federal character monitor, a quarterly publication of the commission (2008:5) accused and summoned the Nigeria communication commission over breach of federal character principles. More so, the inefficiency of the policy in recruiting manpower potentials into the organization and the selection of employees which is not based on merit but the federal character principles are some of the problems that affect the efficient performance of the Nigerian public service (which means that all the geo-political zones will be given equal chance for the appointment and output-efficiency). In recent development, there have been discriminatory attitudes in many federal institutions in terms of students enrolment, appointment of public offices etc. Consequently, there has been gross misconduct in the area of employment due to sectional identity and nepotism by those in authority in the Ministries and parastatals. Federal institutions seem to recruit on the basis of nepotism and favouritism without minding the effect of such practices to the efficiency of service delivery and quality of output to the nation. Even when the federal character principle is observed, the institution will not consider efficiency of the candidate as long as they are relatives, and will not follow the due process thereby cutting corners in the recruitment exercise.

II. LITERATURE

Federalism according to Tekena (2011) is that form of government where the component units of a political organization participate in sharing powers and functions in a cooperative manner through the combined forces of ethnic pluralism and cultural diversity, among others, which tends to pull their people apart. To Suberu (2009) 'Federalism' involves constitutional and irrevocable division of governmental powers and functions on a territorial basis within a single country. It entails the division of power between central and constituent authorities. Although the arrangement of functions and responsibilities within a federal state is usually based on some constitutional or legal framework, the constitution may be a poor guide in determining whether a political system is federal or otherwise. To this school of thought, federalism should be understood not just from the narrow perspective or confines of legal formulation but from the general and systemic interaction of socio-cultural and political factors.

Nigeria is a federation with 36 States and 774 local governments existing in a coordinate and autonomous relationship. Power are shared among the federating unit that makes up the federation i.e. federal, state and local government and each unit has its own autonomous power within its area of jurisdiction usually the federal government have a greater bound of unity with power in the center. However the sharing of power between the center and the component units is in accordance with the constitutional provisions. The federal constitution of Nigeria defined closely the allocation of legislative and executive power between the levels of government; given references to section 4 of the 1999 federal constitution of Nigeria, The constitution provides three lists, the exclusive list, the concurrent list and the residual list. The exclusive list consisted of forty-five provisions on which the federal government only could legislate. The concurrent list contained twenty-nine provisions on which both the federal and states government could legislate, but with the provision that, in the event of any inconsistency in the legislation of the government, federal law will remain supreme. Thus, all subjects or matters not mentioned in the two lists fell to the state government to legislate.

According to Okoli (2004: 109-110) representation is seen in absolute numbers not just between states in the Federation but also between the North and South as collectives. In fact the issue of representation, based on the Federal Character Principle, has unwrittenly degenerated into verbal and sometimes acrimonious exchange between the North and South of the country. To those from the northern parts of the country, federal character is synonymous with, therefore a proportional absorption into Federal Institutions

and Establishment. To those from the Southern parts of the country. It means an attempt by the “North” to infiltrate into areas, which they hitherto regarded as “theirs” by right.

According to Gboyega (1989) federal character principle is merely an elite ploy which would not in real sense improve the lot of the common men in whose name it is designed .He cautioned that the application of the principle was likely to create many problems ,as grave as that it was suppose to solve . For example, the southerners who are already advanced in terms of education may feel as if the policy was intending to deprive them of jobs for the benefit of the northerners since merit is not the only yardstick .He further opined that even promotion is also tie to ethnic consideration and its affects the esprit de corp's of the service. Afigbo (1986) describes the federal character principle as “unsophisticated every day usage” in Nigeria’s multi-ethnic character.

He further said that in this case, to reflect federal character means simply to ensure “Nigerian affairs are not dominated by persons” from a few states or ethnic groups. Ideally, the federal character is basically designed to meet up with ethnic-balancing, but a close look at its operation would reveal a derail from this ends. Beside since its adoption, it has not been able to address the problem of under-representation and over representation with only few instances of working within the spectrum of the federal character formula. To add, to this, is that the federal character may only succeed in reducing the domination of government affairs by some states or ethnic groups but for several reasons such as education imbalance and financial strength of some states or ethnic groups would make them to continuously to dominate the helm of the affairs in the country.

Oni (1989) viewed federal character as means of attaining equality of opportunity for educationally disadvantaged students. He opined that the theory and practice of federal character principles as spelt out in Nigeria constitution with respect to education is meant to eliminate discrimination and build room for equal representation. He later observed that the interpretation of this philosophy may indeed call for a change in the criteria for admissions into institutions of learning in the country. It will be axiomatic to analyze the above idea particularly the concept of equality which cannot be ascertained within the context of Nigeria because even the federal states of United States; Canada and Switzerland which are deemed as classical federal system could not arrive at equality in all ramifications. Moreover even when for a long term the system operates in the educational setting, it has not brought about equality in education among the regions, states and ethnic groups.

III. CONCLUSION

The paper observes that the practice of the FC principle in Nigeria suffers from a major contradiction, because it brings about division amongst Nigerians rather than foster unity as was originally intended by its proponents as a policy option for managing the challenge of equal representation of people from different segments of the society in a multi-ethnic state like Nigeria. It submitted that where appropriate recruitment strategies involving the screening of potential employees based on relevant skills, experience and educational qualifications are adopted and the proper staff training and development of the workforce, organizational productivity could be enhanced even where incompetent employees would have been employed through (in some instances), the poor application of federal character principle in Nigerian public service. There are probable problems in the application of federal character principle system on recruitment process in NPC Abuja, The application of the federal character principle system is having implications on the recruitment exercise in NPC Abuja, The application of federal character principle system on the recruitment exercise at NPC Abuja improves workers performance, The Federal Character Commission does not properly supervise the application of the federal character principle and system in the recruitment process at NPC Abuja, that the application of federal character principle system on the recruitment exercise in the public service has not solved the problem of unequal representation across the country, and that there should be the continuous use of the federal character principle system on the recruitment exercise in the public service.

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Paradoxical Effect of Neutron Shields on Neutron Dose from LINACs

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Abstract- A Monte-Carlo study was carried out to investigate the efficiency of different materials to shield the photo-neutrons emitted from radiotherapy LINACs. Several materials were tried at different thickness. Though neutron fluence decreased using all the tried neutron shields, paradoxically they increased the neutron dose to the patient. This is probably due to thermalization of the photoneutrons in the shields, increasing their capture rate in patient's tissue.

Index Terms- LINAC, Photoneutrons, Neutron dose, Neutron shield

I. INTRODUCTION

When operating LINACs of clinical use at energies greater than 8 MeV, neutrons are produced due to the interactions of the energetic photons with the high-Z materials present in the accelerator head (Alfuraih et al, 2008). At 14 MeV X-ray, the main reactions of gamma rays which lead to emission of photo-neutrons are the (gamma, neutron) reactions with: Fe-56, Cu-63, and Cu-65 (in target), W-184 (in target and flattener), and Pb-208 (in collimator) (Amber et al, 2014).

Because of their high relative biological effectiveness, photo-neutrons are a particular source of unwanted exposure to patients (ICRP, 2008).

Martínez (Martínez, 2013) investigated the neutron flux inside a patient's phantom and observed a significant decrease of fast neutrons and increase in thermal and epithermal neutrons inside the phantom. He explained that the phantom behaved as a neutron moderator due to its high content of low Z materials.

In this research, several neutron absorbing materials were used as neutron shields. Neutron and X-ray doses received by the patient were calculated before and after adding the shield.

II. MATERIALS (MODEL DESCRIPTION)

Siemens HPD X-ray LINAC was modeled using MCNPX code. The dimensions and materials of the components were according to the data published in the physics primer titled "Digital Linear Accelerator" (Siemens medical, 2008). See figure 1.

The LINAC materials modeled by MCNP in the present research are shown in table 1.

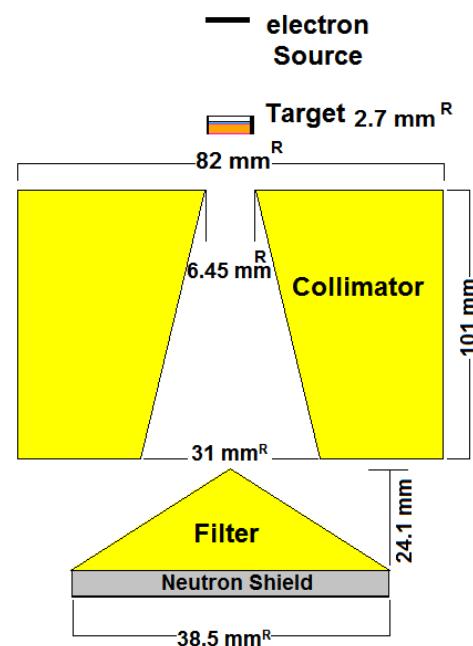


Figure 1. LINAC Head

2.1 Electron Source

It was a planar circular source of radius = 2.7 mm. Energy of the emitted electrons follow a Gaussian distribution, with average energy = 14 MeV, and width = 1MeV.

2.2. Neutron Shield

Different neutron shields at different thicknesses were applied just below the filter. The neutron shields materials and thicknesses were as presented in table 2.

Table 1. LINAC materials modeled.

Component	Materials	Thickness (mm)
Target	Titanium	Ti 0.05
	Water	H ₂ O 0.66
	Titanium	Ti 0.05
	Air	Void 3.53
	Tungsten	W 0.64
	Nicoro (BAu-3) 11 g/cm ³	Au 35 % Cu 62 % Ni 3 % 0.15
	Copper	Cu 1.65
	Nicoro (BAu-3) 11 g/cm ³	See above 0.05
	Stainless Steel GOST08X18H10T	C 0.08 % Cr 18 % Ni 10 % Ti 0.6 % Si 0.8 % Mn 2 % Cu 0.3 % Fe 68.22 % 1.02
	Graphite	C 10.16
Collimator	Stainless Steel GOST08X18H10T	See above 0.04
	Pb (96 %) Sb (4 %)	See Figure 1
Flattener	Tungsten	See Figure 1

2.3. Patient Phantom

It was a cylinder 180 cm long and 15 cm in radius, horizontally lying 80 cm below the base of the flattener, see Figure 2. Its material was according to ICRP Publication 23 (ICRP, 1975).

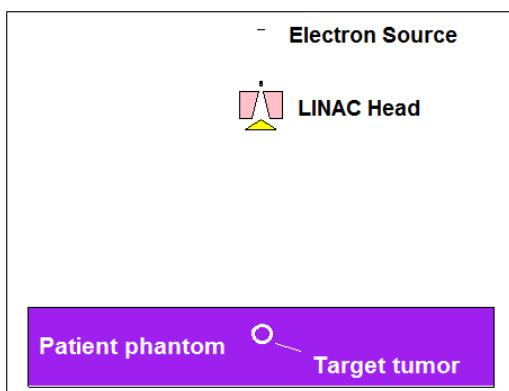


Figure 2. LINAC and patient phantom.

III. METHODS

A spherical, 5 cm radius, volume of the patient phantom was considered as the targeted tumor. X-ray (photon) dose to the target tumor and neutron dose to the whole patient phantom were tallied using MCNPX code. MCNPX code is run in (n p e) mode

Several neutron absorbing materials were added, once a time, as neutron shields. Shields were placed just below the flattener. With each neutron shield, photon dose to the target tumor and neutron doses to the patient were recalculated. The tried shields were as in table 2.

IV. RESULTS

Without neutron shield, photon dose to the tumor and neutron dose to the patient were 1.28701 and 4.10935x10⁻⁴ µSv/10¹⁰ source electrons, respectively.

For all tried neutron shielding materials, photon dose to the target tumor was slightly changed as seen in figure 3 and in table 3. Neutron fluence emitting the LINAC port was markedly reduced using all the tried neutron shields, however, paradoxically, neutron dose to the patient was markedly increased, as seen in figures 4 & 5, and in table 2.

Table 2. Shielding materials with their thicknesses, photon dose to tumor, neutron dose to the patient, and neutron fluence emitting the shield.

Shielding Material	Shield Thickness	X-Ray Dose to Tumor	Neutron Dose to Whole Patient	Neutron surface current traversing the shield
		$\mu\text{Sv}/10^{10}$	electrons from source	Per 10^{10} source electrons
No Shield	-	1.28701	4.10935E-4	2.44225E+04
High Density Poly Ethylene with 5 % Natural Boron	3 mm	1.24458	12.1E-4	1.57549E+04
High Density Poly Ethylene	3 mm	1.30774	9.73200E-4	1.00665E+04

with 5 % Boron-10				
High Density Poly Ethylene with 5 % Boron-10	5 mm	1.28369	11.3216E-04	4.80723E+03
Boron-10	5 mm	1.26906	8.54929E-04	5.00000E+03
Boron-10	10 mm	1.22885	9.06580E-04	7.02346E+03
Boron-10	15 mm	0.987851	10.0580E-04	5.55556E+03
Cadmium	5 mm	1.30230	10.2254E-04	5.55556E+03
Cadmium	10 mm	1.28044	10.2254E-04	5.55556E+03
Boron-10 then Cadmium	10 mm B-10 5 mm Cd	1.18005	9.75886E-04	1.33582E+04

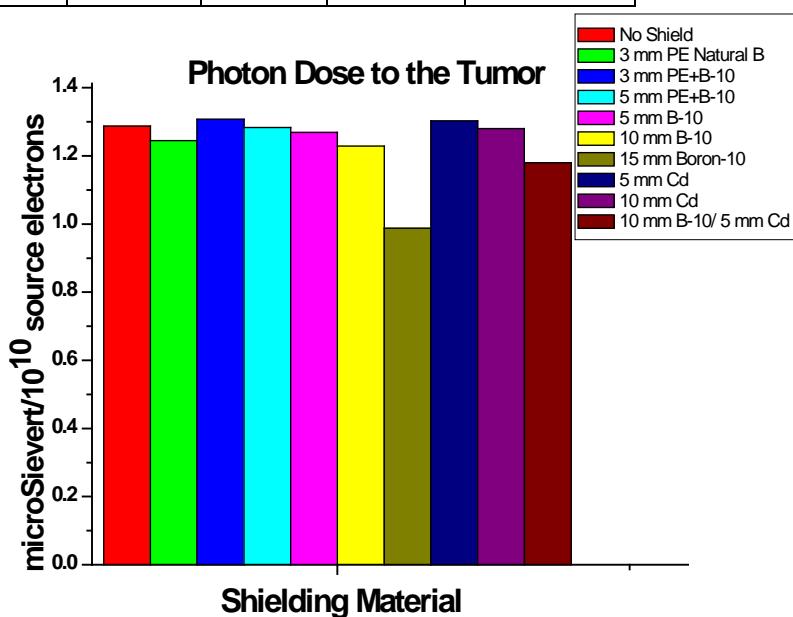


Figure 3. Photon dose to the tumor using different neutron shields.

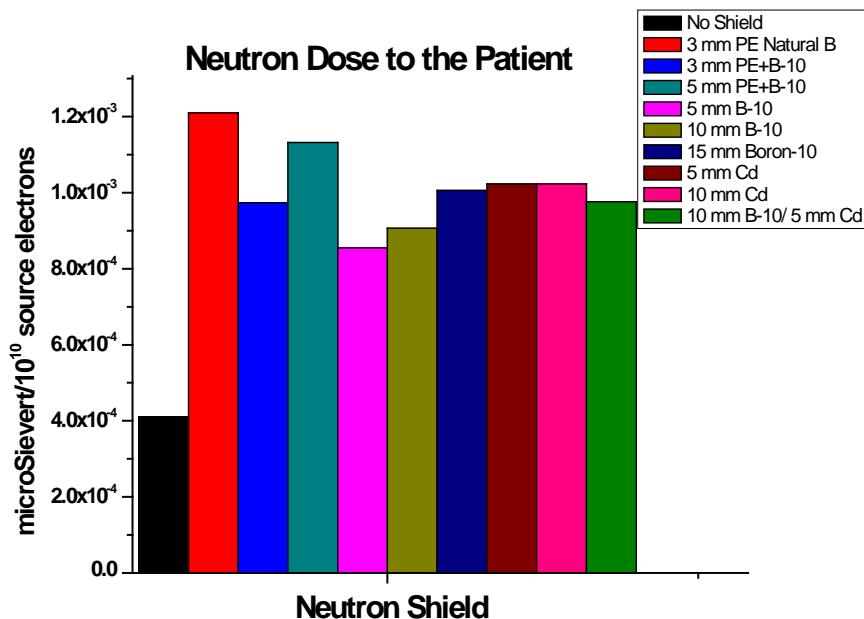


Figure 4. Neutron dose to the patient using different neutron shields.

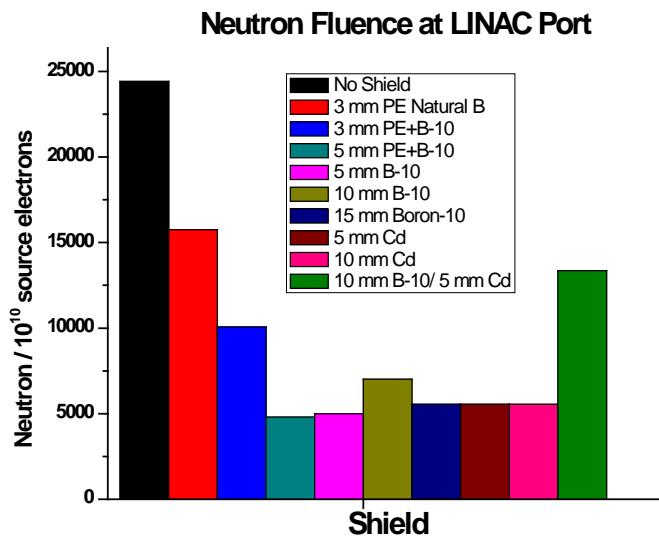


Figure 5. Neutron fluence at LINAC port using different neutron shields.

V. DISCUSSION

Despite the decrease in neutron fluence traversing the neutron shield, neutron dose to the patient was increased probably due to in shield thermalization of the fast neutrons emitted by photo-neutron interactions of the energetic X-rays with the LINAC materials. Thermalization of the neutrons traversing the neutron shield increases their capture cross sections in patient's tissues, thus increasing the absorbed dose, hence increasing the total equivalent dose to the patient.

Exact determination of the neutron spectrum below the neutron shield would take very long MCNPX runs using very large number of electron histories to get the neutron energy spectrum at

acceptable precision. However, it should have verified the thermalization explanation of the increase in neutron dose to the patient. It is planned to be done in future work.

VI. CONCLUSIONS

A Monte-Carlo study was carried out to investigate the efficacy of different materials to shield the photo-neutrons emitted from LINACs. Several materials were tried at different thickness. Though neutron fluence reaching the patient position was reduced by all the tried neutron shields, neutron dose to the patient was markedly increased. This is probably due to thermalization of the

photo-neutrons in the shield, increasing their capture rate inside the patient's tissue, and increasing their dose.

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Optimum Heavy Water Percentage in Moderator for a Th-Pu-U Fueled Nuclear Reactor

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Abstract- A Monte-Carlo parametric study was carried out to investigate the nuclear properties of Th-Pu-U fueled model of the LR-0 reactor when moderated by mixtures of heavy/light water at molecular ratios ranging from 0% up to 100% D₂O at increments of 10% in D₂O. The mass of control rods needed to make the reactor critical and the potential reactivity in heavy water were tallied at the 11 heavy water percentage moderators being studied. It was found that the changes in these tallied parameters with heavy water percentage in moderator were not monotonic. Very large negative reactivity was found at 90% heavy water moderator.

Index Terms- Mixed water moderator, Nuclear reactor, LR-0, Heavy water

I. INTRODUCTION

Earlier published papers on using mixed water moderator viz.; The spectral shift control reactor “SSCR” reactor physics programs reports (Wehmeyer et al., 1962, and Barrett et al., 1962), The mixed moderator PWR “MPWR” report of Mitsubishi heavy industries, Ltd. (Tochihara et al., 1998), and neutronic behavior of LR-0 when being moderated by mixtures of light and heavy water (M. Nagy et al., 2014), concluded that neutron spectrum is non-monotonically hardened on addition of heavy water to originally light water moderated reactor at all heavy water percentages.

This suggested that using mixed-water moderator for Thorium fueled reactors, may improve the conversion factor. However, since the neutronic behavior of a reactor depends strongly on heavy water percentage in moderator, the optimum heavy water percentage had to be investigated for. This work was dedicated to answer this question for an LR-0 reactor fueled by Th-Pu-U.

The current work is an MCNP5 study of the neutronic behavior of hypothetically Th-Pu-U fueled LR-0 reactor when moderated by mixtures of heavy/light water at molecular ratios ranging from 0% up to 100% D₂O at molecular ratio increment of 10% in D₂O. Total mass of control rods needed to make the reactor critical and the potential reactivity in heavy water were tallied for each of the 11 heavy water percentage moderators.

II. MATERIAL

2.1. LR-0 Model

13 standard LR-0 reactor fuel assemblies were assembled in an MCNP5 model. Each assembly is hexagonal in shape of

radius = 13.60 cm, divided into 331 hexagonal moderator cells; each of radius = 0.736 cm. Each fuel assembly contains 312 fuel pin, 18 cluster tube, and 1 central instrumentation tube. The 18 cluster tubes were arranged according to the standard LR-0 reactor fuel assembly (Kyncl et al., 2005).

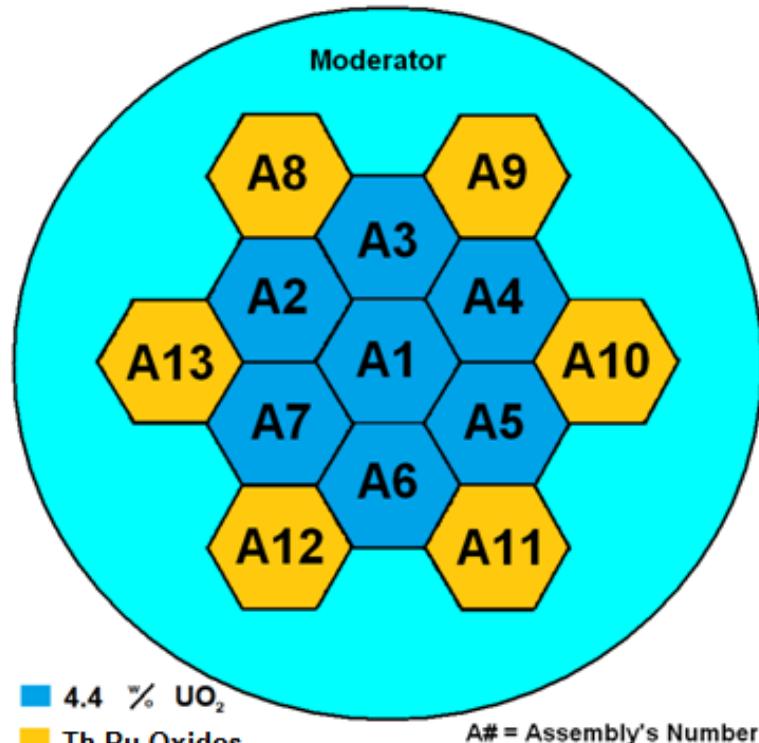


Fig.1. Fuel assemblies numbering, core configuration and fuel distribution.

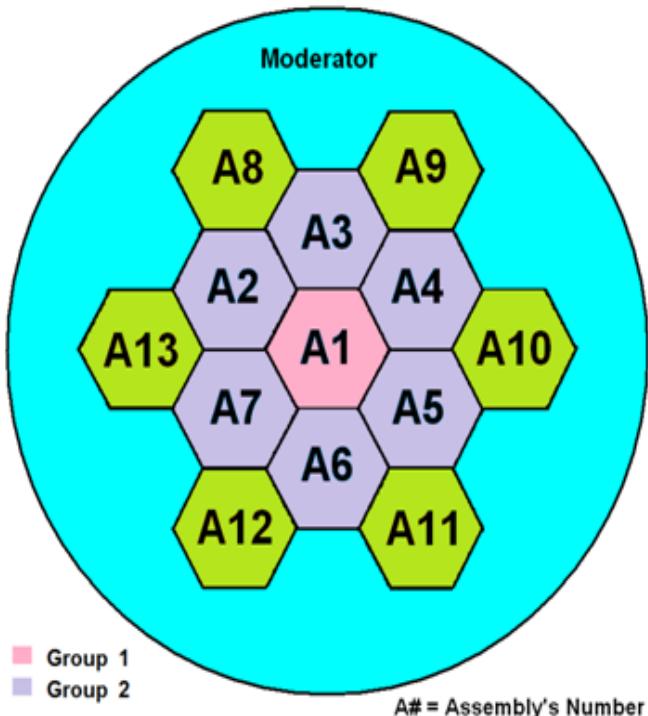


Fig. 2. Control rods groups.

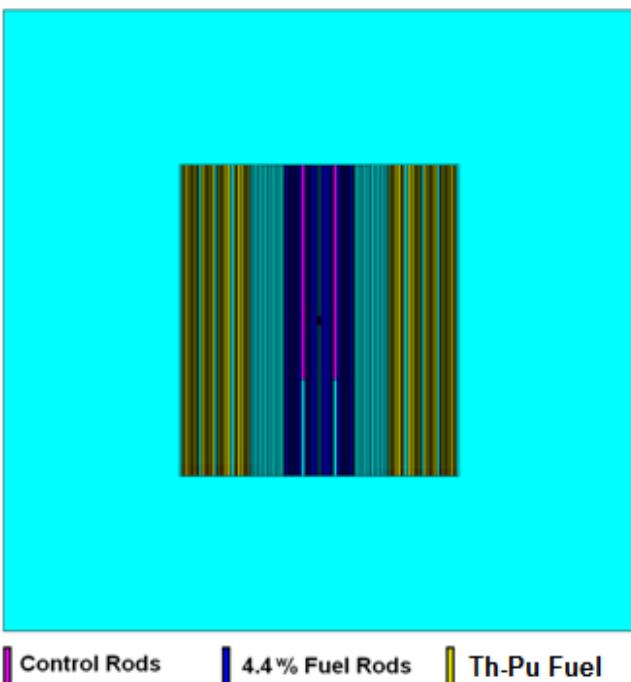


Fig. 3. Longitudinal section of the model.

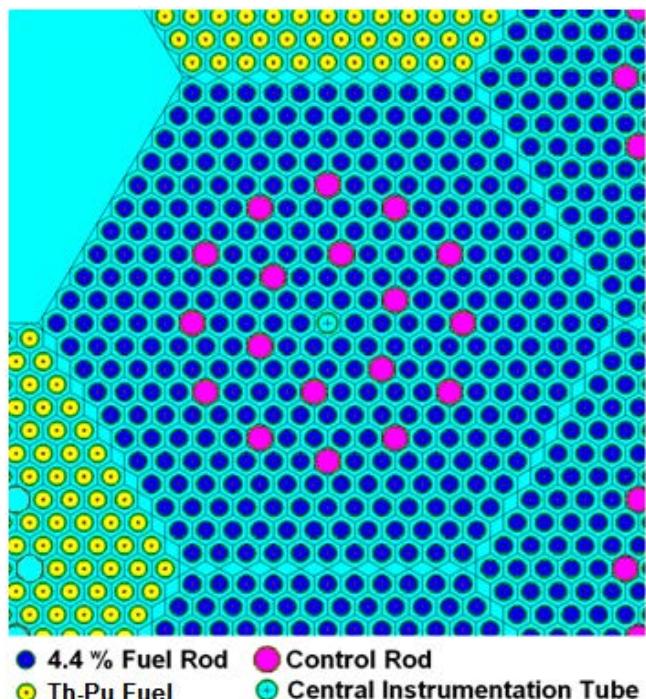


Fig. 4. Structure of fuel assembly

2.2. Fuel pins

Each fuel pin is a hollow cylinder, 125 cm long, with 1.4 mm inner diameter, and 7.53 cm outer diameter. It is encased inside a ZrNbHf alloy clad tube 0.735 mm thick. The axial hollow space is filled with helium gas. The gap between the fuel and the clad is neglected in the model. The 7 central fuel assemblies number had Uranium Oxide fuel at enrichment = 4.4 %, and density = 10.08 g/cm³. The outer 6 fuel assemblies had Thorium-Plutonium fuel at density= 9.24 g/cm³, its atomic composition was as in table A.2. The clad material is ZrNbHf alloy at density = 6.45 g/cm³.

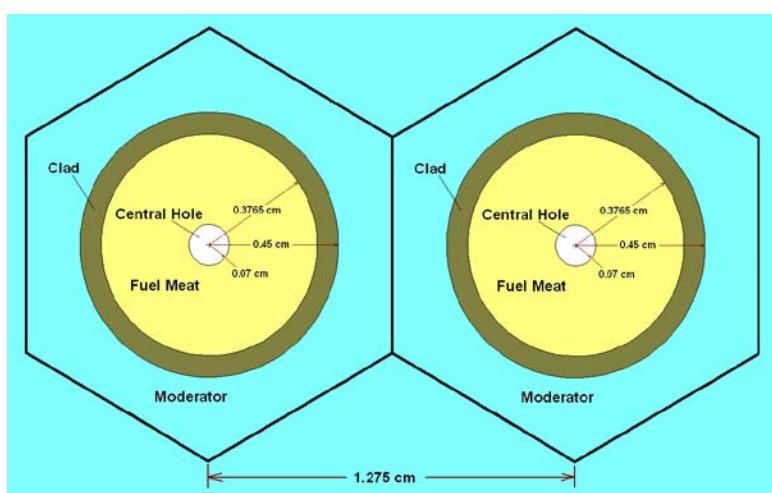


Fig. 5. Fuel Pins & lattice cells geometry.

2.3. Cluster tubes

Cluster tubes are made of stainless steel, with inner diameter of 11 mm, and outer diameter 12.6 mm. They contain the control rods.

2.4. Control rods

Control rods are made of B_4C , 11 mm in diameter. The control rods were grouped into 2 groups; first group in central fuel assembly, second group in fuel assemblies number 2-7. Each group of control rods are moved together. For changing reactor reactivity; the control rods were not (as in real reactors) withdrawn out off core, rather they are shortened or lengthened in the model. This was meant not to disturb the neutronic properties of the moderator in the upper plenum. All boron was $B-10$, as its very high neutron absorption cross section allowed small changes in control rods lengths to change significantly the criticality of the reactor. Thus it was possible to keep the model critical with the control rods partially inserted in all study steps.

2.5. Central instrumentation tube

The central instrumentation tube is made of $ZrNbHf$ alloy, with inner diameter of 8.8 mm, and outer diameter of 10.25 mm. They are filled with moderator.

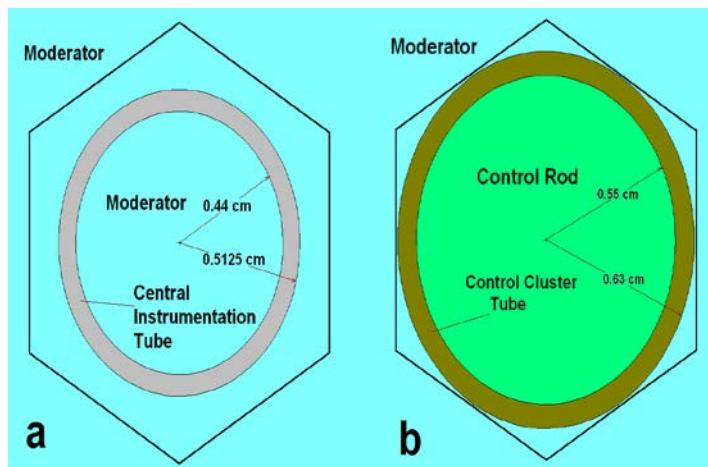


Fig. 7. (a) central instrumentation tube, (b) control cluster tube & rod.

2.6. Moderator

The moderators were mixtures of light and heavy water at different molecular ratios. 11 molecular percentages of heavy water in light water were used in the study viz. 0%, 10%, 20%, ..., 100%. The moderator filled all the model spaces and its outer shape was a square cylinder with 2500 mm in diameter and height, symmetrically surrounding the reactor core.

Structural components of the reactor e.g. assembly spacing grids and bottom structures were neglected in the model to simplify modeling and since their neutronic contribution is unwanted for comparing the nuclear properties of moderators having different molecular ratios of heavy water in light water.

III. METHOD

3.1. Code

MCNP5 using cross section library (ENDF/B-VII.1) was used to mode the LR-0 reactor and carry out the study. The reactor was assumed to be at room temperature and atmospheric pressure, the real operation conditions of the LR-0 reactor.

3.2. Tallies

The tallies included;

- 1) sum of masses of control rods required to set the reactor critical.
- 2) potential reactivity in heavy water were tallied for each of the 11 heavy water percentage moderators.

The study was carried out at 11 steps at different heavy water molecular percentage in moderator; viz. 0%, 10%, 20%, ..., 100%. To keep the reactor critical ($K_{eff} \approx 1.00000$, with tolerance of $+0.00065$), lengths of the B_4C control rods were changed at each step enough to resume criticality.

Because of the probabilistic nature of MCNP code, it was impractical to try achieving k_{eff} of exactly 1.00000. Rather, $k_{eff} \approx 1.00000$ with tolerance of $\sim (+/- 0.00065)$ was accepted at standard deviation (S.D.) not exceeding 0.00020; as shown in table 1.

Table 1. k_{eff} and relevant statistical data for the 11 studied LR-0 models.

D ² O %	0	10	20	30	40	50	60	70	80	90	100
k_{eff}	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
ff	0.04	0.04	0.01	0.01	0.04	0.00	0.04	0.06	0.02	0.03	0.02
2	4	1	0	7	0	2	5	7	5	1	
S.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
.	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
2	2	2	2	2	3	3	2	2	2	2	9

Therefore; all of the 11 models could be considered exactly critical.

IV. RESULTS & DISCUSSION

4.1. Total Mass of Control Rods

Lengths of the control rods were reset for each of the 11 studied cases of heavy water percentage. It was noted that the total mass of the control rods needed to attain criticality for each case was slightly decreasing with increase of heavy water percentage, till 70%. Marked decrease in control rods mass was noted at 80% heavy water. At 90% heavy water, the necessary control rods mass was almost zero. The necessary control rods volume increased again at 100% heavy water percentage. See figure 9.

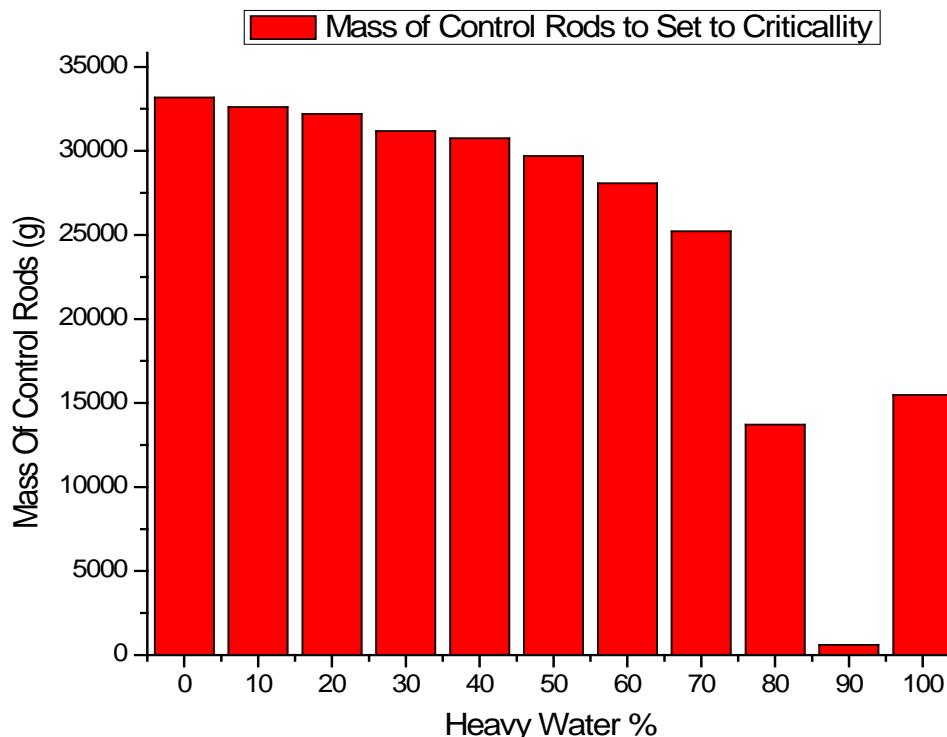


Fig. 9. Total mass of control material vs. D₂O%.

The overall trend of decrease of the total mass of the control rods needed to attain criticality vs. heavy water percentage is simply explained by the reduction in moderation efficiency of the moderator with decrease in available Hydrogen nuclei in moderator with decrease of light water percentages.

The abrupt drop of total mass of the control rods needed to attain criticality at 80 & 90% heavy water percentage might be explained by the fact that at such low light water (Hydrogen nuclei) content in moderator, neutron moderation capability of the moderator is much lowered, hence the reactivity of the system is lowered which necessitates reducing the control rods mass. At

100% heavy water, the total absence of the greedy neutron absorber Hydrogen atoms necessitates the addition of compensatory amounts of neutron poisons.

When compared with results of Nagy et al, 2014, where the fuel was all UO₂, both results had same trend. The two curves of normalized of control rods mass vs. heavy water percentage for the present study and the referred to study were analogous between 0% - 70% heavy water in moderator. However, beyond 70% heavy water, the decrease in needed control rods mass was more marked with Th-Pu-U fuel than with UO₂ only fuel. See figure 10.

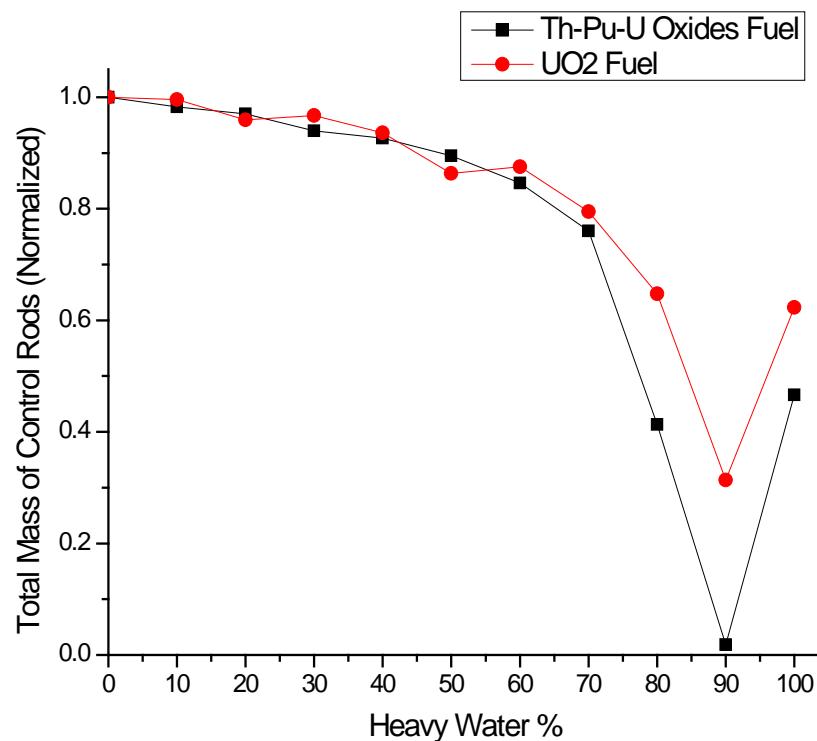


Fig. 10. Mass of control rods vs. D₂O%, with Th-Pu-U fuel compared to UO₂ fuel.

3.2. Reactivity Induced by Replacing Moderator by Heavy Water

Reactivity induced by replacing the moderator by mixture of heavy water/light water, while the control rods lengths were the same as in case of 100% light water case was calculated. It was found that adding heavy water induces negative reactivity, which increased with increase of the added heavy water percentage till 80% heavy water. Slight reduction in negative induced reactivity

was noted with 90% heavy water, and marked reduction was noted at 100% heavy water, as seen in figure 11.

When compared with results of Nagy et al, 2014, both results had same trend. Maximum negative reactivity induced by replacing the moderator by mixture of heavy water/light water was noted at 80% heavy water with Th-Pu-U fuel of the present study, while it was noted at 90% heavy water in the study of Nagy et al with UO₂ fuel. See figure 12.

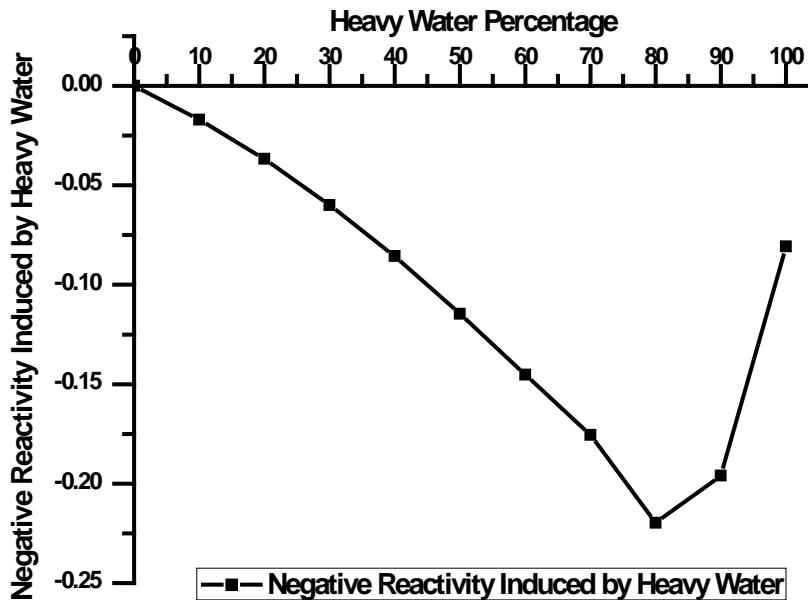


Fig. 11. Reactivity induced by replacing moderator by mixed heavy/light water.

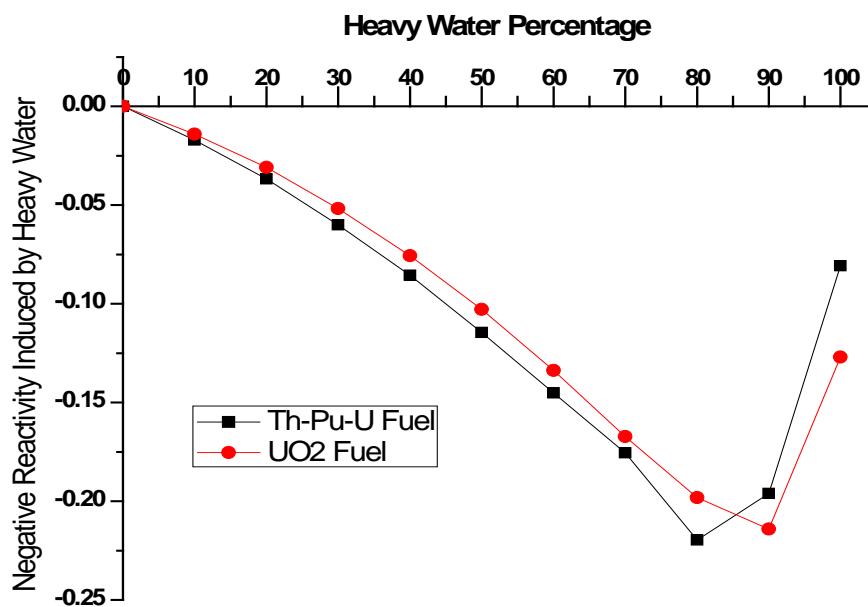


Fig. 12. Induced reactivity vs. D₂O%, with Th-Pu-U fuel compared to UO₂ fuel.

V. CONCLUSIONS

A Monte-Carlo parametric study using MCNP5 was carried on a modified model of the light water zero power experimental reactor (LR-0) to examine its nuclear properties if it is moderated by a mixed water moderator; that is a mixture of light and heavy

water at molecular ratios ranging from 0% up to 100% D₂O with increment of 10% in D₂O. Lengths of the control rods were reset for each of the 11 studied cases of heavy water percentage. Total mass of the control rods needed to attain criticality slightly decreased with increase of heavy water percentage, till 70% followed by marked decrease at 80% heavy water. At 90% heavy

water, the necessary control rods mass was almost zero. The necessary control rods volume increased again at 100% heavy water percentage. Negative reactivity induced by replacing the moderator by mixture of heavy water/light water increased with increase of the added heavy water percentage till 80% heavy water. Slight reduction in negative induced reactivity was noted with 90% heavy water, and marked reduction was noted at 100% heavy water.

Appendix

Materials specifications

A.1. Fuel

Table A.1

Uranium Oxide fuel material specifications

Enrichment = 4.4 w/o, density = 10.08 g/cm³.

Element	Atom Density (Atom/barn.cm)
U-235	9.93059E-4
U-238	2.13038E-2
O-16	4.45937E-2

Table A.2

Thorium-Plutonium Oxides fuel material specifications

Element	Atom Density (Atom/barn.cm)
Th-232	212.7772712
Pu-238	0.4976955
Pu-239	10.7959799
Pu-240	4.74067
Pu-241	2.50976655
O-16	31.9988

A.2. ZrNbHf alloy for clad & central instrumentation tube

Density = 6.45 g/cm³

Table A.3

Clad element composition

Element	Atom Density (Atom/barn.cm)
Zr	4.2141E-02
Nb	4.1808E-04
Hf	6.5285E-06

A.3. Control rods

Boron carbide B₄C, Density = 2.52 g/cm³

Table A.4

Control rod's boron carbide element composition

Nuclide	Atom fraction
Boron-10	4
Carbon	1

A.4. Stainless steel for cluster tubes

Type (GOST 08CH18N10T) stainless steel, density = 7.9 g/cm³

Table A.5

Cluster tubes' stainless steel element composition

Element	Atom Density (Atom/cm.barn)
Fe	5.9063E-02
Ni	8.9167E-03
Cr	1.6469E-02
Si	6.7757E-04
Mn	8.6597E-04
C	1.5844E-04
Ti	1.9872E-04

P	2.6879E-05
S	1.4835E-05

A.5. Helium

Helium gas at S.T.P. density = 0.0001785 g/cm³

A.6. Moderator

11 mixtures were used.

Table A.6

Moderator specifications

D ₂ O %	Density (g/cm ³)	Atom fraction		
		H	D	O
0	1.0000	20	0	10
10	1.0104	18	2	10
20	1.0208	16	4	10
30	1.0312	14	6	10
40	1.0416	12	8	10
50	1.0520	10	10	10
60	1.0624	8	12	10
70	1.0728	6	14	10
80	1.0832	4	16	10
90	1.0936	2	18	10
100	1.1040	0	20	10

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نسبة الماء الثقيل المثالية في مهدئ النيوترونات في مفاعل يعمل بوقود ثوريوم - بلوتونيوم - يورانيوم
محمود ا. دره، عفاف ا. عطية
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الملخص العربي:

تم إجراء دراسة بارامترية بطريقة مونت كارلو لبحث الخصائص النووية لنموذج لمفاعل LR-0 ي العمل على وقود ثوريوم-بلوتونيوم-يورانيوم عند تهديته بواسطة خليط من الماء الثقيل والخفيف بنسب جزيئية بين 0% و حتى 100% من الماء الثقيل، بزيادة 10% ماء ثقيل في كل مرة. وقد تم حساب الكتلة الكلية لقضبان الوقود اللازمة لجعل المفاعل حرجاً، و التفاعلية الكامنة في الماء الثقيل عند الإحدى عشر نسبة من الماء الثقيل في المهدئ النيوتروني قيد الدراسة. وقد تبين أن التغيرات في تلك القيم المحسوبة مع التغير في نسبة الماء الثقيل في المهدئ النيوتروني كانت غير تناسبية. وقد وجدت تفاعلية سالبة كبيرة جداً عند 90% ماء ثقيل في المهدئ النيوتروني.

EFL learners' attitudes towards their English language oral errors: the case of grade twelve students.

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Abstract

The EFL learners are reluctant to speak English in spoken class than practicing the target language through trial-and-error. There is less progress in their spoken skill and they have poor achievement in spoken assessments. Thus, the study was to find out the students' attitudes to their English language oral errors. To do so, 100 systematically sampled grade 12 students and their English language teachers were respondents of the study. The study has come up with the following findings. Majority of the students hold erroneous attitudes towards their English language oral errors. They are afraid of making oral errors, demand perfect accuracy, fear of taking risks of making errors. They lacked opportunities which encourage their learning of speaking English. Thus, they had decreased communicative competence in spoken English. This is because of their negative attitudes to their English language oral errors. They feel that their oral errors are indicators of their weakness and they perceive errors as bad habits to be avoided.

Key Words: EFL, English language, learners' attitude, oral error

I. INTRODUCTION

Language is primarily spoken and the learning of any language involves trial-and-error. Specifically, oral errors in learning foreign/second language are more frequent due to the absence of time for organizing thought. It is also frequent because of fear of doing wrong when the learners practice speaking of the target language in front of the teacher and other students. This may result in more erroneous utterance which may affect meaning and communication. This means if they do not practice speaking through trial-and-error, they keep on uttering erroneous speech (Atkins, Hailom Nuru, 1996)

English has become a dominant language in business, finance and banking, science and technology, popular culture and international relations around

the world. It is widely accepted that fluency in the English language is a key to success in life. A student's attitude toward learning the language is one of the leading predictors of success in learning English. So, teachers and educators should take motivation and attitude factors into consideration when designing English language training and instruction (Hall, 2009).

According to Nunan and Lamb (1996) and Erlenawati (2002), learners' attitudes are derived from variety of sources like previous learning experiences, personality traits, teaching and learning practices, social context and so on. These attitudes of learners to the processes and strategies of EFL learning may foster or hamper the success of their learning. Similarly, Erlenawati (2002) claims that attitudes can "influence learners' motivation to learn, their expectations about language learning, their perceptions about what is easy or difficult about a language, and the strategies they choose in leaning". In the same way, learners have their own self perceptions of their errors in learning EFL which may influence their success in learning the language.

Learners' attitudes to their language learning strategies have influential roles in the effectiveness of foreign language learning. They influence the learners' success in learning FL in a number of ways. They determine the learners' motivation to learn and their predisposition about the nature of FL learning. Thus, learners' attitudes may predispose learners to make efforts to learn or not to do so, or may cause learning to be impaired or even unsuccessful.

Learners with positive attitudes, who experience success, will have these attitudes reinforced. Similarly, learners' negative attitudes may be strengthened by lack of success... (Ellis, 1994: 198-199).

This shows that learners' attitudes influence their success in language proficiency and the attitudes themselves in turn are influenced by these successes. In general, the attitudes learners hold towards the context and nature of language learning as well as their own learning practices may either impede or enhance their success in the attainment of language proficiency. Accordingly, learners' attitudes towards their English language oral errors also affect their success in learning to speak English (Atkins, Hailom and Nuru, 1996).

Though learners' attitude having such a critical effect on the learners' success in foreign language learning, it is less studied in general. Majority of the research literature are on error treatment and on error correction. There is no enough evidence found especially in the local research literature accessible to the researcher shows a research conducted specifically with respect to learners' attitudes towards their English Language oral errors except few studies undertaken on error treatment and attitudes of students and teachers to errors and to learning EFL in general.

As a result, the researcher has intended to investigate EFL learners' attitudes towards their English language oral errors by focusing on the case of grade twelve students.

II. METHODOLOGY

For choosing the required sample, different principles and techniques were used. Among the 17 preparatory schools in the zone, three schools were taken purposively. Then, the number of students in each section of each school was identified. To achieve generalizable, valid and reliable data, stratified random sampling and systematic sampling techniques were used.

This is to obtain representative samples as grade 12 students of these schools were grouped into 13 sections.

Thus, to determine the sample size to be taken from each section, the formula $\frac{n}{N} \times Ni$ was applied;

- n = total number of the sample wanted
- N = total number of target population and
- Ni = the number of each stratum or of each section.

Similarly, systematic sampling was used to determine the individual student taken from each section. To do so, first, the complete name list of each section was obtained; then, to decide the specific interval of the individuals selected from each section's name list, the formula $\frac{N}{n} = K$ was applied; (Wiersma, 1995:292)

- ❖ N = total population of a section
- ❖ n = the number of sample taken from a given section and

- ❖ k = a common factor used to determine the interval of the individuals to be taken from the name list.

So, every k^{th} interval in the name list of each section was selected until the number of wanted sample of the section was covered. The same was done for all the sections. Three groups of Focus Group Discussions with six students each were also used in this study. High achievers, medium achievers and low achievers of the students were selected from the three schools purposefully. This is to get more information about the topic from the students through free discussion. In this study, individual semi-structured interview was used with five grade 12 English language teachers of the three schools. Among the three tools discussed above, questionnaire is the major tools of this study because it consists of different kinds of large items. Furthermore, it was responded by a large number of respondents of the study in relation to the respondents of other tools.

III. RESULT AND DISCUSSION

No	Item	Respondents										Non-response	Total		
		Agree		Strongly agree		Neutral		Disagree		Strongly disagree					
		No	%	No	%	No	%	No	%	No	%	No	%		
1	I fear of making errors/mistakes in speaking during learning English	41	41	30	30	6	6	12	12	11	11	0	0	100	100
2	I worry about making errors/mistakes in speaking in learning English	40	40	29	29	8	8	15	15	8	8	0	0	100	100
3	I feel I should practice speaking in English though I still make oral errors	50	50	21	21	2	2	17	17	10	10	0	0	100	100
4	I feel my own oral errors are indicators of my weakness	47	47	20	20	0	0	20	20	13	13	0	0	100	100
5	I feel my own oral errors are very harmful to my English oral communication	32	32	38	38	5	5	15	15	10	10	0	0	100	100
6	I feel I learn from my errors in a memorable way	12	12	20	20	6	6	40	40	22	22	0	0	100	100
7	I think it is difficult for me to avoid later on unless my teacher corrects me every time I make errors	33	33	30	30	3	3	21	21	13	13	0	0	100	100
8	My errors are useful evidences of progress in learning to speak English	14	14	12	12	3	3	48	48	20	20	3	3	97	100
9	I do not fear of making errors in oral production in English	10	10	11	11	5	5	54	54	20	20	0	0	100	100
10	I am not worried about making errors in English classroom oral interaction	17	17	10	10	10	10	40	40	23	23	0	0	100	100
11	I feel my oral errors are useful to my learning of spoken English	10	10	15	15	6	6	29	29	40	40	0	0	100	100

12	I should not say anything in English until I can say it correctly	45	45	20	20	2	2	12	12	8	8	3	3	97	100
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Table 1: Learners' attitudes towards their English language oral errors

As it is seen from Table 1 above, 71% of the respondents (41% agreed and 30% strongly agreed) confirmed that they fear of making errors in speaking and only 6% of the students have neutral attitude on the issue. However, 23 % (12% disagreed and 11% strongly disagreed) rejected that they do not fear of making errors in speaking English. It can thus be deduced that majority of the subjects are fear of making errors in speaking where some students disapproved of doing so. This tells us that a large number of the learners hold erroneous attitudes towards their own English language oral errors.

In the same Table it is evidenced that among the subjects, 23% disagreed, 69% confirmed and 8% were neutral with the statement "I worry about making errors in speaking in learning English". This may show that small number of the students do not worry about making errors in speaking while most of them worry about making oral errors in learning English. From this it may be inferred that some of the learners' attitudes is positive towards their own English language oral errors but that of most of them is not.

The Table shows that among the respondents, 71% said that they feel they should practice speaking English though they make oral errors, and 27% rejected and only 2% are neutral about the issue. This tends to reflect that majority of the students seem to believe that they should speak English though they make errors but only a few students do not. The implication is that most of the students are theoretically aware that practicing speaking is necessary even if errors appear.

The Table again shows that out of the subjects, 67% confirmed and 33% disapproved the statement, "I feel my own English language oral errors are indicators of my weakness". This seems to show that most of the respondents feel that their own oral errors indicate their weakness, but some of them do not. From this it can be deduced that most of the students seem to hold erroneous views to their own oral errors.

Here it is also read that among the respondents, 32% approved, 62% disapproved, while 6% of the subjects have undecided opinion about the statement, "I feel I learn from my errors in a memorable way". This may indicate that some of the learners are theoretically informed that errors are useful evidences in leaning where most of them do not. This may show us that most of the students do not feel that errors are important in learning language.

Among the respondents, 63% confirmed, 34% disapproved and 3% were neutral to the idea that errors are difficult to avoid later on unless their teacher corrects them as soon as they make spoken errors. This implies that most of the respondents say that errors should be corrected as they occur because they are difficult to eliminate in the future. However, some of the students have shown their disagreement on the issue. It may be deduced here that most of the students hold erroneous thoughts about their own English language oral errors.

In the case of the item, "my errors are useful evidences of my progress in learning to speak English," among the respondents, 68% rejected, 26%

confirmed and 3% showed undecided opinion about the matter. From this, it could be deduced that most of the students feel that their errors are not useful indicators of their learning. On the contrary, about one-fourth of the students believe that errors are useful indicators of progress of their learning. It can be inferred from this that most of the learners hold negative attitude to their own spoken errors.

Concerning the statement, "I do not fear of making errors in oral production in English," among the subjects, 74% showed their disagreement, 21% approved and 5% have neutral opinion. This shows that the majority of the students fear of making oral errors while some of them said they do not fear of doing so. This is also similar to item 10 on which majority of the students confirmed that they fear of making errors. This may also show that the majority of the students hold erroneous view towards their own oral errors.

The information in the Table shows also that 27% of the respondents are not worried about making oral errors, whereas 63% disconfirm and 10% are neutral that they are worried about doing so. This again may show that some of the students do not bother much about making oral errors perhaps due to their realistic attitudes and most of them do because of their negative attitudes.

As the data in the Table indicates among the subjects, 69% disapproved, 25% approved, and 6% have neutral opinion that their oral errors are useful to their learning of spoken English. This shows that majority of the students don't think that their oral errors are useful to their learning of spoken English. Some of the students, however, think that their oral errors are useful to their learning of spoken English. It is also true in the case of item 5

where majority of the students think that their oral errors are not useful to their learning of spoken English.

The data indicates also that among the subjects 20% rejected, 75 confirmed and only 2% of them have neutral opinion that they should not say anything in English until they can say it correctly. Majority of the students expect perfect accuracy and minority of them do not expect perfect accuracy before fluency. This may tell us that majority of the students are not informed that perfect accuracy may be impractical.

In this part of the data from the 12 items of the learners' attitudes to their own oral errors, except on item number 3, on the rest 11 items majority of the students indicated that they have negative attitude towards their English language oral errors.

In the same manner, the result also shows that majority of the subjects confirmed that their own English language oral errors are harmful or not useful to their oral communication or learning of spoken English.

To sum up, as can be witnessed from the learners' responses, majority of the respondents reported that they fear of making oral errors. Besides this, they think that their own oral errors are indicators of their weakness. In addition to these, they prefer frequent and on-the-spot correction by the teacher to get rid of errors. So according to this result, majority of the subjects tend to have negative attitudes towards their own English language oral errors. Generally speaking, although Brown (1994) comment that one's errors are signs of progress of learning, most of the learners said that errors are signs of their weakness and are not signs of learning.

IV. CONCLUSION

From the study it was deduced that majority of the students tend to have negative attitudes toward their English language oral errors. In other words, they afraid of making English language oral errors, they demand perfect accuracy and they feel their own English language oral errors are indicators of their weakness. Besides this, they feel that their own errors impede their learning of spoken English and oral communication. In addition, they prefer frequent and on the spot correction to ‘get rid of’ the errors. They are ashamed and fear of uttering anything in English and are reluctant and inhibited, though they have interest to practice spoken English.

It was further identified that a large number of the learners are concerned more with accuracy than fluency, are nervous, fear of taking risks of making errors and lacked opportunities which encourage their learning of speaking English. They had decreased communicative competence in spoken English because of their negative attitudes to their own English language oral errors though they are ready to participate in communicative activities.

Therefore, it can generally be concluded that majority of the learners hold negative attitudes towards their English language oral errors due to some factors. As a result of this, a considerable number of the students are left with little chances to communicate in spoken English. Hens, this leads them to unsuccessful way of practicing spoken English and results in weak performance of English language speech competence.

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Unexplored Natural Tourism Potentials: Gambella People's National Regional State, South West Ethiopia

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Abstract - *Tourism is travel for recreation, leisure, education and training, visiting friends and relatives, shopping, transit, pilgrimages or business purposes and staying in places outside their usual environment for not less than 24 hours and not more than one consecutive year. The tourism industry is made up attraction sector, accommodation sector and transport sector. Ethiopia embraces enormous natural tourism potentials with its unique biodiversity, spectacular landscapes, lakes, waterfalls, rivers, mountains, cliffs, natural bridges, valleys, protected areas and biosphere reserves. Gambella Region is located at south west of Ethiopia and endowed with remarkable natural tourism destinations. Nonetheless, limited study has conducted in exploring natural tourism potentials. Henceforth, the current study addresses the stated issue. To do so, key informants from three zones (n=15), five regional offices (n=23) and 13 woredas (n=65) has purposively selected based on the set criteria. Altogether, 103 key informants were interviewed besides to field observation. Collected raw data were chosen, refined, categorized, edited, evaluated, coded and entered to SPSS software version 20. Descriptive statistics were computed for relevant variables and information obtained from the key informants and field observation was described in meaningful content. Findings of this study revealed that Gambella Region has endowed with marvelous natural tourism potentials like waterfalls, lakes, rivers, mountains, bridges, wetlands, national park and biosphere reserve. Key informants underlined that the region has delightful natural potential to attract tourists, ecologists, environmentalists, explorers, drifters, naturalist and other segment of tourists towards its unique biodiversity from the different corner of the world.*

Index terms: *Tourism, Natural Tourism Potentials, Gambella, Ethiopia*

I. INTRODUCTION

Tourism is travel for recreational, leisure, education and training, visiting friends and relatives, shopping, transit, pilgrimages or business purposes (UNWTO, 2010; Kumar and Audit, 2016). It is a social, cultural and economic phenomenon which entails the movement of people to countries or places outside their usual environment for personal, business or professional purposes (UNWTO, 2012). It comprises the activities of persons traveling to and staying in places outside their usual environment for not less

than 24 hours and not more than one consecutive year for leisure, business and other purposes (UNWTO, 2013). Now days, it is one of the largest and increasingly recognized growing industries globally, generating 9.8% of global GDP; is the best ways to earn foreign currency (WTTC, 2015). The tourism industry is made up of three major components: namely, transport sector, accommodation sector and attraction sector (Knezevic, 2008). Since the mid-1980s nature based tourism has become a major economic force for both developed and developing nations around the world (TIES, 2006; UNWTO, 2010). Nature based tourism is newly emerging industry and increasingly important source of income, employment and wealth in many countries (WTTC, 2015). Ethiopia embraces enormous natural tourism potentials. The country has endowed with a wealth of tremendous biodiversity, less disturbed natural resources, mountains, lakes, special events, colorful ethnic groups, manmade sites, unusual geological features, local arts, and artifacts (Binayew and Yiheyis, 2016). The country has endowed with various fauna and flora composition. There are about 320 mammal species, 39 endemic; 862 bird species: 19 endemic; 240 reptile species: 16 endemic; 71 amphibian species: 30 endemic; 172 fish species: 38 endemic and 6500-7000 flora species: 625 endemic to the country (Vreugdenhil, D., 2012; Young, J., 2012; MoCT, 2012; Amare, 2015). Likewise, the country has enormous protected areas like 21 national parks; 3 wildlife sanctuaries; 3 wildlife reserves; 3 community conservation areas; 7 open hunting areas and 18 controlled hunting areas (SDPASE, 2008; Vreugdenhil, D., 2012; Young, J., 2012; Amare, 2015). Moreover, nowadays Ethiopia has 5 biosphere reserves; namely Majang Forest biosphere reserve, Lake Tana biosphere reserve, Sheka Forest biosphere reserve, Kaffa Coffee Forest biosphere reserve and Yayu Coffee Forest biosphere reserve (Selemon, Chiranjib and Alemken, 2019). Gambella People's National Regional State is one of the mosaics beautiful tourism destinations of the country which is located at Southwest tip of Ethiopia where five indigenous nationalities and other nation and nationalities of the country live in greater harmony. The region has various natural tourism potentials to attract eco-tourists, ecologists, environmentalists, naturalist, explorers and other segment of tourists towards its unique biodiversity (Selemon, Chiranjib and Alemken, 2019). However, limited studies were conducted to explore natural tourism potentials of the region. Even though the region has endowed with tremendous natural tourism potentials, it seems that the region receives fewer visitors relatively compared to other regions (MoCT, 2012). Hence, the current study explores the major natural tourism potentials of the region in order to attract different visitors from the various corners of the World.

II. RESEARCH METHODOLOGY

Description of the Study Area

The study was conducted from June, 2018- March 2019 in Gambella People's National Regional State. Gambella People's National Regional State is located in the South-western part of Ethiopia about 777 km away from Addis Ababa, capital city of Ethiopia. It is situated in the lowlands of Baro-Akobo River Basin between latitudes $6^{\circ}22'$ to $8^{\circ}37'$ North and longitudes $33^{\circ}10'$ to $35^{\circ}50'$ East. It has a total area of approximately 34,063 km² of land. The region borders with Benishangul Gumuz and Oromiya regions to the North; Southern Nations, Nationalities and People's Regional State (SNNPRS) and the Sudan Republic to the South; Oromiya and SNNPRS to the East and the Sudan Republic to the West. The region encompasses three administrative zones; namely Anywaa, Nuer and Majang zone; and comprises 12 woredas, Itang special woreda and Gambella town administration (Lema, et al., 2017; Mathewos, M., 2017).

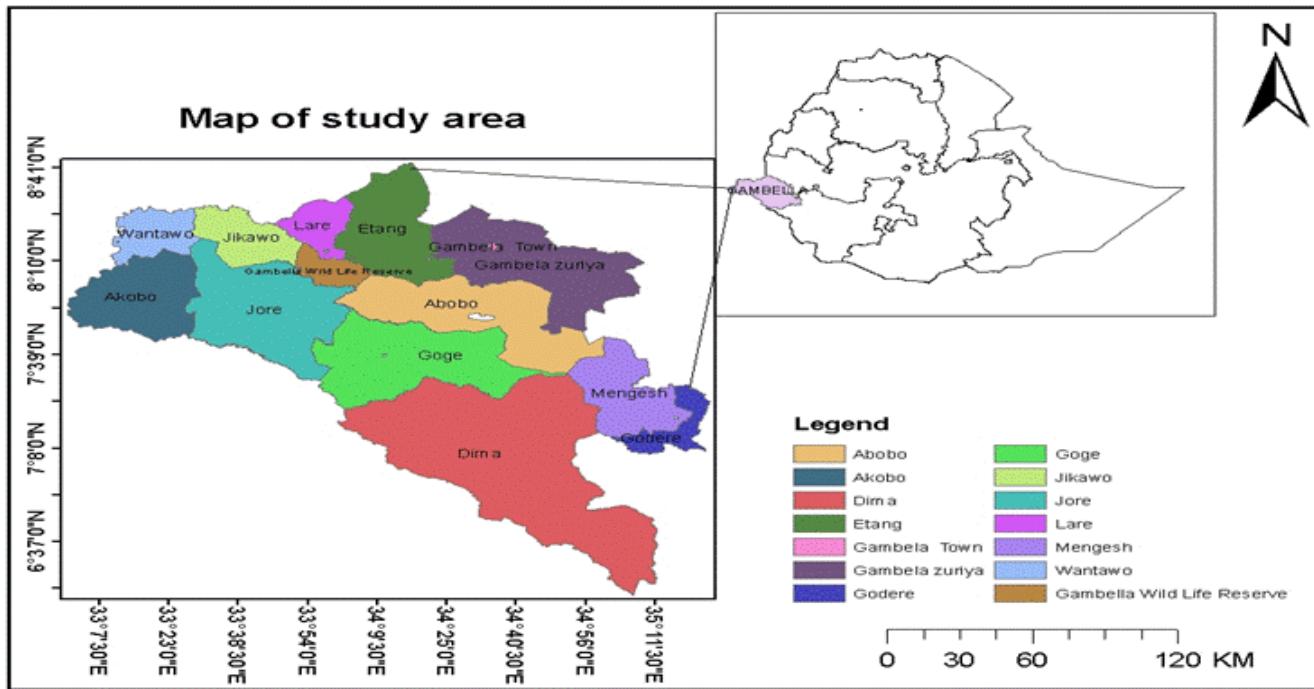


Figure 1: Map of the Study Area

Source: Processed using Arc-GIS 10.3 software, GCS_Adindan

The average temperature is $27^{\circ}\text{C} - 33^{\circ}\text{C}$ and the annual rainfall amount ranges from 900mm-2200mm (Wondachew, M. and Muchie, N., 2017). The region experiences unimodal rainfall characterized by heavy rainfall from May to October and very low precipitation from November to April (Lema, et al., 2017). The Region has a total population of 495,625, 51% (252,769) males and 49% (242,856) female (CSA, 2007). It is inhabited by the five indigenous ethnic groups and others nationalities. The five indigenous ethnic groups are: Anywaa, Nuer, Majang, Komo and Opo; besides, the other Nationalities of Ethiopia who have been living in the region for such a long time live in harmonization.

Sampling Techniques

In this particular study, most of non-probability sampling technique is employed in order to get relevant data from the respondents. Accordingly, key informants from 3 zones ($n= 15$), 13 districts ($n= 65$), Gambella National Park office ($n=5$), Gambella Culture and Tourism Bureau ($n=5$), Gambella Tourism Organization Office ($n=5$), Gambella Culture, History and Heritage Research Directorate ($n=4$) and Gambella Government Communication Office ($n=4$), altogether 103 respondents were purposively selected. Selection criteria were: i) their position in regional offices, zone or districts; ii) their level of knowledge and experience to the tourism industry; iii) the most senior experts and iv) the most relevant individual who can give crucial data to achieve the objectives of the research.

Data Collection Methods

There are 3 zones and 13 Woredas to conduct inventory of natural tourism potentials of the Gambella Region. Since it is difficult for a single person to collect data from those zones and Woredas, it is crucial to involve data collectors and assistants during field work. Thus, three data collectors from Gambella Tourism Organization were purposively selected. The reasons of their purposive selection were: a) since they are experts in Gambella Tourism Organization, they know better about tourism potentials of the Region, b) since they are professionals they better understand the concept of the survey questionnaire, c) they can easily communicate and gather data

from the woredas administrators and senior experts, and d) they are our primary stakeholders in this particular study. Hence, discussion was held for this particular study how to collect data from the 3 zones and 13 woredas. Preliminary field visitation and data collection was done together. Gambella Tourism Organization Office experts further gave training for other woreda level data collectors as necessity. They gave full orientation for woreda level data collectors before they were left alone. In all circumstances, monitoring, seldom field visit, cross-checking and verification was done in order to ensure reliability of the data. According to scheduled plan, in-depth interview using open ended questions was held with purposively selected key informants. Respondents were given opportunity to express deeply their ideas, opinions, feelings and knowledge about natural tourism potentials of the region as well as their respective zone or woreda. Furthermore, the research crew was also made field observation through recording important information, note taking, photo camera capturing, etc. regarding natural tourism potentials of the region. On the other hand, secondary data sources (published documents, articles, books, unpublished data, archives, brochures, etc.) have been referred for the further clarification of the data.

Data Analysis

Data analysis was done in both quantitatively and qualitatively. The data gathered first edited, categorized, arranged and organized before encoding into the software. Frequency and percentages were calculated using SPSS software version 20 and charts and graphs were used to show results. Text explanations and descriptions used in case of qualitative data analysis. Likewise, data collected through field observation were analyzed in content descriptive way to relevant meaning and summarization (qualitatively).

III. RESULTS AND DISCUSSIONS

Demographic Characteristics of the Respondents

In this particular study, demographic characteristics like sex, education level, income levels, age categories, as well as marital status of the respondents were observed. As the table 1 show below about 83.5% of the respondents were males. Concerning education level, most of the respondents were educated one (first degree holders) (74.76%) and 22.33% of the respondents were diploma holders. Most of the respondents (68.93%) were between the ages category of 26-35 whereas a few respondents (6.8%) were in age interval of 46-55. Regarding marital status, most of the respondents were married (95.15%) (Table1).

Table 1: Demographic characteristics of the sampled population (n=103)

No.	Variables	Sample Categories			Frequency	Percentages (%)
		Regional officials*	Zones officials**	Woredas officials***		
1	Sex	Male	20	10	56	86
		Female	3	5	9	17
2	Education Levels	Master degree	3	-	-	2.91
		Bachelor degree	20	15	42	74.76
		Diploma	-	-	23	22.33
3	Age Categories	18-25	-	-	6	5.83
		26-35	23	8	40	68.93
		36-45	-	5	14	18.45
		46-55	-	2	5	6.8
4	Marital Status	Married	22	16	60	98
		Single	-	-	5	4.85

5	Income Levels (in ETB)	2000-3000	-	-	22	22	21.36
		3000-400	-	5	34	39	37.86
		>4000	23	10	9	42	40.78

NB: *Gambella Culture and Tourism Bureau, Gambella Tourism Organization Office, Gambella Government Communication Office,

Gambella Culture, History and Heritage Research Directorate and Gambella National Park Office

**Anywaa, Nuer and Majang Zones

*** 12 woredas of three zones and Itang special woreda

Source: Field Survey (2018/19)

Natural Tourism Potentials of the Gambella People's National Regional State

Natural tourism resources consist of all natural elements and factors that possess a high degree of attractiveness like fauna and flora, mountains, landscapes, hydrographical and bio-geographical aspects, biosphere reserves, protected areas and so on. most of the respondents 98(95.15%) underlined that waterfalls are the major natural tourism potentials followed by Majang Forest Biosphere Reserve (MFBR) 95(92.23%) which has endowed with astonishing fauna and flora species, waterfalls, lakes, valleys, spectacular landscapes, and cliffs. About 90(87.38%) of the respondents notified that Gambella National Park (GNP); the home of various wildlife species, wetlands, lakes, rivers, valleys, grasslands, and woodlands is the major natural tourism potential of the region. Similarly, informants 87(84.47%) and 81(78.64%) stressed that various lakes and rivers respectively are undeniable natural tourism potentials of the region (figure2).

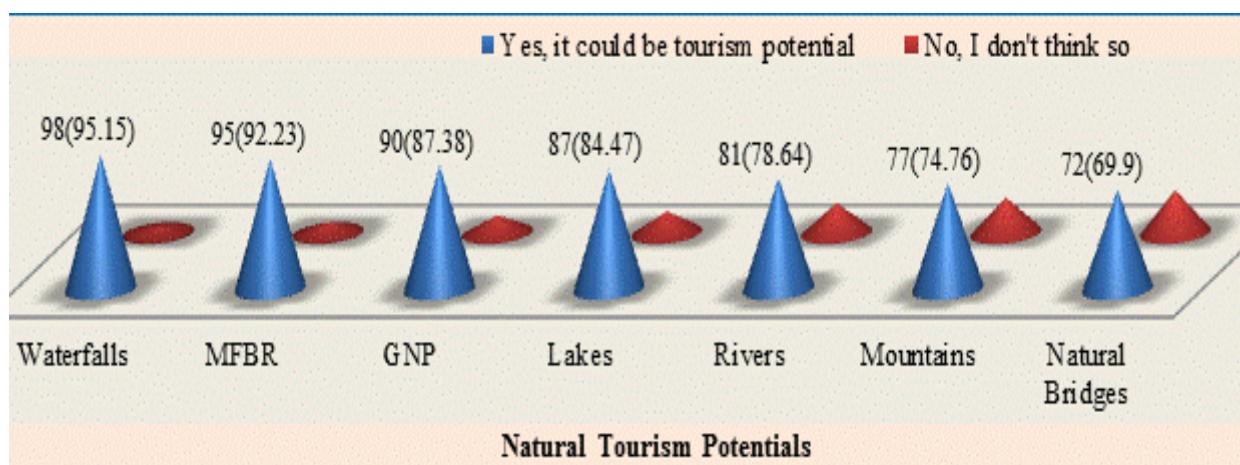


Figure 2: Respondents perception concerning natural tourism potentials of the Region

Source: Field survey 2018/19

Lake Burey

Burey Lake is the unique natural lake found in Majang zone, Mengeshi woreda at 13km north-west from Meti town, the capital town of Majang zone. It is said to be the source of worshiping and an implementation area of traditional believes. Shone River is a very narrow tributary stream that silently crosses through Burey Lake; leaving a miracle visible boundary line on the lake.



Lake Burey (Mengeshi woreda, Gubeti Kebele)

Source: (MELCA office, 2018; GCTB, 2018; GTO, 2018; Field observation, 2018)

Lake Nyimulu

This lake is located in Itang special district at the Ebango kebele; 28k/m away from the Gambella town, capital town of the region. It is sometimes called amphibian lake for it had been once at the site of service in keeping different amphibian and reptile species.



Lake Nyimulu (Itang Special Woreda, Ebango Kebele)

Source: (GCTB, 2018; GTO, 2018; Field observation, 2018)

Lake Thatha

This lake is located in Anywaa Zone, Gog Woreda at Thatha kebele; 119 km away from Gambella town, capital town of the region. It is known for its accommodation of different species of fishes and colorful birds. It is also believed that it highly gives an honor and respected by the surrounding community as the one of the resources where they was practiced their traditional believes.



Lake Thatha (Gog Woreda, Thatha Kebele)

Source: (GCTB, 2018; GTO, 2018; Field observation, 2018)

Lake Wahigan

This lake is located in the Nuer zone, Akobo Woreda. It is near to the village called “Kankan”. The area is mostly known for its swampy and wetland ecosystem. The gio river is the major tributary to this lake.

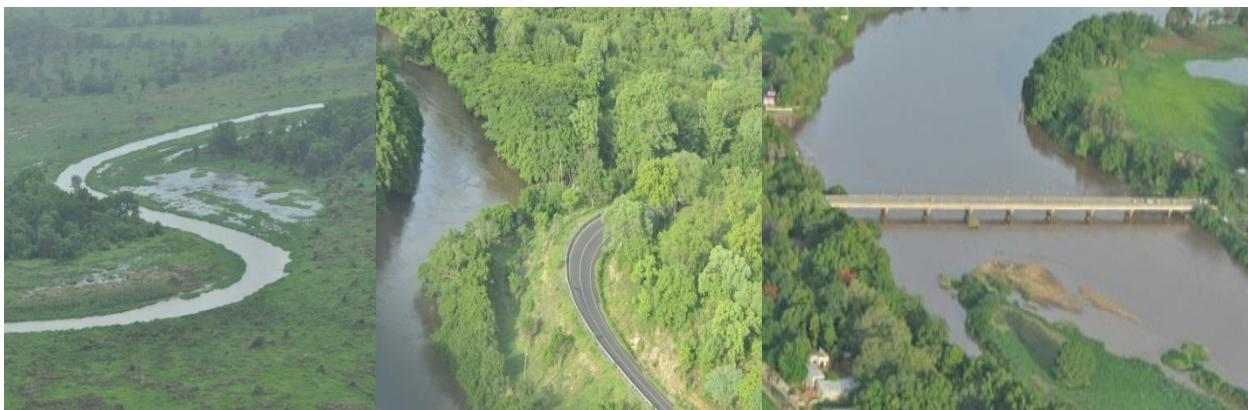


Lake Wahigan (Akobo Woreda)

Source: (GCTB, 2018; GTO, 2018; Field observation, 2018)

Baro River

This river is one of the permanent rivers of the region and natural tourism attractions. It separates the Gambella town (capital city of the region) in to two parts and on which Openo Bridge was built. The length of this bridge is 305m, with the width of 13 m and 10 m high. It is the only navigable river in Ethiopia that can serve as a trade route between Gambella, Ethiopia and the Republic of South Sudan via Abol, Itang, Jikawo, Metar and Akobo Woredas. It supports different species of birds on the river bank and variety of fish species like Nile perch, tilapia, cat fish, star fish, and golden fish. It has remarkable tourism potential to experience like beach tourism, fishing, bird watching, boat services, swimming and so on.



Baro River

Source: (GCTB, 2018; GTO, 2018; Field observation, 2018)

Gilo River

This river is found in Anywaa Zone, Gog Woreda of Ogeneg kebele. It is 2, 91 and 113 km far from Ogeneg kebele, Abobo and Gambella town respectively. This river also crosses Wanethawa Woreda of Nuer Zone and far away 12,42 and 185 km from Metar town, Neur zone (Nyinnyang) and Gambella town respectively.



Gilo River

Source: (GCTB, 2018; GTO, 2018; Field observation, 2018)

Akobo River

This river is found in Nuer Zone, Akobo Woreda and 20 km far from the woreda town. It is the major tributary to the Lake Wahigan and enters in to the swampy and wetland areas. It supports various amphibian and fish species.



Akobo River

Source: (GCTB, 2018; GTO, 2018; Field observation, 2018)

Alwero River

This river is among the major permanent rivers of the Gambella Region. It is rich in different species of the fishes and supports livelihood of the local community. It is the river on which Alwero Dam was built in Anywaa Zone, Abobo Woreda.



Alwero River

Source: (GCTB, 2018; GTO, 2018; Field observation, 2018)

Deretek Waterfall

This green roofed astonishing waterfall is found in the Majang zone, Godere Woreda, in the Semuy Kebele. It is home of numerous fauna and flora species which adds aesthetic value of the surrounding and waterfall itself.



Deretek Waterfall (Godere Woreda, Semuy Kebele)

Source: (MELCA office, 2018; GCTB, 2018; GTO, 2018; Field observation, 2018)

Dike Waterfall

This high falling attractive waterfall is located in the Majang zone, Godere Woreda, in the Gelesha Kebele. It is enclosed with green flora species and supports multiple fauna species. It has a good tourism potential to experience ecotourism activities like ecotrekking, walking, hiking, biking, mountain climbing, etc. and enhances mental satisfaction



Dike Waterfall (Godere Woreda, Gelesha Kebele)

Source: (MELCA office, 2018; GCTB, 2018; GTO, 2018; Field observation, 2018)

Jay Waterfall

It is known as a tributary to Yobe (gilo) River along with Shone River meet at a certain place to jump from one tip of the mountain to another creating a noisy powerful fall with showery moisture weather, being accompanied by a colorful rain bow. The water fall is located in the south-east of Meti town, capital of Manjang Zone. The fall is accounts 50 meter high.



Jay Waterfall (Godere, Gelesha Kebele)

Source: (MELCA office, 2018; GCTB, 2018; GTO, 2018; Field observation, 2018)

Waki Waterfall

It is located in Majang zone, Mengeshi woreda (60 km far) in Tengi kebele. Waki Fall is derived from the name of Waki River and it has six tributaries and falls down. This water fallen is covered by dense forest for its destination.



Waki Waterfall (Mengeshi Woreda, Tengi Kebele)

Source: (MELCA office, 2018; GCTB, 2018; GTO, 2018; Field observation, 2018)

God's Bridge

God's Bridge is the exiting natural concreted bridge sometimes named as Mot Bridge which stands for "Death Bridge". It is naturally built on the River Yobe or Gilo as it passes through Gog Woreda. It is located in Majang Zone, South East of Godere Woreda (Gelesh Kebele) and 28 km far away from Meti town, capital of Majang Zone. The length of the bridge is estimated as 100-120 m, with the width of 20-30m and has height of 60-70 m from water surface.



God's Bridge (Godere Woreda, Gelesha Kebele)

Source: (MELCA office, 2018; GCTB, 2018; GTO, 2018; Field observation, 2018)

Jejebe Mountain/hill

The mountain is found in the Gambella town, capital of the region along the Jejebe River. It is very attractive when you reach to the top of the hill; you have a good view of the whole part of Gambella town. And it is also serving as spiritual place by Ethiopian Orthodox Church; where the church called Abun-Aregawe was built on the top of the hill.



Jejebe mountain/hill

Source: (GCTB, 2018; GTO, 2018; Field observation, 2018)

Gambella National Park

The Gambella National park (GNP) is located extreme west of Ethiopia, established in 1973 in the central plain principally lying between the two major Rivers; Baro and Gilo River. During establishment the park covers an area 6051 km²; but after demarcation it was reduced to 4575 km². Geographically it is located between the coordination of 07° 30'-08° 15' N and 33° 45'-34°-15' E. The park is located in the central lowland plain of the region and falls in six woredas, namely; Abol, Abobo, Gog, Jor, Itang and Jikawo. GNP is known to be one of the richest biome which conserves a diversified assemblage of fauna and flora species (table 2).

Table 2: Wildlife Resources of Gambella National Park

No.	Wildlife Species	No. of Species in GNP	No. of Species in Ethiopia	% Species in GNP from Ethiopia
1	Mammals	69	320	21.56
2	Birds	327	862	37.94
3	Reptiles	7	240	2.92
4	Amphibians	-	71	-
5	Fishes	92	172	53.49
6	Plants	493	6500-7000	7.04 - 7.58

Source: (Vreugdenhil, 2012; Young, 2012; Amare, 2015; GNP Office, 2018; Field observation, 2018)

Majang Forest Biosphere Reserve

Nowadays, Ethiopia has 5 biosphere reserves which are registered under UNESCO; namely Majang Forest Biosphere Reserve (2017), Lake Tana Biosphere Reserve (2015), Sheka Forest Biosphere Reserve (2012), Kaffa Coffee Forest Biosphere Reserve (2010) and Yayu Coffee Forest Biosphere Reserve (2010) (Selemon, Chiranjib and Alemken, 2019). Geographically, Majang Forest Biosphere Reserve is located in between 07°08'-07°23' N latitude and 35°04' - 035°19' E longitude. Majang Forest Biosphere Reserve supports diversified fauna and flora composition and is important elements for tourism development like photo capturing, bird watching, mammal watching, forest walking, hiking, mountain climbing, and so on (table 3).

Table 3: Fauna and Flora Composition of the MFBR

No.	Fauna and Flora	No. of Species in MFBR	No. of Species in Ethiopia	% of species in MFBR from Ethiopia	Endemic Species in Ethiopia	Endemic Species in MFBR
1	Higher Plants	550; 90 Families	6500-7000	7.86- 8.46	625	27
2	Mammals	33	320	10.31	39	
3	Fishes	-	172		38	
4	Birds	180	862	20.88		5
5	Reptiles & Amphibians	20	240*		16**	5
6	Amphibians	-	71		30	

* Amphibians ** Reptiles

Source: (Vreugdenhil, 2012; Young, 2012; MELCA Office, 2018; Field observation, 2018)

IV. CONCLUSION

Tourism industry plays significant role in eradicating poverty, good image building, sharing best experiences, and international communication. It is made up of attraction, accommodation and transportation components. Ethiopia is known for its enormous natural tourism potentials with its unique biodiversity composition, fauna and flora, remarkable landscapes, mountains, valleys, cliffs, water bodies (lakes, rivers, and waterfalls,), protected areas and biosphere reserves. Gambella Region is one of the potential tourism destinations located at South West of Ethiopia. The region has endowed with various natural tourism potentials like water bodies (lakes, rivers, waterfalls, and wetlands), mountains, natural bridges, caves, valleys, landscapes, fauna and flora. The Region possesses also Gambella National Park and Majang Forest Biosphere Reserve with their astonishing natural biodiversity. Hence, the region has undeniable wonderful natural tourism potentials to attract international as well as domestic tourists, ecologists, researches, higher education students, environmentalists, explorers, film makers, drifters, naturalist and other segment of visitors towards its valuable biodiversity.

V. RECOMMENDATIONS

- Conducting further research in identifying hidden natural tourism potentials.
- Enhancing promotion and marketing of existing natural tourism potentials to attract various visitors from the different corners of the World.
- Strengthening collaboration, integration and commitment of all concerned stakeholders for the sustainable conservation and development of tourism industry in the region.

VI. ACKNOWLEDGMENTS

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Assessment of the Quality of Water from Rooftops

(A Case Study of “Nkamponasi” in Tarkwa, Ghana)

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Abstract - Water scarcity has become a problem for many rural and urban communities in Ghana due to evolvement of small scale mining and heavy industries polluting most of the surface water. Rainwater harvesting has become a major source of water for the inhabitants of Nkamponasi, a community in Tarkwa. The aim of this study was to assess the quality of rainwater from rooftops (non-rusty and rusty) in Nkamponasi in Tarkwa. Rainwater samples were collected from non-rusty, rusty and no roof (rainwater without contact with roof surface). Six samples were collected from three rainfall events and analysed for physico-chemical parameters and metals concentration. Each parameter and metal was compared with the World Health Organization (WHO) Guidelines for drinking water quality. The results of the physico-chemical analysis indicated that pH, turbidity and colour were above WHO standard in all water samples collected from the three rainfall events. High lead and chromium concentrations were recorded from the rusty and non-rusty roofs. The study reveals that roofing sheets have an impact on the quality of harvested rainwater.

Index Terms – Rooftops, Water Quality, Nkamponasi, Rainwater

I. INTRODUCTION

The water cycle is the movement of water from the earth's surface into the atmosphere in a cyclic manner and it is powered by the sun (Kuchment, 2004). As the sun shines on the surface of the earth, evaporation takes place on water bodies, snow cover and from the soil. Also plants lose water through transpiration. As the water now in a form of a gas rises higher into the atmosphere, it cools and condenses to form clouds. When the cloud becomes heavy, it falls back on the surface as rain. The rain serves as a recharge for ground water and surface water (Kuchment, 2004).

In Ghana, the inhabitants of most communities rely on rainwater since they lack access to potable water. The evolvement of mining and small scale mining in the Tarkwa Nsuaem Municipality for instance, has rendered most of the available water bodies unclean for consumption. People harvest rain water for irrigation purposes, drinking and bathing.

Rainwater harvesting is a system of collecting and storing rainwater for later use (Daily and Wilkins, 2012). Rainwater

is considered as a safe source of drinking water. This is mainly to the belief that the collection surfaces (mainly rooftops) are isolated from the major sources of contamination. This is however, not always the case. Pollutants such as dust, smoke and soot from air due to commercial and human activities can be dissolved in rainwater before it lands on a roof. Furthermore, birds and other climbing animals may defecate on rooftops contaminating them. The type and quality of roofing materials used for houses have different properties and effects. Rusty roofs may leach heavy metals which when harvested and used without treatment can adversely affect human lives and the environment. Hence, with all potential effects and threats, studies on the quality of rainwater from rooftops in the study area was not given an attentive concerns. This project therefore seeks to study the quality of rainwater from different rooftops (rusty versus non-rusty) in “Nkamponasi” a small community in Tarkwa.

II. MATERIALS AND METHODS

A. Study Area

Nkamponasi is located in the mining town of Tarkwa in the Western Region of Ghana. Tarkwa is the Administrative capital of the Wassa West District located in the southwest

of Ghana (approximately on longitude 20° 59' 45" W and latitude 50° 17' 42" N) and is 160 m above mean sea level (Seidu, 2004). Figure 2.1 is a Map of Ghana showing the location of Tarkwa. The town is about 85 km from Takoradi, which is the regional capital, 233 km from Kumasi and about 317 km from Accra (Kesse, 1985)

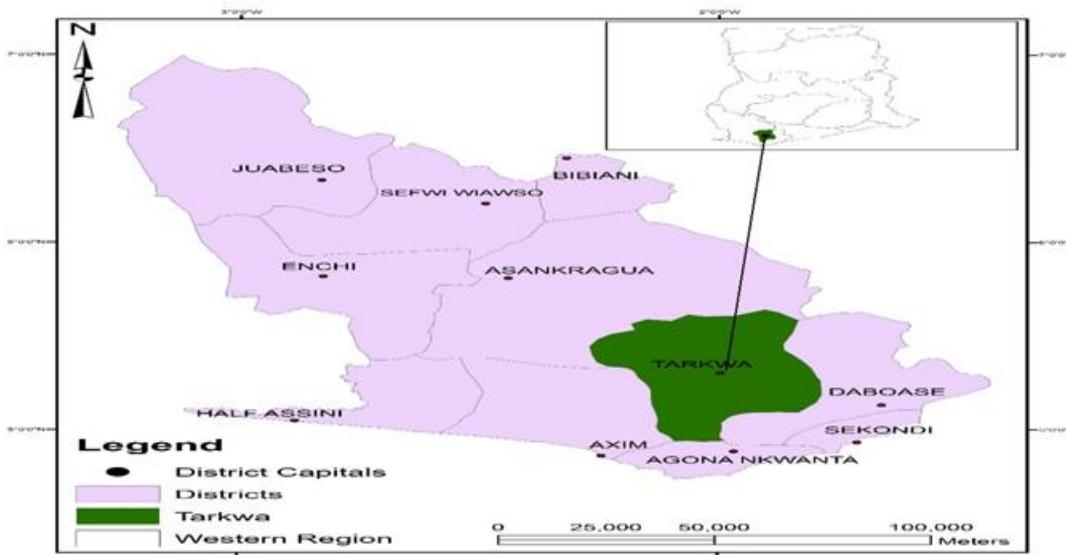


Figure 2.1: A map of Ghana showing the location of Tarkwa

B. Climate

Tarkwa experiences one of the highest rainfall patterns in Ghana (Anon., 2015). Nkamponasi, Tarkwa area has a South-Western Equatorial Climate with seasons influenced by the moist South-West Monsoon Winds from the South, Atlantic Ocean and the North-East Trade Winds. The mean rainfall is approximately 1500 mm with peaks of more than 1700 mm³ in June and October. Between November and February, the rainfall pattern decreases to between 20 mm³ and 90 mm³. The mean annual temperature is approximately 25 °C with small daily temperature variations.

Relative humidity varies from 61 % in January to a maximum of 80 % in August and September (Forson, 2006). The high precipitation experienced in Tarkwa supports plant growth without irrigation. Rain water becomes the main water source for agricultural activities which continues all throughout the year (Anon., 2015). The municipality has a peculiar rainfall pattern, in that during the raining season, it usually rains around 2 p.m. thus, the nickname of the municipality is "Tarkwa at 2" (Anon, 2014)

C. Sampling and Analysis

• Sampling of rainwater

The first field work was to identify common roofing materials used in Nkamponasi. Two houses were selected for using a rusty and non-rusty roof. Figure 2.1 shows the non-rusty and rusty roofs sampled. There was no evident sources of pollution (trees) around the sampling points. Clean, plastic buckets were used in collecting rainwater samples from the rooftops before transferring them into sampling bottles which were closed tightly. To test composition of rainwater itself without the influence of rooftops, a bucket was placed in an open area to collect rainwater. After sampling, samples were immediately stored in a working refrigerator to ensure that water samples did not lose their integrity. Gloves were also worn to avoid contamination of the samples. All analysis were done in the laboratory. Six samples were collected from three different rainfall events. Care was taken to ensure that samples were representative of water to be examined and that no accidental contaminations occurred during sampling.

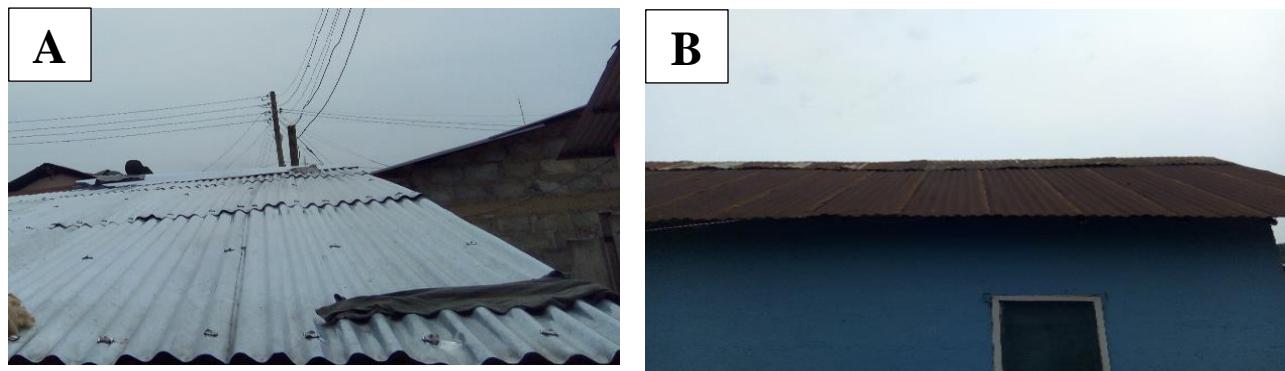


Figure 2.2: Non-rusty roof (A) and Rusty roof (B)

- **Monitoring of rainfall events**

Monitoring of rainfall started in the early parts of the year 2017, where there is less rainfall in Tarkwa. Samples were

collected from three different rainfall events. Rainfall data was collected from UMaT Meteorological office. Details of the rainfall events are presented in the Table 2.1.

Table 2.1: Details of rainfall events

Rainfall Event	Date	Sampling Time	Number of Samples	Rainfall Volume(mm^3)	Wind Speed	Wind Direction
A	3/3/2017	6:20 pm-7:14 pm	2	10.8	40.27	SW
B	8/3/2017	3:02 pm- 3:58 pm	2	11.0	25.44	NW
C	9/3/2017	2:02 pm -3:12 pm	2	8.4	22.33	SW

- **Sample Labelling**

Clean 500 ml bottles were used for the rainwater collection. The sample bottles were labelled using a permanent marker to prevent water from cleaning the labels. The labels were RW (rainwater without contact with roof surface), NR (rainwater from non-rusty roof) and R (rainwater from rusty roof) for each rainfall event.

D. Laboratory analysis

In the laboratory, the samples were analyzed for physico-chemical parameters as well as for metal concentration.

- **Analysis of Physico-chemical parameters**

The physico-chemical parameters were analysed using various instruments in the laboratory. The instruments used and the parameters they measure are outlined in Table 2.2.

Table 2.2: Instruments used in measuring physico-chemical parameters

Instrument	Parameter(s)
LaMotte SMART 3 Colorimeter	Colour
OARTON PC 300 Cond./ TDS	Conductivity and TDS
Extech pH multimeter	pH
Hanna H1 9146 DO	Dissolved Oxygen

- Metal concentration analysis**

Prior to the metal ion content determination, samples were filtered using 0.45 µm Whatman Filter paper to remove suspended matter. 1 ppm of concentrated HNO₃ was added to the filtered samples to make the metals mobile in solution. Eight metals (Fe, Zn, Cd, Cr, Pb, Mn, Ni, Co) were analysed using the Varian AA240FS Atomic Adsorption Spectrometer (AAS). The AAS works on the principle of Beer Lamberts law which describes the relationship between absorbance and concentration. Deionized water was used in preparing blank samples. The blank solution was used together with each standard for a particular metal analysis during calibration. Samples were presented after calibration to the AAS for metal concentration reading.

III. RESULTS AND DISCUSSION

- Physico-chemical analysis of water samples**

Table 3.1 shows the average results of the physico-chemical analysis carried out on the water samples from rusty, non-rusty and no roof with the exception of pH which is in ranges. The results obtained were compared with the WHO standard for drinking water quality. Conductivity, TDS and DO were all below the WHO standards. pH, turbidity and colour exceeded the WHO standard and are discussed below.

Table 3.1: Results of physico-chemical parameters

Parameter	pH	CON	TDS	DO	TURB	COL. (TCU)	
	Roof	µs/cm	(mg/L)	(mg/L)	(NTU)	TRUE	APP.
No roof	4.63 - 6.31	25	16	7.29	20	243	105
Non-rusty	4.86 - 6.26	39	25	6.94	24	285	133
Rusty roof	5.30 - 7.20	40	26	6.76	43	455	167
WHO STD	6.50-8.50	1500	1000	-	5	15	15

A. pH

From Table 3.1, the pH of the water samples collected were within the ranges of 4.63-6.31, 4.86-6.26 and 5.30-7.20 for no roof, non-rusty and rusty roofs, respectively. The pH of all the water samples analyzed were below the range of the WHO standard value for drinking water (6.50-8.50). Low pH was recorded in the no roof and it may be from emission of gases (Nitrogen oxides and Sulphur oxide) from vehicles and heavy industries. These gases are released from heavy industries and vehicles and find themselves in the atmosphere causing acid rain. The pH from the rusty and non-rusty roof samples may also be from anthropogenic and wind-blown particulates. According to Winters and Graunke (2014), pH of rain plays a more prominent role in metal roofs or roofs containing metals in their matrix. Low pH of rainwater has the ability to cause corrosion to metal roof surfaces and other metal fittings used in the construction of the roofs. It can also lead to a metallic and bitter taste of the water. Concerns regarding rainwater acidity do not relate to

any direct threat posed by low pH value, but are due to indirect effects of this more 'aggressive water' in leaching out metals (Gould, 1999).

B. Turbidity

From Figure 3.1, the average turbidity values of all the water samples were above the WHO standard value of 5 NTU. The turbidity of water from the rusty roof was highest with a value of 43 NTU but was comparatively lower in the non-rusty roof. This may be attributed to the composition and age of the roofing materials. The high turbidity recorded for all water samples may be as a result of dry deposition such as dust and soot on both roof surfaces and in the direct rainwater (no roof). The dry deposition acts as a condensation nuclei for cloud particles before it falls to the surface as rain. It may also attach itself to the rain particles before it gets to the surface.

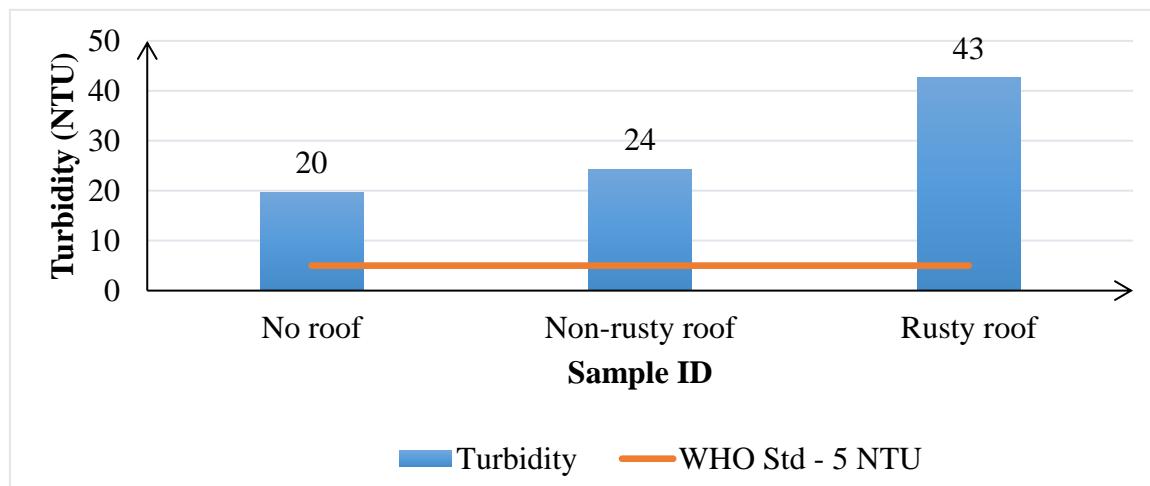


Figure 3.1: Average turbidity for rainfall events

C. Colour

The average colour of the samples were 243, 285 and 455 TCU for no roof, non-rusty and rusty roof, respectively from Fig 5.2. They all exceeded WHO standard value of 15 TCU. The colour was high in the rusty roof with a value of 455 TCU than all the samples. The colour in Figure 3.2 can be linked with the turbidity in Figure 3.1. This means the more

turbid the water from the rusty roof is, the higher the colour and vice versa. The presence of colour in the no roof sample may be as a result of dry deposits such as dirt which attaches itself to the rain before it lands on the roofing material. The high colour from the roofs which was significantly higher in the rusty roof may be attributed to the composition and the age of roofing material and from dry deposits such as soot, dirt from anthropogenic activities.

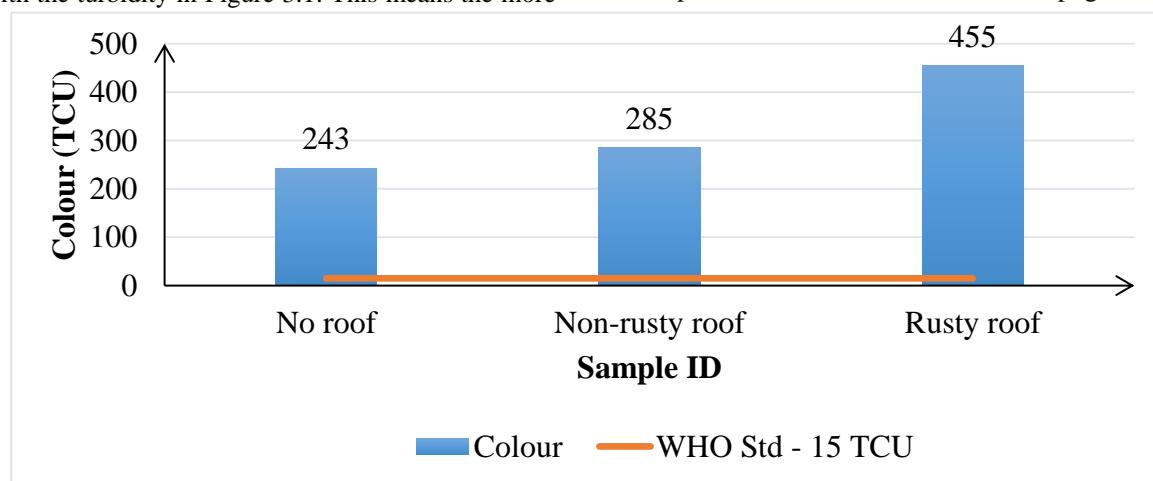


Figure 3.2: Average colour for rainfall events

• Concentration of metal ions

Table 3.2 summarizes the average results of metal concentration analysis carried out on the water samples. The

results obtained were compared with the WHO standard for drinking water quality. Zn, Cu, Mn, Cd, Co, Ni and Fe were below the WHO standards. Cr and Pb exceeded the WHO standard and are discussed below.

Table 3.2: Average results of metal concentration analysis

Parameter	Cu	Cd	Pb	Mn	Ni	Zn	Co	Fe	Cr
	Roof	mg/L							
No roof	0.010	0.000	0.024	0.113	<0.002	0.064	0.000	0.181	0.086
Non-rusty	0.011	0.000	0.015	0.170	<0.002	0.046	0.021	0.261	0.171
Rusty	0.033	0.001	0.097	0.224	<0.002	0.515	0.016	0.263	0.100
WHO STD	2.000	0.050	0.010	0.500	<0.002	5.00	-	0.300	0.050

A. Lead Concentration

All the water samples had their Pb concentration exceeding the WHO value which can have adverse effect on humans, plants, animals and surface water (Figure 3.3). Average Pb concentration was higher in no roof as compared to the non-rusty roof. The presence of Pb in the water sample may be as a result of anthropogenic activities and wind-blown particles containing lead. The concentration of Pb from the rusty roof sample was the highest concentration of 0.097 mg/L which exceeded the WHO standard value of

0.01mg/L. According to Waller and Inman (1982), high Pb concentrations was recorded in old roofs (rusty roofs) water samples in Halifax, Nova Scotia. The presence of Pb from samples collected from roofs may likely to be from materials such as lead headed nails, primers for roof construction and deposition of Pb particles on the roof surface in areas subject to heavy industrial activities and traffic pollution (Gould, 1999). Lead toxicity is a particularly insidious hazard with the potential to cause irreversible health effects (Anon., 2007).

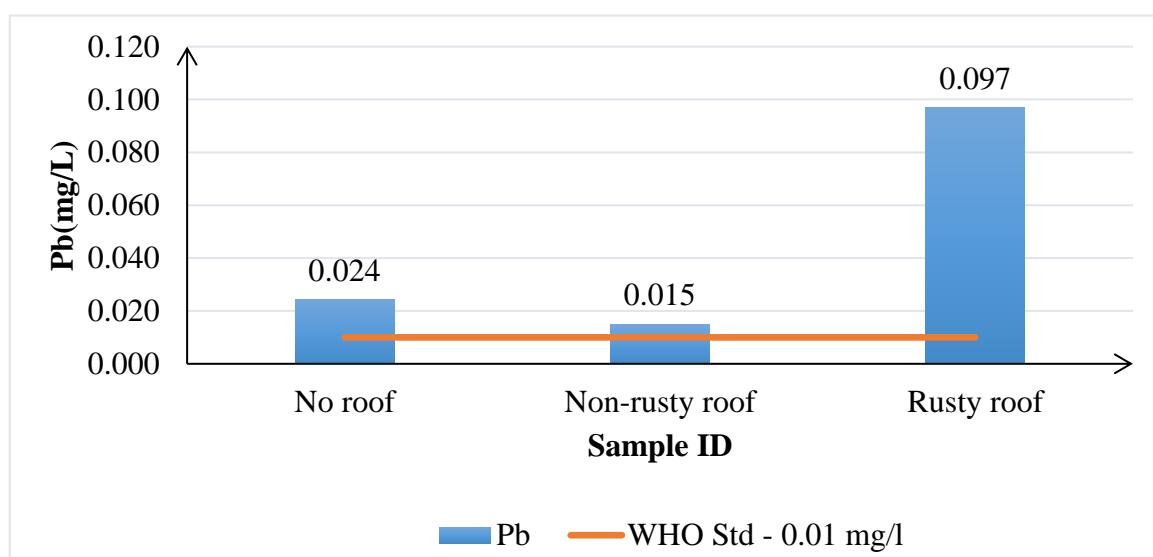


Figure 3.3: Average lead for rainfall events

B. Chromium concentration

From Figure 3.4, Cr concentration in all the water samples exceeded the WHO value of 0.05 mg/L. Cr concentration of 0.024 mg/L was detected in the no roof sample and it may be due to anthropogenic activities (burning of materials

containing chromium) and wind-blown particulates containing chromium. Cr concentration was higher in non-rusty roof compared to with the rusty roof. The high concentration of chromium in the samples from the roofs may be from the composition of the roofing materials. Cr is

used for electroplating metals to prevent it from corrosion e.g. chromated roofing sheets (Winters and Graunke, 2014).

Due to atmospheric changes, chromium from roof surfaces begin to leach off from the surface. It may also be attributed to anthropogenic activities such as burning of materials containing chromium and from dry deposition of chromium particles on roof surfaces.

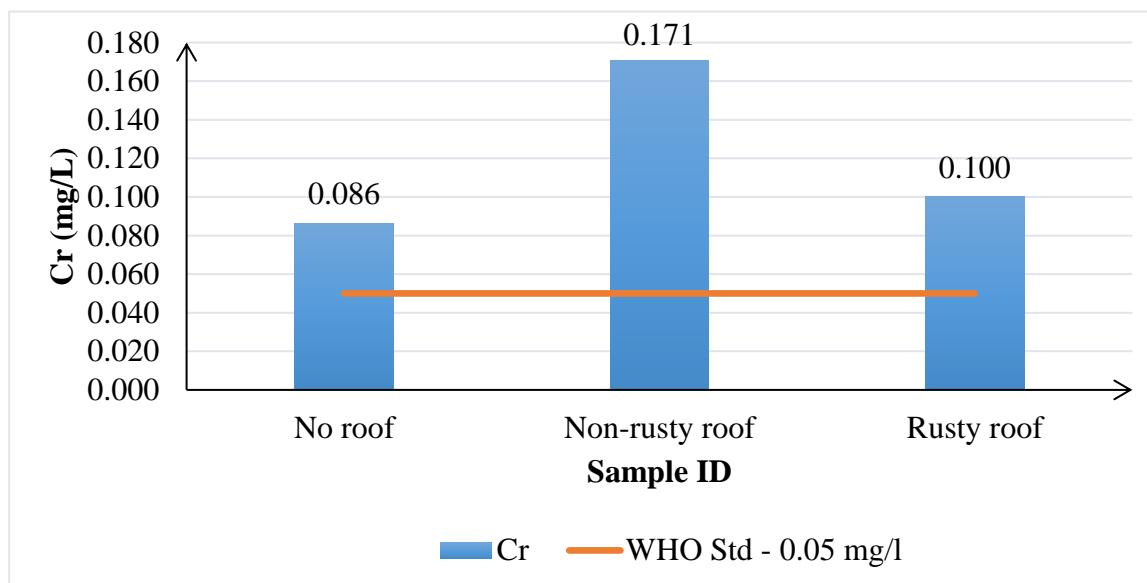


Figure 3.4: Average chromium concentration for rainfall events

IV. CONCLUSION

This study focused on the assessment of water quality from rooftops (rusty and non-rusty) in Nkamponasi, a community in Tarkwa. The physico-chemical parameters and metal concentrations from different (rusty and non-rusty) rooftops within the study area were analyzed. The study findings reveal that Physico-chemical parameters such as pH, turbidity and colour exceeded the WHO standard for safe drinking water in most of the water samples tested. The

concentrations of lead and chromium detected in the water samples exceeded the WHO standard value for safe drinking water. All other metals were within the WHO limit. Environmental and anthropogenic activities (burning of materials containing metals) might have influenced the concentrations of metals in both direct rainwater and rainwater harvested from rooftops. It is therefore indicated that contamination of rainfall was dependent on the roofing material used and the age of roofing materials; the older the roofing sheet, the more contaminated rainwater was.

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Greywater Characteristics and Potential Use for Toilet Flushing in Aqaba City

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Abstract- Knowing greywater characteristics is essential to evaluate the potential for reuse and to determine the appropriate treatment system. This research was carried out to estimate the quantity and analyze the quality of greywater generated in the urban city of Aqaba. The results revealed, that an average of 107 Lpcd was generated which is the largest recorded so far in Jordan comparing to other urban cities. Greywater compromises 53% of total fresh water consumption and 75% of total households' wastewater. The study also showed that no less than 17% of fresh water can be saved when reusing greywater for toilet flushing, this amount can reduce extraction of Al-Disi aquifer or desalinate water which may shifted to serve other cities in the kingdom. Average concentrations of COD, BOD, TSS, NO₃-N, NH₄-N, TN, and pH during the time of analysis of 24-hour were 962, 253, 212, 2.5, 2.1, 5.3 mg/L and 7.5 respectively which indicates strong greywater. In Aqaba, 64% of the citizens were positive to reuse greywater for toilet flushing and other public using, such as street cleaning, landscape and greening, for different reasons such as increase water saving, reduce water bill, and wastewater discharge to the environment while the main driver for recycling was the water shortage.

Index Terms- Greywater, quantity and quality; Residential, Jordan, Reuse, Acceptance

I. INTRODUCTION

Considered the second poorest country with respect to water in the world, the kingdom of Jordan with an area of about 90,000 km² and a population around 10 million^[1] which lies among the dry and semi-dry climatic zone is characterized by its minimal volumes of rainfall and high percentage of evaporation. The maximum annual precipitation is about 600 mm in the northwest highlands while in the southern areas the precipitation is less than 50 mm. According to the Ministry of water and irrigation 2017, approximately 93.5% of the rainfall evaporates, 4.4% recharges the groundwater, and the rest 2.1% finds its way to the surface water. In 2003 the residential water supply level was in the range of 60-70 Lpcd, and increased to 125 Lpcd, meanwhile the internationally accepted level is 200 Lpcd to ensure healthy and adequate life^{[2][3]}.

As the water demand-supply gap is increasing in the kingdom^[4], an alternative water resource is essential to bridge that gap. Treated wastewater is already contributed to the water

budget as Jordan among the top countries reusing wastewater. There are now 23 wastewater treatment plants (WWTPs) treating domestic wastewater in different types of treatment systems, these systems are divided into trickling filters, activated sludge and waste stabilization ponds. Although wastewater reuse recognition is growing and the amount of reclaimed water produced is increasing (163 Million Cubic Meter (MCM) of wastewater was treated in 2017 comparing to 98 MCM in 2007)^[2], the use of reclaimed water still limited to irrigation and cooling in industry where standards and regulations are available. As to other usages, such as residential and public toilet flushing and landscapes, greening, street washing, few successful project were reported.

Greywater has become increasingly popular in the world as unconventional source of water for its economic and environmental benefits^[5]. Greywater is the domestic wastewater excluding that generated from toilets^{[6][7][8]}, and in some cases kitchen^[9]. It constitutes about 50 to 80% of the total households' wastewater^[9] and usually contains fewer pollutants than raw wastewater. With an adequate treatment, and if used for toilet flushing, greywater can reduce water demand by 30% up to 45% of a typical household freshwater, if the use in irrigation and laundry are added^{[8][10]}. A study conducted in Syria showed that using treated greywater for toilet flushing could save about 35% of the drinking water^[11].

Although greywater reuse is not a new topic to Jordan, it has been practiced on a small scale only (within a single house or small public establishment), for the reasons to conserve much water and save money. A study conducted by the "Center of the Study of the Built Environment" (CSBE) in 2002, revealed that on-site greywater in domestic context was used directly without biological treatment (sometimes mechanical filtration) and mainly for landscaping and restricted agriculture in different Jordanian villages and cities, as many of the substances contained in greywater are not harmful to plants, and some are actually plant nutrients. For example, in rural area in the north Jordan, a house owner has diverted greywater directly to irrigate his olive trees after storing it in a reservoir in his backyard. Furthermore, in the capital city of Amman another greywater system was introduced in a dual-plumbed house where underground collection tank and filtration system were installed. Grey water (excluding kitchen sink) were collected, filtered and used in irrigation^[12].

Wastewater characteristics are well known and available in Jordan, however, there is lack in data of greywater. Knowing grey water characteristics is essential for the design and constructing of proper reusing treatment unit, and necessary for the assessment of environmental impact and the energy potential of its maintaining, thus, the objectives of this research is (i) to estimate the quantity of greywater produced in the urban city of Aqaba, (ii) seek potentials of using reclaimed greywater for toilet flushing or other potential using and fresh water saving, (iii) investigate the quality of greywater and its variation during the whole day, (iv) and to investigate the social acceptance toward reusing reclaimed greywater for toilet flushing in Aqaba.

II. METHODOLOGY

Study cite, Aqaba City:

Aqaba City in the far south is the only coastal city in Jordan, from which it gains its strategically importance for the presence of the only port and being the main touristic city. With a population of about 198,500 capita and an area of about 375 square kilometer [1], Aqaba is privileged to be the only city in the kingdom with a continuous water supply where it relies entirely on Al-Disi aquifer for its fresh water use. The current per capita consumption of water is around 202 Lpcd as indicated from "Aqaba Water", and is expected to rise with the growing population and infrastructure. 5 (MCM) of expensive desalinated water (JOD 0.8/m³ of desalinated water to 0.30-0.50/m³ of fresh water) is being provided to the city each year since 2016 to decrease the water deficit gap. However, while the water demand still exceeds the supply, there is an urgent need to introduce a sustainable water resource such as wastewater.

In Aqaba, there is only one centralized wastewater treatment plant is treating water using waste stabilization ponds (WSP) as an ecological process, and activated sludge (AS) for the biological process. It has received about 7 MCM of wastewater in 2015 of which 2.5 MCM and 4.5 MCM entering the ecological and the biological plants respectively. About two-thirds the amount of incoming water to the biological treatment plant is treated and pumped into the distribution network and sold to beneficiaries, furthermore, industrial and agricultural sectors are benefiting from all of the reclaimed water produced by the mechanical treatment plant [13]. A project for expanding the plant is coming on the stream to increase the treatment capacity to meet the increasing of wastewater production especially in tourist season where over 500,000 visitors in the city exert numerous pressures on both the water supply system and wastewater production, while the first "nutrients recovery" workshop is being established.

Greywater can be a reliable and sustainable water resource which may produce more fresh water to be used, thus increase the standards of life of people lives in the city of Aqaba and reduce demand-supply gap. By allocating more fresh water to Aqaba citizens, the abstraction of "Al-Disi" aquifer, or desalinated water can be reduced or shifted to serve other cities in the kingdom which may increase the available water for citizens there.

Greywater Characteristics: Quantity

Greywater generated quantity was measured by the similar methodologies applied by (Mourad et al) & (Rezaul et al), where a survey questionnaire and personal interviews were conducted during the period from June through August 2018. The representative sample was calculated using the following equation [11]

[14] [15]:

$$n \geq (1/\varepsilon^2)N / (1/\varepsilon^2 + N)$$

where:

n: sample size

N: population

ε : sample error from 1% to 20%

Taking the total population of the city and assuming 10% sample error, 100 responses were needed by the equation above. Chosen randomly; 50% were men and 50% were women to ensure gender equality. The interviews took place at homes, offices, universities, streets and bus stations.

Questionnaire includes questions such as family members, billed water in the last few months, volume of flushing tank, number of cars, and frequency of domestic activities such as shower, face and hand washing, tooth brushing, clothes, dish washing, house cleaning, garden watering, car washing and toilet use both during winter and summer time. The following equations were used:

$$Gd = Gp + Gf$$

$$Gp = (FsQs + FaQa + FtbQtb + FhwQhw + FfwQfw)$$

$$Gf = (FlQi + FdwQdw + FcQc + FvQv) / FM$$

$$Q = f \times t$$

Where: Gp, Gf are personal and family greywater generation (Lpcd), and Gd is the daily total greywater generation per person.

Fs, Fa, Ftf, Ftb, Fhw, Ffw, Fl, Fdw, Fc, Fv, are the daily frequency of using showers, ablution, toilet flushing, tooth brushing, hand washing, face washing, laundry, dish washing, cleaning, and vehicle washing respectively, and FM is number of representing the family members.

While the Q are the corresponding average water consumption in liters for one use of the previous activities, equal to flow rate (f) multiplying by time (t) required to finish the single activity.

Water required for toilet flushing was calculated using the following equation:

$$Wtf = Qtf Ftf$$

While quantity of each toilet flush (Qt) was estimated from the volume of each toilet tank.

Time (t) required for different activities by individual or within the family was estimated based on a group of 10 volunteers of different gender, age, and marital status. Each member performed and repeated different activities for 20 times, 10 times during summer and 10 times during winter, and time required to complete each was recorded. Average flow rate (f) was measured using a known volume of measuring container and the time needed to fill the container was recorded.

Greywater characteristics: Quality

Just like other Jordanian cities, the plumbing practices in Aqaba are not consistent and do not conform the standards required by the regulations. Vast majority of houses in Aqaba city are constructed in a way that greywater from bathrooms is being mixed with toilet water "black water" before meet at the manhole outside the house. This makes the interception and use of graywater relatively uneasy. A typical three floors, six apartments building (approximately 5 people in each apartment) was chosen for the study, one toilet pipe (black water) from one bathroom in the ground floor was separated from other bathroom water (sink, shower, laundry) and directed alone to the main sewer. The rest toilets in the building were closed during the period of the study (24 hours) and residents of the building were asked to use the isolated toilet not theirs, it was feasible since the whole building was owned by the same family members. Greywater was collected from flow of kitchen sinks, clothes washing machines, bathtubs, showers, and sinks before coming into contact with black water sewer, and stored in a 1 m³ tank. A sample every three hours was collected for a during a period of 24 hours (9:00, 12:00, 15:00, 18:00, 21:00, 00:00, 3:00, 6:00, 9:00) plus another one mixture sample from the previous samples collected and stored at 4 °C. The analysis was performed at the same day directly after each sampling event by the credited Laboratories of Aqaba Waste Water Treatment Plant.

Greywater quality is essential in order to determine the appropriate treatment technology, for this purpose the main pollution parameters were analyzed, these include (COD, BOD₅, TSS, NO₃-N, NH₄-N, TN, and pH). Methods were described by

literature (*Standard Methods For the Examination of Water and Wastewater, 22nd Edition*).

Social Acceptance:

Another online survey was conducted from 12nd Nov. to 12nd Feb. 2019, Employing "Google forms", The survey was published on social media websites (Facebook, Twitter) and the most popular chatting application (What's App) and was open for everyone to participate. The survey includes two parts: firstly, introduction: to make sure that the survey was perfectly understood, a brief introduction about the topic and its goals was developed, that contains definition of greywater and wastewater beside some information about the former and its applications in non-potable uses. The second part was the questions themselves which included social acceptance of reusing greywater for toilet flushing, people's opinions about the main driver for reusing greywater, expected benefits, thoughts and concerns.

III. RESULTS AND DISCUSSION

Greywater Quantity

Table (1) represents the frequency of different activities during Winter season by individuals and within a single household with the corresponding quantity of water needed per one use of each activity and per capita, while Table (2) represents the same information in Summer time.

Table 1:Personal and Family Water Uses (Winter)

Activity	Frequency (per day)	Volume per one use (L)	Total Quantity (L/capita)
Shower	0.43	60	25.8
Ablution	3	2	6
Tooth brushing	2	0.75	1.5
Hand and face wash	3	1.5	4.5
Toilet flushing	5	7	35
Cooking	1	20	4*
Laundry	0.43	240	20.64*
Dish washing	2	20	8*
Cleaning	0.28	15	0.84*
Vehicle wash	0.14	10	0.28*

Table 2: Personal and Family Water Uses (Summer)

Activity	Frequency (per day)	Volume per one use (L)	Total Quantity (L/capita)
Shower	2	30	60
Ablution	4	3	12
Tooth brushing	2	1.5	3
Hand and face wash	6	2	12
Toilet flushing	5	7	35
Cooking	1	25	5*
Laundry	0.57	240	27.36*
Dish washing	4	25	20*
Cleaning	0.57	20	2.28*
Vehicle wash	0.14	15	0.42*

* Divided by average family member (5)

Greywater generation depends on water consumption, as water consumption increases the quantity produced will also do, and due to seasonality in water consumption in Aqaba city [18], where the consumption is a function of temperature, greywater quantity is increasing during summer season (June, July, and August) from 142 Lpcd where the water consumption is high, and decreasing to 72 Lpcd during winter (November, December, and January) when the consumption is lower. Kitchen sink represents all wastewater that comes from kitchen activities, this includes dish washing, cleaning fruit and vegetables, and water needed during food preparation, the quantity of dish washing was calculated while quantity of other activities was estimated.

Taking into consideration an average family members of 5 people, the winter-summer average amount of greywater produced in Aqaba city is about 107 Lpcd which consists with the international average generation rate of 90 to 120 Lpcd [11]. This result is higher than that reported by Ghunmi et al. (2008) and Jamrah and Ayyash (2008) for the urban cities of Amman, Irbid, Russaifa, and Zarqa of 59, 63, 51, 58 Lpcd respectively [16][17]. This might be for the reasons of the higher per capita consumption of water in Aqaba due to the continuous water supply, life style of Aqaba citizens, and the higher income comparing to these cities. And lower than that recorded in Alain city in United Arab Emirates of 192 Lpcd [14], this difference is due to the different life style between the two people, homes type, income, and water tariff although both cities share almost the same climate. Excluding kitchen wastewater or as called "Brown water" will result an average value of 80 Lpcd greywater which is a better quality wastewater to be treated and used in toilet flushing.

Figure (1) shows the average percentages of water consumption for different activities both in summer and winter. Toilet flushing represents 17% of total water consumption of 202 Lpcd, while the highest percentage is for shower 20% which may be due to the higher temperature in the city. Showering activity is characterized by a high daily frequency but a low water volume consumption in summer comparing to that in winter by a low daily frequency but high water volume consumption (See Table 1,2). Laundry and kitchen sink are among the high values as well, while ablution and washing have almost similar percentages of 5% and 4% respectively. Total greywater generated represents almost 53% of total fresh water

consumption, this result is lower than that reported by Jamrah and Ayyash (2008) for other Jordanian Urban cities (See Table 3). The rest of consumption represents the highest percentage (30%); this goes to other unmentioned uses such as drinking, garden watering, outdoor cleaning, leakage, and water-based air conditioners that run for 24 hours a day during summer and being used widely in the city. Air conditioners consume huge quantities of water which can't be described as greywater or wastewater; the reason is that water used by these devices is being consumed as it evaporates during the process of cooling.

A previous study was conducted for Aqaba city in 2010 to estimate the percentage of water end uses. The estimated percentage for toilet flushing is 17.6% is similar to ours, while its different with regard to the shower activity of 21% and 12% in 2010, most probably because the per capita consumption of water increased since 2010 (See [19]).

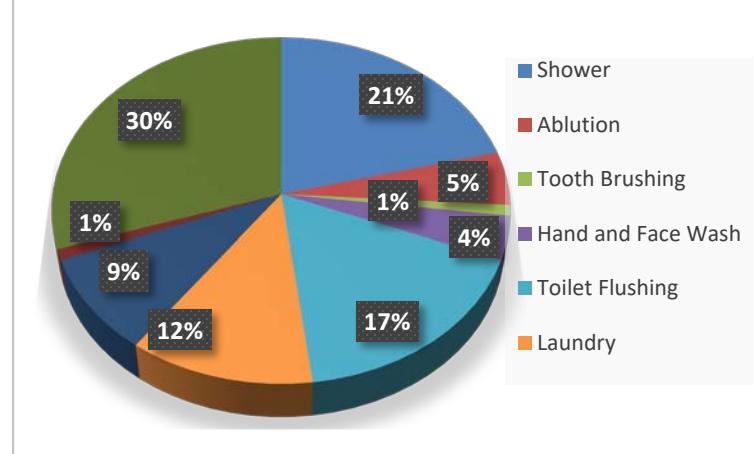


Figure 1. Water consumption for different activities

Table 3. Greywater generation in different cities

	Greywater (Lpcd)	Percentage to fresh water (%)
Aqaba	107	53
Amman	59	70
Irbid	63	78
Rusaifa	51	75
Zarqa	58	71

Alain	192	69
Saida	43	33

The quantity of water needed for toilet flushing is about 35 Lpcd which can be covered by greywater generated even during winter. If collecting greywater mainly for toilet flushing, greywater can save almost 17% of total fresh water consumption. Using a quick calculations and assuming the price of fresh water is JD 0.4/m³, and a sewage charge of JOD 0.29/m³; a typical family of 5 members can save about JOD 10.8 of their quarterly water bill (USD 1.0 = JOD 0.71). Greywater can also cover different non-potable water applications in houses which may increase the potential savings up to 29% if laundry was considered (JOD 18.3 of the quarterly paid water bill). A similar result will be obtained when brown water (kitchen wastewater) is excluded and greywater includes streams from wash basins, sinks, laundry, and bath tubes. This might result to a less polluted wastewater which can be treated easily, and still can cover the need for flushing beside other applications.

Greywater Quality

Greywater quality is a function of household's activities, socioeconomic and cultural factors besides many others [8][20]. In the city of Aqaba, Friday and Saturday are holidays, however, Friday is the most important day of the week where most families and friends gather or go out for a long day picnic. Saturday is the cleaning day as many housewives have the chance to clean the house, do laundry and start preparing for the next working and school days, that may include many cleaning and hygienic activities. As samples were captured on Saturday, measurements of COD concentrations were within the range of

84-1760 mg/L which are higher than typical urban greywater, this might be due to the existence of significant amounts of chemicals from kitchen and laundry detergents. BOD concentrations were lower and ranged from 50-524 mg/L. BOD and COD have similar variation tendencies during the day where two peaks appeared at lunch and dinner time (12:00-15:00, 21:00-00:00) when the main contributor to greywater is kitchen wastewater and an obvious valley from 03:00-06:00 as people are still sleeping and lessening of activities at houses. COD/BOD ratio average was 3.8 which indicates bad biodegradability. TSS ranged from 12-547 mg/L with a one obvious peak at dinner time, suspended solids usually come from food particles of kitchen wastewater, fiber from laundry, skin and hair from showering water. Knowing suspended solids content gives information about particles that may cause clogging of filters in the treatment system. In terms of Nitrogen, greywater showed deficiency of Nitrogen due to the absence of urine and feces which are the main sources of Nitrogen in black water.

The mixture sample to somehow could be considered as the average of the results, as it was close to the real average of the records, giving values for COD, BOD, TSS, NO₃-N, NH₄-N, TN, and pH of 917, 293, 172, 2.8, 1.9, 5.3 mg/L ad 7.7 respectively while the real average was 962, 253, 212, 2.5, 2.1, 5.2 mg/L and 7.5 respectively. These results represent only the quality of greywater at the time of analysis and further researches should be carried out in order to better conclude the quality of Aqaba greywater. However, greywater have a higher quality than mixed wastewater and with a proper treatment it can result a higher quality of reclaimed water than mixed domestic wastewater, colorless, and none pathogenic microorganism if a disinfection unit is used.

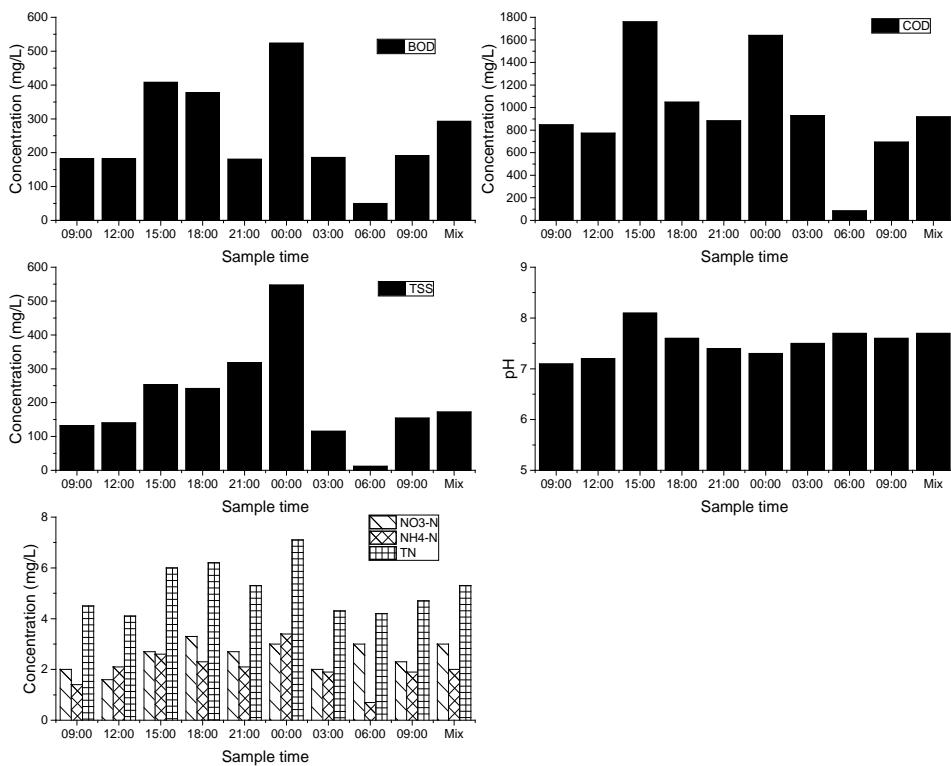


Figure 2. Variation of different parameters during 24-hour

Strong greywater needs more advanced and complex treatment technology, rather than simple ecological or mechanical treatment. Among the vast variety of treatment systems, MBR seems to be the most preferable on small scale or within several communities for its high efficiency removing organic substances, SS and turbidity. Furthermore, the contagious invertebrate egg, bacteria and virus and so on. Occupying a small area MBR unit can be installed and maintained easily for communities or residential areas and its feasibility to automated running.

Greywater separation and collecting can be a challenge in the build-up areas. Converting pipes of black water solely to the main sewer and shifting all other greywater source pipes to the treatment unit require a lot of plumping works and may not be preferable for many people. On the other hand, for those new planning residential and urban areas it will be easier simply if the dual plumping system is activated effectively especially that regulations are available.

Social Acceptance

Domestic wastewater source separating treating and reuse will be useless with the absence of beneficiaries approval, so the online survey aimed to evaluate the acceptance of urban reclaimed greywater recycling for toilet flushing after the advanced treating using MBR and disinfection in Aqaba and show peoples thoughts and concerns. The survey received 387

responses, the majority of participants were lies within the age range of 36 to 45 years old and have completed their university studying. It is showed that, 64% of the interviewees agreed to collect greywater, treat and reuse it for toilet flushing and other non-potable uses if meets the standards, while 14% were not sure about their opinions and the rest showed a negative response. This percentage is quiet high comparing to that reported in Alain city of 18% [14], and relatively low comparing to that reported in Saida city of 83% [11], this percentage can be increased by increasing awareness among society towards reasons and importance of such unconventional resource.

Because reclaimed greywater has a higher quality and more biologically stable than reclaimed mixed domestic water which can be stored up to 3 weeks with an advanced disinfection method, another question was arising, whether they agree to use reclaimed mixed wastewater instead of greywater for the same applications, 47% framed reclaimed wastewater positively while 35% framed it negatively and the rest were not sure again. As a result, people prefer to use reclaimed greywater than mixed wastewater where the potential human risk is lower.

People believed there is an urgent need to introduce new unconventional water resources such as greywater justifying that water shortage in Jordan being the main driver. 69% thinks they will reduce the water bill cost by using greywater for toilet flushing, 87% thinks there would be an environmental importance in reducing the wastewater production and discharge.

The survey revealed that whatever the reason is (increase fresh water, reduce water bill, or even saving the environment), inevitably there is an importance to collect, treat and use greywater for toilet flushing rather than fresh water.

IV. CONCLUSION

This study aimed to estimate greywater quantity generated in the city of Aqaba by employing a questionnaire survey covered 100 people, it showed that average of greywater generated was 107 Lpcd from 72 Lpcd in winter to 142 Lpcd in summer which represent 53% of fresh water consumption and 75% of total households' wastewater. The quantity of greywater in Aqaba is the highest compared to other Jordanian cities. Toilet flushing consumed 35 Lpcd, this amount can be covered totally by greywater and save 17% of fresh water up to 29% if other applications such as laundry was added.

The study also conducted that greywater quality in Aqaba is strong with its organic content although the average total quantity of greywater generated is high. The variation of parameters tendencies during the 24-hour analysis showed a similar trend with obvious peaks at meals time when kitchen wastewater is the main contributor.

As new urban areas are planned, and the city is expanding, greywater separation, treatment, and reuse in Aqaba can be an optimized choice which will not only save fresh water or reduce water bill but also improve standards of life of people in other cities of Jordan by allocating more fresh water for them.

Another online survey questionnaire was designed to evaluate public acceptance toward greywater reuse particularly for toilet flushing. 64% framed reusing greywater positively for the reasons of saving freshwater, reducing water bills, and saving the environment where the water shortage was the main driver of reuse in the view of people. Finally government should play a vital role in increasing the awareness among people toward new unconventional water resources such as greywater.

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Risk factors for Diarrhoeal diseases in the Under Fives in the Rural and Urban Areas of Mbale District: A Cross Sectional -Comparative study.

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Abstract

Background: The prevalence of diarrhoeal diseases is an aspect of public health significance in most parts of the world especially in developing countries like Uganda. Mbale, a district in Uganda has showed the same trend. Outbreaks of common diarrhoeal diseases including dysentery, enteric fevers and cholera are regularly reported among children under five years of age with increased cases of sickness and deaths. Unfortunately, there is also varied and increased prevalence in the rural and urban areas of which the risk factors responsible are unknown. **Objective:** The study aimed at evaluating the risk factors for the prevalence of diarrhoeal diseases in the rural and urban areas of Mbale district. **Materials and Methods:** A descriptive comparative cross-sectional study was conducted involving rural and urban areas on 790 households (rural=405, urban=385) with cases and non-cases of diarrhoea from June to October 2011. The sample size was estimated using the Kish and Leslie (1965) formula. Data was collected through structured interviews using questionnaires and analyzed using SPSS version 17. Bivariate and Multivariate analyses were also used. **Results:** The rural areas had a high prevalence of 59.8% diarrhoeal diseases among children under-fives years of age compared to urban areas with 42.6%. Sanitation facilities such as pit latrines, bathrooms etc. were significantly associated with diarrhoeal diseases prevalence in rural and urban areas e.g. rural homes without pit latrines registered 94.0% (227/242) cases (p-value=0.0053) compared to 5.5% (9/164) without latrines in urban area. **Conclusions:** As the rural areas had a higher prevalence compared to the urban areas, appropriate intervention programs should be formulated focused on the significant risk factors.

Index Terms- Diarrhoea, risk factors, comparative cross sectional study, under-fives, rural areas urban areas; Mbale district

1.0 Introduction

The prevalence of diarrhoeal diseases outbreaks is still a public health burden to most countries in the world today. About 4 billion cases of diarrhoea per year cause 1.8 million deaths, over 90% of them (1.6 million) are children under-five years of age (UNICEF, 2005). It is important to note that diarrhoeal diseases kill more than 2 million children a year in the developing world. Many children are left underweight, mentally and physically stunted, and vulnerable to other deadly diseases and too debilitated to go to school. Conservative estimates place the global death toll from diarrhoeal diseases at about two million deaths per year (1.7-2.5 million deaths), ranking third among all causes of infectious disease deaths worldwide. An average morbidity attack rate of 3.2 episodes of diarrhoea per year per child has been reported in some settings in developing countries, this number can be as high as 12 episodes per year per child (WHO,2009). Moreover, repeated episodes of diarrhoeal disease makes children more vulnerable to other diseases (UNICEF, 2005).

In Uganda, over 75% of the disease burden is due to inadequate sanitation practices (MOH,2005). In Mbale district, Diarrhoeal diseases represent 8% of the diseases burden of Mbale district (Mbale DDHS office, 2010). Many studies have suggested a number of interventions to check diarrhoeal diseases outbreaks among the under-fives. A study in Ecuador on Nutritional and Environmental risk factors for diarrhoeal diseases in Ecuadorian children found that the prevalence of the

diarrhoeal disease was significantly associated with hygienic factors like the quality of water, sanitation, and refuse system but not with demographic factors such as sex, attitude, population density and family size (Harold. B., et al., 1993).

Another study suggests that major environmental sanitation aspects like waste disposal, water supply, house-hold and food hygiene are associated with the prevalence of diarrhoeal diseases because of the possibility of disease-causing organisms inhabiting and multiplying in these sources when the conditions are favourable. Such sources offer the best of transmission for diseases agents and therefore, they are a potential danger if not taken care of properly (Fening, K.O and Edoh, D. A, 2009).

A study by Eshete, (2007), in Ethiopia showed that there was a significant association between transportation to and storage of drinking water in the house and the under-five childhood diarrhoeal morbidity. 87% of the households where containers used for transporting and storing drinking water were uncovered were more likely to have children with diarrhoea than the households where the containers were always covered probably because water not covered could easily be contaminated by pets and other vermin Eshete.W.B.,2009). In addition, a number of studies by Kyobutungi et al (2007), UNHabitat (2010) and McLennan (1998) , all found that susceptibility to occurrence of diarrhoeal diseases increased in both the rural and urban areas due to lack of many environmental sanitation facilities. There was also observed variation in prevalence of diarrhoeal diseases with rural being worse off than the urban but again with the urban poor, there was a high prevalence (Kyobutungi et al, 2007; UN Habitat, 2010; and McLennan,1998).

In Mbale district, outbreaks of common diarrhoeal diseases including dysentery, enteric fevers and cholera are regularly being reported among under-fives and recent data shows that there is a rising trend in the prevalence of Diarrhoeal diseases in both the rural and urban areas of Mbale district. The combined prevalence of all these diseases in urban areas is at 0.40% compared to the rural areas where the prevalence is at 0.46% (Mbale DDHS Office records, 2010). This trend is responsible for the increased cases of sickness and deaths among the under-fives in the district.

Unfortunately, there is also variation in prevalence in the rural and urban areas of which the risk factors responsible are unknown because no study has ever been carried within this area. This study was therefore carried out in Mbale district and its purpose was to evaluate “the risk factors for the prevalence of diarrhoeal diseases in the rural and urban areas of Mbale.” It involved the urban and rural areas of Mbale i.e. Bunghoko sub-county - rural setting and Industrial division-an urban setting.

2.0 Research Objectives

The study was carried out with the purpose of evaluating the risk factors responsible for the variation in prevalence of diarrhoeal diseases among the children under-five years of age in the rural and urban areas of Mbale district as a basis to suggest appropriate measures to control diarrhoeal diseases.

The study specific objectives were to; 1-investigate factors influencing the prevalence of diarrhoeal diseases in both rural and urban areas of Mbale district, 2-to investigate the role of environmental factors in the prevalence of diarrhoeal diseases in both the rural and urban areas of Mbale district and 3-to evaluate if the difference in socio-economic setup in both rural and urban areas has any influence in the prevalence of diarrhoeal diseases in the under-fives.

3.0 Materials and Methods

A descriptive cross-sectional study with a comparative aspect was carried out in the rural and the urban areas of Mbale district from June 2011 to October 2011. It covered Bunghoko sub county –a rural area situated approximately 15kms from Mbale and the Industrial division-an urban setting found within Mbale town. The study population was confined to households with at least a child under-five with a history of diarrhoea two (2) weeks prior to the survey date, and those without and staff from the health centre and public health department.

The Kish and Leslie (1965) formula was used for estimating the sample size; thus, $n=z^2pq/d^2$ ($z=1.96$ at 95% CI, $p=\text{estimated prevalence} =0.4$ (urban) or 0.46 (rural), d (the desired level of precision set at 5% = 0.05). Hence, a sample size of 790 households was used out of which 405 households were from the rural setting and 385 from the urban setting.

The selection of the subcounty/division was done purposively; multistage random sampling was then used in the selection of the parishes. Two parishes were chosen from Bunghoko subcounty namely; Bumbobi and Buhumwa parishes while two were also chosen from the Industrial division namely; Malukhu ward and Namatala ward. Two villages were then chosen from each parish randomly hence Malukhu ward had Sironko and Muyembe villages, Namatala ward had Sisyie and Mvule A&B villages, Bumbobi had Lokii and Nabesa villages and Buhumwa had Nabihomwa and Bufuya villages, in total eight (8) villages were chosen. Using a record from the village health team and LCIs, 790 households were chosen using simple random sampling according to the village population.

Data was collected using observation, interviews, focus group discussion and documents analysis and the tools used were structured interview guides and questionnaires which were administered by both the researcher and the research assistants to respondents who were majorly mothers and care takers of the under-fives in the selected households.

All questionnaires were edited. The data was categorized, coded and then entered into the computer using SPSS version 17. First stage analysis involved obtaining descriptive statistics. Further, bivariate analysis was used to see the level of association between the Independent and the dependent variables. Finally, a multivariate analysis was performed, where a logistic regression model was used to determine the odds ratios and 95% confidence interval for the different risk factors of diarrhoea and describe the strength of association between the selected study variables by controlling for the effect of possible confounders. The logistic regression formula was ran by only selecting those variables that appeared to be statistically significant ($p<0.05$) during bivariate analysis. The regression formula used is given as ; $\text{Logit } (\pi_i) = \alpha + \beta_1 (\text{presence of pit latrine}) + \beta_2 (\text{presence of bath shelter}) + \beta_3 (\text{presence of household storage facility}) + \beta_4 (\text{Presence of kitchen}) + \beta_5 (\text{presence of water source}) + \beta_6 (\text{presence of water storage facility}) + \beta_7 (\text{marital status}) + \beta_8 (\text{level of caretaker}) + \dots + \beta_k (\text{Family income level})$, where π_i is the likelihood prevalence of diarrhoeal diseases. β_i are the coefficient values associated with the i th factor in the model, it was possible to interpret the importance of each risk factor.

Before the study, approval and Ethical clearance was obtained from the International Health Sciences University's Research and Ethics Committee, and then the local officials at the Mbale district local government were communicated through a letter from the University's Institute of Health Policy and Management (IHP&M). Informed consent was always obtained from the mothers or the caretakers of the children under five years before conducting the interview. Privacy and confidentiality were maintained during the interview. Mothers of children who were found to be sick during the survey visit were advised to visit the nearby health facility.

4.0 Data Analysis/ Findings

A total of 790 households were visited (405 households from Bunghoko sub county –a rural setting, 385 households industrial division-an Urban setting).

The findings on the socio-demographic characteristics of the respondents in both rural and urban areas of Mbale indicate that the majority of the respondents 72% were aged between 20- 49 years, and the majority of respondents 47% were married. On the level of education, the majority 32% were of primary level followed by those who never went to school 19.7%. This means that the combined group constituted more than a half of all the respondents. and regarding the occupation of the respondents, the highest percentage of the respondents 28.9% were peasants. Again, more than half 53.7% of the respondents were earning less than Ug.shs.500, 000 per month (less than \$ 125). (Table I).

Table 1: Socio demographic characteristics of respondents

Table 1: Socio-Demographic characteristics of all respondents, Mbale July 2011		
Variable	Frequency (N=790)	Percentage (%)
Age category		
10-19	26	3.29
20-29	179	22.70
30-39	213	27.00
40-49	178	22.50
50-59	66	8.35
60-69	69	8.70
70-79	36	4.56
80-89	23	2.90
Marital status		
Single	115	14.56
Married	374	47.34
Divorced	58	7.34
Widowed	126	15.95
Separated	74	9.37
Co-habiting	43	5.44
Level of education		
Never went to school	156	19.75
Primary education	253	32.02
Secondary education	151	19.10
Tertiary education	128	16.20
University	97	12.30
Others*	5	0.63
Occupation		
Peasant	228	28.9
Housewife	169	21.4
Trader	176	22.3
Teacher	88	11.1
Others**	129	16.3
Tribe		
Mugisu	435	55.1
Muganda	68	8.6
Munyole	37	4.7
Mugwere	56	7.1
Japhadhola	11	1.4
Etesot	73	9.2
Others***	110	13.9
Level of household income per month		
Less than 100.000	269	34.05
100.000-499.000	155	19.60
500.000-999.000	66	8.35
Above 1.000.000	300	38.00

Source: *Field data, 2011*

Key: 1.Others = Post graduate training ,Informal training*

*2.Others** = other professional occupations like Health worker, engineer, electrician, carpenter.*

*3.Others***= other tribes like Acholi, Langi, Banyankole, Bakiga, Basoga, Sabiny*

Data on the prevalence pattern of diarrhoeal diseases among the under-fives showed that the highest number of respondents i.e. 59.8% in the rural area had reported that children under five years of age had had diarrhoea in the two weeks preceding the study as compared to 42.6 % in the urban area, therefore the rural setting/area was most hit with diarrhoeal disease prevalence than the urban area (Table 2).

Table 2: Prevalence pattern of diarrhoeal diseases in Urban and rural areas of Mbale district

Diarrhoeal cases in the past 2 weeks	Rural setting		Urban setting	
	Frequency(n)	Percent (%)	Frequency(n)	Percent (%)
Yes (cases)	242	59.8	164	42.6
No (non cases)	163	40.2	221	57.4
Total	405	100.0	385	100.0

Source: *Field data, 2011*

Bivariate analysis results showed that in the rural areas; rural homes without excreta disposal facilities (pit latrines) registered 94.0% (227/242) cases of diarrhoea with (p-value=0.0053) as compared to 5.5% (9/164) without excreta disposal facilities in urban area. Rural homes without kitchens registered 65.7%(159/242) cases of diarrhoea with (p-value=0.0365) compared to only 32.5%(54/166) without the kitchens. In rural area, rural homes without household waste storage facilities registered 45%(109/242) cases of diarrhoea with (p-value=0.049) compared to 26.8%(44/164) in the urban, The rural homes found not boiling water registered 77.2%(154/242) cases of diarrhoea with (p-value=0.0163) as compared to 73.2%(120/164) in urban.

Rural homes whose state of cleanliness of the floor was dirty registered 63.6% (154/242) cases of diarrhoea with p-value=0.0245 compared to 50% (82/164) in urban (p-value=0.009). Rural homes with family income below half million Uganda shillings (less than \$125) registered 38.4% (93/242) cases of diarrhoea with(p-value=0.008) as compared to 25.6% (42/164) in the urban area which consequently shows that the rural area was worse off than urban area.

Finally, the logistics regression analysis (Table 3) showed that the factors that were significant in diarrhoeal diseases prevalence in the rural area were; state of the water source, cleanliness of the house, level of education of the parents or caretakers, household water storage facility, family income level , house hold waste storage facility, presence of bath shelter, presence of the excreta disposal facility, distance of the household storage facility from the household, presence of kitchen, marital status of the parents, presence of the household waste disposal facility (p-values; 0.0041,0.0089,0.0093,0.217,0.224,0.278,0.334, 0.375,0.380,0.436,0.474, 0.0486 respectively).The factor that was not statistically significant was the distance of the excreta disposal facility to the household (p-value= 0.836).

Table 3: Showing the results of the logistic regression analysis for the rural area.

Variables:	B	S.E.	Adjusted OR	95% C.I. for OR	Lower	Upper
<u>Excreta disposal facility</u>	-.097	.339	1.181		1.0467	1.763
1. Present						
2. Absent						
<u>House hold waste storage facility</u>	-.057	.203	1.278		1.0635	1.406
1. Present						
2. Absent						
<u>House hold waste disposal method</u>	.151	.217	1.486		1.760	2.781
1. Present						
2. Absent						
<u>Kitchen</u>	.174	.223	1.508		1.0769	1.842
1. Present						
2. Absent						
<u>House hold water storage facility</u>	.373	.302	1.524		1.380	2.625
1. Present						
2. Absent						
<u>Water boiled or not</u>	.261	.251	1.820		1.794	2.120
1. Yes						
2. No						
<u>State of repair of floor</u>	.028	.210	2.018		1.681	2.553
1. Cracked						
2. Smooth						
<u>family income level</u>	.095	.078	2.477		1.943	3.282
1. at least 500,000/=						
2. at most 500,000/=						
<u>level of education</u>	-.008	.089	1.200		1.183	2.380
1. At most P7						
2. At least secondary						
<u>Marital status</u>	.063	.088	1.953		1.896	2.326
1. Once married ***						
2. Single ***						
<u>State of water source</u>	-.140	.171	1.967		1.622	2.320
1. Protected						
2. Un protected						
<u>Distance from house</u>						
<u>Excreta disposal*** facility</u>	.050	.241	.0930	***0.65	1.686	
1. Less than 10m						
2. 10m or more						
<u>bath shelter</u>	.267	.276	1.935		1.760	3.241
1. less than 10m						
2. 10m or more						
<u>House hold waste storage</u>	.233	.265	1.770		1.750	2.123
1. Less than 10m						
2. 10m or more						
Constant	-1.868	1.046	3.192		-	-

Key: B-Coefficient for the Constant (also called the “intercept”).

S.E = Standard error around the coefficient for the constant.

In the urban area, the following factors were found to be statistically significant; family monthly income level, type of water source, marital status, level of education of the care takers, presence of the household storage facility, (p-values; 0.006, 0.013, 0.0173, 0.0228, 0.043 respectively). The age of the child (at p-value=0.859) was the only factor that was found not to be statistically significant with the prevalence of diarrhoeal diseases in the urban areas. (Table 4).

Table 4: Showing results of the logistic regression analysis for the urban area

Variables:	B	S.E.	Adjusted OR	95% C.I. for OR	OR	p
				Lower	Upper	
Level of education of parents						
1. At most P.7	0.100	0.083	1.452	1.0939	1.899	0
2. At least secondary						
Marital status						
1. Once married	0.120	0.088	1.858	1.490	2.341	0
2. Single						
Age of the child						
1. At most 23 months	-0.017	0.098	0.031	0.811	1.191	0
2. At 24 months						
house hold waste storage						
1. Atleast 10m	-0.137	0.174	0.623	0.020	0.922	0
2. Atmost 10m						
Type of water source						
1. Protected	-0.663	0.267	6.164	5.306	7.870	0
2. Unprotected						
Family income level						
1. Atleast 500,000/=	-0.046	0.093	0.247	0.179	0.914	0
2. Atmost 500,000/=						
Constant	0.320	0.700	0.208	-	-	0

Key: B-Coefficient for the Constant (also called the "intercept"),
 S.E = Standard error around the coefficient for the constant.

5.0 Discussion

Previous studies carried out have revealed that a number of risk factors are responsible for the prevalence of diarrhoeal diseases (UNICEF, 2005; UNICEF, 2009).

A total of 790 households of study subjects were involved and thus 790 questionnaires were administered, 385 study subjects were from the Industrial division (an urban setting) while 405 were from Bunghoko sub-county (a rural area). The socio-demographic information shows that a majority of the respondents 213 (26.9%) were in the age category of 30-39, followed by 20-29 with 179 (22.6%), 40-49 with 178 (22.5%), and then by 60-69(8.73%), 50-59 (8.35%), 70-79(4.60%), 10-19 (3.67%) and 80-89 (2.90%). The age of the caretakers is an important issue to be taken care of because it determines the level of experience and responsibility of the caretakers of the under-fives. In this case, the majority were aged 30-39 years which is a very active, productive age who are likely to play a big role in the control of diarrhoeal diseases. The findings also show that the married formed the greatest number of respondents 374 (47.3%) compared to other categories which was a relatively low proportion among parents/guardians of the children.

Married couples are expected to cope better with sick children than other categories of marital status like single mothers. Indeed, marital status of the mothers /guardians was statistically significant in the prevalence of diarrhoea.

Many respondents, at least 51.1% had studied up to secondary level. The level of education had a very big impact in the occurrence of diarrhoeal diseases as this was statistically significant at both bivariate and multivariate level, the mothers' education in the prevention and control of diarrhoeal diseases among under-fives cannot be over emphasized. This was aptly explained by Shrestha (1997), who stated that "as long as there is a discrepancy between the understanding of the people and the real situation with no one trying to fill the gap the problem of diarrhoeal diseases remains the same." These results furthermore concur with the work of Woldemicael (1995), who noted that caretakers' knowledge was important in the spread of diarrhoeal diseases because it influences child caretaking practices such as breast feeding, bottle feeding.

The findings also show that a majority of the respondents with children with diarrhoea were peasants (28.9%) and majority (53.7%) was earning below ug.shs.500,000 per month which is indicative of a low socio-economic status of the study population. Such a situation is in most cases associated with the high prevalence of diarrhoeal diseases among under-fives. These findings agree with Banjerjee et al (2004), who found that the overall prevalence of diarrhoea was the highest (31.57%) in the lower socio-economic class.

The study revealed that personal factors related to the caretakers and children under-five years like age of the respondents (rural, p-value=0.034; urban, p-value=0.009), marital status of the parents (rural, p-value=0.0236; urban, p-value 0.041) were significant in the prevalence of diarrhoeal diseases both in rural and urban areas. The education level of the parents or the caretakers was another factor that was found to be significant both in the rural areas, and the urban areas, (p-value=0.027 & p-value=0.035 respectively). Family income level was another factor that was highly significant in the rural areas (p-value=0.008) than in the urban areas (p-value=0.708).

Also, the age group of the child under five years influenced the prevalence of diarrhoeal diseases among the under-fives in both rural and urban areas (p-values; 0.034; and 0.009 respectively).

The findings also show that the rural areas were most affected with 242/405 cases (prevalence rate= 59.8%) than the urban areas which had 164/385 cases (prevalence rate =42.6%), the prevalence rate of the rural area was higher than the overall prevalence rate for the whole study population in Mbale district which had 406/790 cases (prevalence rate =51.4%). This is because of the high presence of the prevailing factors namely poor state of the water sources, poor household hygiene, low level of education of the parents and the caretakers, lack of vital basic environmental sanitation facilities like pit latrines, bath shelters, kitchens, household waste storage and disposal facilities like dustbins, refuse/garbage pits, poor socio-economic factors like low household income that are significant in the rural areas hence a high prevalence of diarrhoeal diseases among the under-fives. Part of these findings are in agreement with Schiller (2007), who noted that diarrhoea can also spread from person to person, aggravated by number of people in an area (In our case, the number of households) combined with poor personal hygiene. He disagrees with these findings in that for him, urban location or rural did not matter. These findings take note of the fact that Schiller's study area was in USA which is very significantly different in the hygiene levels both in rural and urban settings from ours.

The study of Fening and Edoh (2009), concurred with current study findings where he indicated that rural areas were more affected than urban area by Diarrhoea diseases. The level of awareness of Diarrhoea diseases aggravated by illiteracy is another major cause of diarrhoea when it comes to developing countries. Due to poverty and consequently poor living standards, food is prepared or stored in unhygienic conditions. The living crowded conditions contaminate food and pollute water which also contributes to the diarrhoeal diseases which on the other hand are more common in urban settings than the rural areas. Feacham (1984), refutes the findings of the current study. He observed hygiene was major cause not the type of location or residence that is either rural or urban location, that hand washing even in Medical institutions showed a lax attitude to personal hygiene. Unlike our findings, Feacham's (1984) study, rejected marital status as a factor that influenced prevalence of diarrhoeal diseases. From Feacham (1984), one can clearly observe that his study was done in an institution where sanitary facilities are better than in our study area.

On the role of environmental factors in the prevalence of diarrhoeal diseases in both the rural and urban areas of Mbale District, the findings reveal that the presence of kitchen, presence of an excreta disposal facility, type of house hold waste storage and disposal method, presence of water storage, treatment of water were influential environmental sanitation factors in the prevalence of diarrhoeal diseases in both rural and urban areas.

The study demonstrated that environmental variables above in the prevalence of diarrhoeal diseases were more influential in rural areas than the urban areas of Mbale district. These factors are biologically plausible in the transmission of diarrhoeal diseases. Indeed, the study concurs with Navaneethan (2008), that diarrhoeal disease was significantly associated with hygienic factors like the quality of water, level of excreta disposal, waste disposal, in remote areas than in urban settings. He found the morbidity rate of the under five children due to diarrhoeal diseases to be higher in the rural areas than in the urban areas.

This research study observed among others that the state of cleanliness of the houses in both rural areas (p-value 0.0245) and urban areas (p-value 0.0098) was a significant factor in diarrhoeal prevalence. It was observed that more dirty homes and consequently higher prevalence of diarrhoea occurred in the rural than urban setting in this population. This observation reflects the general difference in socio-economic situations in rural settings needing policy makers to address these disparities in Mbale district if diarrhoeal diseases among the under-fives have to be effectively controlled. In rural areas, most houses are poorly maintained, with dirty and cracked floors as compared to the urban areas.

In regard to family income levels, low level of family income was significantly associated with the prevalence of diarrhoeal diseases, with the rural areas exhibiting a high prevalence among families with income less 500,000 (\$125) per month (p-value 0.008) than the urban areas (p-value 0.708). Family income is important because it helps families to acquire basic resources such as soap; clean water, and other resources that would enable parents to prevent occurrence of diarrhoea, and afford the treatment costs if the children fell sick. The study findings concur with Patel et al., (2009), who

noted that it was in rural areas where more susceptible conditions such as infectious agents that cause diarrhoea are present or are sporadically introduced throughout the surrounding environment than urban areas. He noted that diarrhoea was a rare occurrence for most people who live in urban areas where sanitation is of relatively high quality level, access to safe water is high and personal and domestic hygiene is relatively good. In our findings, diarrhoea is however not rare in urban settings like Mbale. Furthermore, the high cases of diarrhoeal diseases in rural areas in the study at hand may be as a result of majority of respondents living in households with disposal facilities isolated from them which make it easy for under-fives to defecate indiscriminately hence poor environmental hygiene.

This study has highlighted big hygiene gaps in Mbale area, which gaps are driving diarrhoeal prevalence. This is a big challenge for the Health department in the district which must be addressed urgently.

6.0 Conclusion

The study concludes that the rural setting had a higher prevalence (PR=59.8%) compared to the urban settings (42.6%) and higher than overall population prevalence (51.4%)

In the rural setting; poor state of water sources, dirty households, lack of environmental sanitary facilities like pit latrine presence, bath shelters, kitchens and poor household waste storage and disposal facilities were significantly associated with diarrhoeal diseases prevalence.

In urban areas, poor state of households, age of the child, distance of the pit latrines and poor household waste storage and presence of disposal facilities were significant factors.

In both the rural and urban areas, the level of the household monthly income and cleanliness of the household were significant factors in the diarrhoeal diseases prevalence.

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9.0 Competing interests

None declared.

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Cytochrome Oxidase Activity at The Hepatic Parenchyma Different Periods of Ischemia and Obstructive Jaundice

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Abstract- In this study, the activity of cytochrome oxidase was studied in different periods of the ischemic hepatic parenchyma and obstructive jaundice. It has been found that when liver damage occurs at different periods of ischemia and obstructive jaundice lead to inhibition of cytochrome oxidase.

Index Terms- liver, ischemia, hepatocellular damage, jaundice, animals, carbon tetrachloride

I. INTRODUCTION

Currently known methods for diagnosis of acute and chronic liver disease based on determining the activity of various enzymes in the blood and liver tissue, the rate of absorption of dyes and radioactive substances, the level of the metabolites synthesized by the organ [1,2,3,5,7]. However, none of these diagnostic tests do not provide a number of intact and functionally capable of liver parenchyma cells, and allows you to make only a qualitative picture of the pathological process in the body.

At the same time, such a diagnostic test is needed in Hepatology, it would allow to objectively represent the state of hepatic parenchyma in each case based approaches to selection of the treatment method and surgical volume, its validity and pathogenetic adequate postoperative period [4].

II. MATERIAL AND METHODS

Acute and chronic experiments on 200 rats weighing 160 - males made to solve the problem180 grams 46 dogs of various weights and sex.

By choosing as the main directions of the study of mitochondrial respiratory chain, responsible for liver cells and energy consuming 90% oxygen entering the cell, we examined the activity of cytochrome oxidase (cytochrome a a3 +). The latter has

been studied by us in the presence of two substrates: cytochrome c -Natural electron donor and tetramethyl phenylenediamine (TMPD) -iskusstvennym electron donor. The need for such methodical reception due to the fact that reduced cytochrome C transmits electrons oligofermentnomu cytochrome oxidase complex which activates oxygen to form OH- via cytochrome a3. Recycled same TMPD oxidizes by cytochromes a + a3, localized on inner mitochondrial membrane (Jacob E / E., 1960).

To measure the activity in the presence of cytochrome oxidase and cytochrome C TMPD body piece taken in a Dounce homogenizer homogenate was prepared in a medium consisting of 0.25Msucrose 2x10 -4 EDTA, 0.01 M tris-HCl buffer (pH 7.6-7.8). The ratio of liver tissue and the medium was 1: 2 weight / volume. Polarographic analysis PL-7 (CSSR) was performed with a standard platinum electrode Clark closed.

The polarographic cell volume of 1.1 ml ($t = 37^{\circ}\text{C}$) was added to the resulting homogenate is 1.4 mg protein calculating active volume of the cell. Then recorded the rate of oxygen consumption. Similar recordings were carried out with sequential addition of sodium ascorbate polarographic cell - analysis of final 2 mM TMPD and cytochrome C at a final concentration of 1 uM and 5 uM respectively. respiration rate expressed in nmol of O₂ / min · mg protein. Predictive coefficient was calculated (PC) by the formula: PC = Cytochrome C -Askorbat Na / TMPD Na-Ascorbate

Digital material processed by the method of variation statistics.

III. RESULTS AND ITS DISCUSSION

Trying to use a cleaner model of damage to the liver parenchyma, we used ischemia.

Table №1
TMPD-activity and cytochrome C oxidase in liver ischemic animals

Period research	Ascorbate-dependent O ₂ consumption	TMPD oxidase activity	Cytochrome C oxidase activity	The ratio of cytochrome C / TMPD-oxidase activity
reference data	10.5 ± 0.15 N = 5	20.0 ± 1.5 N = 5	27.9 ± 3.0 N = 5	1.9 ± 0.05 N = 5
30 minutes ischemia % In the original data	10.5 ± 0.26 N = 5 P 0.05 100.0%	16.5 ± 0.45 N = 5 P 0.01 82,5%	28.6 ± 0.86 N = 5 P 0.05 102.5%	3.0 N = 5 P 0.01 157.9%
60 minutes ischemia % In the original data	12.0 ± 0.8 N = 5 P 0.05 114.3%	15.7 ± 0.9 N = 5 P 0.01 78,5%	33.8 ± 2.6 N = 5 P 0.05 121.0%	5.9 ± 0.06 N = 5 P 0.01 310.5%
120 minutes ischemia % In the original data	11.2 ± 0.36 N = 5 P 0.05 106.7%	15.9 ± 0.9 N = 5 P 0.01 79,5%	49.7 ± 6.3 N = 5 P 0.01 178.1%	.8,1 ± 0.07 N = 5 P 0.01 426.4%

As shown in Table №1, deprivation of oxygen to the liver in normothermia conditions almost did not change ascorbate-dependent oxygen consumption. TMPD-oxidase activity is reduced most significantly to the 60 minutes of ischemia (21.5%) and preserved substantially the 120 min study. Its level ranging from 60 minutes is increased by 1.2 times and continues to grow to 120 minutes of ischemia. After 180 minutes deprivation liver cytochrome C oxidase activity increases blood flow by 2.4 times (up to 67.3 ± 2.8 nmol of O₂ / min-1 protein (r0,01, n = 5).

Interesting data were obtained in the group experiments with obstructive jaundice. Ligation of the common bile duct leading to the fact that after 7 days of increased activity by adding substrates of cytochrome: TMPD and cytochrome-C. If TMPD oxidase activity increased only 1.4 times, the cytochrome C

oxidase activity increased significantly (3.1-fold). The increased level of the last saved when obstructive jaundice duration of 14 and 21 hours. During these periods, the study traced and higher activity TMPD oxidase. It is 2.4 times more as compared to the intact animals and 1.7 times the rats in which the obstructive jaundice duration of 7 days.

In this group of experiments, it was found that 7 days were critical period. And indeed there was a icterus paws and ears, decreased response to pain stimuli, ruffled fur, discharge from the nose ichor. At necropsy animals showed bleeding in the mesentery, the pleural cavity. The liver was their lemon-yellow color and a soft texture.

Table №2
TMPD-activity and cytochrome C oxidase animal liver homogenates with obstructive jaundice

Period research	Ascorbate dependent O ₂ consumption	TMPD oxidase activity	Cytochrome C oxidase activity	Tsit. ratio C / TMPD-oxidase activity
Initial data	10.5 ± 0.15 N = 5	20.0 ± 1.5 N = 5	27.9 ± 3.0 N = 5	1.9 ± 0.05 N = 5
7 days obstructive jaundice % In the original data	20.8 ± 0.8 N = 5 P 0.01 198.1%	27.8 ± 0.9 N = 5 P 0.02 139.0%	87.9 ± 2.5 N = 5 P 0.01 315.0%	9.8 ± 0.3 N = 5 P 0.01 515.8%
14 days obstructive jaundice % In the original data	37.7 ± 0.9 N = 5 P 0.01 359.0%	47.5 ± 0.8 N = 5 P 0.01 237.5%	95.7 ± 0.6 N = 5 P 0.01 343.0%	5.9 + _006 N = 5 P 0.01 310.5%
21 days obstructive jaundice % In the original data	22.9 ± 0.7 N = 5 P 0.01 218.1%	32.1 ± 1.1 N = 5 P 0.01 160.5%	73.8 ± 4.5 N = 5 P 0.01 264.5%	5.5 ± 0.05 N = 5 P 0.01 289.5%

Visible intensive growth rate during the first 7 days of observation. And this turned out to be a critical period, after which 37 rats were killed 22 animals, ie, 59.4%. The rest of the animals survived and were derived from the experience of two months. They have a 14 and 21 days of study ratio was respectively 5.9 ± 0.06 and 5.5 ± 0.05 units (Table 4). At autopsy of these animals within a specified time occurred recanalization bile duct and the outflow of the restoration of the liver [5].

IV. FINDINGS

1. liver lesions at different periods of ischemia and obstructive jaundice lead to the inhibition of cytochrome oxidase.
2. The ratio of cytochrome c / TMPD-oxidase activity is indicative of degradation of the inner mitochondrial membrane and disorders bioenergy hepatocytes.
3. Tier coefficient corresponds to a certain number of damaged (or preserved) liver parenchyma.
4. The use of the coefficient allows to predict disease outcome.

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Assessment of Environmental Impact of Solid Waste Generation and Disposal in Sokoto Metropolis

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Abstract- Population growths in urban centers in Nigeria have significantly increased the generation of wastes in urban areas. Inadequate waste services have led to illegal burning and dumping of wastes on open spaces, which is degrading the environment and creates profound public health concerns. This paper aimed to access the implication of illegal dumping of solid wastes in Sokoto metropolis, Sokoto State, Nigeria. A total of four hundred questionnaires were administered using systematic sampling on categories of respondents in the study area. The researchers also visited the Sokoto state Urban and Regional Planning Board (SURPB) and the Sokoto State Environmental Protection Agency, (SEPA) who assigned the responsibilities of ensuring a cleaner and refuse-free environment in Sokoto metropolis. Secondary data also used to obtain information from review method; The results of the findings deduced that, several open spaces and even water channels are been used as dump sites in the study area. The composition of the solid waste in the metropolis contained mostly food waste, bottle glass waste, ashes, nylon, metal and cans, papers and wood. The research also revealed that, there is no legal authorized dumpsite in some part of the metropolis. The major environmental issues resulting from improper of solid waste in Sokoto metropolis are blocked of drainage channels during rainstorm causing flooding in the metropolis. The researcher found that people of the area suffered from malaria fever caused by mosquitoes that breed on the wastes and gutters occupied by such solid wastes. Other diseases include respiratory problems, typhoid, cholera, and meningitis. The solid waste may decomposed to emit methane and carbon gases which contribute to climate change. Therefore, the paper recommends that there should be a continued public enlightenment on the causes and danger of illegal dumping of waste and finally, a strong legislation with the severe action should be put in place and also recommended that available waste bin should be adequately provided.

Index Terms- Environmental Impact, Solid Waste, Generation, Disposal

I. INTRODUCTION

Solid waste disposal is one of the major environmental problems that developing countries are faced with. Health hazard, traffic congestion, unsightliness, unpleasantness and blockage of drainages are some of the problems caused by lack of efficient waste management practice in Nigeria. Solid wastes could be defined as non-liquid and nongaseous products of human

activities, regarded as being useless. It could take the forms of refuse, garbage and sludge (Leton and Omotosho, 2004). Cities in Nigeria, being among the fast growing cities in the world (Onibokun and Kumuyi, 1996) are faced with the problem of solid waste generation According to Mansoor et al. (2005), "proper solid waste disposal is an important component of environmental sanitation and sustainability." A sustainable environment and improved waste management offer opportunities for income generation, health improvements and reduced vulnerability. This could hardly be attained in some of the developing countries, most especially in Nigeria because of non-readiness, uncoordinated and laissez faire attitude toward better ways of solid waste disposal methods in spite of their high rate of urbanization and growth in commercial and industrial activities (Afangideh et al., 2012). The situation of solid waste disposal methods in some of the Nigerian cities lives more to be desired as garbages of waste generated litter all nook and cranny of the towns and cities. In a study on municipal solid management in China, Dong et al. (2010) report that the amount of municipal solid waste generate increased tremendously from 31.3 million tons in 1980 to 212 million tons in 2006, and the waste generation rate increased from 0.50 kg/capita/day in 1980 to 0.98 kg/capita/year in 2006. According to them, the waste composition in China is dominated by the concentration of kitchen waste in urban solid waste which accounted for 60% of the waste stream. The report on municipal solid waste of Dong et al. (2010) in China further stressed that the total amount of municipal solid waste collected and transported was 148 million tons in 2006, of which 91.4% was land filled, 6.4% was incinerated and 2.2% was composted. The overall municipal solid waste treatment rate in China was approximately 62% in 2007. In 2007, there were 460 facilities, including 366 landfill sites, 17 composing plants, and 66 incineration plants. The report of Dong et al. (2010) was able to throw more light on the waste generation and composition in the Asian continent most especially in China where the research was conducted. Several studies conducted in different parts of the world, particularly in major urban centers in Europe and United States of America; show that the types of waste generated and management techniques vary with the level of civilization, industrialization and socio-economic well-being of the nation involved (Herbert, 2007). However, the solid waste generated from industrial products, such as polythene bags, plastics from beverages, electronic materials, broken bottles and empty cartons, constitute hidden places for vector diseases. Also, offensive odor emanating from dumping sites constitutes environmental risks to human health. It is worrisome that much research on waste management has been conducted in Nigeria and

other developing countries. However, some of the studies do not adequately examine the environmental impact of waste disposal methods on human health which is the main focus of this research. The objective of this study is to Assess the types and components of solid waste generated in the study area and identify the environmental problems that ensued due to indiscriminate waste disposal and finally suggest better ways of handling the challenges of indiscriminate waste disposal particularly in terms of land requirement. This will give city planners and other stakeholders a chance to develop appropriate database for proper sanitation in urban environment with the aim to reducing the risk of urban residents from being vulnerable to outbreak of diseases which is inimical to human health.

1.2 Statement of the Problem

Ethically, the beauty of any environment lies in its good sanitary condition. This is so because, when an environment is clean, the lives of citizenry are not threatened by illnesses and other environmental related problems. Proper refuse disposal and management involve the dumping of wastes (solid, liquid or gaseous) from our homes, industries and public outfits for example hotels, hospitals and schools etc at a specific place or in government provided containers and the control and removal of refuse from places where they can cause hazards to a place where they are less hazardous to public and the environment. Sokoto metropolis, particularly Sokoto North and Sokoto South Local Governments, presents a ghastly picture; the neglect of filled refuse bins in recent time has its effect on the inhabitants. Many areas around the homes are littered with domestic refuse, garbage and other wastes.

Some of these wastes generated are harmful with negative impacts on our environment, land, water and air. To ensure a clean and safe environment, the Sokoto State Government established the then Sokoto Urban Development Authority (SUDA) which is now known as the State Urban and Regional Planning Board (SURPB), and the State Environmental Protection Agency (SEPA), to monitor the environmental quality and to ensure a refuse-free environment. However, despite the government's efforts at making the environment clean in the metropolis, people seem to be careless about their environment. Despite the provision of refuse bins/refuse bunkers by the government many people still prefer dumping refuse at places they considered convenient for them.

People seem not to be aware of the interrelatedness of dirty environment and diseases. Victims of environment related disease like malaria fever, typhoid fever, dysentery and others seem to be on the increase. Indiscriminate refuse dump affects quality of water and air of which the people seem not to be aware. Public

Educational Programmes that enlighten the public on the implications of indiscriminate refuse dump are almost non-existent. Mass media seem not to be doing enough to create awareness about implications of indiscriminate refuse dump. It was against this background that the researcher intends to embark on this research to appraise the environmental problems of waste disposal in Sokoto metropolis, Sokoto State.

1.3 Aim and Objectives of the Study

Aim

The aim of the research is to assess environmental impact of solid waste generation and disposal in Sokoto metropolitan areas.

Objectives

The major objectives that will aid the realization of the ultimate goal are to:

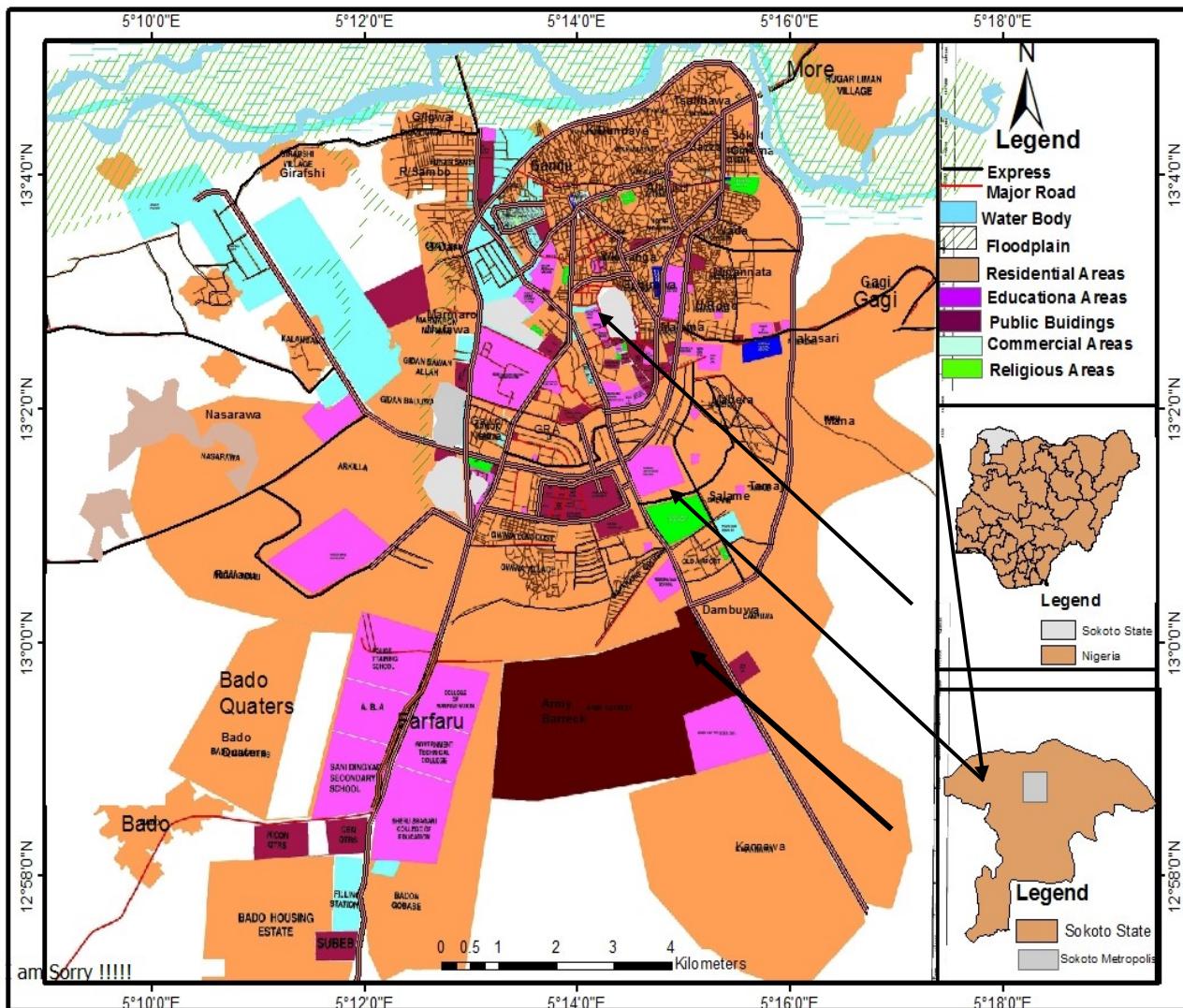
- i. Assess the types and components of solid waste generated.
- ii. Quantify the amount and composition of waste generated and disposed per ward in the area.
- iii. Investigate the waste disposal methods in the study area.
- iv. Identify the environmental problems that ensued due to indiscriminate waste disposal.
- v. suggest better ways of handling the challenges of indiscriminate waste disposal particularly in terms of land requirements

II. STUDY AREA

2.1 Location, Size and Population of the Study Area

Sokoto State is located to the extreme North-West of Nigeria between longitude 4°8'E and 6°54'E and latitude 12°N between and 13° 58'N. By its location, it shares boundaries with the Republic of Niger to the North, Kebbi State to the West and South-West, and Zamfara State to the East. The state covers a total land area of about 28,232.37 square kilometers. Sokoto metropolis comprises of two major local government councils, namely; Sokoto North and Sokoto South local government and parts of Dange Shuni, Kware, Bodinga and Wamakko local governments areas (Sokoto, 2006), (See, figure 1: map showing the study area). The total population of Sokoto metropolis was estimated at 485,483 people based on 2010 population projection with an average annual growth rate of 2.6% and with an average density of 1000 persons per kilometer square estimated (Abdullahi, A.M. (2007).

Figure 1: Map of the Study Area



Source: Arc GIS Generated by GIS Lab. Department of Geography UDUS, 2018

2.2 Climate

Sokoto metropolis has a tropical continental type of climate dominated by two opposing air masses. The Tropical Maritime wind from the south and Tropical Continental from the north, while the Tropical Maritime wind brings moist conditions and rainfall, the Tropical Continental brings cold, dry and dusty weather. The annual rainfall is about 550mm with a high peak in August. The dry season sets in first with the cold harmattan from October to March and a hot period comes in from April to the end of May when temperature reach 100 of (45°C) (Sani, 2012).

2.3 Vegetation

The vegetation of the area is Sudan savannah which consists of continuous grass cover and low proportion of trees. The trees have an average height between 20-15 feet, the grasses here are shorter and less luxuriant, and some trees are thorny while other has broad leaves of the species of guinea savannah. Trees are deciduous, shorter and more scattered as well as the area is generally hot. The natural vegetation is often disturbed especially due to continue farming, grazing and burning. Common trees in

the area include baobab and locust bean. Grasses and shrubs are also available and they serve as pasture to animals such as cattle, sheep and goats that are being reared in the area (Davis, 1982).

2.4 People of the Study Area

Sokoto metropolis is populated mainly by Hausa, Fulani, and Zabarmawa. With the colonial conquest in 1903 and the emergence of Nigeria as a political entity in 1914, many other ethnic groups from the south and north central of the country have migrated and taken permanent residence in the state. Although, the Ibos and Yoruba, top the list of southern migrants, one can find large numbers of almost all the over 250, other ethnic groups in Nigeria comfortably pursuing their legitimate business as employees of federal, state and private organization in the state. This multicultural situation is seen in the large number of registered cultural associations and ethnic groups meetings that take place on weekends in various locations of the state (Boyd, 1982).

III. METHODOLOGY

The researchers were used literature search, questionnaires, interview and personal observation. During observation a number of collection individual emptying their wastes were noted. The instruments were used in carried out the research include: pans, buckets, drums, hand gloves, GPS, Camera, and measuring tape. While the household wastes were measured with the aid of field co-researchers, they do the measurement of the households waste at the end of every week. Four major dumpsites dumped sites were selected from the four zones in the study area (Gidan Haki, Arkilla Gawon Nama and Gagi). On the other hand, a total of four hundred (400) questionnaires were administered to heads of the households selected in each of unit, and agencies responsible for solid waste management. These were done to determine the sources of waste, methods of waste disposal, and the effect of waste in the area. Besides, principal component analysis was used to examine the factors affecting environmental health in the study area. These factors include, residential location, distance to public authorized waste dump site, awareness of risk involved in storing waste in the residence for a long period of time, type of waste generated, among others.

IV. RESULT

4.1 Sources of Solid Waste in Sokoto Metropolis

Sources	Percentages
Residential	53.5
Commercial	36.9
Industrial	2.9
Others	6.7
Total	100

4.3 Methods of solid Waste Disposal in the Study Area

Methods of disposal	Gidan Haki (%)	Gawon Nama (%)	Arkilla (%)	Gagi (%)	Cumulative (%)
Burning	19	31	27	12	22.2
Direct dumping	54	50.2	47	61	53.05
Store in waste bin	3.2	6.2	9.8	2.1	5.33
Dig and bury	4.3	1.2	2.3	6.8	3.7
Land filling	5.2	1.7	4.3	15.2	6.6
Others	14.3	9.7	9.6	2.9	9.12
Total	100	100	100	100	100

Source field survey 2019

Open dumping with 53.05% is the major method of disposing and managing solid waste in Sokoto metropolis. Waste burning accounted for 22.2 %, store in waste bin 5.32%, dig and bury 3.7, land filling 6.6 and others account for 9.12. The implication of this is that most households dump their refuse on roads, streets,

Source field survey 2019

Table 4.1 revealed that residential wastes are the major sources of solid waste in the study area, accounting for 53.5%. Commercial wastes accounts for 36.9%, industrial wastes, and others with 8.9%. These responses indicate that the residents in the various zones yield the highest volume of solid wastes in the area. This is as a result of the dumping of wastes by household in the area.

4.2 Availability of Authorized Dumpsites in the Neighborhoods

Response	Total	Percentage
Yes	74	19
No	313	81
Total	386	100

Source field survey 2019

Considering the above table, 81% of the respondents stated that, there is no authorized dumpsites in their neighborhoods while, 19% have dumpsites around them. Similarly, information sourced from the interview with director of SEPA, revealed that, it is only people of Gawon Nama are using legal authorized dumping site among selected units. This forces most of the residents to indiscriminately dump their waste along the roads, behind school and houses, and even turning some water channels into dumpsites. It also observed that people in study area are not aware that, these illegal dumpsites are not legal proposed dumpsites for wastes disposal. In turn, government should create awareness via social media to enlighten the people on the danger of dumping solid waste in an open space,. In addition, government should provide bin and ensure that people make use of these authorized dumpsites

available open spaces, gutters, market areas and other illegal dumpsites. This may caused health hazards to the people living in this area. Traffic congestion and inaccessibility of roads also results from this act of dumping wastes on some major roads in the area. The burning, the problem with this method is the air, air

pollution and its inability to treat inorganic items of solid wastes such as, bottle, glass, metals, etc., It is evident from the table 4.2 that, 81% of the respondents have no authorized dumpsites in their neighbourhoods while, lack of authorized waste bin has resulted in the indiscriminate dumping of wastes by the residents, along

major roads, behind houses and even turning the drainage system into dumpsites, as such resulted in the blockage of drainage channels thus, causing flood and pollution from the stench emitted from the illegal dumpsite

Fig: 2 Animals are feeding on open dumping wastes in Sokoto Metropolis



Source: field survey 2019

Fig: 3 Open burning of dumping Solid Waste in Sokoto Metropolis



Source field survey 2019

Fig: 4 Transportation of collected waste through open body trucks



Source field survey 2019

4.4 Distances to the Dump Sites

The distance to the disposal points were further determined and the result was presented in Table 4.4. It shows the distance of various disposal points in metres. About (19.7%) of the respondents have their disposal point located at a distance of 1-50 metres in Gidan haki, (10.3%) in gawon nama, (9.4%) in Arkilla and (8.9%) in Gagi showing the proximity of the designated dumpsites in the area. At a distance of 51 -100metres, Gidan haki recorded (9.4%), Gawon nama,(7.0%), Arkilla,(6.1%) and Gagi,(3.3%).In Gidan haki and Gagi, (4.2%) of the respondents dispose their waste at a distance of 101-150 metres, and (3.3%)in Arkilla while has only (1.4%) of the respondents. It was also observed that in Gawon nama about (5.2%) dispose their refuse at a relative distance of 150 metres and above, while (3.8%) and (2.8%) disposed refuse in Arkilla and Gidan haki respectively. It is evident from the result that the farther the designated dump-sites, the lesser the use by the respondents. This shows that people are of the habit of dumping their refuse within a close range to their residence or where they carry out their daily activities due to distance apart and it accounts for huge heaps of accumulated refuse found along the road-sides, streets, and gutters. This further explains why people tend to disregard the use of designated Official dump-sites and create alternative points

4.5 Perceived effects of solid waste

Effects	Total	Percentage
Environmental despoliation	135	35
Health hazards	100	26
Economic	66	17
Social	85	22
Total	386	100

Source field survey 2019

Table 4.5 shows that, the major effects of waste disposal in Sokoto in metropolis are; environmental effects 35%, health hazard with 26%, and socio-economic effects with 22% and 17% respectively. These effects can cause the destruction of the environment, pollution of underground water and air pollution in places where solid waste are being indiscriminately burnt in open space. Dumping of solid waste in water channels can causes flooding problem. Flooding could destroy and lowers the yields from farms. Also, refuse on the roads may leads to the inaccessibility of such roads thus, leading to less mobility of the people in the area. While social impact was identified as unpleasant odor, Odors are developed when solid wastes are stored for long period of time on site between collection, in transfer station, and landfills. The formation of odor results decomposition of the readily decomposable organic components found in solid wastes.

Fig: 5 Blocked water channel due to Dumping Solid waste in Sokoto metropolis



Source: Field survey 2019

4.6 Diseases associated with solid waste.

Illness /diseases	Total	Percentage
Malaria	116	30
Typhoid	77	20
Cholera	77	20
meningitis	27	10
Respiratory diseases	78	20
Total	100	386

Source field survey 2019

Table 4.6 revealed that 30% of the respondents identified malaria fever as major disease associated with solid waste disposal, as a result of the mosquitoes that breed on the wastes and gutters. 20% of the respondents agree with respiratory problems which resulted from illegal burning of waste, while typhoid accounts for 20% which as a result of contamination of drinking water either on surface or underground by the improper disposal of solid wastes. Cholera and meningitis account for 10% and 20% respectively, which are as a result of contamination of food and water taken by the respondents.

V. CONCLUSION

Disposal of solid waste has constituted a serious environmental threat to human existence in urban centers in the developing countries of the world. But this is more pronounced in some of the urban centers in Nigeria due to the high rate of

urbanization trends within the last 25 years. It is on this background that the present study was designed to assess the environmental impact of solid waste disposal methods on the inhabitants of Sokoto metropolis so that appropriate modern methods of solid waste techniques could be recommended for the city and other urban centers in Nigeria at large. Open dumping is the major method of disposing solid waste in Sokoto metropolis. Most households dump their refuse on roads, streets, illegal open spaces, culverts, market areas and other illegal sites. The burning, the problem with this method is the air, air pollution and its inability to treat inorganic items of solid wastes such as, bottle, glass, metals, etc., findings reveal that majority of Sokoto metropolis residents burn the waste generated in their households which constitutes serious environmental risk to human health as the smoke emanating from the burnings pollute the natural environment. Similarly, nonchalant attitudes toward prompt disposal of the solid waste also accounted for the significant proportion of the variance of the factors affecting environmental health in the city. It was discovered that residents less than fifty

metres from the dumpsite are most affected by the dumpsite. Hence they were victims of malaria, chest pains, diarrhea cholera, and irritation of the skin, nose and eyes. This state of health of respondents in this study can be linked to pollution from the dumpsite. It was also noted that the extent of air and water pollution is worse in the raining season as a result of offensive and disease-carrying odor, as well as ground water pollution. In the dry season, the smoke from the incineration of the dumpsite is an important source of air pollution for people living far away from the dumpsite

VI. RECOMMENDATIONS

I. There is the need to reassess all legislations regarding waste management with a view to stream lining them so that there is a comprehensive and clear role for all the agencies, various tiers of government, as well as the public including Non-Governmental Organizations (NGOs) and community associations.

ii. Continuous public enlightenment on the dangers of solid waste to the general public especially the female population.

iii. Landfills: Standard landfills (not the ordinary dug earth) should be constructed at specific locations to minimize the impacts of municipal solid waste. Landfills are engineered to protect the environment and prevent pollutants from entering the soil and possibly polluting ground water in one ways. The municipal solid wastes are synthetic liners like plastic to separate the landfill's trash from the land below it.

iv. Combustor: This involves the burning of municipal solid waste at extremely high temperatures to reduce waste volume, control bacteria, and sometimes generate electricity.

vi. Citizens should be made to pay a realistic fee for waste services in return for the guarantee that indeed these services will be provided.

vii. There should be effective and proper monitoring of solid waste disposal activities.

viii. Severe Sanction: Re-introduction and enforcement of monthly sanitation. This will assist in cleaning up the city.

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A Review of Bryophytes; Evolution, Value and Threats

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Abstract-Bryophytes are the first dwellers of land plant history. The global context of bryophytes species is comparatively obtained much greater concern with the emergence of the concept of conservation biology. Literature from 1860 to 2017 was used along with e-resources for the review. Literary evidence revealed a rate of destruction or degradation of bryophytes has increased. The unawareness of people regarding the value of bryoflora has increased the rate of destruction. Considering both the ecological and economic value of bryophytes this review emphasized the necessity of conservation measures to protect bryophyte species.

Index Terms- Bryophyte, Bryogeography, Conservation, Ecological and economic value, Threats

1. INTRODUCTION

1.1 What are bryophytes?

Bryophytes (commonly referred to as mosses) are the first dwellers of the land plant history, play a spirited role in ecosystems. Land plants evolved 480 million years ago. First land plants evolved from freshwater algae like ancestors (Sakakibara, 2016). The term ‘bryophyte’ has its origin in the Greek language, referring to plants that swell upon hydration. The occurrence of bryophytes takes place in wet, humid or boggy areas such as damp rocks, damp land area, forests and tree trunks. With the development of the concept of conservation biology which is closely related to biodiversity, conservation of bryophytes initially and completely overlooked by least amount of scientists and researchers. Bryophytes were first studied centuries ago. And also, nobody has understood the plant life cycle so the conversation among the researchers was disorganized. As a result, the meaning of some of the many terms that have been coined over the years to explain bryophytes is confusing and overlapping. Bryophytes have gained considerable publicity in the past fifteen years at least among scientists. Literary evidence prove the negligence of bryophyte studies;

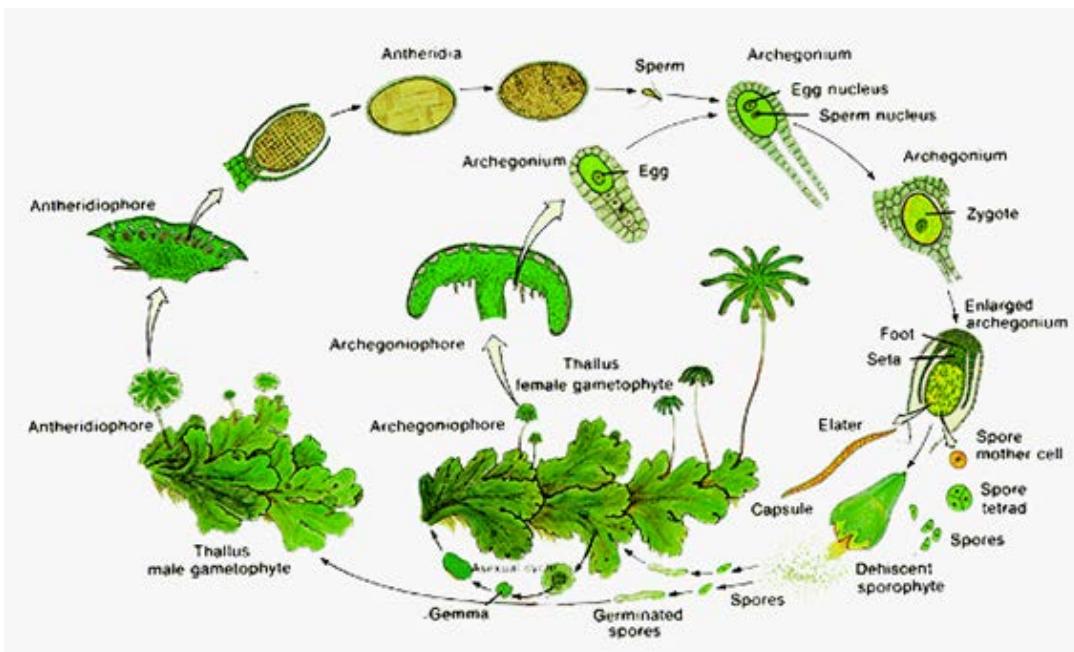
“a lot of time has passed since and most certainly a vast corpus of bryophytes research did not receive the proper attention it deserved, but ever since the publication and availability of the *Physcomitrella patens* genome(as the fourth genome of land plant after *Arabidopsis thaliana* (the *Arabidopsis* genome initiative, 2000), *Oryza sativa*(Goff et al, 2002; Yu et al, 2002) and *Populus trichocarpa* (Tuskan et al, 2006) and as the first nonvascular plant genome(Rensing et al, 2008) bryophytes and mosses in particular, again serve as focal points of plant and genome research”.

-Lang et al, 2016

Thus the vocabulary of bryophytes has developed recently than the early times.

Extant bryophytes belong to either liverwort (Marchantiophyta), mosses (Bryophyta in the strict sense) or hornworts (Anthocerotophyta) (Wellman and Gray, 2000). Liverworts are the earliest diverged lineage of land plants, their origin dates back to the Silurian period (Kenrick and Crane, 1997 a, b; Wellman et al, 2003 and Heinrichs et al, 2006). The vegetative gametophyte is either thalloid i.e. ribbon-like plants or composed of a leafy stem, with leaves arranged in two or three parallel rows. Specialized water-conducting cells account for endohydric transport in the gametophytes of some taxa (Edwards et al. 2003) but are always lacking in the sporophyte. The sporophyte produces a single sporangium elevated, at maturity, on a seta that grows primarily by cell elongation rather than extensive cell divisions. The mode of dehiscence of the sporangium varies but typically, the capsule wall splits along four vertical lines. Stomata are always lacking in the sporangial wall. The capsule holds spores and elaters, elongated cells with spiral wall thickenings that are thought to promote spore release. An axial columella is lacking in the sporangium (Vanderpoorten and Goffinet, 2009). Spores typically develop into a single, branched gametophyte (Figure1).

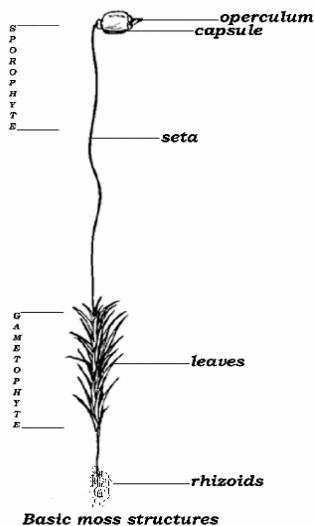
Figure 1. *Marchantia* life cycle



Source: <https://www.pinterest.com/pin/340514421800127878/>, 2019

Hornworts are the species composed of the least diverse lineage of bryophytes, which never bears leaves where the thallus may be dissected. Their name refers to the horn like sporophyte that lacks seta and dehisces along one or two vertical lines. The vegetative gametophyte is always thalloid (Vanderpoorten and Goffinet, 2009). The thallus may be dissected but never bear leaves. These species lack water-conducting cells in both generations of the life cycle. The sporophyte is linear and composed of the long sporangium. The long sporangium cannot be seen in the foot. A seta is thus completely lacking. A basal meristem adds new cells to the base of the sporangium, which consequently matures basipetally. Dehiscence follows two longitudinal lines, extending downward much like a zipper, gradually exposing a spore mass surrounding an axial columella. Pseudo-elaters facilitate the dispersal of spores. Stomata are present on the sporangial walls of some taxa. All hornworts harbour endosymbiotic colonies of *Nostoc*, which form globular or channelled clusters throughout the thallus (Vanderpoorten and Goffinet, 2009).

Figure 2. Basic moss structure



Source: <http://bryophytes.science.oregonstate.edu/page3.htm>, 2019

Mosses are the species generally seen as small plants confined to humid habitats avoiding exposure to direct sunlight. The vegetative body is always composed of a stem bearing leaves, typically arranged in spiral rows. Axial water conducting strands occur in both generations of many taxa. The activity of an intercalary meristem, located immediately below the presumptive capsule gives rise to the seta, which completes its development prior to sporogenesis. This stalk is almost never branched, although in very rare cases two

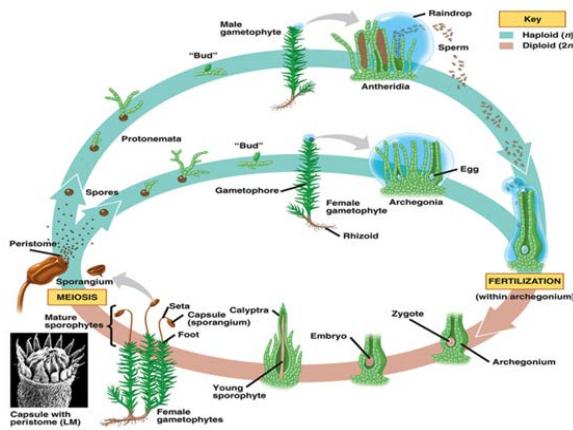
capsules may be found on the same seta (Leitgeb 1876). The sporangium is always terminal. In the majority of mosses, the capsule sheds an operculum (Figure 2). Stomata may occur in the capsule wall but are always lacking on the seta. The columella typically extends beyond the sporogenous layer. In most taxa, the spore sac surrounds an axial columella, rarely does it also arch over it. Cells of the sporogenous tissue never divide to form elaters. Spore germination results in a filamentous or, in some basal lineages including Sphagnum and Oedipodium, a thalloid sporeling called a protonema, which subsequently develops into one to several gametophytes thalloid (Vanderpoorten and Goffinet, 2009). The bryophytes include a small number of species with a smaller stature and more mellowed colours and of less obvious ecological significance with less evolutionary stories. However, this aspect was changed due to frequent studies on bryophytes.

1.1 Evolutionary significance

Asakawa *et al* (2013) mentioned that the richness of endemic bryophyte genera in the southern hemisphere indicate that these plant species might have originated in the past landmass what is now Antarctica some 350,000,000 years ago and later these plant species introduced to the southern hemisphere during the evolutionary process. The extant embryophyte phylogeny dates back to the Ordovician period (Vanderpoorten and Goffinet, 2009) which was existed about 475 million years ago. Most recently Crandall-Stotler *et al* (2009) proposed a classification scheme to identify bryophytes which were based on both morphological and molecular data, accordingly the three groups of bryophytes; liverworts, hornworts and mosses were recognized as three phyla; Bryophyta (mosses), Marchantiophyta (liverworts) and Anthocerotophyta (hornworts) (Ruklani and Rubasinghe, 2013). The three major bryophyte lineages differ from one another in a variety of attributes, most conspicuously in the architecture of the vegetative (gametophyte) body and the sporophyte, to the extent that they are easily distinguished in the field.

This group of plants incorporate the earliest lineage of land plants derived from green algal ancestors (Goffinet and Shaw, 2009). The evolutionary history of bryophytes reveals early life on earth. Goffinet and Shaw (2009) and Shaw *et al* (2011) mentioned that this group of plant species do not constitute a single monophyletic lineage and share a basically similar life cycle (Figure 3) with perennial and free-living, photosynthetic gametophyte alternating with a short-lived sporophyte. These species complete its entire development attached to the maternal gametophyte (Shaw *et al*, 2011). Critical aspects of life cycle evolution were involved in adapting bryophyte ancestors to life on land i.e. protection of the embryo in protective maternal tissue, elaboration of two distinct multicellular stages specialized for different functions, but the colonization of land also required structural and physiological adaptations to succeed in habitats with high solar radiation, high-temperature fluctuations, a drying atmosphere, and limited access to dissolved nutrients (Hanson and Rice, 2014). Although the primary structural design of the photosynthetic machinery was conserved from their algal ancestor, early land plants, as with contemporary bryophytes, likely facilitated carbon capture over short and long temporal scales in several years. These include the reduction of external water films on leaf surfaces, which impede the diffusion of carbon dioxide, the evolution of ventilated thalli or leaf structures, and the advancement of carbon concentrating mechanisms. In addition, these plant species evolved desiccation tolerance, which allowed plants to equilibrate with a drying atmosphere and retain metabolic function upon rehydration along with adaptations to achieve positive carbon balance during wet-dry cycles (Hanson and Rice, 2014).

Figure 3. Bryophyte life cycle



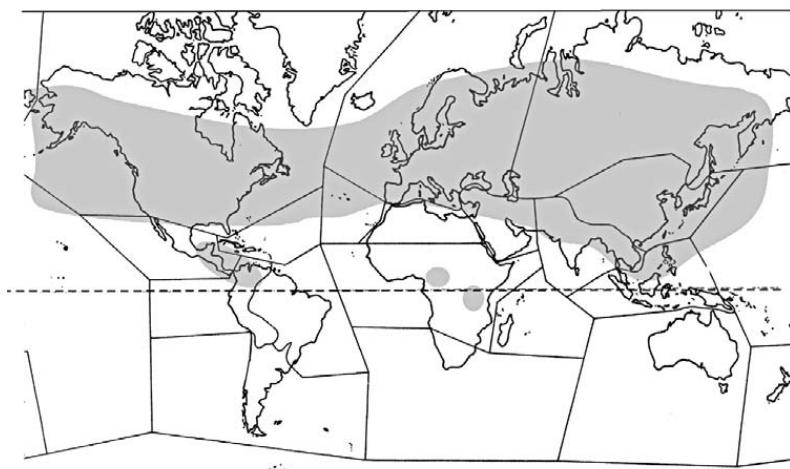
Source: <https://www.pinterest.com/ahsapbio/>, 2019

For a long time, bryophytes had a reputation of being “unmoving, unchanging sphinxes of the past” (Goffinet and Shaw, 2009). This aspect has proven inaccurate by scientists and researchers. These are species that show local adaptation to heterogeneous environments and exhibit their responsiveness to natural selection (Goffinet and Shaw, 2009). Bryophytes have barely been tapped as a resource for understanding photosynthesis and respiration on land despite the fact that the bryophyte life form has achieved ecological success in

varied environments that span every continent, occur across dramatic gradients of temperature and water availability and were present at the early stage of the transition from aquatic habitats to land, potentially as early as the Cambrian (Hanson and Rice, 2014).

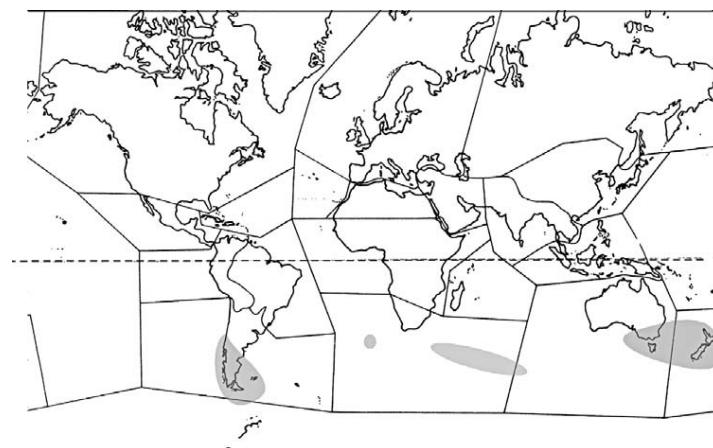
In general, bryophytes species have wide geographic ranges that often span more than one continent (Figure 4, 5 and 6). Vanderpoorten and Goffinet (2009) further stated that some termed as ‘cosmopolitan’, which are even widespread across all continents. Therefore, bryophytes species tend to show wider distributions than vascular plants. There are around 20,000 species of bryophytes have distributed throughout the world (Working list of all plant species, 2013). New Zealand, New Caledonia, Japan and Costa Rica are notable countries that displaying the highest species diversity of liverworts (Asakawa *et al*, 2013). Nepal, Bhutan, Taiwan, the Philippines, the islands of Borneo, Colombia, Ecuador and Sao Paulo in Brazil are the countries with more than 151 species per 10,000 km². Konrat *et al* (2008) stated the countries with rich areas of liverworts with 75-150 species per 10,000km² including French Guyana, Norway, the British Isles, Madagascar and the Iberian Peninsula. The distribution of a number of endemic genera of bryophytes throughout the world shows the importance of conservation of these small plant species (Figure 7).

Figure 4. Holarctic distribution of the liverwort *Lepidozia reptans*



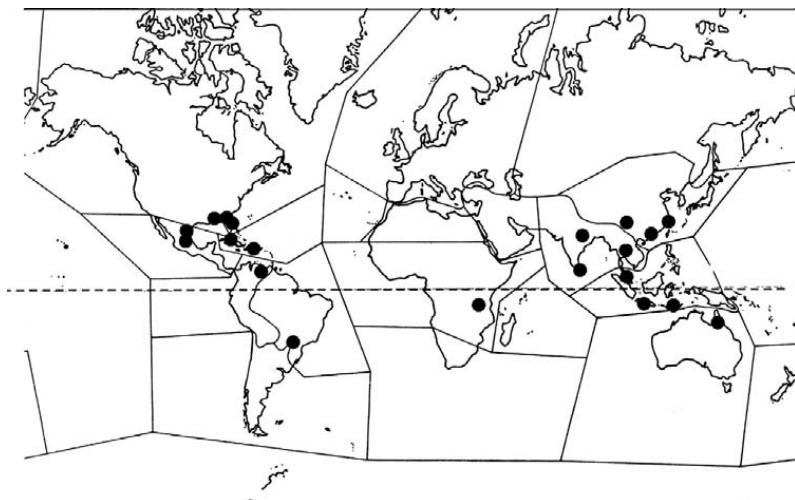
Source: Vanderpoorten and Goffinet, 2009

Figure 5. Circum-Subantarctic range of the liverwort genus *Herzogobryum*



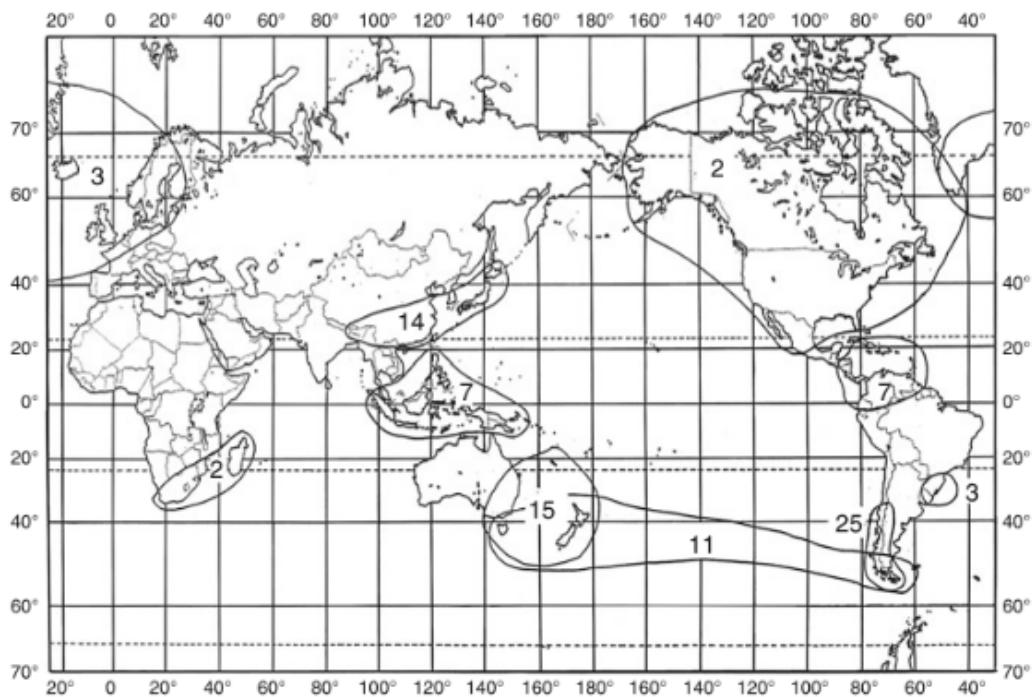
Source: Vanderpoorten and Goffinet, 2009

Figure 6. Nearly pantropical distribution of the moss *Erpodium biseriatum*



Source: Vanderpoorten and Goffinet, 2009

Figure 7. Number of endemic genera of bryophytes



Source: Inoue, (1978)

India and Sri Lanka, which belongs to the Palaeotropical Kingdom (Figure 8) are also rich in liverwort species where 555 and 110 species have been recorded respectively and in Nepal and Bhutan, in sequence, 36 and 44 taxa of liverworts are identified (Chaturvedi and Chaturvedi, 2008). Sri Lanka consists of 327 species of liverworts, 560 species of mosses and 5 species of hornworts (Ruklani and Rubasinghe, 2016). In Sri Lanka, these plant species have been recorded mainly from central highlands and low land areas in the country due to the limited literature on a past collection of bryophytes. Since the establishment of Botanical garden and herbarium in Peradeniya which make the linkage to the British period, of which George Gardner and George Thwaites made a great contribution, resulted in three publications by William Mitten (1960) on both mosses and liverworts (Rubasinghe and Long, 2014). The first checklists of

bryophytes of Sri Lanka were published a collection of limited number of literature by B. A. Abewickrama where 16 species of complex thalloid in 9 genera and 4 families belong to liverworts have mentioned (Abewickrama and Jansen, 1978 a, b; Long and Rubasinghe, 2014; Rubasinghe and Long, 2014 and Pethiyagoda, 2011). However, by the mid-nineteenth century, several collectors from Europe (Table 1) gone through bryophyte world. Among them, Johannes Nietner from Germany and Odoardo Beccari from Italy were the first. Victor Schiffner and Max Fleischer from Austria and Germany respectively, became prominent bryologist throughout South East Asia, by the early twentieth century and both bryologists visited Sri Lanka (Rubasinghe and Long, 2014). Fleischer's study leads to various new genera and species.

Table 1. Details of Bryophyte specimens deposited in National herbarium in Peradeniya

Collector	Name as mentioned on the herbarium packet	Year	Locality
A. H. G. Alston	• <i>Marchantia palmate</i>	• 1927	• Rangala
	• <i>Marchantia</i> sp.	• 1925	• Near Peradeniya
	• <i>Lunularia cruciate</i>	• 1925	• Hakgala
	• <i>Dumortiera hirsute</i>	• 1925	• Kandy
	• <i>Plagiochasma rupestre</i>	• 1925	• Peradeniya
	• <i>Riccia</i> sp.	• 1925	• Peradeniya
M. Fleischer	• <i>Marchantia</i> sp.	• 1898	• Hantana
	• <i>M. lecordiana</i>	• 1898	• Peradeniya
G. Gardner	• <i>Riccia crispatula</i>	• 1844	• Matale

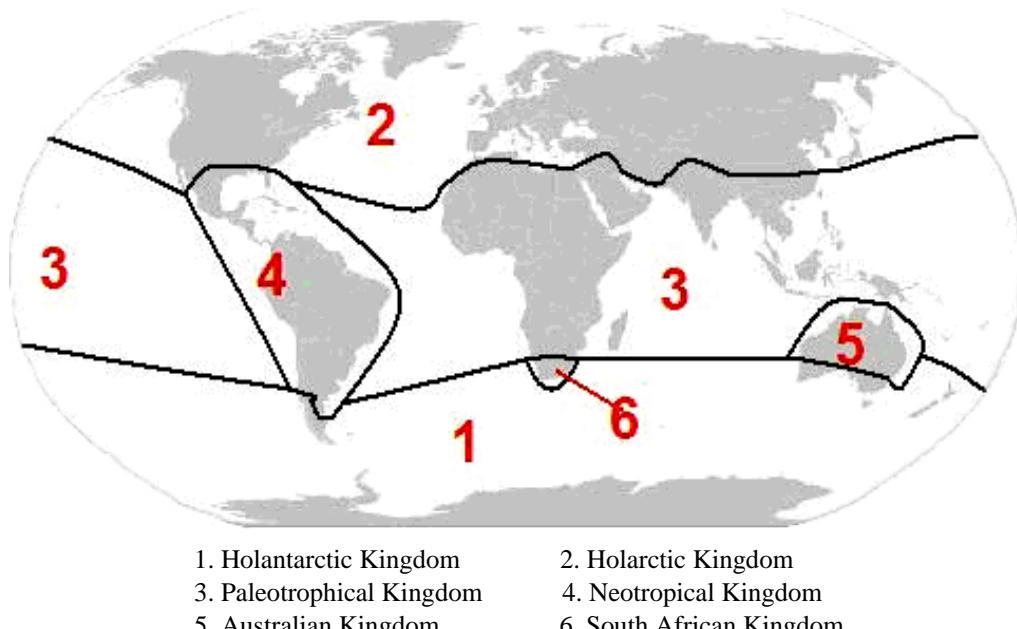
Source: Ruklani *et al*, 2015

In 2002 Sri Lankan checklist of mosses was updated by B. J. O'Shea (O'Shea, 2002). During the year 2014 Long and Rubasinghe updated the checklist of liverworts and hornworts of Sri Lanka (Ruklani *et al*, 2015). According to literature hornworts and liverworts are the least studied two group of plant species in Sri Lanka (Gunawardena *et al*, 2007 and Rubasinghe and Long, 2014). The most recent updated checklist of liverworts and hornworts complex thalloids in the country consists of nine families; Aytoniaceae, Blasiaceae, Cyathodiaceae, Dumortieraceae, Exormothecaceae, Lunulariaceae, Marchantiaceae, Ricciaceae and Targioniaceae, ten genera: *Plagiochasma* and *Reboulia*, *Blasia*, *Cyathodium*, *Exormotheca*, *Lunularia*, *Marchantia*, *Riccia* and *Targionia* and seventeen species (Long and Rubasinghe, 2014). However, Sri Lankan liverworts; leafy, complex and simple thalloid have not been analyzed for a biogeographic relationship (Rubasinghe and Ruklani, 2017). As well as many studied have been carried out on flowering plants in Sri Lanka (Murawski *et al*, 1994; Rubasinghe *et al*, 2005). However, the bryophyte species of Sri Lanka remains poorly studied (Ruklani *et al*, 2015).

1.2 Bryogeographical regions

Takhtajan in 1986 was the first plant bio-geographer who introduced a comprehensive, detailed system of floral units based on their levels of endemism. Further explaining the principle underlying Takhtajan's system Vanderpoorten and Goffinet (2009) stated that distinctiveness of each floral unit, as expressed by its level of endemism, is the result of isolation, which has permitted independent evolution within the area in question. German Theodor Herzog (1880-1961) was the most important after Fleischer who was the first to describe the ecological structure and bryological richness of different forest zones in southern Sri Lanka. Theodor's study also summarized biogeographical links of the bryoflora where he has mentioned six broad bryogeographical zones or kingdoms (Figure 3), possibly with some minor variations are still accepted (Australian national herbarium, 2008). H. N. Dixon an English bryologist continued on Mitten's work, in describing/ed many new moss species (Rubasinghe and Long, 2014). Local bryologist B. A. Abeywickrama's contribution has had a major influence on bryology. Among the visitors who contributed on bryoflora were H. Inoue from Japan, C. C. Townsend from England, and P. P. M. Tixier from France and Maurice Onraedt (1981) from Belgium.

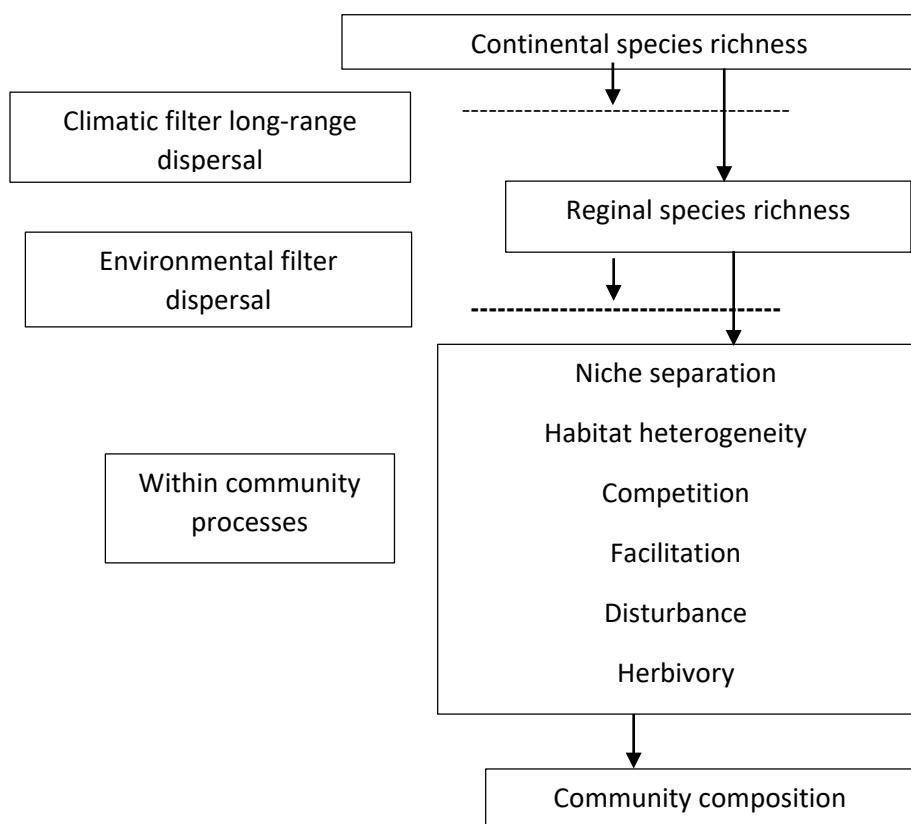
Figure 8. Bryogeographical zones described by Theodor Herzog



Source: <https://www.anbg.gov.au/bryophyte/bryogeography>, 2008

Bryophyte distributions are influenced by a variety of factors (Figure9) operating over a range of temporal and spatial scales (Rydin, 2009).

Figure9. Nested spatial structure of the processes shaping bryophyte species diversity and composition



Source: Vanderpoorten and Goffinet, 2009

Figure 10. *Dumortiera hirsute* (Sw.) Nees



Source: <http://bryologia-zeylanica.blogspot.com/>, 2012

Figure 11. *Phyrrhobryum spiniforme* (Hedw.) Mitt.



Source: <http://bryologia-zeylanica.blogspot.com/>, 2012

Figure 12. *Orthorrhynchium elegans*



Source: <http://bryologia-zeylanica.blogspot.com/>, 2012

Figure 9. *Frullaniaceae* family



Source: <http://bryologia-zeylanica.blogspot.com/>, 2012

The distribution of this group of plant species emphasizes the vast majority of bryophytes species are sparsely distributed within a given area or globally (Cleavitt, 2005). Adding further explanation Longton and Hedderson (2000) stated that species frequency distributions are typically extremely skewed, with rare and potentially threatened species representing the bulk of the flora. Most countries in the world do not a concern for bryophytes, due to this limited availability of precise data on species distribution the threat levels on species are difficult to evaluate. In 1995 Ines-Sastre and Tan mentioned that the loss of species no less than 12 per cent in Puerto Rico in the course of twentieth-century and 50 per cent of the moss species in Mount Santo Thomas in the Philippines within a 50 year period. Although this indicates that even 10 per cent of bryophyte species loss per year from one country, it is quite difficult to measure the impact of this loss as there are no data related to the extent of bryophytes and also without a clear understanding of root causes stand behind this loss.

2. ECONOMIC AND ECOLOGICAL VALUE OF BRYOPHYTES

The economic and ecological value of bryophytes is not emphasized in the community. Liverworts and mosses have been tried and used as a source of fuel for a long time in developed countries including Sweden, Ireland, Poland, Soviet Union, West Germany and Finland. Peat mosses are identified for the production of methane and heat which will be going to apply in producing electricity in the future. Bryophytes have excellent power to absorb moisture and act as a preservative agent. They have the ability to preserve dead bodies too. In addition, these plant species are used as a material for the construction of temporary dwellings. E.g. at Kapkot in the Himalayas, villagers use moss mats with grasses, bamboo and shrubs to make *parking* (a kind of door placing at the openings of their temporary huts). Due to lower cost and easy transport, these dwellers use *Sphagnum* peat as housing construction materials. Himalayans used to keep mosses as insect repellents when storing their food; dried mosses along with liverworts made into a coarse powder and sprinkled over grains and stored in containers. Fibre industry also applies bryophytes for different purposes; as a lining of diapers to improve absorbing power, as decorations for net bags and make cheap clothes mixed with wool. In Sri Lanka, the use of bryophytes can be clearly identified in several ways such as eco-friendly products; coir pots, coir fibre pitch (coco-peat), moss sticks and hanging wire baskets. Medicinal value of bryophytes particularly identified for skin cases; help to cure ringworms, mixer of ash of moss and honey to treat burns, cuts and wounds, for Sphagnol' chilblains, scabies, acne and to cure allaying arising skin problems from insect bites. China is important in commercial medicines made up of bryophytes for bronchitis, tympanitis, cystitis, cardio-vascular system and tonsillitis. Bryophytes are used in the biotechnological field, transgenic *Physcomitrella* sp. are now being used to produce 'blood-clotting factor IX' for treatment of haemophilia B and other proteins. Roig and Mesa (1945) mentioned the use of *Marchantia polymorpha* to cure pulmonary tuberculosis and affections of the liver. Hartwell (1971) further explained that *Marchantia polymorpha*, *Marchantia stellate* and *Polytrichum commune* possess antitumor too. Aqueous extract of *Conocephalum conicum* is antibiotically active against *Candida albicans* (Hayes, 1974), an opportunistic pathogenic yeast. Krishna cited (2011) on Landley's (1856) mentioning of *Sphagnum* species as a wretched food among barbarous countries as bryophytes are not directly used as human food.

Role of the ecological value of bryophytes is too important like economic value. Peat formation, as seed beds for germination of vascular plant seeds, supply a micro habitat, numerous invertebrate species e.g. aphids, nematodes, rotifers and tardigrades (Merrifield and Ingham, 1998 and Peck, 2006) and some bird species eat bryophytes; Red grouse chicks prefer *Bryum* species and birds like Field fare, Song thrush and Black birds include some small amount of mosses to their regular diet, most invertebrates lay their eggs or shelter them, as construction material of nests of some birds, high tolerable for pollutants e.g. *Funaria hygrometrica* and *Bryum argenteum* tolerant for sulfur dioxide, pollution preventer of soil erosion; intertwined moss stems and rhizoids bind soil particles firmly and hold a large amount of water and helps to reduce runoff, supply and maintain micro climates, nutrient cycling; absorb nutrients dissolved in rain water or mist and then die where decaying bryophytes release nutrients to surrounding plants, indicator of soil pH; liverworts and mosses e.g. *Campylopus paradoxus* indicate acidic soil and indicator of acid rain as they lack epidermis and cuticle hence are most vulnerable than vascular plants e.g. *Neckera crispa* indicate high pH as like acid rain. *Neckera crispa* species were used by prehistoric men in a lakeshore settlement in West Germany indicated Stone Age uses of mosses (Grosse-Brauckmann, 1979).

3. THREATS OF BRYOPHYTES

3.4. Direct threats

Direct threats derived from horticulture as a long term traditional use of bryophytes, especially among commercial epiphyte growers. Due to the high water holding capacity of bryophytes, those with highly specialized hyalocytes e.g. *Leucobryum* and *Sphagnum*, make them very useful potting medium mostly in greenhouse crops and potted ornamental plants and seedlings, particularly favoured by orchid growers and for wrapping flowers or fruit tree rootstocks for transportation. Today outdoor *Sphagnum* nurseries are an interesting option that can be seen for horticulture (Rochefort and Lode, 2006), though this is an option for a new type of professional horticulture, bryophytes are directly harvested from natural populations throughout the world. However the local regulations are existed e.g. the EU Directive in Europe and the Flora and Fauna guarantee in Victoria- Australia, the destruction of bryophytes are not monitored worldwide and can result in ecological damage and decline in bryophyte diversity. Whinam and Buxton (1997) mostly focused on *Sphagnum*, commercial moss harvest has been increased and expanded to other taxa including epiphytes. Epiphyte moss harvest is developed in temperate rainforests mostly including Pacific coast of western North America. Commercial harvesting has become a serious sensitive threat in this area which appears to be one of the impotent regions for conservations of bryophytes as 15 per cent of moss species are endemic in this area (Schofield, 1984). Considering the frequent loss of bryophytes especially due to commercial harvest, it will take at least 20 years to regrowth and biomass recovery even longer (Peck, 2006).

3.2. Indirect threats

Though the bryophytes directly affected via commercial harvest, most serious threats or stresses derive indirectly especially from the destruction or degradation of their natural habitats. The causes can be at both the local and global level. At the global scale, threats are global warming, pollution and biological invasions. At the local scale, threats include deforestation, logging and agriculture and habitat fragmentation. Biermann and Daniels (1997) and Ketner-Oostra and Sykora (2004) stated a particular example of biological invasion happened in permanent vegetation plots located in Dutch sand dunes; *Campylopus introflexus* has continuously increased in abundance since the 1960s', outgrowing the native vegetation and finally forming a monotonous, dense moss carpet with an open canopy of *Corynephorus canescens*. Due to the habitat fragmentation especially in rainforests which are identified as biodiversity hotspots, bryophytes have threatened highly. The conservation has become a challenge due to habitat fragmentation. Island biogeography which reveals precious knowledge related to fauna and flora, deals with the concept of equilibrium theory since McArthur and Wilson (1967) that the number of species reflects a balance between immigration and extinction rates, which are both influenced by two main intrinsic island characteristics; impact of island size and immigration is controlled by species dispersibility. This model widely applied to predict species richness in both oceanic islands and terrestrial habitats (Whittaker, 1998) which are rich in bryophytes. When the extinction risk increased rapidly in isolates especially at the local levels small fragments exhibit proportionally more degraded edge surfaces. These factors primarily impact epiphytes. Shade epiphytes are less desiccation -tolerant than sun epiphytes and developed putative adaptations such as papillose cell walls, which enhance the capillary absorption and speed up the process of rehydration. This shows their high sensitivity towards disturbance (Gradstein, 1992 a, b,

Gradstein *et al.* 2001, Acebey *et al.*, 2003). The cause of epiphyll species loss in small fragments (<10 ha) is reduced colonization which was confirmed by Zartman and Shaw (2006). Fragmentation also has the potential for disastrous effects on levels of genetic diversity in impacted populations. Wilson and Provan (2003) mentioned that in the study of peatland fragmentation on the genetic diversity and structure of peat moss *Polytrichum commune*, genetic diversity values from completely cut bogs were indeed found to be lower than those from uncut peatlands.

In Sri Lanka, most of the bryophyte species have become threatened due to agricultural practices and clearing of forest areas. Utilization of bryophytes is commonly less among the community and do not have any consideration for these tiny plants. At the same, an evaluation of the impact of threats could be identified which is rather a difficult task due to the lack of statistical data and wide-ranging literature on bryophytes.

CONCLUSION

The literature survey indicates the less awareness of bryophytes among a community which was also mentioned in a recent study done by Ruklani *et al* in 2015. The scarcity of literature sources with a detailed account on bryophytes in Sri Lanka increases the vulnerability of bryophytes as it is difficult to implement necessary conservation measures without understanding the status of species and accurate identification of species. Generally, people are not aware of these plant species and the studies carried out on bryophytes have focused mostly on the species distributed in central highlands and lowland areas in Sri Lanka. In addition, currently, there are no conservation measures implemented to protect this ecologically important plant species. Though deforestation, industrialization and environmental pollution affect the survival of these plant species people are not aware of this issue. When comparing to other countries, the local community have no clear understanding of the economic or ecological value of these bryophytes. Therefore conservation of bryophytes in Sri Lanka has become a challenge which intensifies reduction or extinction rate of some species without revealing their identity. In Sri Lankan context it is again difficult to identify or measure the impact of stresses or the causes of degradation or destruction of bryophytes due to least attention on bryophytes. In order to implement conservation measures, preliminary community awareness program, workshops and training programs have to be carried out especially among farmers or those who regularly work with soil and plants. And also a comprehensive bryophyte flora survey needs to be carried out to create accurate bryoflora species checklist. As it is a time-consuming task it is important to have the cooperation of both government and non-government environmental organizations in Sri Lanka to conduct a thoroughly comprehensive survey on bryophytes in the country to implement conservation measures early as possible to conserve this miracle species as discussed in the beginning.

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Relationship Of The Handling Of Complaints Against The Satisfaction And Loyalty Of Customers On Cosmetic Products

(A Case Study : Cosmetic Company in Indonesia)

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Abstract – In the era of globalization very tight competition between the companies, thus encouraging the development of expectations subscribes. The Company is required to maintain the market by increasing quality. Basically, customers will be comparing the quality of the products supplied by the cosmetic company XYZ with quality products that customers expect. Handling of complaints could be used as a benchmark for the quality of the products offered, so it is expected to create customer satisfaction and loyalty. This study uses the qualitative and quantitative descriptive method that is generally qualitative data should be quantified in advance in order to be measured on a numerical scale, through a questionnaire given to respondents. In this case, the respondents are customers of cosmetic products. Processing techniques and data analysis in this research is qualitative descriptive analysis. The analysis tool is using the Correlation Analysis Statistical Product and Service Solutions based on the results of research and evaluation on the cosmetic company can be concluded grievance significant effect on loyalty (0.675) with a value of $\alpha = 0.05$

Keywords: Handling complaints, satisfaction, and loyalty

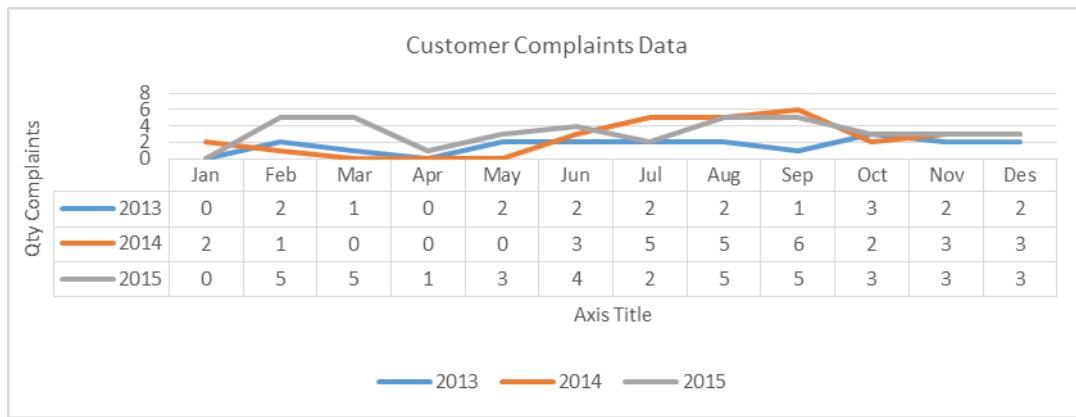
I. INTRODUCTION

Cosmetic companies that are developing is a cosmetics company. Cosmetics company based in Jakarta to divide multiple segments in the marketing of its products, it is aiming to have all the market gaps can be met. cosmetic companies divide the 3 segments of the products offered to the market, as follows:

- A Segment
Exclusive product offers and selling price is quite expensive.
- Segment B
Offering products with a segment of buyers for the medium.
- Segment C
Offering products with buyer segments for low incomes

Customer complaints or customer dissatisfaction is a risk the work need not be troubled. Customer complaints are considered as an important opportunity for the company to know the reaction of the customers of a service company, especially on cosmetics company XYZ (Kim et al., 2003).

Low quality will cause discontent on customers, not only at the customers but also have an impact on others because customers who are disappointed will tell you at least 15 other people. Impact prospect will drop his choice to competitors (Lupiyoadi and Hamdani, 2006). Customer complaints is the element that should be noted and used as input in the drafting of the strategy of service companies. Knowledge of customer complaints will help corporate managers pay attention to and solve the problems that arise. Companies can use the appropriate way to formulate the next service. A complaint management system are arranged appropriately and effectively, will make it easier for the company to maximize the level of customer loyalty. Here is a picture of 1 indicating dissatisfaction of customers by product segment C



Source: Company Cosmetic Data (2016)

Picture 1 Customer Complaints Data

Satisfaction will be achieved when the quality of the products and services provided in accordance with their needs, because by knowing the factors affecting the satisfaction will be able to increase customer loyalty (Tjiptono, 2004). Many of the benefits received by the company with the achievement of a high level of customer satisfaction that is able to increase customer loyalty, can prevent the onset of customer turnover, reducing the sensitivity of customers against price, reduce the cost of marketing failure, reduce operating costs caused by the rising number of customers, increase the effectiveness of your ads and increase your business reputation (Fornell, 1992). Therefore, the purposes of this research are to 1) Analyze customer satisfaction against cosmetic products segment c 2) Analyse the handling of complaints against customer satisfaction 3) Analyse the handling of complaints against the satisfaction of service.

One of the lifestyle of customers who start many found was delivering ketiSalah a lifestyle that many customers found is to convey dissatisfaction on the products purchased. The Ketidakpuasaan can be delivered orally or by using the telephone and in writing (Rangkuti, 2003:99).

II. DATA AND METHODOLOGY

This research is conducted in Jakarta. The location is chosen intentionally by considering headquarter that is located in Jakarta. The days this research is conducted is on October until November 2016. This research design is using qualitative and quantitative method through an exploration of using questionnaire technique as well as purposive sampling.

Data is taken from questionnaire data, after that we do an analysis using SPSS Statistics. SPSS is a piece of software that serves to analyze data, perform statistical calculations both for statistical parametric or non-parametric with windows (Ghozali, 2009). The results of processing are then analyzed and presented in the form of descriptions, pictures, or tables. Process for data analysis such as table 1.

Table 1. Research Method

No	Research Objectives	Types Of Data	The Data Source	Method
1	Measure Customer Satisfaction	Secondary Data	Company Cosmetic	CSI
2	Analyze the relationship of the handling of the complaint against complacency	Primary Data	Questionnaire	Correction Analysis
3	Analyze the relationship of the handling of complaints against the loyalty	Primary Data	Questionnaire	Correction Analysis
4	Analyzing the relationship of satisfaction towards loyalty	Primary Data	Questionnaire	Correction Analysis

Customer Satisfaction Index (CSI) is a quantitative analysis in the form of a percentage of customers who are happy in a customer satisfaction survey. CSI is required to know the level of overall customer satisfaction with attention to the importance of attributes – attributes of a product or service. Interpretation of CSI Value such as table 2.

Table 2. Interpretation of CSI Value

Angka indeks	Interpretasi
X≤64%	Very Poor

64% < X ≤ 71%	Poor
71% < X ≤ 77%	Cause for Concern
77% < X ≤ 80%	Borderline
80% < X ≤ 84%	Good
84% < X ≤ 87%	Very good
87% < X	Excellent

Source Customer Satisfaction Measurement, www.leadershipfactor.com

Gap Analysis

Gap analysis is used to assess the handling of the complaint terhadap satisfaction and loyalty against cosmetic products. This method is used to measure the gap between the expectations of performance. The results of the analysis into a reference in menignantkan complaints handling performance. There are 3 indicators research, namely product satisfaction, handling complaints, as well as the loyalty that spelled out through the questionnaire questions. Gap analysis is done through a detailed questionnaire by charging the customer. The respondents gave an assessment of the scale of liqueur 1 to 5 on each variable is observed. The results of the measurement gap later depicted in the diagram of the radar.

III. DISCUSSION AND RESULT

General Overview of the cosmetic company

The object of research is the company that runs its business in the field of cosmetics. our satisfaction measurement is aimed at knowing the consumer satisfied products, services provided by a cosmetics company, and service in handling complaints.

Description of respondents

The respondents were selected using a probability sampling design the sampling (Purposive sampling) i.e. simple random sampling. These terms of use by using the consideration of respondents able to inform what experienced the ease of getting it. The respondents in this study grouped based on gender, age, religion, occupation, status, and monthly income.

Description the research Variables

This research aims to look at the influence of each free variable consisting of the handling of complaints against variables bound to the satisfaction of the quality products and services, as well as loyalty. The presentation of data as follows:

a. Variable Product Satisfaction

Product satisfaction variables consisted of 27 questions that attributes are used, such as graph 1 below.



Figure 1 product satisfaction Results

Based on the graph above can describe what the desired by each customer towards the product to be purchased, can be seen from the great Gap of which the product is not easily broken, a form of packaging that is nice/beautiful, a lot of content, There is a price discount and samples for the tester.

b. Variable Satisfaction Services

Product satisfaction variable consists of 21 questions that attributes are used, such as chart 2 below.



Figure 2 Satisfaction Services Result

Based on the graph above can describe what the desired by each customer against that will be given, can be seen from the great Gap among these publications via the newspapers.

c. the Complaint Handling Satisfaction Variables

Product satisfaction variable consists of 8 attributes the questions used, such as chart 3 below.

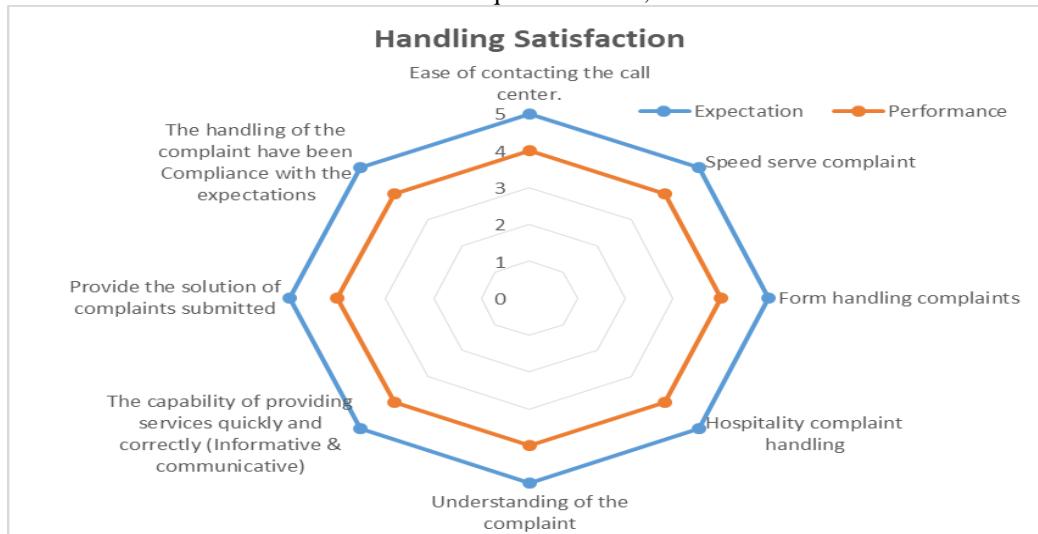


Figure 3 Handling Satisfaction Result

d. CSI (Customer Satisfaction Index)

Customer satisfaction is a qualitative analysis of the index in the form of a percentage of customers in a customer satisfaction survey can be seen in table 3.

Table 3. Interpretation of CSI Value

Variabel	CSI Value(%)	Interpretation
Product satisfaction	74.31	Cause for Concern
Satisfaction Services	85,77	Very good
ComplaintHandling	80.00	Good
Satisfaction		

Based on the above data for product attributes needed special handling, so that products are presented to the customer in accordance with what ang wanted by customers. This special handling is needed to be done so that customers do not turn to products of other brands.

e. Correlation Analysis Test

The correlation analysis was used to determine the relationship of two variables. The correlation calculation is done using the SPSS program, assistance with such results on the table 4

Tabel 4 Correlation Analysis Test

		penanganan	Kepuasan	Loyalitas
Spearman's rho	Handling	Correlation Coefficient	1.000	.307
		Sig. (2-tailed)	.	.099
	N		30	30
Statisfaction		Correlation Coefficient	.307	1.000
		Sig. (2-tailed)	.099	.
	N		30	30
Loyalty		Correlation Coefficient	.675**	.238
		Sig. (2-tailed)	.000	.206
	N		30	30

**. Correlation is significant at the 0.01 level (2-tailed).

Source (2017)

Based on the table above note that the dimensions of the handling of complaints together-the same effect on loyalty.

f Test the hypothesis

1. On the first hypothesis in which the handling of complaints had no effect against the variable satisfaction because 0307 (sig) < 0.05.
2. on the second hypothesis where the handling of complaints against the influential variables loyalty because 0675 (sig) < 0.05.
3. on the third hypothesis where satisfaction has no effect against the variable loyalty because 0238 (sig) < 0.05.

Managerial Implications

Managerial implication that can be done by a corporation management is explained as follow:

1. The improvement of quality product, particularly in terms of variant and packaging so that customers are interested in buying..
2. A good coop implementation management, therefore it results efficient chickens, because the death level is low and the usage of woof is growing
3. To improve the quality of human resource itself such Training regularly with competent agencies to improve the competence of employees..

IV. CONCLUSION AND RECOMENDATIONS

Conclusion

After this research is done, based on the research outcome it can be concluded as in follow:

1. Results of the questionnaire data processing, where customers are still not satisfied against cosmetic products segment C, and need special handling to repair segments of cosmetic products C.
2. Handling of complaints is not to our satisfaction.
3. Our satisfaction customers have no effect against the loyalty.

Recommendations

This study can be useful references in anticipation of business competition. To improve the competitiveness of excellence, companies need to adopt the latest technology and the most up-to-date. Moreover companies need to innovate on the product formula and packaging so that the customers the more loyal towards cosmetic products as well as improving the quality of human resources. Therefore, companies can achieve the competitiveness of excellence where the resource base of technology and people.

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Service Management of Agricultural Extension Quality Using Fuzzy ServQual

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Abstract- This study aims to measure the quality of service of agricultural extension workers at the UPT. BPP Sukaraja uses the Fuzzy Service Quality (servqual) method by grouping question attributes into five service dimensions criteria, namely the dimensions of Tangibles (Direct Evidence), Reliability (Responsibility), Responsiveness, Assurance, Empathy. Based on the results of the study showed that the value of the gap gap that requires the priority of improvement and improvement in service quality is the dimension of Tangibles with a negative gap value of -0.45, this means that the expectations of farmers are still not achieved. Based on the results of these gap can be a motivation to continue to improve the quality of service to farmers for UPT BPP Sukaraja.

Index Terms- Fuzzy Serqual, Service, Agricultural Extension)

I. INTRODUCTION

UPT. BPP Sukaraja Seluma Regency of Bengkulu Province is an instance that provides services in extension sector, regardless of the problems above. Service quality is the key to customer trust, in this case farmer groups / farmers. But UPT. BPP Sukaraja often has difficulty in measuring the quality of its services. According to the Head of the UPT. Agricultural Extension Office (UPT BPP) Sukaraja only has 24 agricultural instructors by fostering 20 assisted villages with 116 farmer groups with ± 628 members with an area of ± 867 ha. Therefore, a study is needed to determine the extent of service quality at UPT BPP Sukaraja on the quality of agricultural instructor's services. By knowing the level of farmer's satisfaction, it is expected that the quality of agricultural instructor's services in the UPT Agricultural Extension Office (UPT BPP) in the future can be better and more useful.

One method that can be used to solve the problem of measuring the service quality of agricultural instructors is using Fuzzy Service Quality (ServQual) [1]. The approach to the Fuzzy Service Quality (ServQual) method was chosen because this method can analyze satisfaction and service quality by grouping question attributes into five service dimensions criteria. In which generally, the assessment of perceptions and expectations on Servqual uses a linkert scale that has a range of values between 1

and 5 to express the level of satisfaction and the level of importance of service performance.

The purpose of this study is to evaluate the service quality of agricultural instructors at the UPT. BPP Sukaraja Seluma Regency of Bengkulu Province by implementing Fuzzy Service Quality as an effort to improve the service quality of instructors because it is feared it will have a negative impact on agricultural development.

II. LITERATURE REVIEW

It is important for an analyst and designer to be aware of the quality in the system. One of the reviews is the quality of the system in providing services called service quality (ServQual). ServQual can be used as a diagnostic tool to see areas of excellence and short service failures [1]. service quality is measured through the measurement of 5 gaps (difference in assessment). The five gaps are measured by reviewing the opinions of customers and management on service quality. The five gaps that exist can be explained as follows [2].

Thus, the value used in determining the score used to determine the level of service quality from the calculation of fuzzyfication is the category of Dissatisfaction with a score of 1,2,3 Satisfied Categories with a score of 3,4,5 and the category of Very Satisfied with stocks 5, 6, 7 . The value of fuzzyfication is the average value of a value (median), b (upper limit), c (lower limit). Calculation of questionnaire data fuzzyfication is done by the following formula [4],[5]:

Median (a_i) :

$$a_i = \frac{(b_1 x n_{j_1}) + (b_2 x n_{j_2}) + \dots + (b_k x n_{j_k})}{n_{j_1} + n_{j_2} + \dots + n_{j_k}} \quad (1)$$

Upper Limit (b_i) :

$$b_i = \frac{(b_1 x n_{j_1}) + (b_2 x n_{j_2}) + \dots + (b_k x n_{j_k})}{n_{j_1} + n_{j_2} + \dots + n_{j_k}} \quad (2)$$

Lower Limit (c_i) :

$$c_i = \frac{(b_1 x n_{j_1}) + (b_2 x n_{j_2}) + \dots + (b_k x n_{j_k})}{n_{j_1} + n_{j_2} + \dots + n_{j_k}} \quad (3)$$

Notes:

b_i = average fuzzy set value per level of interest

n = number of respondents per level of interest

The next step is to do defuzzification using the Geometric Mean formula to get a single value with the following formula [5]:

$$\text{Defuzzification} = (a_i \times b_i \times c_i)^{1/3} \quad (4)$$

$$\text{Serqual value (gap)} = \text{Perception} - \text{expectation} \quad (5)$$

III. METHODOLOGI

System design model that describes the complete stages from the start of Analysis and Definition of Requirements, System and software design, implementation and unit testing, integration and

testing system, operation and maintenance. The respective stages can be explained as follows:

- a. Analysis and Definitions Requirements, namely services, limits and objectives are determined in consultation with the user system. These requirements are then defined in detail and function as system specifications.
- b. System Design and Software, namely the system design process dividing requirements in a software system. This activity determines the overall system architecture.
- c. Unit implementation and testing, namely software design that is realized as a series of programs or program units. Unit testing involves verifying each unit whether it meets its specifications.
- d. System Integration and Testing, that is, the individual program or program unit is integrated and tested as a complete system to ensure that the system requirements are met and after fulfilling then the program is sent to the customer to be tested by the customer whether in accordance with the wishes determined by the customer
- e. Operation and Maintenance, which is the longest phase of the life cycle, because the system is installed, used and continues to be used by users who in this case are extension agents to find a correction factor that needs improvement.

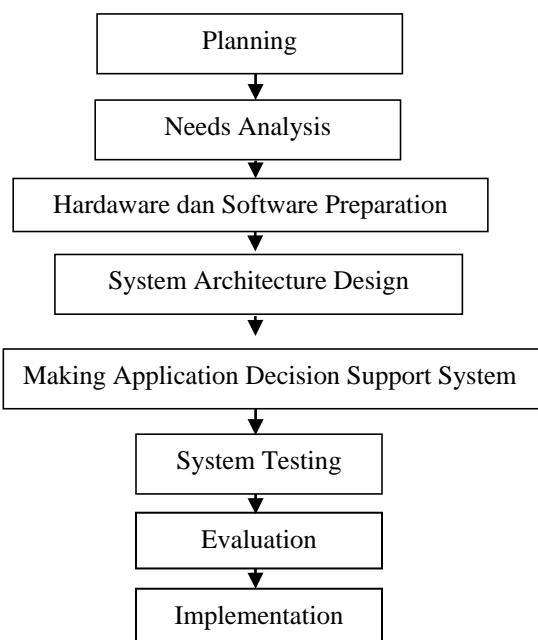


Fig. 1. Research Stage

IV. RESULTS

The research variables were obtained based on the services provided by the UPT BPP Sukaraja then grouped based on five dimensions (serqual) service quality, namely the dimensions of Tangibles (Direct Evidence), Reliability, Responsiveness, Assurance, Empathy with 15 variables/statement attribute [6], as shown in table 1.

Table 1. Dimensions and Variables / Statement Attribute

Dimension	No. Ques	Statements
<i>Tangibles (Direct Evidence)</i>	1	Instructors' skills in using local languages
	2	Instructors' ability to provide explanations in writing
	3	Completeness and readiness of instructors' equipments
<i>Reliability</i>	4	Instructors invite farmers to attend farmer group meetings
	5	Instructors make cooperative relations between farmer groups and other parties
	6	The materials offered are in accordance with what farmers needs
<i>Responsiveness</i>	7	The intensity of instructors' visits to farmer groups
	8	Instructors are quick to respond to service
	9	Instructors recap/ask problems to farmers and find solutions (proactive attitude).
<i>Assurance</i>	10	Instructors teach a variety of farming skills and carry out guidance and application
	11	Instructors receive questions and answer directly and are able to answer questions correctly
	12	Instructors' ability to increase productivity, quantity and quality of farming commodities
<i>Empathy</i>	13	Providing training services/courses/application of technology to farmers with a polite and friendly attitude
	14	Instructors attend meetings/deliberations held by farmer groups
	15	Instructors provide reading, food and drink materials during the extension

The recapitulation of perception scores and expectations is obtained from the sum of each respondent's answer score. The recapitulation results can be seen in table 2.

Table 2. The results of the recapitulation of scores on perceptions and expectations

No. Quest	Perceptions			Expectations		
	Not satisfied	Satisfied	Very satisfied	Not important	Important	Very important
Q 1	10	45	31	1	39	46
Q 2	5	55	26	0	57	29
Q 3	20	48	18	0	63	23
Q 4	4	56	26	0	61	25
Q 5	4	65	17	1	49	36
Q 6	6	50	30	1	51	34
Q 7	5	51	30	0	41	45
Q 8	8	44	34	0	47	39
Q 9	13	44	29	1	45	40
Q 10	18	35	33	0	55	31
Q 11	5	41	40	0	49	37
Q 12	3	55	28	0	50	36
Q 13	5	43	38	1	55	30
Q 14	6	46	34	0	48	38
Q 15	23	40	23	1	61	24

Table 3.Fuzzification results of perceptions and expectations

No. Quest	Fuzzification of Perceptions			Fuzzification of Expectations		
	a	b	c	a	b	c
Q 1	3,49	4,49	5,49	4,05	5,05	6,05
Q 2	3,49	4,49	5,49	3,67	4,67	5,67
Q 3	2,95	3,95	4,95	3,53	4,53	5,53
Q 4	3,51	4,51	5,51	3,58	4,58	5,58
Q 5	3,30	4,30	5,30	3,81	4,81	5,81
Q 6	3,56	4,56	5,56	3,77	4,77	5,77
Q 7	3,58	4,58	5,58	4,05	5,05	6,05
Q 8	3,60	4,60	5,60	3,91	4,91	5,91
Q 9	3,37	4,37	5,37	3,91	4,91	5,91
Q 10	3,35	4,35	5,35	3,72	4,72	5,72
Q 11	3,81	4,81	5,81	3,86	4,86	5,86
Q 12	3,58	4,58	5,58	3,84	4,84	5,84
Q 13	3,77	4,77	5,77	3,67	4,67	5,67
Q 14	3,65	4,65	5,65	3,88	4,88	5,88
Q 15	3,00	4,00	5,00	3,53	4,53	5,53

The following is an example of a Defuzzification calculation for the level of perception and expectation of the Q1 statement variables using equation 5. The results of all calculations can be seen in Table 4.

Table 4.DefuzzificationResults of perceptions and expectations

No. Quest	Defuzzification	Defuzzification
Q 1	4,41	4,98
Q 2	4,41	4,60
Q 3	3,87	4,46
Q 4	4,44	4,51
Q 5	4,22	4,74
Q 6	4,48	4,70
Q 7	4,51	4,98
Q 8	4,53	4,84
Q 9	4,29	4,84
Q 10	4,27	4,65
Q 11	4,74	4,79
Q 12	4,51	4,77
Q 13	4,70	4,60
Q 14	4,58	4,81
Q 15	3,91	4,46

The results of Gap value calculation per dimension are obtained based on the difference in dimensions value of perception level and dimension value of expectations. This is used to show the extent to which the quality of agricultural instructors services in UPT BPP Sukaraja per service dimension in providing services to farmer groups. The calculation results of Gap values per dimension can be seen in Table 5.

Table 5. Results of Gap per statement dimension

Serqual Dimension	No. Quest	Defuzzification of Perception	Defuzzification of expectation	Gap	Rank
<i>Tangible</i> <i>s</i> (Direct evidence)	1	4,41	4,98	-0,57	
	2	4,41	4,60	-0,19	
	3	3,87	4,46	-0,59	
Total		4,23	4,68	-0,45	1
<i>Reliability</i> <i>y</i>	4	4,44	4,51	-0,07	
	5	4,22	4,74	-0,52	
	6	4,48	4,70	-0,21	
Total		4,38	4,65	-0,27	4
<i>Responsiveness</i>	7	4,51	4,98	-0,47	
	8	4,53	4,84	-0,31	
	9	4,29	4,84	-0,54	
<i>Assurance</i>	10	4,27	4,65	-0,38	
	11	4,74	4,79	-0,05	
	Total	4,47	4,82	-0,35	3
<i>Empathy</i>	12	4,51	4,77	-0,26	
	13	4,70	4,60	-0,09	
	Total	4,60	4,68	-0,08	5
<i>Total</i>	14	4,58	4,81	-0,24	
	15	3,91	4,46	-0,55	
Total		4,25	4,64	-0,39	2

The role of the overall Gap will provide information on how big the level of importance is and how far the statement role is in the level of service quality on instructors at UPT BPP Sukaraja. The results of the overall Gap value calculation can be seen in Table 6.

Table 6. The results of Overall Gap value

Serqual Dimension	Defuzzification of Perception	Defuzzification of expectation	Gap	Rank
Tangibles	4,23	4,68	-0,45	1
Reliability	4,38	4,65	-0,27	4
Responsiveness	4,47	4,82	-0,35	3
Assurance	4,60	4,68	-0,08	5
Empathy	4,25	4,64	-0,39	2

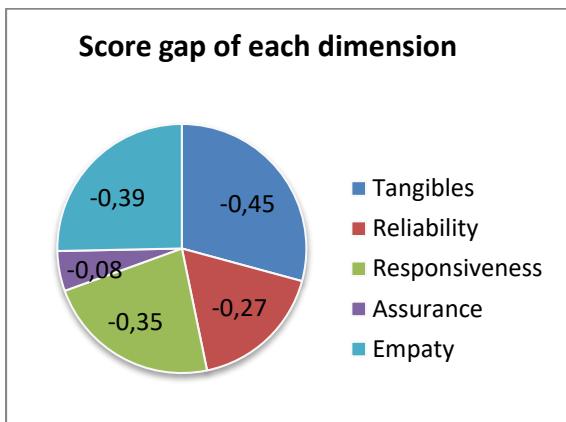


Fig. 2. Score gap of each dimensi

Figure 2 tells that gap score of each dimension is less than 0, it means that expectation of service given is still higher than perception received by users. From those five dimensions, tangible dimension has the highest gap; which is -0,45, and assurance dimension has the smallest gap, which is -0,08. It shows that there is a need to do refinement of service related to attributes existing on tangible dimension to fulfill standard of quality expected. The gap score of each dimension is shown in picture 2.

V. CONCLUSION

- From the calculation of serqual (gap) per variable and dimension that gets the highest score on the dimensions of

Tangibles with variable of instructor ability in using local language, the ability of instructors in providing written explanations, completeness and readiness of extension equipment with total value of -0,45 . Variable statements on the Tangibles dimension can be made a priority in improving the service quality of agricultural instructor's services.

- From the calculation results of the Defuzzyfication, the highest expectation value of service quality is the ability of instructor to use the local language and the intensity of instructor's visit to the farmer group with a value of 4,98 and for the lowest value the completeness of the instructor provides reading material, food and drink during counseling with the value of 4,46.
- From the calculation of Defuzzyfication, the highest perceptual value of service quality is instructor receives questions and answers directly. Then agricultural instructor's services is also able to answer the questions correctly with a value of 4,74. For the lowest value is the completeness and readiness of the instructor with the value obtained 3,87.

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Possible development paths taken by global economies post-financial crisis

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Abstract: We examine 75 economies that have displayed remarkable changes in the Global Competitiveness Index (GCI) scores. Additionally, the paper explores relationship between increase in their competitiveness over a period of eleven years (from 2007-08 to 2017-18) and the development pathways followed by them. While East Asian growth accelerations were driven by rapid industrialization (Rodrik & Diao, The recent growth boom in developing economies: A structural perspective, 2017) highlighting the linear route to structural transformation followed by most developed economies; we find that during the specified period of our analysis, certain developed and emerging economies have increased their competitiveness by following a different route. This paper closely examines the paths followed by these economies by identifying the factors attributing to maximum growth in competitiveness. Also, it highlights the pillars moving simultaneously and contributing the most to the GCI Score.

Keywords: Competitiveness, Development Paths, Structural Transformation, Time Series

I. INTRODUCTION

Though the macro-economic and eco-political strategies have been varying across the countries, some countries have typically followed certain development trajectories. While the claim to fame for the Asian Tigers was rapid structural transformation and avoiding the middle-income trap (Kasenda, 2014), this was supplemented with reforms and initiatives like free market norms (Felipe, Abdon, & Kumar, 2012). The global positioning of an economy in terms of competitiveness and ease of business regulations is increasingly gaining momentum over the past few years. Given the fact that Global competitiveness is a multidimensional concept, this paper builds on the conclusions based on the framework of competitiveness formulated by World Economic Forum. It states that competitiveness is determined by the productivity with which a nation uses its human, capital, and natural resources (Porter, 2007).

The theory of comparative advantage is based on achieving competitiveness by improving the business environment of an economy based on the diamond model developed by Porter, which involves a play of four critical factors. These factors are: Input Conditions (given by natural endowments, human resources, capital availability, physical infrastructure etc.), context for firm rivalry (determined by local rules and incentives that encourage investment and productivity), demand conditions determined by the needs of sophisticated customers, and strong cluster of local suppliers supporting openness to competition. Similarly, theories on competitive advantage of regions are based on regions competing with each other over attracting key markets, firms (capital), and workers (Michael, Martin, & Tyler, 2004).

Associations between macro-economic aggregates and competitiveness have highlighted the fact that economic growth as measured by GDP per capita growth rates is positively related to the growth in global competitiveness (Korez-Vide & Polona, 2016). Additionally, with regards to trade patterns and natural endowments different countries have gone with specialization in different industries, making their labour productivity a function of the nature of industry (export/import) (Wolff, 2003). Most researches have classified factor endowments as a fundamental pillar of competitiveness, eventually other factor categories like skilled human capital and ultimately deployment of superior technology enables the creation of strong competitive position on domestic and world markets (Lundberg, 1988). By classifying all the world economies into certain stages of development, the competitiveness framework proposes a typical pathway of development. However, it also gives a scope to individual countries to significantly diverge from this 'average' path. This leads to each economy developing on its core competency and defining its own path for increasing competitiveness (Ketels, 2017).

This paper analyses the Global Competitiveness scores of approximately 140 economies over a period of 11 years, from 2007-08 to 2017-18. It investigates the pillars that have accounted for a high increase in the GCI scores over these years. Further, it highlights which pillars have moved simultaneously and shown a considerable increase in the overall GCI score.

II. THEORETICAL BACKGROUND & HYPOTHESIS

Innately, structural transformation has stressed upon the gradual evolution and shift of an economy from agriculture to industries to services sector, with the rate and direction of structural transformation a variable (Rodrik, Structural Change, Fundamentals, and Growth: an overview, 2013). Also, a parallel narrative development of fundamental capabilities in the form of human capital and institutions has been observed from select global economies. Though the overarching objective of structural transformation has been shifting the resources towards industrialization as a means to generating more economic growth and hence employment, the pathways of implementation have differed across the globe- some being state-led and some being purely governed by the market forces (Rodrik, The Past, Present, and Future of Economic Growth, 2013).

Attempts towards evaluating the productivity of the global economies have been made by many research organizations and think tanks. This paper makes use of the World Economic Forum's Global Competitiveness dataset. The Global Competitiveness Index is a measure of productivity and takes into account twelve pillars, differentially weighed for each economy on the basis of which stage of development it is in. Out of the twelve pillars, the first four pillars make sub-Index A or the Factor Driving Conditions, the next six pillars make sub-index B or the Efficiency Driving conditions, and the last two pillars make sub-Index C or the Innovation driving conditions (see Exhibit 1). The competitiveness scores are in the range 1-7 with 1 representing least competitive economy and proximity to 7 representing the most competitive economy.

Exhibit 1: Global Competitiveness Index Framework

Sub-Index A (Basic Requirements)	Sub-Index B (Efficiency Enhancers)	Sub-Index C (Innovation & Sophistication)
Institutions	Higher Education and Learning	Business Sophistication
Infrastructure	Goods Market Efficiency	Innovation
Macro-economic environment	Labour Market Efficiency	
Health & Primary Education	Financial Market Development	
	Technological Readiness	
	Market Size	

Source: *World Economic Forum*

The pillars constituting Global Competitiveness are quantified by a total of 113 indicators, 74 of which are qualitative and capture responses from the business community/ entrepreneurs operating from that economy. These perception indicators measure various aspects of an economy like Government efficiency (government policy supports national competitiveness or not), Infrastructure (do they fulfil business requirements or not), and efficiency of operating businesses. They are ranked by the entrepreneur on a scale of 1-7 (with description on what each score captures clearly stated).

The remaining 39 indicators are quantitative in nature and are pooled in from various international and national databases like the World Bank macro-economic aggregates, ILO data, UNICEF data on social indicators, etc. In order to fit the quantitative data in the range 1-7, normalization of each indicator is done by taking the ratio of difference of an economy with the minimum value economy to the difference between maximum and minimum values over this indicator. Once all indicators are uniformly placed in the 1-7 range, the concept of differential weightages (See Exhibit 2) is applied to each economy

Exhibit 2: Weightages used for GCI computation

STAGE OF DEVELOPMENT					
	Stage 1: Factor driven	Transition from Stage 1 to Stage 2	Stage 2: Efficiency Driven	Transition from Stage 2 to Stage 3	Stage 3: Innovation Driven
Weight for basic requirements	60%	40-60%	40%	20-40%	20%
Weight for efficiency enhancers	35%	35-50%	50%	50%	50%
Weight for innovation & sophistication	5%	5-10%	10%	10-30%	30%

Source: *World Economic Forum*

Much of the scholarly works on competitiveness have dealt with analysis at specific economy level and regional levels (Mihaela, 2016) (Martin, 2002) , with factors of competitiveness being disaggregated at various levels and assessment done for each for any economy/region. Further, some studies have associated the concept of competitiveness with a specialization strategy evolving to comparative advantage (Jiri & Ondrej, 2017). Firm level research has provided an insight on which factors affect a firm's competitiveness in emerging markets (Akben-Selcuk, 2016).

Pillar Specific studies emanating from the Global Competitiveness Concept have surfaced recently, highlighting the importance of a specific pillar on competitiveness of a nation (Sekuloska, 2014) (Alina Mihaela, Liviu, Maria Denisa, & Maria Alexandra,

2018). Our work is based on an empirical analysis of the GCI dataset that identifies the factors which have been moving together and impacting the competitiveness scores. Hence we test the following hypothesis through this paper:

Hypothesis 1: Post financial crisis a group of economies have taken alternative paths for increasing their competitiveness

III. METHODOLOGY & DATA

GCI Data over the period 2007-08 to 2017-18 is taken for 140 economies and difference in delta is noted for each economy between the given interval of 11 years. Primary data source used is the GCI database from 2007-08 to 2017-18, Data from World Bank Development Indicators (export-import), and ITC Trade Maps.

1. Shortlisting GCI Accelerators: With an objective of shortlisting those economies that have shown fastest acceleration in this interval, a filter of Delta greater than or equal to 0.20 is applied. The rationale of applying this filter is that it accounts for approximately 3% of the improvement in the GCI Score. Since, the range of score in which all 140 economies are evaluated in from 1-7, which is extremely small, movements in score made by economies in ten years are rigid and may seem unnoticeable. This explains the reason of pegging delta at 0.20 which gives a derived sample of 75 economies (approximately 50% of the universe).

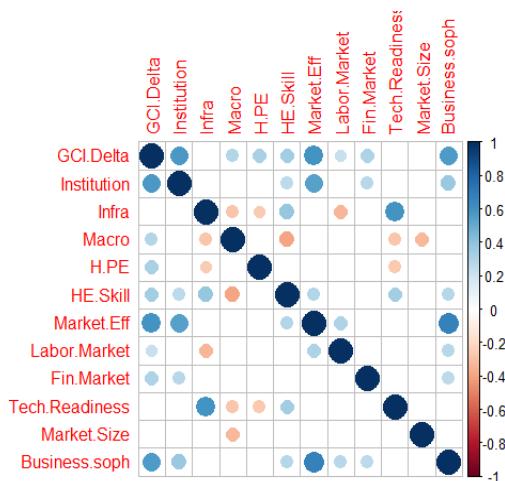
Another caveat towards the selected sample is that since the data is used between the time period 2007-08 to 2017-18, many countries that may have already achieved a significant GCI score (reaching saturation value) before this time window, might not be featuring in the list of short-listed 75 economies.

2. Delta variation in pillars: Second objective is to check how improvement in the twelve pillars is leading to an improvement in the GCI Score (delta value for the given window of eleven years). Notwithstanding we have also taken into account that there might be associations between the constituent pillars of the index, and that improvement in these associated pillars might have led to a faster growth of GCI delta. Correlation matrix of Pillar delta for 75 Countries with GCI delta >0.2. The plot below only displays significant correlation between variables. $p<0.05$.

The correlation matrix of the pillar delta scores highlights the pillars that have moved together during the chosen time frame. Circles in blue indicates positive correlation and circles in red indicate negative correlation. The bigger the circle, higher the correlation between the 2 variables. Based on the correlation matrix, following observations were made:

- Between 2007-08 and 2017-18 for the 75 short-listed economies (scoped in this study), the improvement in the GCI delta has been strongly related with Improvements on Pillar 1: Institutions, Pillar 6: Goods Market Efficiency, and Pillar 11: Business Sophistication
- Improvements made by economies on Pillar 6: Goods Market Efficiency were strongly correlated with improvements made on Pillar 1: Institutions and Pillar 11: Business Sophistication
- Any economy making an improvement on Pillar 9: Technological Readiness was strongly correlated with improvements on Pillar 2: Infrastructure
- Improvements on Pillar 3: Macro-economic Environment of an economy were negatively correlated with Improvements made by the economy on Pillar 5: Higher Education & Skilling and the market size

Fig 1: Correlation matrix of the pillar delta



Source: Own analysis using GCI scores from 2007-08 to 2017-18

Meanwhile during an initial analysis, we computed the delta values for pillars during 2017-18 and 2007-08 for all the 140 economies. Even though equal weightage is given to each pillar, some pillars have grown at a greater rate while some have shown lesser elasticity. In essence, the more rigid is GCI score movement for a particular pillar, lesser number of economies are showing improvement over it. From Table 1 it can be observed that Pillar 9- Technological Readiness has the greatest delta elasticity; and for that matter 127 out of 140 economies between 2007-08 and 2017-18 have shown a positive delta greater than 0.20. This also goes in line with the technology endogenizing theories of development. Similarly, for pillar 7: Labour Market Efficiency which has shown the least delta elasticity among all the 12 pillars, only 26 economies have exhibited a delta greater than the pegged value during the period of study.

Table 1: Pillar wise Elasticity in delta

Pillar	Elasticity in delta	Number of economies	
Pillar 1: Institutions	0.81	45	Lowest delta of the sample fixed at 0.20 (countries showing an improvement only above this delta value are taken for analysis)
Pillar 2: Institutions	1.58	102	
Pillar 3: Macro-economic environment	1.62	67	
Pillar 4: Health & Primary education	1.38	98	
Pillar 5: Higher Education & Learning	1.42	105	
Pillar 6: Goods Market Efficiency	0.79	53	
Pillar 7: Labour Market efficiency	0.52	26	
Pillar 8: Financial Market Development	1.33	21	
Pillar 9: Technological Readiness	2.05	127	
Pillar 10: Market Size	1.46	101	
Pillar 11: Business Sophistication	1.01	69	
Pillar 12: Innovation	0.60	64	
	Greater elasticity	Lesser elasticity (rigidity)	

Source: Own analysis using GCI scores from 2007-08 to 2017-18

3. Clustering of economies: Since the overall objective of the paper is to propose alternative development pathways that economies around the world have been exhibiting post 2007-08 financial crisis, clustering was carried out on the basis of pillars' delta scores (pillar score in 2017-18 minus pillar score in 2007-08). We developed 8 clusters of countries based on 12 pillar delta scores for further analysis and evaluation, as to which pillars have contributed the most in increasing the GCI Score for a particular cluster. However, the median value for four of these clusters was lesser than the median value of the sample of 75 economies. So we took all those clusters that had median value greater than 3.47 (median of the 75 economies).

Table 2: Cluster components

Cluster	Countries	Median GCI Delta
Cluster 1	5	0.702
Cluster 2	13	0.368
Cluster 3	10	0.418
Cluster 4	14	0.279
Cluster 5	17	0.245
Cluster 6	2	0.349
Cluster 7	8	0.357
Cluster 8	6	0.259

Source: self-analysis using GCI scores from 2007-08 to 2017-18

This gives us a final sample of 38 economies. However, since cluster 1 & 6 did not factor into our assessment as they had lesser number of elements available for analysis.

4. Principal Component Analysis for selected clusters: In order to find which pillars have been moving together in a particular cluster and hence contribute the most to the GCI score improvement, we carried out individual cluster analysis. Additionally, Principal Component Analysis also helped us identify the key pillars that explain the maximum variation in the delta scores in each cluster

IV. EMPIRICAL ANALYSIS

This section intends to explore the number of alternative development pathways that global economies have exhibited post-financial crisis. While some economies have emphasized on the improvement of institutional quality and governance as the levers for upgrading their productivity curve over a period of time, some have started with strengthening their human capital through primary education, health-care systems, and skilling as per evolving markets (Kasenda, 2014). The arguments that endogenize technology as a lever of growth in long term have led to some nations upgrading their industries ecosystem along with the workforce and integrating themselves to the global production networks of advanced products (Rodrik, New Technologies, Global Value Chains, and Developing Economies, 2018).

1. PATHWAY 1: Linear Translators (from factor Driven to Efficiency Driven) Economies making improvement on infrastructure, technological readiness, and higher education & learning

Ten economies constitute this cluster; They are Kyrgyz Republic, Bulgaria, Russian Federation, Georgia, Indonesia, Costa Rica, Bangladesh, Bosnia & Herzegovina, Poland, and Uruguay. Among the notable cluster characteristics are the pillars with greatest improvement in score, which are: Pillar 2- Infrastructure, Pillar 5- Higher Education & Learning, and Pillar 9- Technological Readiness. Also, economies falling in this cluster have shown a negative delta for Pillar 7- Labour Market Efficiency and Pillar 8- Financial Markets, over a period of ten years (2007-08 to 2017-18).

Table 3: Cluster 3 characteristics

MEDIAN DELTA VALUES												
GCI Delta	PILLAR 1	PILLAR 2	PILLAR 3	PILLAR 4	PILLAR 5	PILLAR 6	PILLAR 7	PILLAR 8	PILLAR 9	PILLAR 10	PILLAR 11	PILLAR 12
0.418	0.316	1.215	0.381	0.496	0.627	0.274	-0.588	-0.049	1.554	0.335	0.163	0.166

Source: self-analysis

We tried to delve deeper into the pillar specific indicators by analysing their performance over the period. Building from the axiom that ICT infrastructure¹ has a positive and significant effect on the growth in productivity of economies (Zohra, 2012), we observe that economies of this cluster had tremendously improved the telecom penetration between 2007-08 and 2017-18. While economies like Kyrgyz Republic, Bangladesh, Indonesia, and Costa Rica had exhibited steep surge in the ‘mobile subscriptions per 100 population’ between this period, indicating a strong penetration of telecommunication services post-financial crisis; countries like Bulgaria and Russian Federation had already achieved a peak performance and saturation over this indicator around 2013-14. Also, it was observed that for indicators: ‘Individuals using internet, %’ and ‘mobile broadband subscriptions, per 100 populations’², economies like Bangladesh, Georgia, and Kyrgyz Republic that started with a very low base of internet penetration, picked up significantly in the eleven years post financial crisis. Similarly, the same three countries and Uruguay showed a rocketing user base of mobile broadband connections. Looking at the technology deployment as an instrument for efficient public distribution (Muralidharan, Niehaus, Sukhtankar, & Weaver, 2019) and hence greater productivity, many development projects carried out in the Asian countries have provided an evidence of mobile linked services as a tool for improving last mile service delivery, minimizing transaction costs, and hence facilitating the flow of savings into bank (DeMel, McIntosh, Sheth, & Woodruff, 2018). Developing countries, in the last ten years have increasingly displayed the significance of cellular handsets in not only ensuring last mile connectivity but also increasing primary-school enrolment, particularly for young girls as well as targeted improvements in teacher attendance and school facilities (Asim & Dee, 2016)

For the indicator ‘Secondary Education enrolment, gross percentage’, it can be observed that almost all the economies in this cluster have showed significant positive progress in Secondary enrolment rates³, except for Bulgaria & Uruguay. As the enrolment rates in Bulgaria and Uruguay was already more than 100 percent in 2007-08, a slight downward movement over the indicator in 2017-18 skewed the two’s performance. Among all the economies of this cluster Costa Rica showed the highest absolute improvement in terms of ‘secondary enrolment, gross percentage’, in spite of the fact that it started from a lower value base in 20008. Since education performance indicators get translated into an optimized performance in medium to long run and yield inter-generational results (Akresh, Halim, & Kleemans, 2018), evidences from some of the economies in this cluster corroborate that efforts towards increasing the enrolment rates began sometime in late 70’s.

Similarly, it was observed that tertiary education enrolment climbed up for almost all the economies post-financial crisis. Among the ten economies studied in cluster 3, it was observed that the less developed economies that began with a comparatively lower enrolment rate in 2007-08 showed the maximum improvement- case of Costa Rica and Bosnia & Herzegovina. This is a stylized

¹ Pillar 2 consists of 9 indicators, of which 6 are qualitative indicators and 3 are quantitative indicators. We have tried to understand the Pillar performance by studying the quantitative indicators. Therefore, for Pillar 2: Infrastructure we have studied the communication infrastructure indicator ‘Mobile telephone subscriptions per 100 populations’

² Pillar 9 consists of 7 indicators of which 3 are qualitative and 4 are quantitative. We have tried to understand the performance of Pillar 9 by studying the quantitative indicators ‘individuals using internet, %’ and ‘mobile broadband subscription, per 100 population’

³ Pillar 5 consists of 8 indicators, of which 6 are qualitative and 2 are quantitative. Indicators used for analysing the Pillar performance are: Secondary education enrolment, gross %’ and ‘Tertiary education enrolment, gross %’

fact highlighted in many researches that competitiveness increases with increased labour productivity (Wolff, 2003). For developing countries, where manufacturing sectors are usually picking up, labour productivity tends to catch up with the productivity of developed countries, where technologies are the most advanced. The greater the distance from the productivity frontier, the faster the rate of productivity growth (Rodrik, McMillan, & Sepulveda, Structural Change, Fundamentals, and Growth: A framework and case studies, 2016).

2. PATHWAY 2: Institutions facilitating Markets (from factor Driven to Efficiency Driven)

Thirteen economies constitute this cluster. They are: China, Nepal, United States of America, Guinea, Guyana, Macedonia FYR, Paraguay, Burundi, Bhutan, Cote De Ivory, Cameroon, Senegal, Rwanda). The notable cluster characteristics include significant improvement in the scores of these pillars: Pillar 1- Institutions, Pillar 2- Infrastructure, Pillar 5: Higher Education & Training, Pillar 6- Good Market Efficiency, Pillar 9- Technological Readiness, and Pillar 12- Innovation.

Table 4: Cluster characteristics of Cluster 2

MEDIAN DELTA VALUES													
GCI	PILLAR 1	PILLAR 2	PILLAR 3	PILLAR 4	PILLAR 5	PILLAR 6	PILLAR 7	PILLAR 8	PILLAR 9	PILLAR 10	PILLAR 11	PILLAR 12	
0.368	0.407	0.501	0.159	0.218	0.471	0.428	0.103	0.292	0.520	0.308	0.334	0.558	

Source: self-analysis

It has been established that quality of institutions positively impacts the entrepreneurship rate in an economy and hence the overall productivity (Autio & Fu, 2015). Also easier business entry/exists and other related regulations tend to support the growth of the economy. On these lines, a parallel can be drawn from the characteristics of this cluster, with pillar 1 and pillar 6 facilitating each other's' performance. While Pillar 1 explains the quality of regulatory processes necessary for improving competitiveness, pillar 6 details the the market conditions like Imports, Exports, Custom Procedures, FDI etc.

We studied the trade statistics (export & import data of economies in Cluster 2) using database from International Trade Centre; we observed that economies of this cluster except Nepal & Bhutan have shown increased exports during the period of study. Further, the imports for all nations have gone up indicating their integration in the global value chains. (Kurul & Yalta, 2017) have shown the significance of institutional factors in FDI flows in developing economies by using a panel data estimation from 2002-2012. Since a range of indicators on legal and political institutional quality including business conducive economic policies play a determining role in increasing trade (Robert & Whelan, 2010), the increase in exports and imports can be seen as impacted by the doing business environment of the economy.

We studied Cluster 2 by analysing the indicators: 'Number of procedures to start a business' and 'Number of days to start a business'⁴. It was observed that the average number of days for the 13 economies of this cluster, between 2017-18 and 2007-08, came down to 13.9 from 38.6. In essence, all the countries minimized the transaction time with Senegal, Paraguay & Burundi minimizing 52 and 39 days respectively in time taken for starting a business. Similarly, the number of procedures to start a business for the Cluster 2 economies, came down from 10 in 2007-08 to 6 in 2017-18. Notably, Senegal, Paraguay & Burundi Cameroon are the economies that most simplified their business procedures. Again, this can be corroborated by observing the rate of change of exports & imports during the period 2007-08 to 2017-18, which has led to a significant improvement in the GCI scores for the economies of this cluster.

These observations assert the underlying fact that institutions act as a source of trade and thus facilitate markets (Levchenko, 2006).

3. PATHWAY 3: Non-linear translators or Disruptors

Eight economies constitute this cluster (Cluster 7). They are: Malta, Kenya, Luxembourg, Italy, Cape Verde, Mauritius, Netherlands, and New Zealand). The notable cluster characteristics include significant improvement in the scores of these pillars: Pillar 2: Infrastructure, Pillar 3: Macro-economic environment, Pillar 7: Higher Education & Learning, Pillar 7: Labour Market Efficiency, and Pillar 12: Innovation

Table 7: Cluster characteristics for cluster 7

MEDIAN DELTA VALUES													
GCI	PILLAR 1	PILLAR 2	PILLAR 3	PILLAR 4	PILLAR 5	PILLAR 6	PILLAR 7	PILLAR 8	PILLAR 9	PILLAR 10	PILLAR 11	PILLAR 12	
0.357	0.039	0.692	0.415	0.373	0.478	0.270	0.330	-0.779	1.011	0.250	0.289	0.558	

⁴ Doing Business indicators are taken from the World Bank annual study on Ease of Doing business. It consists of 10 major areas that impact doing business in any economy. This dataset captures information for 190 nations on procedural, capital, and time aspects an entrepreneur undergoes for carrying out his business.

The term ‘non-linear translators’ implies that notwithstanding the agriculture sector witnessing a rapid decline post financial crisis in these economies, the economy has bypassed the industrial sector growth phase and a majority share of the GDP now is accounted by the services sector. This cluster is characterized by the new means of production based on a wide range of factors enabled by technological developments (Alessandrini, Pietro, Gramillano, & Lilla, 2017).

The economies of this cluster are distributed on two broad contours: (i) across geographical expanse that covers the African and European Continents; (ii) across all three income-group classification ranging from Kenya & Cape Verde in Lower Middle Income, Mauritius in Upper-Middle Income, and the remaining five countries in High Income Groups. So, we tried to understand the variations in economic structure of Cluster 7 economies, by studying the economic indicators’ database from the World Development Indicators. The following characteristics were observed:

- All the remaining economies of the cluster registered a sharp decline in agriculture, except for Kenya where it continued to rise. Understandably, this is well supported from the income-group Kenya lies in, with its factors of production predominantly utilized in the primary sector.
- Share of industries in GDP declined between 2007-08 and 2017-18, with Malta marking the steepest decline (from 51% in 2007-08 to 13% in 2017-18)
- Share of services in the GDP increased for all the economies in this cluster, with Malta (highest rise) and Kenya (lowest rise) lying at the extremes.

The three African economies of this cluster display their integration with global economies through preferential market access. For Cape Verde growth has been sustained by the service sector, namely transports, hotel and restaurants and communications, and also due to increased spending on education and improved governance (Macedo & Pereira, 2010). Similarly, Mauritius which was pioneering manufacturing in late 90s through its export promotion zone adjusted to the trade shocks through a right-policy mix that offered the share of services to rise, especially tourism, financial services, and information and computer technology (ICT) (Frankel, 2010)

Additionally, for the Cluster 7 economies it was observed that, a saturation improvement is marked by the indicators of factor-based pillars⁵. In essence values for indicators like ‘Mobile subscriptions per 100 populations’ have increased tremendously, with all the countries increasing their mobile subscription base. in fact, a steep hike in value for this indicator for some of the economies was achieved by 2015-16, post which the increase is nominal. Additionally, the primary education enrolment rate, net % for majority of economies in this cluster is in top 10 percentile.

Among the efficiency driven pillars⁶, the economies in this cluster have shown greater improvements on indicators like ‘Women Workforce Participation Ratio’, ‘Individuals using internet, %’. Between 2017-18 and 2007-08, all the economies have shown a surge not less than 25% over the indicator ‘individuals using internet’. Additionally, Malta, Kenya, and Mauritius have shown more than 100% growth over this indicator, which can be also attributed to their lower base at 2007-08.

Among the innovation driven indicators⁷, a significant improvement is registered over the indicator ‘PCT patent applications, per million population’, marking the shift of all the countries towards Knowledge-Driven economies focusing on R&D.

V. CONCLUSION

The development paths explored in the previous section support Hypothesis 1: Post financial crisis a group of economies have taken alternative paths for increasing their competitiveness

Also, it was found out that Pillar 1: Institutions, Pillar 6: Goods Market Efficiency, and Pillar 11: Business Sophistication have contributed the most to the improvement in GCI scores of economies post financial crisis (Refer Figure 1). Alternatively, pillars that have been moving simultaneously and giving a significant GCI score improvement over these years have been:

- Combination 1: Pillar 2- Infrastructure & Pillar 9- Technological Readiness
- Combination 2: Pillar 1- Institutions, Pillar 6- Goods Market Efficiency, and Pillar 11- Business Sophistication
- Combination 3: Pillar 2- Infrastructure & Pillar 5- Higher Education & Learning

⁵ Factor Based Pillars include Pillar 1 to Pillar 4 that deal with subjects of Institutions, Infrastructure, Macro-economic environment, and Primary Education and Health

⁶ Efficiency Driven Pillars include Pillar 5 to 10 that deal with subjects of Higher Education & Training, Goods Market Efficiency, Labour Market Efficiency, Financial Market Development, Technological Readiness, and Market Size

⁷ Innovation Driven Pillars include Pillar 11 & Pillar 12 that deal with Business Sophistication and Innovation respectively

Economies falling in Cluster 3 and taking development pathway 1 have been utilizing Combination1 for marking a greater GCI score growth between 2007-08 to 2017-18. Similarly, economies falling in Cluster 2 and taking development pathway 2 have been utilizing Combination 2. The above arguments support Hypothesis 1 that states post-financial crisis a group of economies have taken alternative development paths.

Additionally, it was also found from Cluster 7, that economies like Burundi, Macedonia FYR, and Paraguay that increased their exports commendably between 2007-08 and 2017-18, had strong correlations with their easing of business regulations (Indicators: Number of procedures and days taken to start a business). By eliminating 8-10 procedures for business entries, they made doing businesses in them efficient by approximately 37 days, which led to growth in trade.

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Aqueous Extracts Of Common Plants Against Different Skin Problems Malassezia Furfur, Fusarium Proliferatum, Dryness, Acne, Rashes, Skin Burning

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Abstract- The objective of this study is to determine the antimicrobial properties of medicinal plants like *Mentha selvestris*, *Osimum basillus*, *Rosa indica*, *Rosa sinensis*, *Punica granatum*. The aqueous extracts was obtained by distillation method by liebig,s condenser. It was applied on skin patients who had Acne, dryness, pimples with pus, *Malassezia furfur*, *fusarium proliferatum*. It was found that *Mentha piperita* was most effective for *Malassezia furfur*. For *fusarium proliferatum* it was found that basil showed best result as compared to DMSO. It was found that for *Malassezia furfur* DMSO showed zone of inhibition 16mm as compared to *mentha piperita* which had 25mm. In agar plate of *fusarium proliferatum* DMSO inhibited 0.6mm area as compared to *Osimum basilicum* which had 25mm.

Index Terms- mint, basil, skin problems, dandruff, nail fungus

Pepper *Mentha piperita* is a hybrid plant which is a cross between water *Mentha piperita* and spear *Mentha piperita*. It is native to Europe and the Middle East (Edris et al., 2003). *Mentha piperita*, a member of the (Lamiaceae, *Mentha piperita*) family, is a perennial plant with a height of 50 cm.The leaves have very short petioles. The plant is always sterile and has a strong pepper *Mentha piperita* scent (Herro 2010). *Mentha piperita* is widely used in food, cosmetics and medicine. It has been proven helpful relief of common cold. It may also decrease symptoms of irritating bowel syndrome. (punit p, 2004)

Basil is one of the oldest spices belonging to the *Ocimum* genus and to the Lamiaceae family. This genus has great variety in its

morphology and chemotypes (Lawrence, 1988) . *ocimum* species are used both in brazilian traditional medicine against bronchitis, coughs, and sore throat and in adding flavors in food. (Robert. F.V 2017)

The *Rosa indica* is a woody [perennial flowering plant](#) belongs to the family [Rosaceae](#). Most species are native to [Asia](#). Some species hybridize easily, and this has been used in the development of the large variety of [gardens of Rosa indicas](#). Other species have been used for stomach problems, and are being studying for controlling cancer growth. (Mabberley, 1997)

The plants *Hibiscus rosa-sinensis* (H.rosa-sinensis) belongs to the family Malvaceae. Traditionally the flowers can be used as anti- asthmatic agents in many countries (Zhao, 2010). There are many studies which reveal the presence of different compounds with antimicrobial properties in various parts of plant (Sorachai et al., 2011). Flowers of *Hibiscus rosa-sinensis* tiliaceus L. are widely used for birth control and for treating skin infections (Melecchi, 2006). Leaves and flowers of selected *Hibiscus rosa-sinensis* species are used in traditional medicine for centuries. Information on their antioxidant and antibacterial activities is less (Wong et al., 2010). Combination of plant extract with antibiotics help to minimize the Minimum Inhibitory Concentrations (MICs), helpful activity and this reduces the side effects, the economic cost and reduce sensory impact. These combinations may also control some bacteria that show constantly high resistance to antimicrobials, i.e.

improving the efficacy of antibiotics against resistant bacterial pathogens, modifying agents (Aiyegore et al., 2010)

Pomegranate (*Punica granatum* L.); a granular apple which is consumed worldwide. The fruit is a native shrub of western Asia and Mediterranean countries have a maximum content of health promoting chemicals. Pomegranate fruit extracts have shown many life preventing activities against many life threatening diseases such as cancer (Lansky EP et al., 2007), cardiovascular diseases, atherosclerosis (Al-jarallah A et al., 2013) and type II diabetes (Banihani S et al., 2015). Interestingly, the nutritional parameters mentioned above are not limited to the edible part of the fruit, the vital role are played by the non-edible fractions of fruit and tree i.e. leaves, barks, seeds, buds, flower and peel. Although, these parts are considered to be waste, they contain enormous amount of nutritional value and biological active compounds compared to the edible portion of the fruit (Akhtar S, ismail et al., 2015). Pomegranate peels are distinguished by an internal network of membranes encompassing almost 26–30% of total fruit weight and are characterized by considerable amounts of phenolic compounds, including flavonoids such as anthocyanins, catechins and other complex flavonoids and hydrolysable tannins (punicalagin, punicalin, pedunculagin, ellagic and gallic acid). These compounds are intense in pomegranate peel and juice, which depicts 92% of the antioxidant activity allied with the fruit (Afaq F, saleem M et al., 2008)

MATERIALS AND METHODS:

Preparation of extracts:

Mentha piperita and basil leaves were freshly collected from a garden of frontier college along Flowers of *Hibiscus rosa-sinensis* and *Rosa indica*. These leaves and flowers were separately placed in around bottom flask with air tight on flame. The round bottom flask had a side tube which was connected with liebig condenser. Liebig condenser is a glass tube which has two glass connectors present opposite to each other. One connector was connected with pipe which was supplying water to tube while the other connector was placed in basin to pass the water from tube to basin. The passage of water was meant to cool the tube and condense the vapours to aqueous form. As the flame was vaporizing the moisture inside the leaves and flowers the pure extract of leaves was condensing to aqueous form and pouring in the beaker placed under the end of condenser.

Table no. 1 quantity of plants taken and extract obtained.

PLANTS	BOTANICAL NAMES	PART USED	AMOUNT TAKEN IN GRAMS	EXTRACT YIELD
MENTHA PIPERITA	MENTHA PEPPERITA	LEAVES	242g	60ml
HIBISCUS ROSA-SINENSIS	H. ROSA SINENSIS	FLOWER	39.2g	40ml
BASIL	OCIMUM BASILUS	LEAVES	72.5g	63ml
ROSA INDICA	ROSA INDICA	PETALS	73.3g	54ml
PUNICA GRANATUM	PUNICA GRANATUM	PEEL	72g	40ml

Preparation of agar solution:

To prepare potato infusion, 200g of sliced unpeeled potatoes were boiled in 1 liter distilled water for 30 minutes and filtered through filter paper. It was then mixed with dextrose sugar, agar along potato water and boiled to dissolve while constant stirrer. It was then placed in Autoclave for 15 min at 121C. The final pH was determined 5.6 (sagar 2015).

Culturing *Malassezia furfur* and *Fusarium proliferatum*:

To culture *Malassezia furfur* and *fusarium proliferatum* a test tube was taken and prepared a solution of 1g of glucose, 0-5g of agar in 2ml of water. The spores of *Malassezia furfur* were taken from one's hair and *fusarium proliferatum* from a patient. The spores were mixed with test tube agar solution. The solution was placed in incubator for 24 hours to culture the fungus.

Preparation of agar plates:

Agar solution was poured in petri dishes and let it freeze for 24 hours. In petri dishes, by the help of loop streaking was done. In streaked dishes 6 hills were made by 6mm cork borer. Then by digital pipette 5 different aqueous 75 μ l extracts were dropped in 5 hills. DMSO was dropped in remaining hill. Following latter procedure, second petri dish for *Fusarium proliferatum* was made. The petri dishes were placed in incubator for 72 hours. After the completion of incubation period, zones of inhibition were measured in mm by means of scale.

RESULTS AND DISCUSSION:

Table below shows the results by application of extract on their skin.

Table no. 2 Results after application of extracts

PATIENTS	SKIN PROBLEM	Amount given	Time
Patient A	Acne	10ml	3 days
Patient B	Dryness	10ml	2 days
Patient C	Rashes	10ml	1 day
Patient D	pimples	10ml	1 day
Patient E	Skin irritation	10ml	Instantly

The amount of 10ml was given to each patient and advised them to use it properly. During 72 hours the effect was observed on their affected area. The mixture of extract worked instantly on skin irritations which gave soothing effect on skin. Patient A used it two times daily and the mixture showed very good results against the skin irritation and redness with removal of pus. It was daily used by a patient as a skin primer. For dryness it was used regularly till 4-5 days and skin was transformed to smooth one. Patient D applied it on pus pimple and it removed pus from the pimple with reducing the redness and irritation.

Table no. 3 inhibition zones for *Malassezia furfur* :

EXTRACT	HIGH EFFECT	MODERATE EFFECT	LOW EFFECT	
<i>Mentha piperita</i>	25mm			
<i>Ocimum basilicum</i>	20mm			
<i>Rosa indica</i>		10mm		
<i>Hibiscus rosa-sinensis</i>		14mm		
<i>Punica granatum</i>			5mm	
DMSO		16mm		

The above table proves that for *Malassezia furfu*, *Mentha piperita* aqueous extract effected the most with inhibition zone 25mm, while *Ocimum basilicum* worked less than *Mentha piperita* with measurement of 20mm. On the other hand *Rosa indica* with 10mm, *Hibiscus rosa-sinensis* with 14mm and DMSO had moderate effect and did not show very positive results. The duration of incubation was 72 hours.

Table no 4. Inhibition zones for *Fusarium proliferatum*:

EXTRACT	HIGH EFFECT	MODERATE EFFECT	LOW EFFECT	
<i>Mentha piperita</i>			0mm	
<i>Ocimum basilicum</i>	25mm			
<i>Rosa indica</i>			0mm	
<i>Hibiscus rosa-sinensis</i>			0mm	
<i>Punica granatum</i>	20mm			
DMSO			0.6mm	

The above table is proof that *Fusarium proliferatum* was inhibited by *ocimum basilicum* with inhibition zone 25mm. for *Punica granatum* the inhibition zone was measured 20mm. Other extracts i.e *Rosa indica*, *Hibiscus rosa-sinensis* and *Mentha piperita* had nil effect against it and the zones were covered with fungus. The duration of incubation was 72 hours.

Image of Healed acne.



I. CONCLUSION

The study concluded that aqueous extracts of different common plants which had several antimicrobial properties showed very good against skin problems such as skin irritation, dryness, acne, pimples and fungal activities such as *Malassezia furfur* and onchomycosis. *Mentha piperita* and *ocimum basilicum*

Showed very good results for skin problems. They were also effective against *Malassezia furfur*. *Punica granatum* which has well known anti-microbial properties worked well against onchomycosis. This study was done with in short period of time with lack of resources. The study shows that the mixture of aqueous extract of *mentha piperita*, *ocimum basilicum*, *Hibiscus rosa-sinensis*, *Rosa indica* and *Punica granatum* show very good effects for skin problems. This study should be extend and find out more possible anti-microbial activities against severral other problems. Industrialists must use this study in their ;products like cosmetics, shampoos, soaps, face wash and lotions as an alternatives of chemicals in order to avoid the side effects of such chemicals which cause dangerous side effects.

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Strategic Architecture to Develop Coal Business at PT XYZ

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Abstract- Strategic management is the accumulation of management effort and team to maximize all the resources to winning the competition in industry for long term purpose. Strategic management is an action to formulate strategy to achieve the company objectives. The purpose of this study are: (1) Analyze the current condition of PT XYZ. (2) Analyze internal factors and external factors that affect company performance. (3) Formulate strategies to survive and develop coal business at PT XYZ. The method of this research used descriptive and purposive sampling. The data analysis techniques were Internal Factor Evaluation (IFE), External Factor Evaluation (EFE), and SWOT matrix. The Strategic Architecture were formulated as blue print strategy based on the alternatives strategies and strategic challenge refers to company objectives. The result explain that, join with other miner in near location can optimize mining development that will give advantage for long term goals. Conveyor system chosen as substitute hauling truck transportation to efficient operational cost. Increase the people competencies to handle all of strategies activities is a mandatory.

Index Terms- External Factor Evaluation (EFE), Internal Factor Evaluation (IFE), Strategic Architecture, SWOT matrix

I. INTRODUCTION

Coal as one of the non renewable energy sources is the third largest contributor of fossil energy sources after petroleum and gas as described in Table 1. The natural characteristics of ready-to-use coal products and does not require raw material processing systems to be finished or semi-finished materials such as oil refineries and gas is a distinct advantage for the energy industry when compared to petroleum and gas.

Table 1 Fossil energy resources in Indonesia

No.	Kind of Energy	Unit	Resources	Reserves
1.	Oil	Miliar Barel / Billion Barrel	7,4	3,6
2.	Gas	Trillions of Standard Cubic Feet of Gas (TSCF)	149,3	100,3
3.	Coal	Miliar Ton / Billion Ton	124,8	32,27

Sources : Report of Ministry of Energy and Mineral Resources (ESDM)

The Indonesia government classifies the price of coal based on coal calorie (Kcal / Kg) with the issuance of Coal Price (HPB) marker : 7000, 6700, 6150, 5700, 5400, 5000, 4400 and 4200. In addition, the government through ministry of ESDM also issued Coal Reference Price (HBA) is a government price set for coal with calorific value of 6322 Kcal / kg. The amount of calorie value in HPB based on coal which has been dominating the coal market in Indonesia, for example coal with calorific value of 4200 kcal / kg is the coal which has been produced by PT Arutmin with ecocoal brand. PT. XYZ releases coal with calorific value of 4100 - 4200 kcal / kg so as to benchmark the selling price of PT XYZ marketing coal using HPB marker 4200 and other index such as Indonesia Coal Index (ICI) or index from Platts.

From Figure 1 the price of coal is at the lowest level in 2015 - mid 2016 then rebound to its peak in early 2017 then fall back. There is no guarantee that market conditions will not return to the worst conditions such as 2015 to 2016. Facing the condition of the price of coal that is going down, the company is required to survive and win business competition by making new breakthrough in the form of dynamic business strategy and long-term oriented.

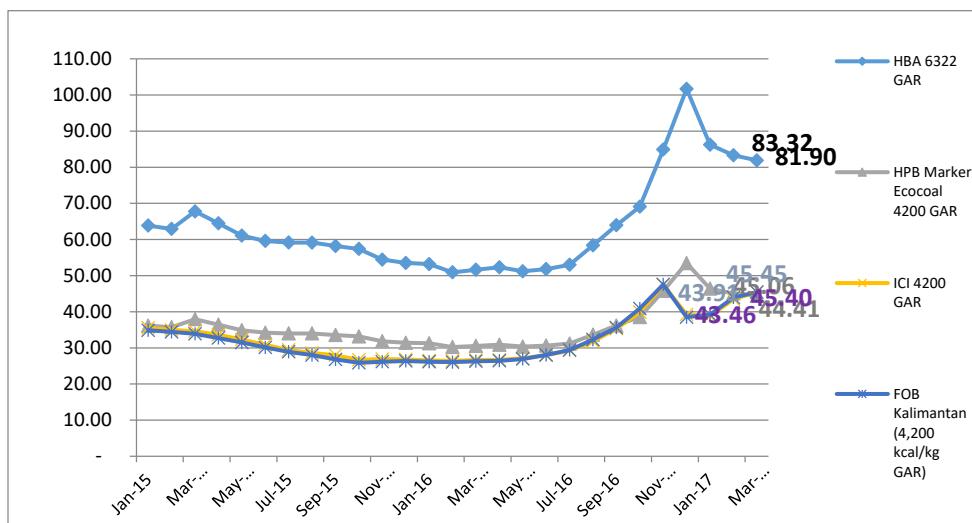


Figure 1. Coal Price Index

Sources : Report of Ministry of Energy and Mineral Resources (ESDM)

The shifting form of coal following the coal groove in the ground requires the company to have specific advantages such as core competence in coal mining which is different from mineral mines as well as supportive strategies to boost performance and create long-term sustainable growth. To be able to survive the company raises the volume of coal production drastically can be seen in Figure 2, so that profit can stay awake even though company margin is constantly depleted because coal price approaching production cost.

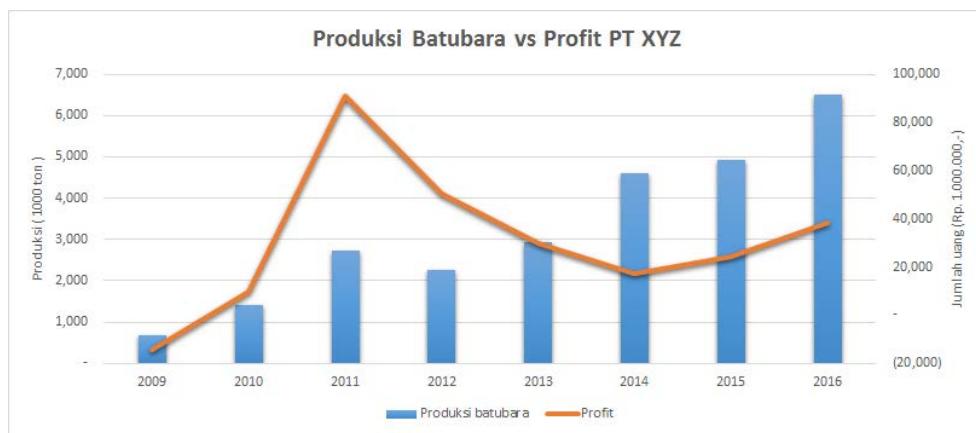


Figure 2. Coal Production vs Profit PT. XYZ until 2016

Coal as a commodity product whose price is highly dependent on market conditions is influenced by external conditions such as changes in government policy or policy changes in coal importing countries. The issue of environmental issues raised by coal importing countries from Europe and Japan is the concern of coal mining companies to ensure sustainable growth.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

The research was conducted in offices were located in Jakarta in each company office. The research will be conducted in the period of August to September 2017. Data to be used in this research are (1) primary data and (2) secondary data. Primary data obtained from result of focus group discussion (FGD) and in-depth interview with purposive sampling method.

Figure 3 shows the framework of research thinking to get appropriate company strategies. These strategies to support company for longterm life cycle.

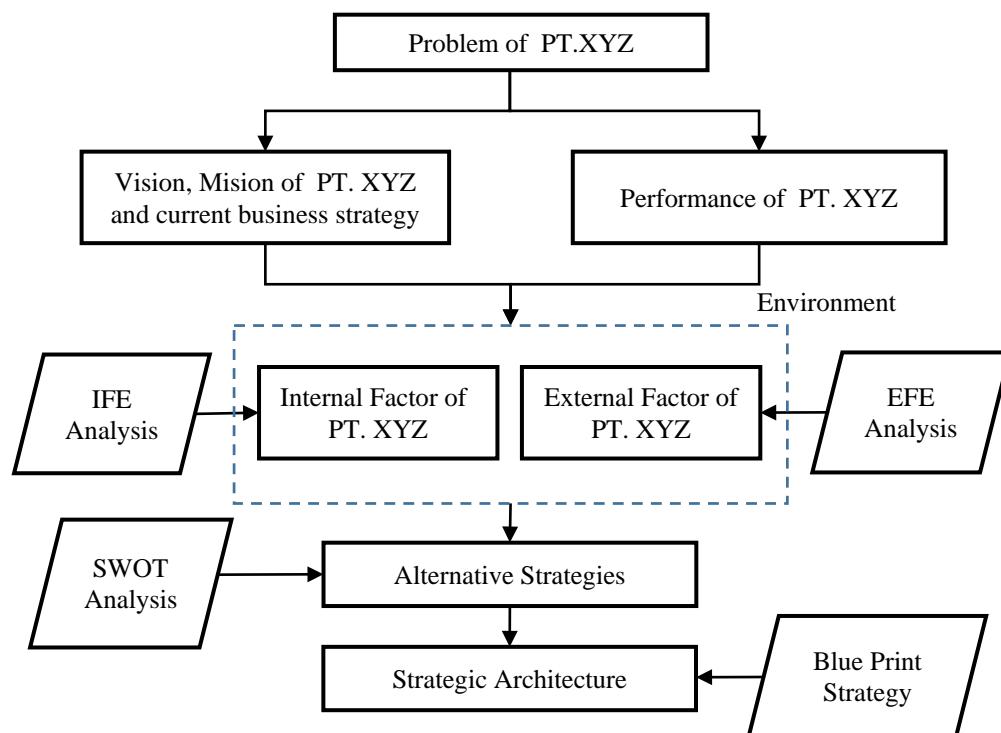


Figure 3. Framework for Research Thinking

Bruce et al.(1983) several alternative coal marketing strategies to support sales are building long term agreements with second customers building long-term agreements with traders and third building long-term commitments with short market concentration of time. Then the weight assessment of each indicator using the paired comparison method of Kinnear and Taylor (1991).

III. RESULT AND DISCUSSION

Internal Factor Evaluation (IFE) matrix from the results of research that has been done in PT XYZ in the period August - September 2017 obtained results in Table 2. Total weighted score on the IFE matrix shows the number 3.130 greater than the average response of 2.50 it illustrates that the response of PT XYZ to strengths and weaknesses above average. David SY (2013) namely the threat of entry of new entrants in the same industry with high profit levels will invite new players in the industry. Competition will become tighter and result in lower profits. Internal Factor Evaluation (IFE) matrix from the results of research that has been done in PT XYZ in the period August - September 2017 obtained results in Table 2.

Table 2 IFE Matrix

Indicator Internal Factor	Weighted Score	
	Strengths	
1. Capability of Production Continuity		0.276
2. Mining Readiness		0.239
3. Huge Resourcess		0.220
4. People Competency		0.214
5. Human Resources in Organization Structure		0.208
6. Company Reputation		0.199
7. Sulfur Content in Coal		0.172
8. Mining Infrastructure		0.163
9. Lean Production		0.155
10. Relationship with contractor		0.144
11. Location Area		0.115
12. Hauling Road Ownership by Third Party		0.105
13. Owned Laboratorium		0.098

Weaknesses	
1. Compliance with Standard	0.180
2. Lack of Disposal Area	0.143
3. Production Equipment	0.129
4. Business Development	0.105
5. Operation depend weather	0.102
6. Characteristic of Low Rank Coal (Dusty, High TM, Self Combustion)	0.090
7. Research and Development	0.073
Total	3.130

Total weighted score on the IFE matrix shows the number 3.130 greater than the average response of 2.50 it illustrates that the response of PT XYZ to strengths and weaknesses above average. David SY (2013) namely the threat of entry of new entrants in the same industry with high profit levels will invite new players in the industry. Competition will become tighter and result in lower profits.

External Factor Evaluation (EFE) matrix the result of external factor research from both PT XYZ internal respondent and verification from external respondent of PT XYZ for total weighted score on EFE matrix in Table 3. shows the figure of 2,696 which means the ability of PT XYZ to respond to opportunities and threats above average. On the highest weighted score opportunity factor on the construction of a 35,000 MW power plant in Indonesia and the lowest weighted score on overburden and interburden utilization. In the threats factor the highest weighted score on mine land compensation is constrained and the lowest weighted score of coal derivative products.

Table 3 EFE Matrix

Indicator External Factor	Weighted Score
Opportunities	
1. 35.000 MW Power plant infrastructure in Indonesia	0.240
2. Goverment Regulation	0.240
3. Mine Boundary with Other Miner	0.233
4. Market outside China	0.215
5. Utilization of Land after Mine closure	0.170
6. Other Port in near Mine Location	0.154
7. Utilization content of Over Burden and Inter Burden	0.141
Threats	
1. Land Compensation	0.221
2. Social at Surround Mining Area	0.206
3. Mining License (IUP)	0.204
4. Rainy Weather in Surface Mining	0.170
5. China's Government Regulation	0.169
6. Additional Cost by Regulation Change (LHV,LS)	0.140
7. Greener Energy / Renewable Energy	0.118
8. Derivative of Coal (Liquid Gas, etc)	0.075
Total	2.696

SWOT Matrix

It is important to gain competitive advantage and to have a product that suits the consumer's wishes with optimal support from the existing resources, said Rangkuti (2001). Boleslaw (2010) states that the resume of the SWOT analysis is to ensure compatibility between resources and conditions in the environment and the ability to take advantage of strengths and weaknesses, opportunities and threats

The SWOT matrix generates alternative outcome strategies from IFE matrix matching and EFE matrix. According Murthy (2014) the need for maintenance management is a crucial business activity and vital to maintain business and succeed the business so it must be managed with strategic. Here are each strategy according to David (2009), SWOT consists of:

1. SO Strategy

Strategies are structured using the power to take advantage of opportunities. SO strategy in PT XYZ is to improve the company's image as a world-class company, foster good relations with the government, expand marketing network both overseas and domestic, make contract with PLN for coal supply, conduct research cooperation with agriculture and forestry for land use post mining. Resources consist of assets, including hardware, software, data and people, and capabilities, including daily competencies and practices according to David (2005)

2. WO Strategy

An organized strategy minimizes the weaknesses to take advantage of opportunities. The WO strategy of PT XYZ is to conduct international standardization certification, to cooperate with other miners, to improve contracts with contractors, to utilize post mining land, to make All road mine roads, improve quality control system from pit to port,

3. Strategy ST

Strategies are structured to harness the power to deal with threats. ST's Strategy at PT XYZ is Securing the land to be mined in the next 5 years, Empowering communities around the mine to support coal mining activities,

4. WT Strategy

Strategies are structured to minimize weaknesses to avoid threats. WT's strategy at PT XYZ is the Compliance of all environmental regulations around the mine and in touch with the surrounding community, Creating an efficient conveyor system from the mouth of the mine to the port, Establishing a power plant for supply to PLN South Kalimantan, Adding new coal mixing business from trading coal around IUP.

Strategic Architecture

This strategic architecture was popularized by Hamel and Prahalad (1995). The benefits of strategic architecture is to formulate a strategy into the canvas of the plan to achieve the vision and mission of the company by paying attention to the challenges that exist in the future. Hermawati et al. (2016) explained that government through KEN (National Energy Committee) that arranges the energy policy to use in a green environment and useful energy. There is no standard consideration in designing the strategic architecture, however the preparation of strategies is based on certain considerations such as time, achieved and the challenges to be faced as showed at Table 4.

Table 4 Designing The Strategic Arsitecure

Goals to achieve
1. Domestic and European market domination
2. Diversified products
3. Increased production to 12 million / year
4. Sustainable growth
Challenges that arise
1. The more expensive mine land.
2. The distance hauling the farther away.
3. Limited disposal area.
4. Conflict with the community around the job
5. Alternative energy is getting cheaper.
6. Government regulations are changing frequently.
7. Domestic Market Obligation (DMO) is getting stronger.

We also clearly see the strategic arrangement at Table 5. It's divided into two strategies. There are gradual strategies and strategies that run regularly. These strategies will keep company on the right track to achieve goals at above. These strategies are blue print of company for long term to develop business into increasing income and to grow profit.

Tabel 5 Divisions of strategic arrangement

Gradual strategies
1. Improving corporate image in the coal business world as a world-class company.
2. Expanding network marketing both abroad and in the country.
3. Make a sales contract with PLN for supply to power plant.
4. Hold mining cooperation with other miners in IUP boundary.
5. Improving cooperation contracts with contractor related performance contracts Heavy equipment.
6. Make a mining road that All weather in accordance with the budget.
7. Secure the land to be mined for the next 5 years.
8. Make rain water flow to the void area in the IUP area that has been completed.
9. Establish new business unit selling coal mixing with coal trading around IUP area.
10. Creating an efficient conveyor system to replace hauling transport by truck.
11. Establish a power plant for supply to PLN in South Kalimantan area.

Tabel 5 Divisions of strategic arrangement (continued)

Strategies that run regularly
1. Fostering good relations with the government as a mining regulator.
2. Conducting cooperation with agricultural and forestry research institutions related to post-mining
3. Implement international standard certification such as ISO 9000 and ISO 14000
4. Follow and comply with all government regulations regarding licensing.
5. Compliance to all environmental regulations for both humans and plants
6. Increase the core competencies of the company's organization.
7. Empower communities around the mine to support mining operations.

In accordance with the research Pan and Scarbrough (1999) effective knowledge management known as the knowledge architecture needed to design and classify according to the level of level and framework of existing knowledge concepts.

Managerial Implications

From the results of the preparation of strategic architecture there are consequences to implement those strategies. Prepare budget for all activity that need investments such as mine land for 5 years, land for conveyor construction and land for power plant. Prepare skill up competencies to support new business and new process. Prepare networking system to support new business and new process. Prepare to propose license to government for new business and investments. Professionals acquisition to support new process and new business. Strategies that run regularly must stick in Key Performance Indicator (KPI) for make the priority.

IV. CONCLUSION

The condition of a healthy company backed by adequate resources makes the company has a high enough profit but it is unfortunate that the lack of business development that benefits the company's profit as future investment.

The external condition of the company can be responded well by the company this can be seen from the total weighted score of EFE 2,696 matrix. However, these external conditions can be a serious threat if not handled immediately such as mine land issues that have not been released and social issues related to environmental issues surrounding coal mines. The internal condition of the company is also responded very well by the company this is seen from the total weighed score of IFE matrix 3.130. However, the problem of disposal land shortages and heavy equipment performance is a weakness that must be addressed to proceed further.

Strategic formulation of strategic architecture provides an overview of the strategic arrangement gradually to achieve the goals set forth on the canvas in the form of blue print strategy.

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Study of Nutritional Intervention among Malnourished Children at Malnutrition Treatment Center (MTC), Jharkhand

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ABSTRACT

Background. Child malnutrition is the major public health problem over the world. Developing countries are highly affected. Protein-energy malnutrition occurs when there are deficiencies in protein, energy foods or both, relative to a body's needs. Nutritional intervention programs run in all over the world to reduce the prevalence of childhood malnutrition. MTC runs with Collaboration of UNICEF and State Government. The MTCs are facility based care units where Moderate acute malnourished (MAM) and severely Acute Malnourished (SAM) children (Z -Score $<-3SD$ and $<-4SD$ of the median WHO child growth), or a Mid-Upper Arm Circumference <115 mm / <11.5 cm below 5 years are admitted with their Mothers for treatment, stabilization and rehabilitation.

Objective. 1.To study the effects of nutritional intervention measures undertaken by MTC. 2. To find out the role of socio-economic status and awareness and knowledge among mothers of the admitted children. **Methods.** The study was conducted over 3 MTC of Bokaro and Ranchi district (Jharkhand). Total 40 respondents were taken at the age group 6-60 month. The primary data were collected with the help of schedule. The schedule consist of personal details like name, age , sex of children, type of family, parents occupation, education of parents etc. and anthropometric measurement, appetite test, discharge data collect from MTC. **Result.** Malnutrition was found to be higher in the age group of 11-20 months. Moderate and severe malnutrition was higher in girl child. PEM prevalence was higher among the children of illiterate mothers and farmer/labourer parents. In MTC, the admitted children given high-energy milk and other ready-to-use therapeutic food (RUTF) due to this most of the children are cured. **Conclusion.** A child age group 11-20 month, female child, having uneducated mother, living in a household with poor wealth status, laborer class parents are associated with increased odds of being malnourished. MTC provide treatment, stabilization and rehabilitation.

Keyword – Malnutrition, Nutrition intervention programs, Under-five Children, Malnutrition treatment center.

INTRODUCTION

The World Health Organization defines malnutrition “deficiencies, excess or imbalance in a person’s intake of Energy and / or nutrient.” Malnutrition occurs due to diet, environment, and a host of other condition (2). Malnutrition refers to the situation where there is an unbalanced diet in which some nutrients are in excess, lacking or wrong proportion. Simply put, we can categorize it to be under nutrition and over nutrition. Despite India’s 50% increase in GDP since 1991, more than one third of the world’s malnourished children live in India. Among these, half of them under 3 are underweight and a third of wealthiest children are over-nutrient.

Nearly half of all deaths in children under 5 are attribute to under nutrition. This translates into the unnecessary loss of about 3 million young lives a year. Under nutrition puts children at greater risk of dying from common infections and contributes to delayed recovery. In addition, the interaction between under nutrition and infection can create a potentially lethal cycle of worsening illness and deteriorating nutritional status. Poor nutrition in the first thousand days of child’s life can also lead to stunted growth, which is irreversible and associated with impaired cognitive ability and reduced school and work performance (5, 8).

According to JME in India under 5 years children Survey report (4)-

Survey Year	WHO Global Database	Survey Sample Size	Severe Wasting	Wasting	Over Weight	Stunting	Under Weight	Income Group
2005-06	2799	49233	6.8	20	1.9	47.9	43.5	Lower middle
2013-14	3291	91273	4.6	15.1		38.7	29.4	Lower middle
2015-16	3302		7.5	21		38.4	35.7	Lower middle

According to the National Family Health Survey (NFHS) under 5 years in India are (6)-

Survey Year	Stunted	Wasted	Severely Wasted	Under Weight
NFHS-3 (2005-06)	48.0	19.8	6.4	42.5
NFHS-4 (2015-16)	38.4	21.0	7.5	35.7

According to the National Family Health Survey (NFHS) under 5 years in Jharkhand are (7)-

Survey Year	Stunted	Wasted	Severely Wasted	Under weight
NFHS-2 (1998-99)	54.1	28.1		51.5
NFHS-3 (2005-06)	49.8	32.3	11.8	56.5
NFHS-4 (2015-16)	45.3	29.0	11.4	47.8

Under-5 Mortality rate in India is 50% and in Jharkhand is 54%. Under – nutrition has also been implicated in the etiology of several disease such as pneumonia, tuberculosis etc. which leads to higher Mortality rate and shown to reduce the physical and mental development of children.

Some of the major causes for malnutrition in Jharkhand are economic inequality. Due to the low social status of some population groups, their diet often lacks in both quality and quantity. In Jharkhand, Mothers generally lack of knowledge in feeding children. Consequently, new infants and children are unable to get adequate amount of nutrition from their mothers.

Nutritional intervention programs have however been found in various parts of the world to be capable of reducing the prevalence of childhood malnutrition. In India Nutritional intervention programs run by different names like Nutritional Rehabilitation Center (NRC), Malnutrition Treatment Center (MTC) etc. MTC runs with Collaboration of UNICEF and State Government. Funds are raised from UNICEF and Medical guidelines providing by WHO makes a successful MTC program run all over India in every state in Governmental Hospitals (1). The MTCs are facility based care units where severely acute malnourished (SAM) and Moderate Acute Malnourished (MAM) children (Z-Score <-3SD and <-4SD of the median WHO child growth), or a Mid-Upper Arm Circumference <115 mm /<11.5 cm below 5 years are admitted with their Mothers for treatment, stabilization and rehabilitation. Generally, these children require high-energy milk and other ready-to-use therapeutic food (RUTF) such as F-75 and F-100. These foods are specially formulated to give children experiencing malnutrition the essential food and micronutrients they need to recover. Mothers stay with the children at MTC and attend counseling sessions on how to take care of the SAM child after discharge from MTC. Special foods, nutritional supplements, medicines are administered according to the guidelines ministry of health and family welfare (3).

OBJECTIVES

1. To find out the role of socio-economic status.
2. To find out awareness and knowledge among mothers of the admitted children.
3. To study the effects of nutritional intervention measures undertaken by MTC.

MATERIAL AND METHOD

The present study has covered three MTC (Phusro, Chas, and Ranchi) from Bokaro and Ranchi district, Jharkhand. The study is complied with the help of primary data. The duration of the study was only four month (Sep. to Dec. 2017). Total 40 respondents were selected from three MTC age group between 6-60 months. The primary data were collected with the help of specially prepared schedule. The schedule consists of personal details like name of the child, age, sex, types of family, parents occupation, educational status and nutrition related question etc. In MTC Anthropometric measurement, clinical examination and appetite test are taken at the time of children admitted. Parents and staff of MTC were informed about the purpose of this study and role of data collection so as to obtain full participation. Data were entered and analyses in MS-excel.

RESULT AND DISCUSSION

From the present study of malnutrition (PEM) in under 5 year children was observed in three MTC. However, it was found to be higher (50%) in the age group of 11-20 months as compared to other age groups. The higher occurrence of grade III and IV malnutrition were found in this age group. Female (70%) were higher prevalence of malnutrition in comparison to males (30%) and also grade III and grade IV malnutrition was found to be higher in female than in males (Table.-1).

It was also notice that the children of illiterate mothers had higher prevalence of PEM and also those children whose father were farmer (55%)/ laborers (32.5%) in comparison to those who are in other work (Table.-2).

At the time of admission 37 (92.5%) children pass appetite test and 3 (7.5%) children fail. It decides the F-75 and F-100 diet. F-100 diet given to 37 (92.5%) children and rest of given F-75 diet. Out of 40 children after treatment 20 (50%) cured, 19 (47.5%) defaulter and 1 (2.5%) medical referral (Table.-3).

Table. 1- Prevalence of PEM amongst under 5 years old children (n=40)

Age Group (Month)	Total children Studied	Grade III Malnutrition	Grade IV Malnutrition
Age Wise			
<10	17.5%	14.28%	25%
11-20	50%	53.57%	41.66%
21-30	15%	10.71%	25%
31-40	12.5%	14.28%	8.33%
41-50	2.5%	3.57%	
51-60	2.5%	3.57%	
Sex Wise			
Male	30%	32.11%	25%
Female	70%	67.85%	75%
Grand total	40	28	12

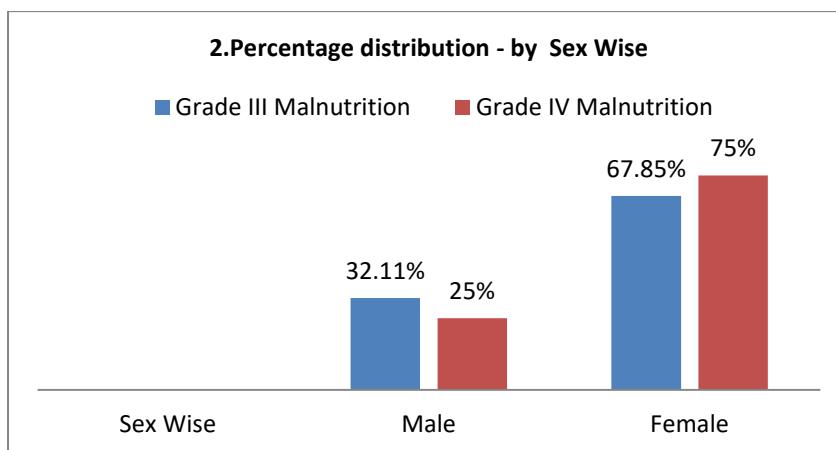
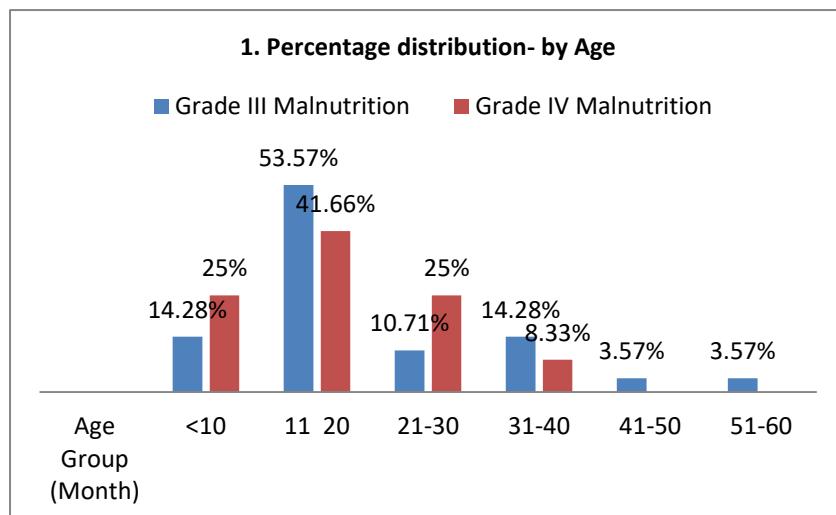


Table. 2- Educational status of mother and Occupation of father (n=40)

Educational Status of Mother	Total children Studied	Grade III Malnourished	Grade IV Malnourished
Illiterate	29 (72.5%)	19 (67.85%)	10 (83.33%)
Primary	10 (25%)	8 (28.57%)	2 (16.66%)
Secondary	-	-	-
Diploma and above	1 (2.5%)	1 (3.57%)	-
Occupation of Father			
Laborer	13 (32.5%)	10 (35.71%)	3 (25%)
Farmer	22 (55%)	15 (53.57%)	7 (58.33%)
Service	-	-	-
Business	3 (7.5%)	2 (7.14%)	1 (8.33%)
Not working	2 (5%)	1 (3.57%)	1 (8.33%)
Grand total	40	28	12

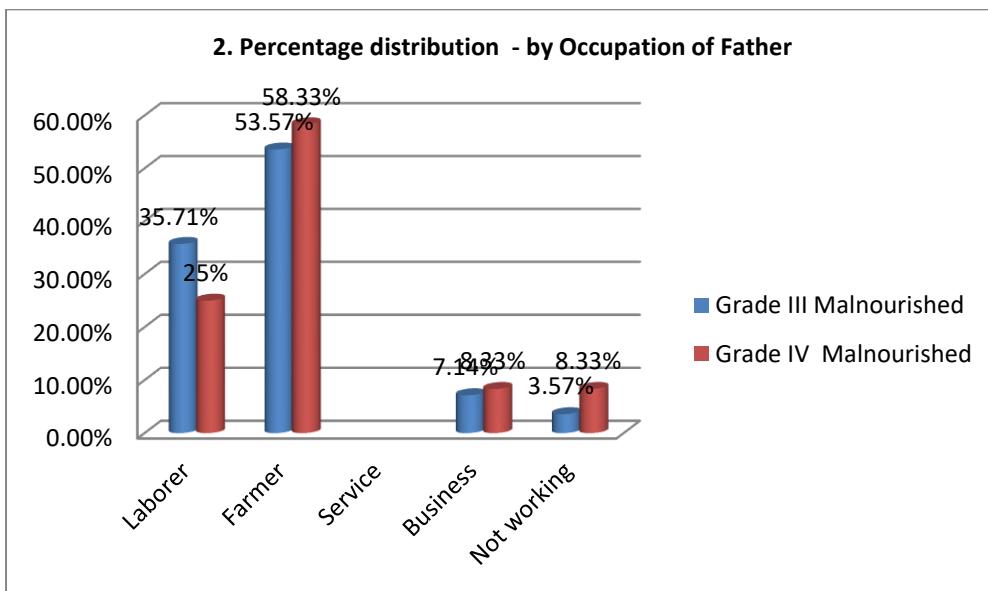
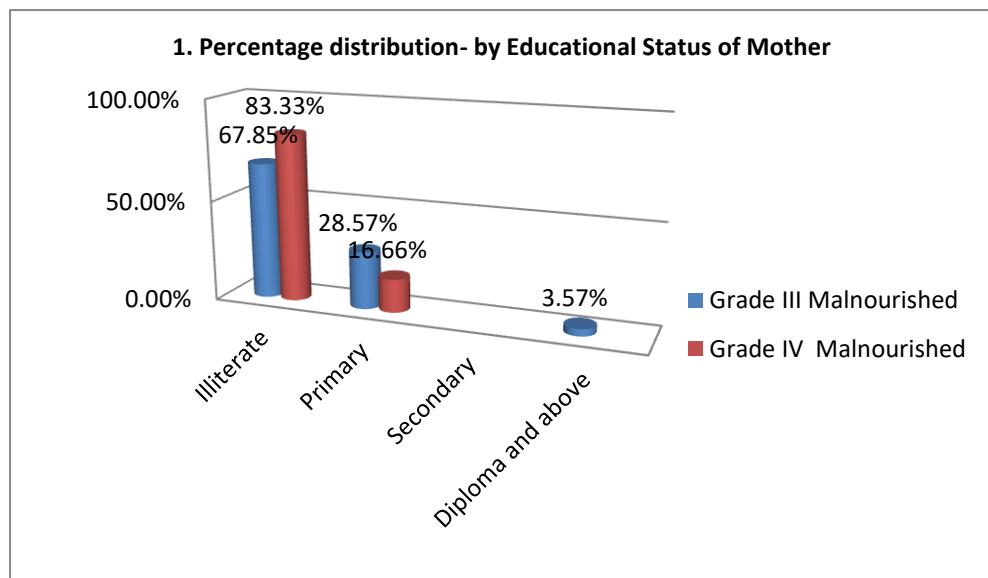
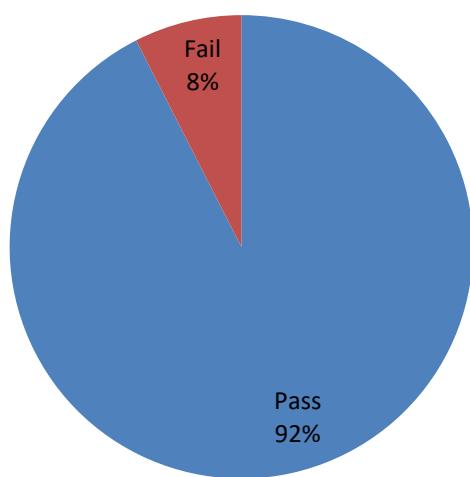


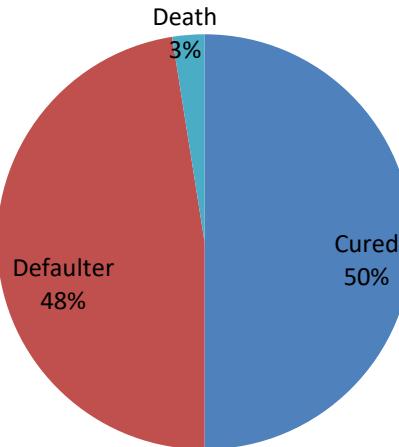
Table. 3- Prevalence of Malnutrition in relation to appetite test and discharge from MTC (n=40)

Appetite test	Total children Studied
Pass	37 (92.5%)
Fail	3 (7.5%)
Discharge	
Cured	20 (50%)
Defaulter	19 (47.5%)
Non-Respondent	
Medical referral	
Death	1 (2.5%)
Grand total	40

1. Percentage distribution - by Appetite test



2. Discharge



CONCLUSIONS

The occurrence of overall and grade III and IV PEM was highest amongst the age group 11-20 month. Majority of the children were Female. This is because parents were lack of attention towards the girl child. Children of illiterate mothers had higher prevalence of PEM. Lack of proper education and awareness of nutrition among mothers cause the big impact in health of children. The children of Laborers and farmer were affected most. It is quite often seen that in laborer and farmer class both the parents work through the day, resulting in child receiving almost no attention. In MTC most of the children are cured because they provide Ready-to-use therapeutic food, special attention, treatment etc. Also we conclude that by educating the parents of basic nutritional requirement like high-energy and high-protein diet and consume locally available low cost nutritious foods for rapid weight gain.

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NRCs – The centers of life.

Knowledge, Attitudes and Breast Cancer Screening Practices among Market Women in Thika Town, Kiambu County, Kenya

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Abstract-Introduction: Breast cancer is one of the commonest cancers among women in Kenya. Screening of the cancer is done through self-breast examination, clinical breast examination, and mammography. The success in the management of breast cancer is essentially dependent on the stage at which the cancer is diagnosed and therefore screening is helpful at identifying the disease in the early stages. The study aimed at assessing knowledge, attitudes and breast cancer screening practices among women in Thika Town, Kiambu County, Kenya.

Methods: The study utilized an analytical cross-sectional study design that had mixed methods of data collection; pre-tested self-administered structured questionnaires and Focused Group Discussions. A sample size of 304 respondents was selected through systematic random sampling from both markets while Focus Group Discussion participants were selected through convenience sampling. SPSS version 22 was used to analyse quantitative data while qualitative data was analyzed by use of content analysis.

Results: The respondents who were screened by any of the methods were 13.2%. They had high awareness of breast cancer and 95.3% had heard of breast cancer screening. Knowledge of symptoms

1. INTRODUCTION

Breast cancer is a major public health concern. It accounted for 12% of all cancer cases seen globally in 2018 (32) and was the main cause of cancer related deaths among women where an estimated 626,679 deaths were reported to have occurred in 2018 (32). With 168,690 new cases and 74,072 deaths, breast cancer was the leading cancer among women in

was high (70.5%) but knowledge of risk factors (50%) was lower among the respondents. Approximately half of the respondents were knowledgeable on the procedure for self-breast examination. All the respondents were afraid of being diagnosed with breast cancer and most (74%) agreed that they were afraid of disfigurement. They (84.9%) did not like the embarrassment associated with clinical breast examination and majority (48.8%) agreed that mammography is painful. Most of the participants would go for treatment if diagnosed with breast cancer as well as support those found with breast cancer. On multivariate analysis knowledge of procedure of self-breast examination (2.62; 95% CI: 1.212-5.665) and level of agreement with statements on breast cancer and screening (8.03; 95% CI: 1.85-34.85) were the strongest predictors for screening among the respondents.

Conclusion: In conclusion, uptake of screening was low; there was incomplete knowledge of breast cancer and screening in addition to negative attitudes. There is need for creation of sustained awareness on breast cancer and screening through mass media, healthcare professionals and breast cancer survivors.

Index Terms: Attitudes, breast cancer, knowledge, screening

Africa in 2018 (32). It is also the leading malignancy among women in Kenya where 5, 985 new cases were diagnosed in 2018 (32). The incidence rates for breast cancer vary globally from 25.9 in South Central Asia to 94.2 new cases in Australia and New Zealand (32, 37). South Central Asia is closely followed by African regions at 27.9 in middle Africa and 29.9 per 100,000 new cases in Eastern Africa.

Other developed countries in regions such as Europe and Northern America have more than 80 new cases

The incidence of breast cancer in African countries is lower compared to the developed countries (32, 37). The survival rates are also poor and mortality rates are as high as the industrialized nations (6, 32). Most of the developing countries are characterized by inadequate funding and unavailability of treatment facilities as well as staff. African women have also been found to present at a younger age (35-49 years) and with a more aggressive type of breast cancer (1, 6). Patients in developing countries also present in advanced stages of the cancer; 64% of patients with cancer in Kenya presented at stages III and IV (7) while 77.8% of patients in Angola were diagnosed with breast cancer in the advanced stages (8). Survival from breast cancer is dependent on various important genetic and clinical factors. One of the key factors is the stage and grade of the tumour when the diagnosis is made (1, 31). For this reason, chances of survival are improved greatly when breast cancer is detected early, especially through screening.

Screening for breast cancer is done through mammography which is a method that has been found to reduce deaths related to breast cancer by 20% (29). Clinical Breast examination (CBE) is also useful in the early detection of cancer with clinical trials reporting specificity and sensitivity rates of 94.3% and 51.7% respectively (9, 10). Provencher et.al, (30) also found that a significant portion of breast cancer cases in their Canadian study would have been missed if CBE was not done on the patients. Self-breast examination (SBE) is used as a tool for creating awareness for breast cancer among women especially in the developing countries (29). Recent studies in Kenya found that 30.8% of women in Nairobi County and 28% of women in Kakamega County reported to have been screened for breast cancer in 2013 and 2014 respectively (11, 12).

2. METHODS

The study was an analytical cross sectional study carried out in Mukiriti and Madaraka markets in Thika Town, Kiambu County, Kenya from April-August 2017. The population of Kiambu County was 1,623, 282 with 820,679 being women (14). Thika Town constituency had a population of 165,342 (14). The markets were selected because they are the largest in Thika Town. Economic activities included selling clothes and shoes, jewelry, salons, furniture and foodstuff. The target population was the approximately 1000 women who own and work in stalls in both markets. Data was collected by use of pre-tested self-administered structured questionnaires

per 100,000 women (32, 37).

presented in the Kenya Demographic Health Survey (13) showed that only 10% of women in Kenya have had both a Self-breast Examination and a Clinical Breast Examination done. Other low and middle income countries also have low rates screening. An analysis of the World Health Survey (2003) found that only 2.2% of women in low-income countries had ever been screened for breast cancer (3). Developed countries such as Denmark and Netherlands had screening rates of 84.3% and 79.4% in 2014 (15). The differences in the screening rates can be attributed to improved and timely dissemination of information on breast cancer in the high income countries. The developed countries also have organized national screening programmes where women are invited through phone calls as well as mails and follow-up is done on them. In developing countries national screening programmes are non-existent and screening for breast cancer is mostly emphasized in the month of October which is the breast cancer month (16, 29).

Several reasons have been identified for the low screening rates in the developing countries in which Kenya is part of. A review by Islam et.al (17) found that lack of knowledge and poor understanding on the importance of screening for breast cancer were key barriers to women being screened in low and middle income countries. Other barriers identified were psychological factors such as fear and anxiety, perception of not being at risk and fear of a painful mammogram (17). This study was designed to establish the knowledge, attitudes and breast cancer screening practices among market women in Thika Town, Kiambu County, Kenya.

and Focus Group Discussions (FGDs). Systematic sampling was used to get 304 respondents for the self-administered questionnaires where 152 respondents from each market took part in the study. Convenience sampling was used to get participants for the Focus Group Discussions which took place in Mukiriti market; three Focus Group Discussions were held. Women who operated permanent stalls and those who consented took part in the study while customers, those who did not consent as well as those who had breast cancer were not considered to be eligible for the study. Data from the questionnaires was manually checked to ensure completeness and was then coded and keyed into a computer database

using SPSS version 22. Percentages, frequencies and composite scores (univariate analysis) were first utilized to analyze quantitative data; Chi squares (bivariate analysis) and binary logistic regression (multivariate) analysis were then utilized to determine the association between the variables (i.e. dependent and independent variables). Content analysis was used for the qualitative data whereby trends, patterns and relationships from the data collected were established.

3. RESULTS

Coverage and Response Rate

The study targeted a sample size of 304 respondents from whom 258 completely filled and returned their questionnaires and this resulted to a coverage rate of 84.9%. The response rate was 100%.

Characteristics of the Respondents

Majority of the respondents 105 (40.7%) were in the age range of 25-34 years. They were followed by those who were between 35-44 years (31.8%). A large proportion of the respondents was married (62%) and had between 2-5 children (55%). Majority (53.5%) also had a secondary level of education, were self-employed 45.3% (117%), had worked between 6-10 years and 114 (44.2%) earned between Ksh 15,000-Ksh 20,000. Almost all 250 (96.9%) respondents were Christians and a large number 121 (48.4%) were Catholics. Most of the respondents 170 (65.8%) spoke Kikuyu as their mother tongue.

Uptake/Practice of Breast Cancer Screening

The study sought to establish the uptake of screening for breast cancer and therefore asked the respondents to indicate if they have ever gone to be screened. The proportion of the respondents who reported to have been screened was 34 (13.2%) (95% C.I. 9.9-17.2) as indicated in Figure 1

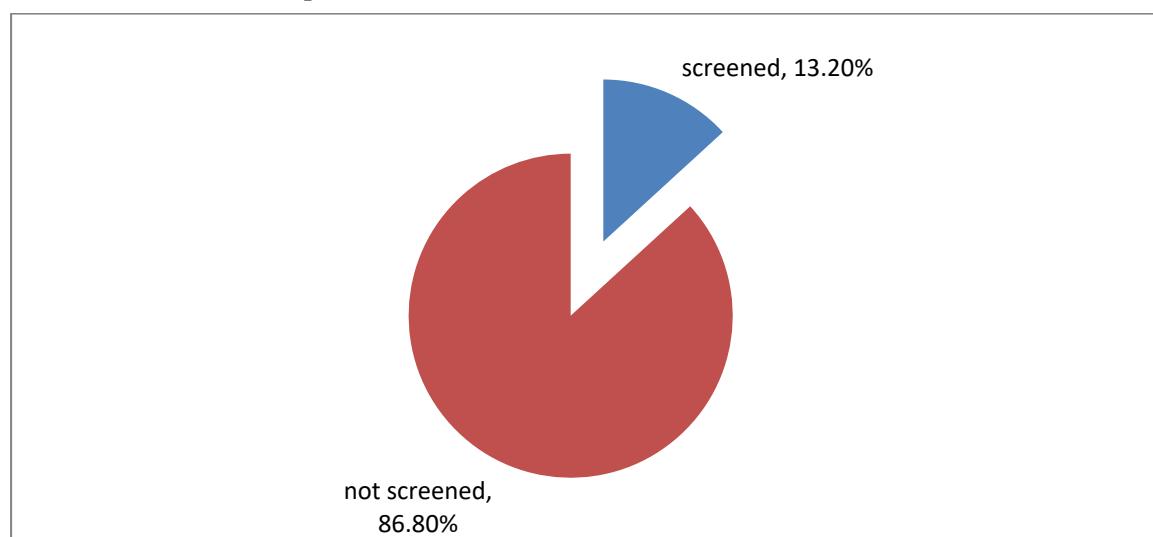


Figure 1: Uptake of Breast Cancer Screening among market women in Thika Town, Kiambu County, Kenya (April-August 2017)

During the previous two years 18 out of the 34 screened respondents (52.9%) (95% C.I 35.1-70.2) indicated to have done self-breast examination; 14 respondents (41.2%) (95% C.I 24.7-59.3) reported to have undertaken a clinical breast examination and the rest of the respondents (5.9%) (95% C.I 0.7-19.7) had a mammography done. Out of 18 respondents who had done self-breast examination, only 3 (16.7%) correctly examined themselves monthly, 44% 4 examined themselves annually, 33.3% after two years (33.3%) and the remaining 5.6% examined themselves after one week.

Knowledge of breast cancer

All the respondents 258 (100%) had heard of breast cancer. From the responses got from the Focus Group Discussions, the sources of information on breast cancer and screening mentioned were media (radio and television), hospitals, campaigns, friends and relatives, colleagues, community health workers, school and one respondent mentioned the husband to be the source of information.

Symptoms and risk factors for breast cancer

In regards to symptoms of breast cancer, most of the respondents (80.2%) correctly identified nipple discharge as a symptom. Majority also identified (76%) nipple retraction, (74.4%) ulcers on the breast

and (72.9%) breast lump as symptoms. A lesser number of respondents (57.4%) and 45.7% correctly identified dimpling of skin on breast and skin colour changes respectively as symptoms. The responses were then computed and categorized into five quintiles based on the level of knowledge of symptoms (Table 1). Majority of the respondents (70.5%) were knowledgeable on the symptoms of breast cancer. On the risk factors majority of the respondents (82.6%) correctly identified obesity as a risk factor. A large proportion (72.9%) recognized

late menopause, (67.1%) early menarche, (65.9%) previous history of breast cancer in one breast and (53.1%) increasing age as risk factors. Fewer respondents (46.5%) identified lack of exercise and (48.4%) late age at first birth as risk factors. The variables were computed and categorized into five quintiles to establish the level of knowledge of risk factors. Half of the respondents were knowledgeable on the risk factors for breast cancer (Table 1).

Table 1: Level of knowledge of symptoms and risk factors for breast cancer among market women in Thika Town, Kiambu County, Kenya (April-August 2017)

Variable	Frequency	Percentage (%)
Symptoms of Breast Cancer		
Very high knowledge	93	36.0
High knowledge	89	34.5
Average knowledge	55	21.3
Low knowledge	17	6.6
Very low knowledge	4	1.6
Total	258	100
Risk factors for Breast Cancer		
Very high knowledge	59	22.9
High knowledge	70	27.1
Average knowledge	102	39.5
Low knowledge	21	8.1
Very low knowledge	6	2.3
Total	258	100

Knowledge of Breast Cancer Screening

Almost all the respondents 246 (95.3%) had heard of breast cancer screening. A large proportion of the respondents correctly indicated that self-breast examination (81.8%) and clinical breast examination (77.5%) were screening modalities. A significantly lesser number of respondents (52.7%) identified mammography as a screening technique. Slightly more than half of the respondents (56.6%) indicated that clinical breast examination is done annually while 44.2% indicated that mammography is done

after every two years. On the procedure for performing a self-breast examination, slightly more than half of the respondents indicated that self-breast examination does not begin by inspection with arms akimbo, 52.7% indicated that inspection is then done with arms raised, 51.6% indicated that palpation is not done with a flat palm, 50.4% indicated that palpation is then done with the patient standing upright and when lying supine and 55.4% indicated that palpation of the breast is not done systematically. The responses were computed and categorized into five quintiles based on the level of knowledge on the

procedure for self-breast examination. The first category was from 0-0.20 and the respondents in this group were considered to have very high knowledge, the second category was 0.21-0.40 and the respondents were considered to have high knowledge, the third category was from 0.41-0.60 and the respondents were considered to have average

knowledge, the fourth was from 0.61-0.80 and the respondents were considered to have low knowledge and the fifth category was from 0.81-1.00 and the respondents in this category were considered to have very low knowledge (Table 2). Approximately 50% of the respondents were knowledgeable on the procedure for self-breast examination.

Table 2: Level of Knowledge on the procedure for self-breast examination

Variable	Frequency	Percentage (%)
Very high knowledge	80	31
High knowledge	49	19.0
Average knowledge	47	18.2
Low knowledge	35	13.6
Very low knowledge	47	18.2
Total	258	100

The respondents were presented with statements that had information regarding breast cancer and screening; they were asked to indicate the degree to which they agreed with them. Majority of the respondents strongly agreed (46.1%) that early diagnosis has favourable outcomes following treatment; 73.6% agreed that cigarette smoking, obesity and hormonal contraceptives contribute to cancer of the breast and that early presentation of the disease is a painless breast lump; 57.8% agreed that

breast cancer can be inherited; 53.9% agreed that self-breast examination helps in the early detection of breast cancer; 32.9% were neutral on whether breast cancer is caused by putting coins in the brassieres; 66.3% disagreed that breast cancer is caused by breastfeeding and 61.2% disagreed that breast cancer leads to the loss of breasts. The responses were computed and categorized into five based on the level of agreement and 68.6% of the respondents agreed with the statements provided (Figure 2).

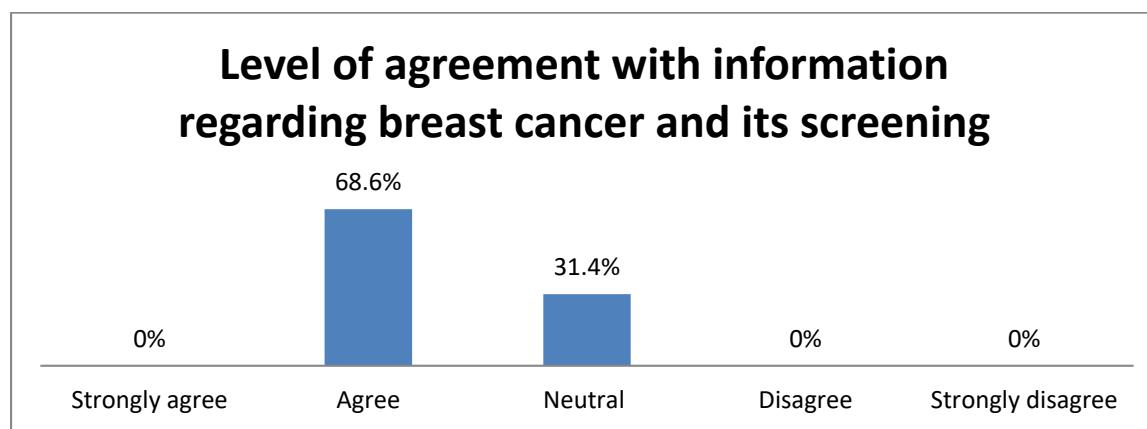


Figure 2: Level of agreement with information regarding breast cancer and screening

Bivariate analysis between knowledge of symptoms and risk factors of breast cancer and uptake of breast cancer screening

A bivariate analysis showed that there was a tendency of the uptake of breast cancer screening to increase as the level of knowledge of symptoms

increased. A breast lump is the commonest sign of breast cancer and 72.9% of the respondents were aware that it was a symptom. Uptake of screening was found to be higher (23 out of 34 i.e. 67.6%) among those who had indicated that it was a symptom. This was however not statistically significant ($\chi^2=0.54$, $p=0.462$). Obesity (modifiable risk factor) was a factor mentioned by most of the respondents (82.6%) and uptake of screening was higher (26 out of 34 respondents; 76.5%) among those who indicated that it was risk factor however that was also not statistically significant ($\chi^2=1.161$,

Table 3: Cross tabulation between knowledge of symptoms and risk factors of breast cancer and uptake of breast cancer screening

Variable	Breast screening uptake				Chi square/Significance		
	Screened	Not screened	Total				
Knowledge of symptoms of breast cancer							
Very high knowledge	14 (15.1%)	79(84.9%)	93 (100%)	$\chi^2=1.107$ $df=4$ $p=0.893$			
High knowledge	10 (11.2%)	79 (88.8%)	89 (100%)				
Average knowledge	7 (12.7%)	48 (87.3%)	55 (100%)				
Low knowledge	2 (11.8%)	15 (88.2%)	17 (100%)				
Very low knowledge	1 (25.0%)	3 (75.0%)	4 (100%)				
Total	34	224	258 (100%)				
Knowledge of risk factors for breast cancer							
Modifiable risk factors							
Very high knowledge	8 (15.4%)	44 (84.6%)	52 (100%)	$\chi^2=3.708$ $df=3$ $p=0.295$			
High knowledge	13 (11.2%)	103 (88.8%)	116 (100%)				
Average knowledge	0 (0%)	0 (0%)	0 (0%)				
Low knowledge	8 (11.3%)	63 (88.7%)	71 (100%)				
Very low knowledge	5 (26.3%)	14 (73.7%)	19 (100%)				
Total	34	224	258 (100)				
Non modifiable risk factors							
Very high knowledge	2 (4.7%)	41 (95.3%)	43 (100%)	$\chi^2=14.250$ $df=4$ $p=0.007^*$			
High knowledge	22 (21.8%)	79 (78.2%)	101 (100%)				
Average knowledge	9 (10.8%)	74 (89.2%)	83 (100%)				

Low knowledge	0 (0%)	27 (100%)	27 (100%)	
Very low knowledge	1 (25.0%)	3 (75.0%)	4 (100%)	
Total	34	224	258 (100%)	

*Significant values with $p < 0.05$

Upon cross tabulation, there was a statistical significance between the number of children and the level of knowledge of symptoms ($X^2=4.023$, $p=0.045$). The respondents with two and more children had a higher level of knowledge of symptoms of breast cancer. There was no statistical significance between any of the demographic characteristics and modifiable risk factors but non-modifiable risk factors late menopause was statistically significant with marital status ($X^2=4.793$, $p=0.029$), level of education ($X^2=13.291$, $p=0.000$),

Bivariate analysis between knowledge of screening and uptake of breast cancer screening

A bivariate analysis showed that all the respondents who had ever been screened had heard of breast cancer screening. Indication of self-breast

main sources of income ($X^2=33.494$, $p=0.000$) number of children ($X^2=39.753$, $p=0.000$) and being Christian ($X^2=75.896$, $p=0.000$). Previous history of breast cancer in one breast was also statistically significant with main sources of income ($X^2=7.697$, $p=0.021$) and the number of children ($X^2=7.662$, $p=0.006$). Early menarche was statistically significant with age ($X^2=5.889$, $p=0.015$), marital status ($X^2=18.930$, $p=0.000$), main sources of income ($X^2=34.834$, $p=0.000$), number of children ($X^2=7.457$, $p=0.006$) and being Christian ($X^2=20.416$, $p=0.000$).

examination as a screening modality was statistically significant with uptake of screening ($X^2 = 6.134$, $p=0.013$) as well as the knowledge of performing a self-breast examination ($X^2 = 16.332$, $P=0.003$). Uptake of screening was also higher among the respondents who agreed with the statements provided ($X^2=11.835$, $p=0.001$) (Table 4).

Table 4: Cross tabulation between knowledge of screening and uptake of breast cancer screening

Variable	Breast screening uptake				Chi square/Significance		
	Screened	Not screened	Total				
Ever heard of breast cancer screening							
Yes	34 (13.8%)	212 (86.2%)	246 (100%)	$X^2=1.1910$ $df=1$ $p=0.167$			
No	0 (0%)	12 (100%)	12 (100%)				
Total	34	224	258 (100%)				
Modalities of breast cancer screening							
Self-breast examination							
Yes	33 (15.6%)	178 (84.4%)	211 (100%)	$X^2=6.134$ $df=1$ $p=0.013*$			
No	1 (2.1%)	46 (97.9%)	47 (100%)				
Total	34	224	258 (100%)				

Clinical breast examination				
Yes	27 (13.5%)	173 (86.5%)	200 (100%)	$\chi^2=0.080$ df=1 p=0.777
No	7 (12.1%)	51 (87.9%)	58 (100%)	
Total	34	224	258 (100%)	
Mammography				
Yes	20 (14.7%)	116 (85.3%)	136 (100%)	$\chi^2=0.587$ df=1 p=0.444
No	14 (11.5%)	108 (88.5%)	122 (100%)	
Total	34	224	258 (100%)	
How often is clinical breast examination done				
Annually	18 (12.3%)	128 (87.7%)	146 (100%)	$\chi^2=0.212$ df=1 p=0.645
Others	16 (14.3%)	96 (85.7%)	112 (100%)	
Total	34	224	258 (100%)	
How often are you supposed to go for mammography				
After every 2 years	16 (14%)	98 (86%)	114 (100%)	$\chi^2=0.131$ df=1 p=0.717
Others	18 (12.5%)	126 (87.5%)	144 (100%)	
Total	34	224	258 (100%)	
Procedure for self-breast examination				
Very high knowledge	18 (22.5%)	62 (77.5%)	80 (100%)	$\chi^2=16.332$ df=4 p=0.003*
High knowledge	9 (18.4%)	40 (81.6%)	49 (100%)	
Average knowledge	5 (10.6%)	42 (89.4%)	47 (100%)	
Low knowledge	2 (5.7%)	33 (94.3%)	35 (100%)	
Very low knowledge	0 (0%)	47 (100%)	47 (100%)	
Total	34	224	258 (100%)	

*Significant values with $p<0.05$

Multivariate analysis between knowledge of breast cancer and screening and uptake of screening for breast cancer

A binary logistic regression was performed to establish the effects of non-modifiable risk factors, self-breast examination as a modality, procedure for self-breast examination and level of agreement with statements on breast cancer on uptake of screening.

The logistic model was statistically significant $\chi^2=29.609$, $P=0.000$. It explained 20% (Nagelkerke R^2) of the change in uptake of breast cancer screening and correctly classified 86.8% of cases. Increase in the knowledge of the procedure for self-breast examination as well as degree of agreement with statements on breast cancer and screening increased the likelihood of uptake of screening (Table 5).

Table 5: Multivariate analysis between knowledge of cancer of the breast and screening and uptake of screening

Variable	B	S.E.	Sig.	Exp(B)	95% C.I. for EXP(B)	
					Lower	Upper
Self-breast examination as a screening modality	1.984	1.038	0.056	7.272	0.950	55.661
Non-modifiable risk factors	-0.157	0.209	0.453	0.855	0.568	1.287
Procedure for self-breast examination	0.963	0.393	0.014	2.621	1.212	5.665
Level of agreement with statements on breast cancer and screening	2.083	0.749	0.005	8.029	1.850	34.851

*Significant values with p< 0.05

Attitude towards breast cancer and screening

All the respondents (100%) agreed that they were afraid of being diagnosed with breast cancer, 74% agreed that they were afraid of being disfigured, 84.9% of the respondents agreed that they hated the embarrassment associated with clinical breast examination, 69.8% agreed that women should be encouraged to screen for cancer of the breast and 65.1% agreed that doing a self-breast examination would make them worry of breast cancer. A large proportion of the respondents disagreed (59.3%) that

cancer of the breast is a curse, 49.2% disagreed with the statement that they are not at risk of developing breast cancer, 48.8% agreed that having a mammography is painful and 46.9% were neutral on the statement that they consider breast cancer as a ‘death sentence’. The responses were then computed and categorized into 5 quintiles. The groups ranged from strongly agree (0-0.20), to agree (0.21-0.40), to neutral (0.41-0.60), to disagree (0.61-0.80) and finally strongly disagree (0.81-1.00). Most of the respondents (77.1%) agreed with the statements provided (Table 6)

Table 6: Percentage of the respondents' extent of agreement on statements on attitude towards breast cancer and screening

Statements	Frequency	Percentage (%)
Strongly agree	0	0
Agree	199	77.1
Neutral	59	22.9
Disagree	0	0
Strongly disagree	0	0
Total	258	100

On how the society treats someone with breast cancer; majority of the FGD participants mentioned that the society treats people with pity and sympathy and even empathized with them as one respondent mentioned ‘*I imagine the pain they experience. I lost a friend last year who had cancer and she didn't know (FGD-2)*’. A large number of participants said that they would offer financial support as one respondent put it ‘*personally, I would organize a fundraiser if somebody I know had breast cancer. They are given very expensive medications (FGD-2)*’. The participants would also encourage them to seek and continue with their medication.

Stigma towards the women with breast cancer patients was also mentioned as another participant mentioned that ‘*some people treat them as outcasts especially the single mothers (FGD-1)*’ and another added that ‘*they will be looked at as death walking because cancer is not curable (FGD-1)*’.

The participants in the FGDs also discussed on what they would do if they were to be diagnosed with breast cancer. Majority of the respondents mentioned that they would accept themselves and then seek treatment as one respondent put it ‘*I have to first accept and then go for treatment because it's a worrisome disease and I want to live and lead a better life (FGD-1)*’. Another mentioned that ‘*I would seek medication and try to follow the doctor's prescription*’

Some of the participants would create awareness of breast cancer to help others seek medical care as one respondent put it ‘*I would start awareness campaigns to inform other people of the disease (FGD-3)*’ while other participants would encourage others to go for screening so it can be detected early. A few participants mentioned that they would be afraid of being stigmatized by the society and even equated the

cancer to Human Immunodeficiency Virus which does not have a cure.

Bivariate analysis between attitude towards cancer of the breast and screening and the uptake of screening

A bivariate analysis showed that there was statistical significance between uptake of screening for cancer of the breast and the extent of agreement that breast cancer is a curse ($X^2=26.875$, $p=0.000$), belief that the respondents were at risk of developing breast

Table 7: Cross tabulation between attitude towards cancer of the breast screening and the characteristics of the respondents

Variable	Breast screening uptake			Chi square/Significance
	Screened	Not screened	Total	
Strongly agree	0 (0%)	0 (0%)	0 (0%)	$X^2=3.428$ $df=1$ $p=0.064$
Agree	22 (11.1%)	177 (88.9%)	199 (100%)	
Neutral	12 (20.3%)	47 (79.7%)	59 (100%)	
Disagree	0(0%)	0 (0%)	0 (0%)	
Strongly disagree	0(0%)	0 (0%)	0 (0%)	
Total	34	224	258 (100%)	

*Significant values with $p<0.05$

Factors associated with attitude towards breast cancer and screening

A composite score was made using variables for knowledge of risk factors for breast cancer, procedure for self-breast examination and degree of agreement with statements breast cancer and screening. A bivariate analysis was done and showed the level of knowledge was statistically significant with the attitude of the respondents. ($X^2=13.829$, $p=0.001$).

Demographic factors associated with attitude included marital status ($X^2=10.111$, $p=0.001$), highest level of education ($X^2=28.646$, $p=0.000$), main sources of income ($X^2=16.781$, $p=0.000$), number of children ($X^2=14.720$, $p=0.000$) and being Christian ($X^2=24.28$, $p=0.000$) (*Significant values with $p<0.05$).

4. DISCUSSION

The purpose of this study was to establish the knowledge, attitudes and breast cancer screening practices among women. From the study, 13.2% (95% C.I. 9.9-17.2) of the respondents indicated to have ever been screened for breast cancer. The findings are comparable to those in other developing countries where studies found low screening rates of

cancer ($X^2=16.106$, $p=0.003$), fear of disfigurement ($X^2=13.737$, $p=0.001$), active encouragement of women to screen for breast cancer ($X^2=8.472$, $p=0.037$), having a mammogram is painful ($X^2=10.983$, $p=0.012$) and the fear that breast cancer is a ‘death sentence’ ($X^2=6.770$, $p=0.034$). Upon computing the variables and further analysis, there is no statistical significance between attitude towards breast cancer and screening (Table 7)

17.7% in Nigeria (5), 12% in Indonesia (4), 12% in Iran (18) and an average of 2.2% in low and middle income countries (17). From the screened respondents, majority practiced SBE and CBE which are recommended screening methods in low and middle income countries.

Knowledge of breast cancer has been defined as a woman’s awareness of the symptoms, risk factors, breast cancer screening and treatment. The respondents in this study had high awareness of breast cancer; all respondents indicated to have heard of breast cancer. This was similar to other studies done in Nairobi-Kenya, Tanzania, Senegal where 95.3%, 98.2% and 97.9% of the respondents reported to have heard of breast cancer (11, 19, 20). A higher proportion of respondents (70.5%) in this study correctly identified the symptoms of breast cancer presented to them while fewer (50%) correctly identified risk factors for the cancer depicting partial knowledge of breast cancer among the respondents. These findings are consistent to those of Morse et.al (20) in Tanzania and Marmara et.al (21) in Malta who found variations in both knowledge of symptoms and breast cancer risk factors. The sources of information mentioned in this study included the electronic media (radio and television) and hospitals similar to findings of a review by Ojewusi et.al, (22). These form an important source of information

regarding breast cancer as well as being fertile areas for interventions so as to increase awareness of the cancer.

Further analysis done showed that there was propensity for the uptake of screening for breast cancer to increase as the level of knowledge of symptoms increased. Having more children was associated with the knowledge of symptoms. The level of knowledge was higher among the respondents with two and above children; those who were younger and had worked for less than 10 years in the markets, earned more than Ksh 15,000 and were Catholics. A few selected characteristics were statistically significant with the knowledge of risk factors of cancer of the breast. They were age, marital status, level of education, main sources of income, number of children and being Christian. In this study majority of the younger respondents were more knowledgeable compared the older respondents. Kisangani et.al (23) similarly found that the younger participants who took part in their qualitative study appeared to have a better understanding of the cancer, its signs and symptoms as well as lifestyle issues that predispose people to breast cancer and screening as opposed to older participants. According to data presented in the Kenya Demographic and Health Survey, (13), most women in Kiambu County (90.2%) have given birth in a hospital where they have been taught on various aspects of breast cancer by healthcare professionals (13).

There was a high awareness of breast cancer screening with majority of the respondents correctly indicating that SBE and CBE were modalities. Fewer respondents were aware that mammography is a screening modality. These findings were comparable to a study done in Ghana which found that 93% of the study participants were aware of self-breast examination as a screening modality (34). The findings are significantly higher compared to Agwu et.al, (24) who found that 38.9% of respondents were aware that self-breast examination was screening tool, 13% were aware of clinical breast examination and 13.4% were aware of mammography as a screening technique. In Senegal, 60.3% of the study participants were aware of any one of the screening methods (19). A study done in Uganda on cervical cancer screening found that those who were aware of at least one method of screening were 2 times more likely to have been screened (25).

Knowledge of the procedure for self-breast examination was a strong predictor for breast cancer screening. Those who were knowledgeable on the procedure were 2.6 times more likely to have been

screened. A systematic review by Ojewusi et.al, (22) found that lack of knowledge on how to carry out a SBE was expressed by as one the most important factors in its uptake. Similarly in Lebanon, women who were more confident on their ability to perform a SBE were 2.65 times more likely to practice it. Morse et.al (20) found that 87.7% of the respondents who were aware of SBE in their study mentioned that knowledge of the SBE procedure was an encouraging factor for them to examine themselves and 56.9% would examine themselves if there was an instruction sheet available. Busakhala et.al (9) also found a strong association between reports of prior training on SBE and its practice. Women who examine themselves have been found to more often, easily and correctly identify small changes in their breast on a monthly basis upon which they will visit a doctor. SBE allows women to actively take part in the management of their wellbeing which results to increased awareness and adherence to various screening modalities (26).

Most of the respondents (68.6%) in this study agreed with the statements with information on breast cancer and screening. The statements were meant to assess the general awareness of breast cancer. A composite score of the same was statistically significant with the uptake of screening. The respondents with increased awareness of breast cancer were approximately 8 times more likely to have been screened for breast cancer. Lack of awareness of the condition and its screening will prevent women from being screened for breast cancer. Islam et.al (17) in their review found lack of awareness of breast cancer and screening as a key barrier of screening by women. Kisangani et.al (23) in their qualitative study also found that women being unaware and lacking information on breast cancer screening would be a barrier to them being screened for cancer of the breast.

Beliefs and attitudes have a significant impact on individuals' health-seeking behaviour, how they deal with illness as well as in the adoption of favorable health behaviour. All the respondents in this study were afraid of being diagnosed with breast cancer. These findings were comparable to those of a Maltese screening program which was organized and found that majority of non-attendees were afraid of the result of the screening programme (21). A large portion of the respondents were afraid of being disfigured. Disfigurement would also result in spousal abandonment for the women (27). Findings from the Kakamega study (23) revealed that the participants would not go for screening due to some of their friends having mastectomies after being

found with breast cancer. Chaka et.al (28) also found that a third of the respondents in their Ethiopian study felt that breast cancer would threaten their relationships with their spouses and partners. Majority of respondents in this study hated the embarrassment associated with CBE. The participants in the Kakamega study (23) felt that they would not have a CBE for fear of being stigmatized while majority of respondents in the Ethiopian study (28) however indicated that it was not embarrassing for them to have their breasts examined.

A large proportion of respondents in this study agreed that having a mammogram is painful and this would deter them so as to avoid pain. A review of low and middle income countries revealed that fear of a painful mammogram would bar women from seeking screening services (17). Similarly, a study from Nigeria (35) also found that 50% of the respondents thought that mammography was harmful. The findings of this study were inconsistent with those of a study carried out in Jordan (2) where majority of the respondents were undecided on whether mammography was painful. In our study, majority of the respondents agreed that performing a self-breast examination would cause them to worry about breast cancer. This might explain why out of the 18 respondents only 3 respondents examined themselves monthly with most of the respondents examining themselves after long intervals of time (27). Health education should thus include information that lessens worries and fear towards the various screening modalities (2).

Most of the respondents in our study were undecided (46.9%) on whether breast cancer was a ‘death sentence’. This might be because of the information they had regarding the cancer. In the FGDs the participants mentioned that they would get treatment if they were found with breast cancer and acknowledged that nowadays people have come to accept the disease as a normal condition due to increased awareness about breast cancer (26, 27). Participants in Kakamega (23) however perceived the disease as being a serious terminal disease that has no

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cure. They labeled it a ‘death sentence’. Overall the respondents in our study had negative attitudes and fear towards breast cancer and this is unsurprising given that most people in Kenya present when the disease is in the later stages when nothing in terms of cure can be done to save a patient. The results of a bivariate analysis between knowledge and attitude revealed a statistically significant association. A study done in Iran found a positive relationship between knowledge and attitude in that women with increasing knowledge had a better attitude towards breast cancer (36).

5. CONCLUSION

In conclusion, the screening rate in our study is low. There is high awareness of breast cancer and screening. The level of knowledge was not constant in the various aspects of breast cancer; knowledge of symptoms was higher however, the knowledge of risk factors was lower. Knowledge of the procedure for self-breast examination was also low. The study participants had a negative attitude and fear towards cancer of the breast which would in turn have a negative effect on uptake of screening. There should be sustained creation of awareness on breast cancer and screening through the media by partnering with vernacular mass media outlets (radio and television stations) and various breast cancer survivors with a view of elucidating the misconceptions, diffusing negative attitudes towards breast cancer as well as promoting the uptake of screening for cancer of the breast among the women.

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Biomass accumulated by *Entandrophragma angolense* (Welw.) C DC. seedlings under different light intensities and soil textural classes

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Abstract

Biomass accumulation may affect the carbon status of developing seedling through shift in photosynthesis “source” relative to the respiratory “sink” within the plants. This study investigated the influence of biomass accumulation under different light intensities (25%, 50%, 75% and 100%) and soil textural classes (clay, sandyloam, sandy, loamysand and loamy). The study was conducted in a 4 X 5 factorial experiment in Completely Randomized Design (CRD).

Interactions of light intensities and soil textural showed that seedlings grown using loamysand placed under 50% light intensity had the highest mean Leaf Dry Weight (LDW) of 2.29g while seedlings grown using sandy soil placed under 50% light intensity had the lowest mean leaf dry weight of 0.70g. Stem Dry Weight (SDW) of 1.80g was recorded in seedlings grown using loamysand placed under 25% light intensity while the lowest mean stem dry weight of 0.58g and seedlings grown using sandyloam placed under 50% light intensity had the highest mean Root Dry Weight (RDW) of 1.56g, seedlings grown using clay soil placed under 25% light intensity had the lowest mean root dry weight of 0.59g. Seedlings grown using sandyloam placed under 50% light intensity had the highest mean Total Dry Weight (TDW) of 4.89g and the least was recorded in clay soil placed under 25% light intensity. This reveals that *Entandrophragma angolense* seedlings preferred moderate light intgencies (50% light intensity) and sandyloam for optimum biomass production.

Keywords: *Entandrophragma angolense*, light intensity, soil textural classes, biomass accumulation and seedlings.

Introduction

Forest ecosystem can capture significant amount of Green House Gasses (GHG), particularly carbon dioxide (CO₂). In the recent decades, there is considerable interest in increased change in carbon content of the

vegetation through the preservation of forests, reforestation, creation of forest farms and other land management method. A great number of studies have demonstrated the ability of forest species to store carbon in their biomass.

Entandrophragma angolense (Meliaceae) common name Mahogany, is most common in moist semi-deciduous forest, particularly in regions with an annual rainfall of 1600–1800 mm. However, it can also be found in evergreen forest. In East Africa, it occurs in lowland and mid-altitude rainforest, but sometimes also in gallery forest and thickets, up to 1800 m altitude. It strongly prefers well-drained localities with good water-holding capacity. The heartwood is pale pinkish brown to pale reddish brown, slightly darkening upon exposure to deep reddish brown, and distinctly demarcated from the creamy white to pale pinkish sapwood, which is up to 10cm wide.

Biomass accumulation may affect the carbon status of developing seedling through shift in photosynthesis “source” relative to the respiratory “sink” within the plants. Biomass accumulation also affects capture of light, nutrients and water for seedlings growth. In terms of classical plant growth analysis theory, plant Relative Growth Rate (RGR) is divided into two components. Net Assimilation Rate (NAR) that is the change in plant mass per unit leaf area per unit time and Leaf Area Ratio (LAR) which leaf area per unit plant mass (Evans, 1998).

Plant diversity in forests of the tropics zone however, not all species co-habit within the same spatio-temporal settings. Different in requirements for light, water and nutrients and in life history traits, as well as plant morphology and physiology give rise to variation in species successional status and abundance. The seedling stage is critical in forest trees because survival and performance at this phase will affect composition, structure and functioning of future forest ecosystem while the intensity often serves as an abiotic factor during establishment even shade-tolerant species may utilize forest gaps to promote regeneration from seed (Yahamoto, 2000; Bilek *et.al.*, 2014; Zhu *et. al.*, 2014). Comparisons of seed development of contrast species in uniform light condition can help elucidate underlying morphological and physiology traits important for growth and survival. Understanding how seedling of tree species perform relative to each other in a common environment will contribute to the knowledge of mechanism to maintain species diversity in forest communities and to inform forest management practices to emphasize multifunctional and biodiversity.

Materials and Method

The study was carried out at the Tree Improvement Nursery and Silviculture Nursery of the Department of Sustainable Forest management, Forestry Research Institute of Nigeria, Jericho Hill, Ibadan, Nigeria (FRIN).

FRIN is located within longitude $07^{\circ}23'18''\text{N}$ to $07^{\circ}23'43''\text{N}$ and latitude $03^{\circ}51'20''\text{E}$ to $03^{\circ}51'43''\text{E}$. Mean annual rainfall is about 1548.9 mm, falling within approximately 90 days. The mean maximum temperature is 31.9°C , minimum 24.2°C while the mean daily relative humidity is about 71.9% (FRIN, 2014).

Experimental Design

Two hundred seedlings with good vigour and relatively uniform growth were randomly selected and transplanted into medium sized (10 X 18cm) poly pot filled with 2 kg of the prepared soils and these were exposed to different light intensities: 100%, 75%, 50% and 25% of full day light. Each soil textural class was replicated 10 times under each light intensity chambers. A total of fifty seedlings were placed under each light intensity chamber. Seedlings put under light screening intensive chambers with one layer of mesh net is for 75% of light intensity, those under cages with double layer of mesh net stand for 50% light intensity, those under light screening chambers with triple layers stand for 25% light intensity while those in the open field were exposed to 100% light intensity (Akinyele, 2007 and Agbo-Adediran, 2014). Light intensity within and outside the light screening chamber was measured with a light meter.

For biomass estimation, mean height of the seedlings of each soil textural classes were calculated and one seedling whose height is closest to the mean height was selected for destructive sampling at every four weeks for 16 weeks. The selected seedling from each treatment was carefully uprooted by separating the seedling from the soil, washed and sectioned into root, stem and leaves. Estimations of stem length and root length of each seedling was obtained using meter tape and sensitive weighing balance was used to obtain the initial (fresh) weight of leaves, stem and root. After taking the fresh weight, seedling components (leaf, stem and root) were taken to the analytical laboratory of the Department of Sustainable Forest Management, FRIN, placed in the oven and dried at 70°C until a constant weight is obtained. Since 100% of each component was dried in the oven, the dry weight of each component was taken as their biomass. Seedling total biomass was then obtained by summing the biomass of the various components.

Data collection and analysis

The data collected was subjected to Analysis of Variance and the means were separated using Duncan Multiple Range Test (DMRT) procedure.

Results and Discussion

Effect of light intensities on the biomass accumulation of *E. angolense* seedlings

Leaf Dry Weight (LDW)

The mean seedlings Leaf Dry Weight (LDW) for light intensities ranged from 1.12 to 1.43 g with the highest mean LDW (1.43g) is observed in seedlings placed under 75% Light Intensity (LI) and the lowest mean LDW (1.12g) was recorded in seedlings placed under 25% LI (Table 1). Analysis of Variance (ANOVA) indicated that there were significant differences ($p \leq 0.05$) in the LDW of seedlings of *E. angolense* placed under different light intensities (Table 4).

Stem Dry Weight (SDW)

The mean seedlings Stem Dry Weight (SDW) for light intensities ranged from 0.83 to 1.12 g with the highest mean SDW (1.12g) was in seedlings placed under 100% LI and the lowest mean SDW (0.83g) from the seedlings placed under 25% LI (Table 1). ANOVA indicated that there were no significant effect ($p > 0.05$) of light intensities on the SDW of *E. angolense* seedlings (Table 4).

Root Dry Weight (RDW)

The mean seedlings Root Dry Weight (RDW) for light intensities ranged from 0.94 to 1.21 g with the highest mean RDW from seedlings placed under 100% LI and the lowest mean RDW from the seedlings placed under 25% LI (Table 1). ANOVA indicated that there was no significant effect ($p > 0.05$) of light intensities on the RDW of *E. angolense* seedlings (Table 4).

Total Dry Weight (TDW)

The mean seedlings Total Dry Weight (TDW) for light intensities ranged from 2.90 to 3.58 g with the highest mean TDW (3.58g) was in seedlings placed under 75% LI and the lowest mean TDW (2.90g) was in seedlings placed under 25% LI (Table 1). ANOVA indicated that was no significant effect ($p > 0.05$) of light intensities on the TDW of *E. angolense* seedlings (Table 4).

Effect of soil textural classes on the biomass accumulation of *E. angolense* seedlings

Leaf Dry Weight (LDW)

Seedlings grown using loamy-sand had the highest mean Leaf Dry Weight (LDW) of 1.55 g while seedlings grown using sandy soil had the least with 0.93 g (Table 2). Analysis of Variance (ANOVA) indicated that there was significant difference ($p \leq 0.05$) in the LDW of seedlings of *E. angolense* grown with different soil textural classes (Table 4).

Stem Dry Weight (SDW)

Seedlings grown using sandy-loam had the highest mean Stem Dry Weight (SDW) of 1.39 g while seedlings grown using clay soil had the least with 0.72 g (Table 2). ANOVA indicated that there was significant difference ($p \leq 0.05$) in the SDW of seedlings of *E. angolense* grown using soil textural classes (Table 4).

Root Dry Weight (RDW)

Seedlings grown using sandy-loam had the highest mean Root Dry Weight (RDW) of 1.44 g while seedlings grown using clay soil had the least with 0.70 g (Table 2). ANOVA indicated that there was significant difference ($p \leq 0.05$) in the RDW of seedlings of *E. angolense* grown using soil textural classes (Table 4).

Total Dry Weight (TDW)

Seedlings grown using sandy-loam had the highest mean Total Dry Weight (TDW) of 4.36 g while seedlings grown using clay soil had the least with 2.54 g (Table 2). ANOVA indicated that there was significant difference ($p \leq 0.05$) in the TDW of seedlings of *E. angolense* grown using different textural classes of soils (Table 4).

Table 1: Mean Separation for the Effect of Light Intensities on the Biomass accumulated by *E. angolense* Seedlings

Light Intensity	LDW	SDW	RDW	TDW
100%	1.13 ± 0.11b	1.12 ± 0.10a	1.21 ± 0.10a	3.46 ± 0.28a
75%	1.43 ± 0.12a	1.09 ± 0.13a	1.07 ± 0.13a	3.59 ± 0.24a
50%	1.42 ± 0.09a	0.99 ± 0.14a	1.11 ± 0.11a	3.52 ± 0.22a
25%	1.12 ± 0.14b	0.83 ± 0.11a	0.94 ± 0.12a	2.89 ± 0.23a

Mean±SE followed by the same superscripts in column are not significantly different ($p > 0.05$)

Table 2: Mean Separation for the Effect of Soil Textural Classes on the Biomass Accumulated by *E. angolense* Seedlings

Soil	LDW	SDW	RDW	TDW
Clay	1.12 ± 0.11 ^b	0.72 ± 0.11 ^c	0.70 ± 0.14 ^c	2.54 ± 0.27 ^c
Sandyloam	1.52 ± 0.11 ^a	1.39 ± 0.11 ^a	1.44 ± 0.14 ^a	4.35 ± 0.27 ^a
Sandy	0.93 ± 0.11 ^b	0.99 ± 0.11 ^{ab}	1.00 ± 0.14 ^{ab}	2.92 ± 0.27 ^{bc}
Loamysand	1.55 ± 0.11 ^a	0.87 ± 0.11 ^{ab}	1.03 ± 0.14 ^{abc}	3.45 ± 0.27 ^b
Loamy	1.26 ± 0.11 ^{ab}	1.07 ± 0.11 ^b	1.22 ± 0.14 ^{ab}	3.55 ± 0.27 ^b

Mean±SE followed by the same superscripts in column are not significantly different ($p > 0.05$)

Interaction effect of light intensities and soil textural classes on the biomass accumulation of *E. angolense* seedlings

Leaf Dry Weight (LDW)

Interactions of light intensities and soils showed that seedlings grown using loamy-sand placed under 50% LI had the highest mean Leaf Dry Weight (LDW) of 2.29 g while seedlings grown using sandy soil placed under

50% LI had the lowest mean LDW of 0.70 g (Table 3). Analysis of Variance (ANOVA) indicated that there was no significant interaction effect ($p>0.05$) of light intensities and soil textural classes on the LDW of *E. angolense* seedlings (Table 4).

Stem Dry Weight (SDW)

Interactions of light intensities and soils showed that seedlings grown using sandy-loam placed under 50% LI had the highest mean Stem Dry Weight (SDW) of 1.80 g while seedlings grown using loamy-sand placed under 25% LI had the lowest mean SDW of 0.58 g (Table 3). ANOVA indicated that there was no significant interaction effect ($p>0.05$) of light intensities and soil textural classes on the SDW of *E. angolense* seedlings (Table 4).

Root Dry Weight (RDW)

Interactions of light intensities and soils showed that seedlings grown using sandy-loam placed under 50% LI had the highest mean Root Dry Weight (RDW) of 1.56 g while seedlings grown using clay soil placed under 25% LI had the lowest mean RDW of 0.59 g (Table 3). ANOVA indicated that there was no significant interaction effect ($p>0.05$) of light intensities and soil textural classes on the RDW of *E. angolense* seedlings (Table 4).

Total Dry Weight (TDW)

Interactions of light intensities and soil textural classes showed that seedlings grown using sandy-loam placed under 50% LI had the highest mean Total Dry Weight (TDW) of 4.89 g while seedlings grown using clay soil placed under 25% LI had the lowest mean TDW of 2.05 g (Table 3). ANOVA indicated that was no significant interaction effect ($p>0.05$) of light intensities and soil textural classes on the TDW of *E. angolense* seedlings (Table 4).

Table 3: Mean Values for the Interaction Effect of Light Intensity and Soil Textural Class on the Biomass Accumulated by *E. angolense* Seedlings

Light Intensity	Soil	LDW	SDW	RDW	TDW
100%	Clay	0.89 ± 0.23	0.76 ± 0.22	0.78 ± 0.28	2.43 ± 0.53
	Sandyloam	1.18 ± 0.23	1.70 ± 0.22	1.43 ± 0.28	4.31 ± 0.53
	Sandy	1.14 ± 0.23	1.12 ± 0.22	1.17 ± 0.28	3.42 ± 0.53
	Loamysand	1.22 ± 0.23	0.92 ± 0.22	1.12 ± 0.28	3.26 ± 0.53
	Loamy	1.22 ± 0.23	1.13 ± 0.22	1.53 ± 0.28	3.87 ± 0.53
75%	Clay	1.31 ± 0.23	0.89 ± 0.22	0.63 ± 0.28	2.83 ± 0.53
	Sandyloam	1.99 ± 0.23	0.89 ± 0.22	1.54 ± 0.28	4.42 ± 0.53
	Sandy	1.00 ± 0.23	1.19 ± 0.22	1.11 ± 0.28	3.31 ± 0.53

	Loamysand	1.58 ± 0.23	0.87 ± 0.22	0.80 ± 0.28	3.25 ± 0.53
	Loamy	1.27 ± 0.23	1.58 ± 0.22	1.26 ± 0.28	4.10 ± 0.53
50%	Clay	1.41 ± 0.23	0.63 ± 0.22	0.82 ± 0.28	2.85 ± 0.53
	Sandyloam	1.53 ± 0.23	1.80 ± 0.22	1.56 ± 0.28	4.89 ± 0.53
	Sandy	0.70 ± 0.23	0.65 ± 0.22	0.82 ± 0.28	2.17 ± 0.53
	Loamysand	2.29 ± 0.23	1.11 ± 0.22	1.38 ± 0.28	4.77 ± 0.53
	Loamy	1.17 ± 0.23	0.75 ± 0.22	0.95 ± 0.28	2.87 ± 0.53
25%	Clay	0.87 ± 0.23	0.59 ± 0.22	0.59 ± 0.28	2.05 ± 0.53
	Sandyloam	1.37 ± 0.23	1.18 ± 0.22	1.25 ± 0.28	3.81 ± 0.53
	Sandy	0.89 ± 0.23	0.99 ± 0.22	0.91 ± 0.28	2.79 ± 0.53
	Loamysand	1.10 ± 0.23	0.58 ± 0.22	0.83 ± 0.28	2.50 ± 0.53
	Loamy	1.38 ± 0.23	0.82 ± 0.22	1.14 ± 0.28	3.34 ± 0.53

Mean±SE followed by the same superscripts in column are not significantly different (p>0.05)

Table 4: ANOVA Result for the Effect of Different Light Intensities and Soil Textural Classes on the Biomass Accumulation of *E. angolense* Seedlings

Variable	SV	Df	SS	MS	F	Sig.
LDW	LI	3	1.33	0.44	2.91	0.05*
	S	4	3.30	0.83	5.42	0.00*
	LI * S	12	3.39	0.28	1.85	0.07 ^{ns}
	Error	40	6.10	0.15		
	Total	59	14.12			
SDW	LI	3	0.76	0.25	1.80	0.16 ^{ns}
	S	4	3.08	0.77	5.45	0.00*
	LI * S	12	3.31	0.28	1.95	0.06 ^{ns}
	Error	40	5.65	0.14		
	Total	59	12.80			
RDW	LI	3	0.53	0.18	0.75	0.53 ^{ns}
	S	4	3.63	0.91	3.90	0.01*
	LI * S	12	1.20	0.10	0.43	0.94 ^{ns}
	Error	40	9.31	0.23		
	Total	59	14.66			
TDW	LI	3	4.44	1.48	1.66	0.19 ^{ns}

S	4	22.82	5.71	6.42	0.00*
LI * S	12	12.47	1.04	1.17	0.34 ^{ns}
Error	40	35.56	0.89		
Total	59	75.29			

*significant at ($p \leq 0.05$) ns- not significant ($p > 0.05$)

Conclusion

This study reveals that *Entandrophragma angolense* seedlings preferred moderate light intensities (50% light intensity) and sandyloam for optimum biomass production. *Entandrophragma angolense* can be raised under any of the light intensities in the nursery and have the ability of surviving when planted under tree canopies for enrichment planting programme.

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Wailing of the people of South Sudan from oil contamination (overview of oil production and effects on people health)

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Abstract- The suffering of the South Sudan people from oil contamination occurred in 1997, with the starting of oil production in the then Sudan, followed by reckless exploitation of crude oil and transportation of this crude oil from prospected sites to the Port of Sudan and finally to its way to market through international water.

Handling this activities from wells to tankers and cross 300,000km to its destination was not proper, one can remember how some trucks only makes its environment pollution by not reaching the destination but only to overturn and pours out all the hydrocarbons and no means for cleaning up the site that the incident occurred. Oil contaminated water and soil always have toxics materials or chemicals that may affects people's health and cause further disaster impacts to the ecosystem(Chu, Feng et al. 2015). Oil extraction is very dangerous for the public health for the people who lives in the area and for the workers who works with the oil sectors, because the oil contaminate water, soil, and air pollution which leads to human illness and subsequently to social demographic distribution(Johnston, Lim et al. 2019). Heavy metals are said to affect the total water under the earth surface, ponds, aquifers, and underground streams are said to be in constant danger from this heavy metal contamination

Such as **lead, copper, zinc, and Cadmium (Anyika, Abdul Majid et al. 2015)**, when the heavy metals enter into the soil, they would persists to travel far more for long time due to that they are not moving quickly in their nature. At the some points there are those heavy metasl that can wash on the process into different soil layers and their elements can travel far to aquifers but their movement cannot be that fast because of their migration, (Sherene 2010).

Index Terms- Contamination, health, water quality

I. INTRODUCTION

It's obvious that the world is leading into new strategy of dealing with only none polluted energy and minimize usage of contaminated resources like oil, coals almost all the combustible energies, therefore, they comes to introduce the green energy.

After World War 2, the world engaged its self in industrial and technological competition, and to achieve their ambitions, oil played major roles in enriching these countries financially, almost 61% of the total reservoirs worldwide is occupied by oil prospects, and the more it's found in that part of the earth, the more the contamination is inevitable.

Just as the case of South Sudan people wailing from water, soil, air contamination by oil, this country falls at the center of Africa, with its population of 14 million people, and it has oil revenue which almost acts as the main lifeline of our economic status. In an autonomous referendum, it separated from the old Sudan and forms this new state call South Sudan, with amount of 350,000bb/d, before it's enhanced to 500,000b/d till 2013, when it plunged into another crisis. The production of these 500,000bd, is what is so interesting about in this paper, how this amount does caused the country to have this grave risked future.

Oil is the most dangerous substances that can contaminate soil and water through(Appiah-Adjei, Baidu et al. 2019) and their contamination can biodegrade the soil for a long time, putting human and animals lives at stake. Oil products are the danger to soil, due to their toxicity, spreading scale, and migration ability(Sushkova, Minkina et al. 2019) and (Weihang Shen a and Pingxiao Wu a 2015).

The elements that contaminate the soil are (Radon, Asbestos, lead, creosote and chromatid copper arsenate) the total petroleum Hydrocarbons like (PAHs) spreads into environmental as toxicants basically formed at the time of incomplete combustion of hydrocarbons, And other organic substances (i.e, coal, kerosene, lubricants oil, coal and fossils).(Sushkova, Minkina et al. 2019)

As the result of this, the world is working tirelessly to overcome such a deadly future by introducing some mechanisms to avoid depletion of ecosystem sustainability and serve the services of natural ecosystem in check by remediating the contaminated soil(Shen, Ashworth et al. 2016) and clean the sites with kerosene oil(Huu-Tuan Trana and 2018). Planting a plant seeds to grow a trees which may become a forest would eventually minimize, mitigate, clean the contaminated soil(Mohammad Nazrul Islama Available online 27 June 2017) this phytoremediation used currently because it's cheap and emit nothing to the ecosystem. It has both beneficiary as it

enhance and absorb the pollution and clean up the soil (Gou, Yang et al. 2019).

II. SOUTH SUDAN MAP



Data Source: USGS SRTM



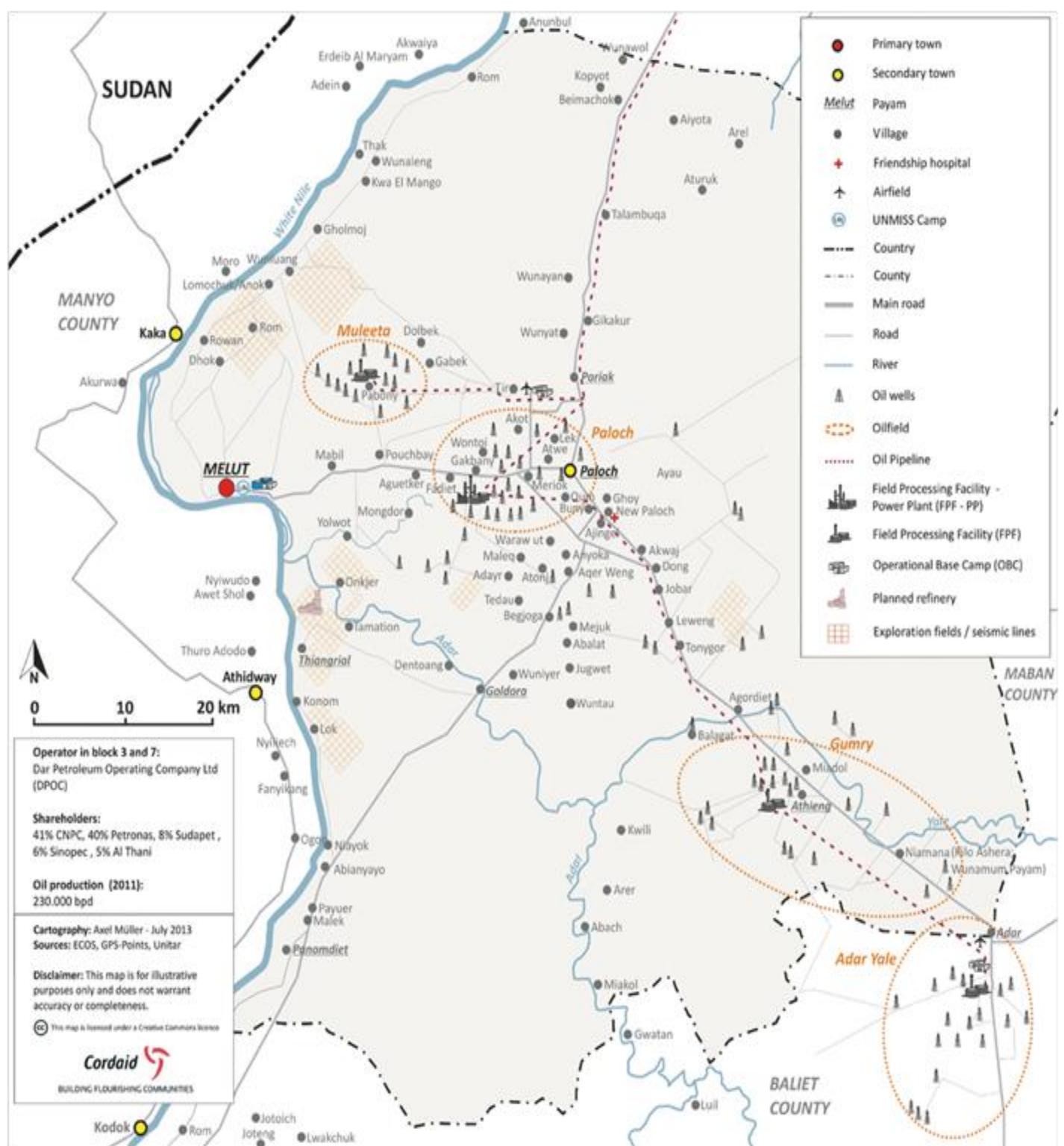
Water produced from oil in Paloch oil field(source UN environment South Sudan)

Oil and the people health in South Sudan

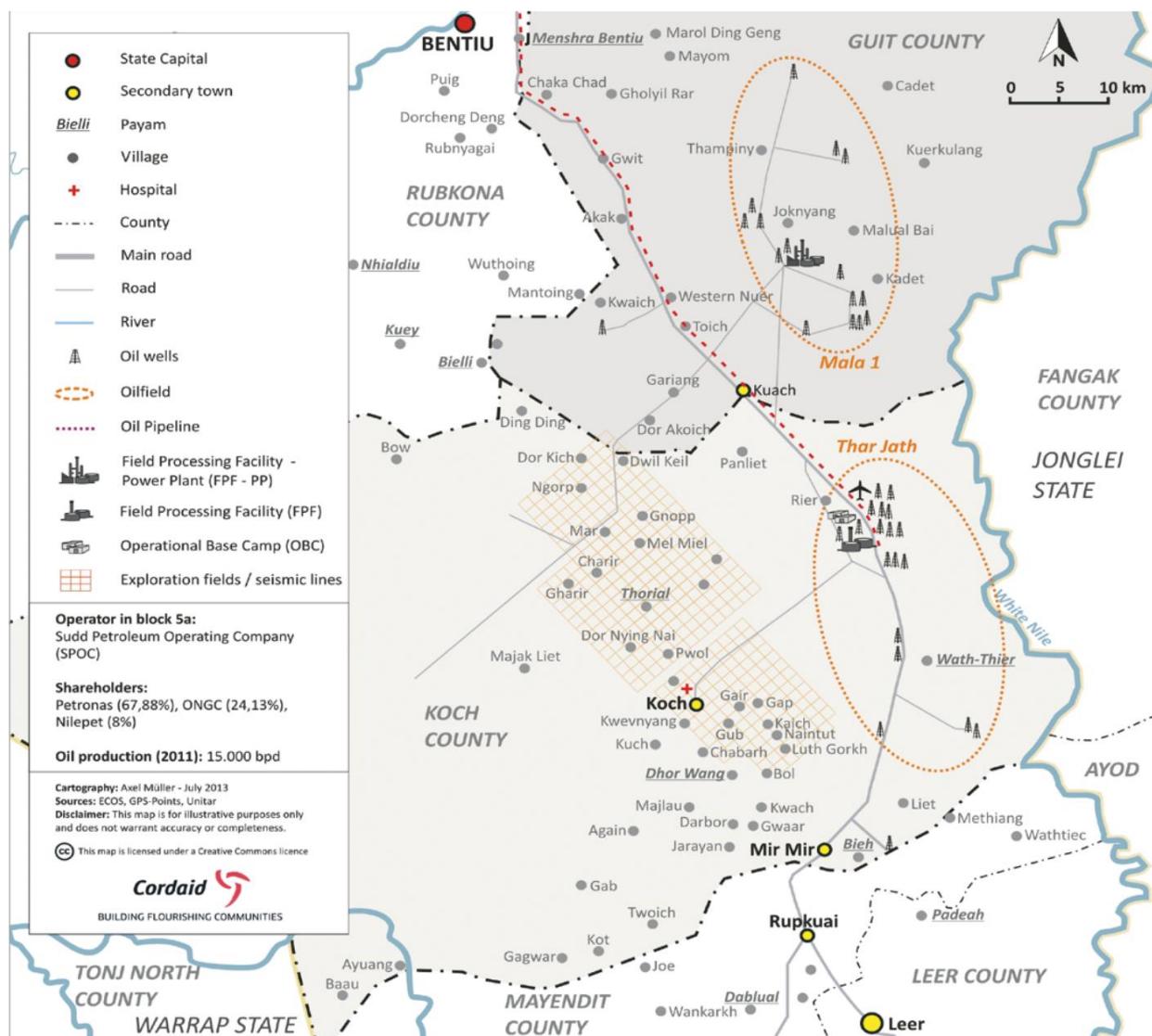
The health of the civil population in the country part of the Upper Nile is endangered by the exploration and production of the oil activities, first it started with displacement of some population in Unity State, where block 1, 4 & 5A is abased, to Melut, Adar, blocks 3 and 7 , in the Northern part of the country.

This practical displacement was only for peoples whose areas falls under exploration prospects and they get little or none compensation from either government or the business companies in the blocks, beside their health, mass movement of people as the result of their drinking water pollution because most of the people drinks from the open lakes and streams of water flowing from the Nile and its tributaries. Hence, the crude oil spills from the constructing sites, dumped wells, and overflowing storage tanks contaminates soil and water (Sarmadi, Zohrevand et al. 2019), moreover, some elements go as far as contaminating ground water (Appiah-Adjei, Baidu et al. 2019) .over 80% of the women living in the affected areas have given birth with children's that have missed limbs, blinds, and deform images(NBS, 2014) The scientific studies shows that the pollution from the oil industries are causing health difficulties including rising numbers of the females infertilities, miss carriages, birth defects, and eyes and skins irritations (Cordaid, 2014) .

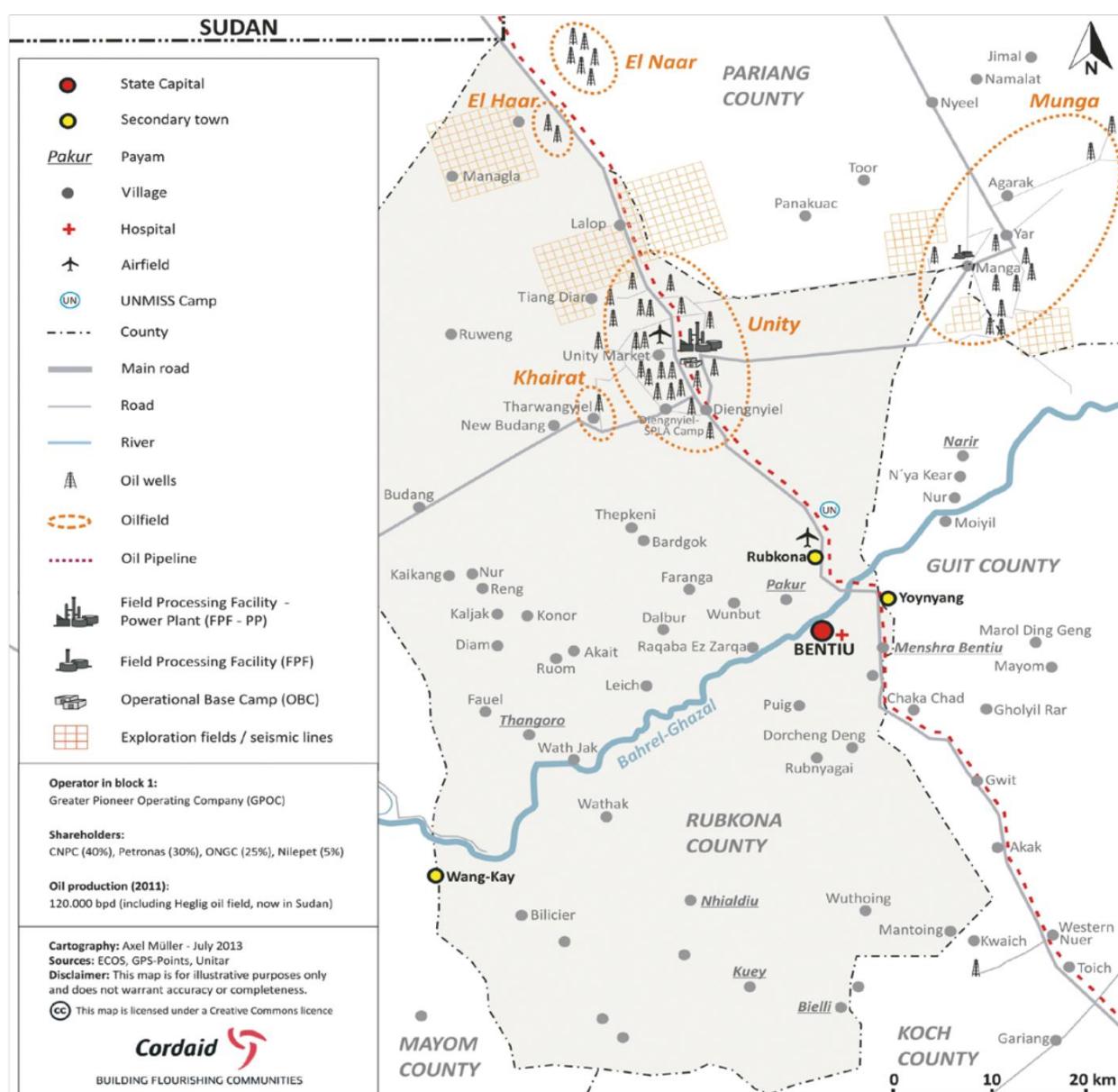
Oil production in Melut County(taken from Cordaid)



Oil production in Koch and Guit counties (source is cordaid)



Oil production in Rubkona and Panrieng counties (source cordaid)



Water-soil contamination

The main water sources in the country is the Nile river and precipitation water from the rain, these water from rain and Nile comes through lakes and braided streams for the domestic use.

But the waste water from oil industry acts as a pollution point source due to lack of technology for treating water pumped out from oil formation(Genovese, Denaro et al. 2008), the oil companies are using bioremediation to contain, treat and clean the heavy metal from contaminating the ground water. Thus, there bioremediation acts as the treatment hubs for the waste pumped materials, and pass them through different stages for microbial clean up(Embar, Forgacs et al. 2006).

The most awful threat of the environmental nowadays, is the hydrocarbons spillages that flows from oil production activities and tends to have relations to the petrochemical industry unlawful disposal of petroleum products. The

petroleum elements are classified and tabled as belong to neurotoxic organic contaminants.

Bioremediation to the group of carcinogens as an accepted technology of incineration and composting security of landfills has become extremely cheap and affordable for the local business entities who has no capacities to build membrane reactor for treating and handling these produced water from oil(Das and Chandran 2011) in the events that the amount of hydrocarbons or any other organic and inorganic compound become too much, Mechanical and chemical concepts generally should be used to treat or remediate hydrocarbons from polluted areas can also be expensive(Denyes, Parisien et al. 2014). Bioremediation is the newest way of treating the waste from oil and other sites because its cost effective and it makes total mineralization. Bioremediation's primary works is to biodegrade soil from the contaminants, which can leads into transformation or organic contaminants into CO_2 H_2O , inorganic compounds, and

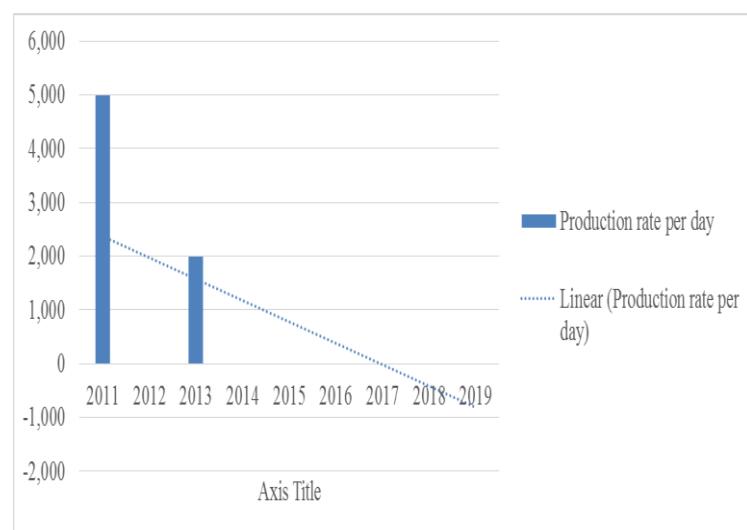
proteins or changes of complex organic body into any other simplest organic compounds using biological catalyst like microorganisms. Largest amount of these indigenous bacteria in the water or soil are only able to degrade hydrocarbons contaminants. In this paper we will only overview the contamination of the soil and water only in the South Sudan caused by oil exploration and flow of the oil and how the people manage this.

Trend of oil production in the last eight years and their potential contamination

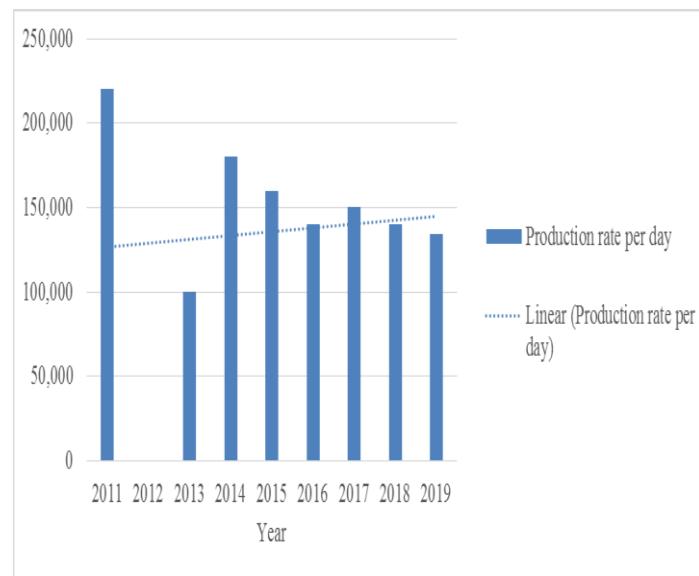
Unity Oil production

year	Production per a day
2011	103,000 b/d
2012	0.00 b/d
2013	50.00 b/d
2014	0.00 b/d
2015	0.00 b/d
2016	30,000 b/d
2017	33,000 b/d
2018	30,000 b/d

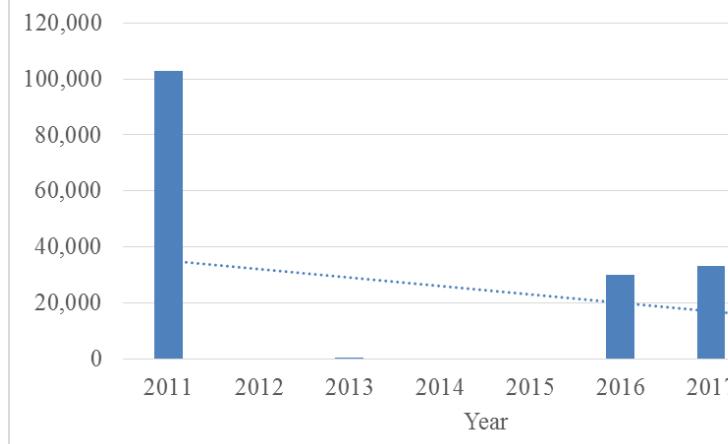
Trend of oil contamination in Tharjath oil field production per a year



Trend of Oil contamination in Paloch oil field production per a year



Trend of oil contamination per a year in Unity oil field production



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The Practices of News and Source Usage in Ethiopian Television

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Abstract- This paper examined the practices of news and source usage in Ethiopian Television (ETV). It assessed news and source selection criteria of the media organization. The study also focused on the major source of news and speakers in the news. Besides, factors affecting news and source selection was also another objective of the study. The study used mixed research method. As a result, quantitative content analysis and an in-depth interview were used as tools of data gathering. It employed purposive sampling to select key informants for the study. For the media content sample, the study focused on ETV's prime time news at 8:00 PM. The findings of the study showed that the major criteria of news selection in ETV were based on the value of the news in building the image of the government. Sources of the news were government officials. The majority of the speakers in the news production by ETV staff reporters were government officials, especially those found at federal level. It was also found that there is lack of journalistic independence in the media. Journalists were influenced to report the positive sides of government and conceal the wrong doings of government officials. Therefore, in the way to the truth as diversified views are very crucial, Ethiopian Television should take the necessary measure to treat varies views in its news stories.

Index Terms- Ethiopian Television, News, Source

I. INTRODUCTION

The primary objective of a news organization is to gather, describe and transmit the news to the large public. To do this, media professionals rely on sources. The media do not simply report something newsworthy as it is. News is the final product of various processes. MacDougall (1968) explains this: At any given moment billions of simultaneous events occur throughout the world... all of these occurrences are potentially news. They do not become so until some purveyor of news gives an account of them. The news, in other words, is the account of the event, not something intrinsic in the event itself.

There are rules which guide journalists for the selection of news. One of these rules is the news value. According to Golding and Elliot (1979), news values are used in two ways. They are criteria of selection from material available to the newsroom of those items worthy of inclusion in the final product. Second, they are guidelines for the presentation of items, suggestion what to emphasize, what to omit, and where to give priority in the preparation of the items for presentation to the audience.

One of the most basic questions about the value of a work of journalism is the nature of its sourcing. Gans (1979: 80) defines sources as "the actors whom journalists observe or interview, including interviewees who appear on the air or who are quoted in articles, and those who only supply background information or story suggestions." There are a lot of possible sources of information about an issue or event for journalists. Keeble (2001: 41) argues, "At the heart of journalism lies the source; becoming a journalist to a great extent means developing sources. How deep are the sourcing, what are the ranges of views offered, and how much can the audience decide for itself what to think about the story? These are the essential elements in trying to assess the quality of reporting (Annual report on American journalism, 2005). Therefore, to increase the value of journalism and quality of reporting, it is inevitable that news and its sources are at the heart of the profession of journalism. Hence, media practitioners are supposed to consider their news and sources very meticulously.

II. STATEMENT OF THE PROBLEM

As to many scholars, for instance, Defleur and Dennis, (1981:325), news is the most powerful media outlet that can make a significant contribution to building a democratic society by depicting a reasonably true picture of what is going on, creating what should be a close correspondence between the 'world outside' and the 'pictures in our heads' Moreover, Hatchen argues that "A democratic society requires a diversity of views and news sources available – marketplaces of ideas from which the public can choose what it wishes to read and believe about public affairs" (1998: 37). So, for the reflection of diversity of views in news production, giving special emphasis for sources of news is most important one.

As mentioned already, news and sources are the two big players in journalism; they have an impact on its practice. Mwaffisi (1994:161) avows, without news, journalism would not exist. And Keeble (2001: 41) avers, at the heart of journalism lies the source. In line with this, it is vital to conduct a study on the practices of Ethiopian Television in news and source usage.

III. OBJECTIVES OF THE STUDY

General Objective

The general objective of the study is to investigate the practices of news and source usage in Ethiopian Television

IV. SPECIFIC OBJECTIVES

1. To identify news and source selection criteria in Ethiopian Television (ETV)
2. To find out the major source of news and speakers in the news in ETV
3. To find out the factors that affects the selection of news and source in the media organization.

V. RESEARCH QUESTIONS

1. What are the criteria of news and source selection in Ethiopian Television?
2. What are the major sources of news and speakers in the news in the media organization?
3. What factors do affect the selection of news and source in the media organization?

VI. RESEARCH METHODOLOGY

In order to answer the research questions and accomplish the objectives of the research, both qualitative and quantitative research methodologies (mixed methods design) have been employed. As a result, the study employed quantitative content analysis and in-depth interviews as data gathering tools. The study

employed purposive sampling to select key informants based on their experiences. The main purpose was to get detailed data from key informants of the media practitioners. For the media content sample, the study focuses on ETV's prime time news at 8:00 PM as it is the time most people come back to their home and watch the news. The researcher believes that a sample of one or two month's prime time news of whatever issues can serve the purpose of the study. Accordingly, the study examined the first two weeks of each of the three months: December, 2012, January and February, 2013. This also has its own reasons. Firstly, the researcher believes that ETV's news broadcast of any times can serve the purpose of the study. Secondly, in order to create variety, it is important to see news that was broadcast at different times.

Data Presentation and Discussion

Sources of the News and Speakers within the News

Based on the objectives of the study, it is fitting to look into the sources that dominate the news production and the major speakers in each of its news stories. Mwaffisi (1994: 161) described sources as the lifeblood of the news, which is the heart of constructing news. In the news making process, sources are the main factors that are taken into consideration at the early stage of news gathering. They are regarded as the output of the news.

Based on the content analysis of six weeks of ETV prime time news stories, the following major sources and speakers within the news were discussed.

Speakers within the news	Sources of the news							
	ETV staff reporters	Ethiopian News Agency	Regional Gov't Comm.	Public relations practitioners	News media organizations	Others	Total	Percent
Government officials at federal	63	6	0	5	0	1	75	51
Government officials at regional	13	2	21	2	2	1	41	27.9
Political parties	3	0	1	0	0	0	4	2.72
Community members	8	2	2	0	1	0	13	8.84
Scholars	5	0	2	0	0	0	7	4.76
Others	3	2	0	2	0	0	7	4.76
Total	95	12	26	9	3	2	147	
Percent	64.62	8.16	17.7	6.12	2	1.36	100	

Table: Sources of the news and speakers within the news

The above table can be described in terms of three classifications: Firstly, the sources of the news; secondly, the speakers within the news and thirdly the emphasis that each source of news adopted for each of its speakers. Accordingly, each of them will be discussed below.

The table depicts that ETV uses different sources of news. Firstly, news which is prepared by ETV staff reporters and the others are from Ethiopian News Agency (ENA), regional government communication offices, public relations practitioners (PRs), different news media organizations and other sources. Out

of 147 news items which were broadcast in ETV, 95 (64.62%) of the news was produced by ETV staff reporters. The regional government communication offices covered about 26 (17.7%) and ENA and PRs practitioners were used 12 times (8.16%) and 9 times (6.12%) respectively. Therefore, it is possible to infer the vast majority of the news in ETV is covered by the staff reporters. In addition, it can be deduced that the other sources of ETV's news were government sources. Secondly, as can be inferred from the above table, government officials at federal level were the main speakers within the news. They appeared in the news 75 times (51%) out of 147 news stories. The regional government officials accounted for about 41 (27.9%) of stories. The community members became speakers within the news about 13 times (8.84%). Scholars and varied political parties covered 7 (4.76%) and 4 (2.72%) of the total news stories respectively. This implies that government officials at both the federal and regional levels were given the highest coverage in ETV. On the contrary, different community members only received 13 (8.84%).

Thirdly, the findings of the above table also show that from the majority of news stories that were produced by ETV staff reporters, which is out of 147 news stories, 63 of the pieces derived from the words of government officials found at federal levels. About 13 news stories were from government officials found at regional level. The others like community members and scholars were given scanty coverage by ETV staff reporters. ENA gave coverage for federal government officials about 6 news stories out of 12 news stories from the whole the total number of news which is 147 news stories. The regional government communication office gave the highest coverage, which accounts for about 21 news stories for government officials found at regional level out of the news stories originated from the regional government communication office which accounts 26 news stories from the total news stories, 147 news stories. And they gave little coverage for the others. The public relations practitioners also gave the highest proportion of coverage for federal government officials which amounts to about five of the nine news stories originating from PRs practitioners.

So, what one can deduce from the above table is that the majority of the speakers in the news production by ETV staff reporters were government officials, especially those found at federal level. Besides, it is possible to infer that the majority of news that came from different regions was beamed directly from government communication offices. This means ETV doesn't pay enough mind to sending reporters to the regional offices because of the access of information it has through them. What is more, the table shows that the news organizations that supplied news to ETV gave more coverage for government sources by emphasizing the views of officials of the government both at federal and regional levels. This shows as the government has different communication offices which supply information to ETV in different places. In relation with this point one informant said the following:

Informant: 4: When ETV aims to organize news, at the same time source of the news is planned together. There is an agreement established by ETV to utilize officers from different organizations, ENA, regional government communication offices and PRs.

this context is seen with what Schudson (1995:28) says is that journalism serves as a common carrier of the perspectives of varied groups in society. According to Schudson, various

perspectives can be entertained through media. It is the role of media in allowing people to voice their opinions. So far, it is also indicated that media are seen as crucial to the promotion of democratic values reflecting society in all its complexity and with many view points as possible, as discussed in the text (Allan, 2005: 55). The argument shows the role of media in democracy by inviting various perspectives. When we compare this with the experience of ETV, the findings show something different. It is possible to argue ETV is a medium in which the voice of the government officials is being heard and the voices of the others are being given less mind. This leaves in jeopardy the democratic process Ethiopian has begun to adopt because for democracy to exist, different viewpoints should be incorporated. In this regard, when we see community members and various political parties, they appeared as information providers in 13 and 4 news stories respectively. It is evident from this that diversified views were void in ETV's coverage.

As Holmes (1920) stated, media are a place where different ideas are entertained. The findings of the study appear in conflict with this point because the practice of ETV indicates that stories were presented from one angle in which officials propagate their agenda by dominating the media.

News Selection Process in ETV

The media do not simply report on something newsworthy. As discussed, news is the final product of various processes. Several scholars proposed different criteria for news selection, Golding and Elliot (1979) proposed on three things for news value: the audience, accessibility and fit. Here, the researcher looks at news selection based on audience interest in ETV. Accordingly, the researcher asked the informants their criteria of news selection. The following is said by informant I:

ETV selects news based on the mission of the ruling party. There is choice of news to be transmitted through ETV considering its content having to evaluate the impact posed against any official beginning from lower level up to higher official on federal level. We have given up much valuable and high intensity news for the above reason; silence is all we do for not covering the news broad cast, we neglected to give attention several times for such kinds of news. In ETV selection of news is done in command when officials from different departments like from finance department in the media come to the newsroom and order us to shape or to select news according to their interest.

From the above passage it is possible to infer that the selection of news in ETV is based not on audience interest. Rather, news is selected if it aligns with the interest of the government. Journalists are selecting news not according to the principles of journalism, but on the basis of their boss. Journalists are working to please their overseers not the public at large. The extracted text also indicates as there is a pressure on journalists on news selection. Journalists are not free to select their own news something that may benefit people. It is also possible to understand from the passage that news is valueless if it negatively raises the name of government officials at different levels. This means the media is working to build the good image of the government by hiding the negative coverage, even if it is true information that the public has the right to know. This runs in direct opposition with Kovach and Rosenstain, 2001 "Principles of Journalism" which say journalism's first obligation is to the

truth and public's right to information. On the same question, (ETV's criteria of news selection) informant 6 and informant 5 share common ideas. Their responses have been presented below respectively.

Above all, our primary objective is to achieve successful implementation of the strategic plan of our country, which intern is the basic for the choice of news. Though ETV is responsible for the house of people's representative, it works to implement the strategy and policies of government. Currently, our focus is playing decisive role in implementing the five years Growth and Transformation Plan (GTP) through selected news that relates and supports the plan.

The major criterion is the focus on the advantage that the news has to deliver to our country, I mean, based on the value of the news in alleviating poverty and promoting democracy. In order to achieve the goal, our purpose is providing information that plays a role in this regard. So, most of the news is chosen if it has any relevance in dealing with the success of our country. Similarly, when we take news from the international news agency like BBC, we take into consideration the benefit of the news towards our country. No matter the source of the news, we can reject news that ruins the image of our country. For example: Britanian's news agency, BBC doesn't work against demolishing the reputation of British and the same works for ETV. We try to attract investors from different parts of the world to come and invest in Ethiopia, success stories help to build a better image in creating good reputation for the country. Whether we like it or not news plays the major share in creating awareness for attracting investors from all over the world by building the image of our country. What defined Ethiopia as a poor country still today is the poverty that had happened in Ethiopia (the 1977 E.C).

The responses of the two informants above serve as evidence for ETV's criteria for news selection. ETV focused on the value of the news in contributing its role in the process of the development the country began. The findings show that ETV selection of news is based on the role the government is playing in development. Moreover, sources of the news are used only if they shed light on the positive developments of the country. This means the activities of the government, in the development aspect are prioritized by ETV. Generally, the angle of news selection in ETV is from government interest point of view, not from the public's interest.

Source Considerations in ETV

There are a number of factors journalists take into account when selecting sources in their news production. Gans (2004) identifies six major source considerations: past suitability, productivity, reliability, trustworthiness, authoritativeness and articulateness. Based on this, as the study in the above table indicated ETV journalists' sources and speakers of the news were found to be government sources and officials of government at different levels. One of the most basic questions about the value of a work of journalism is the nature of its sourcing. How deep is the sourcing, what are the ranges of views offered, and to what extent can the audience decide for itself what to think about the story? These are the essential elements in trying to assess the quality of reporting (Annual report on American journalism, 2005). One of the ways in which the quality of reporting can be seen is when a story is taken from various sources. The value of a

work of journalism is seen when different views are entertained by different sources. From the news stories conducted by ETV staff reporters, a majority of them are derived from the speech of government officials at different levels. Official sources, such as government officials are often preferred by journalists, not only because they are more easily accessible for interviews but also because journalists and their editors believe that official sources have important things to say (Paletz and Entman, 1981). Therefore, interviewing an official source makes journalists' jobs efficient by concentrating on individuals with important things to say and by eliminating the need to double and triple check facts (Hackett, 1985). Journalists gave a little emphasis to the other sources. Information was presented from the angle of the government officials. Informant 2 said the following in reference to claims that certain sources are given special priority in ETV's stories: 'This is because we are serving government and giving special priority for government sources. When a certain event is organized, our known reporting culture is to cover the statement made by a certain government official using people as background information provider. So, for us a big news value is the statement given by government official'. As this extract shows, the journalists of ETV are giving special attention to the speech of government officials. Information reliant on the public or different community members is regarded as supplementary.

Regarding the criteria of ETV's news source selection, the following informants had the following to say:

Informant 3: As much as we can, we see all available sources, but we select and use them thoroughly with great attention. We make use of those sources that go with government plan and reject the ones which opposes the strategy of the ruling party.

Informant 4: Our premium focus is not on the source. We look if the news is concerned with our country's development, and the role the news plays in keeping the national interest. This is the angle from which we approach the source. With regard to international sources like Reuters, CCTV and others, we do not directly copy and use them; thoroughly investigation will be made for the impact after we broadcast to the large public.

Informant 1: ETV uses every available source. The criteria is not the source, but what the content of news is the focus. If the news negatively affects the attitude that the public has towards government, it won't be accepted. If the news focuses on building the reputation of the government, without considering the source of the news, it will be accepted and transmitted.

The excerpts show that ETV is not playing the watchdog role of journalism, but rather is acting as an exhibition for positive portrayal of the government. Other viewpoints are simply rejected. This means news is presented in ETV the way it serves the government. This diminishes the big principle of journalism: 'journalism's loyalty is to citizens and it must serve as an independent monitor of power'. In contrast with these principles of journalism, ETV's primary practice, its loyalty is to government because those who received coverage on the channel are the government officials at different positions, rather than the citizens.

It is the government who is monitoring the media, not the media is monitoring the government.

From the three key informants above it is also possible to understand that ETV's criteria for news source selection is based on the content of the news rather than where the news came from. Whatever the source is if the news focuses on the positive development or constructive actions of the government, it has the chance to be covered. If not, whatever the source, coverage cannot be given. This indicates that ETV is playing its role in presenting daily the good side of the government where as it is rejecting the other sides of the story. It is possible to relate the above arguments with what Moloney (200:65) said in chapter two. He argues that a public relations is about power and manipulation against democracy because it is so often used to support government and commercial interests at the expense of other interests. Generally, in ETV, institutionally affiliated sources typically dominate news discourses. As a result, news comes to reflect government interests. Herman and Chomsky (1988:23) stress the symbiotic relationship between journalists and agents of power. Preferred meanings that are structured into news discourses are overwhelmingly 'those that are functional for elites'. As a result in ETV, sources playing to the interests of the government are favored and dominated while other sources were ignored.

Factors Affecting Journalists News and Source Selection

Weaver (1998) argues that reporters work can only thrive and flourish in a society that protects its media from censorship and in a company that saves its journalists from the marketers. A majority of the informants have pointed out that they have different challenges on selection of their own news and sources based on journalistic principles. The extract below illustrates this:

Informant 1: There are lots of challenges we face. We can't run a story which we believe serve the interests of the public. We are framed according to the plan of government. Since the government plan is focus on development story, we are doing the same. We don't have the power to deal with critical story. Our boss gives us direction on what kinds of story should we focus or not. Even there are times when our editors cut out the core point of the news when we bring newsworthy issues to the newsroom. Most of the time, this happens due to the lack of adequate knowledge from our editors. Most of our editors are people who are not from journalism background and their working experience is below acceptable. They are given the position as a result of political affiliation. They cut the most important part of the news by assuming that it may ruin the image of the government which is not concerned with. So, the structure of the works like reporters, editors and editor in chief is given in our media institution not based on your journalism knowledge. This highly affected the news selection process inside ETV.

As can be inferred from the excerpt above, the big challenge for news selection is the lack of journalistic knowledge displayed by some media professionals. Those who are placed at different positions in the media are selected according to their political affiliation, not for their knowledge of journalism. This means that those high up in media management give editors enough power only to serve the interest of the ruling party. In general, a lack of enough journalistic knowledge is hampering the profession; the government's role in appointing people of its interest at different positions is affecting the quality of journalism. As a result, most

of the news stories were shaped to serve the government's interest. With regard to the challenge on source selection, the same informant said:

Most of the time before we live the media, we receive order. Then we act as a "dispatch order" that is going to address or receive a message for and from somebody. There is no time in which we plan by ourselves to go wherever we want and do whatever we like. This means that we do not have the authority to select our own sources.

From this it can be determined that ETV has already established its source of news. That is why it sends its reporters to gather news to its own sources. This affects the diversity of views that certain news addresses and becomes what Paletz and Etman (1982) argue. They assert that use of official sources would result in homogeneity of reporting.

Informant 2 also eagerly described the challenge of news and source selection in the media as follows:

There are lots of interferences on our job from government. We are not independent in selecting our own news and sources. We are working as per the government's plan. So, it is the government decision that would take place in news and source selection.

Informant 5 (editor) expressed extremely negative opinions regarding the point of the above informants. He feels that "I allow reporters to select and gather news. I cannot impede them, and others cannot interfere with my work. However, if it has a problem in damaging the image of our country, I will revise it." This shows that journalists enjoy freedom of selecting their own news story as far as it doesn't have a negative impact up on government. If they do, their bosses have the authority to interfere with their work; this implies indirectly what informant 1 and 2 said above.

ETV's practice shows that the media practitioners are working to portray the government's image positively. They act as image builders of the government due to the lack of editorial independence in their organization. As a result, they work as per the order of their bosses.

to Gans (2004), while discharging lofty responsibilities, journalists use their power to determine what news story enters the symbolic arena. Dryly, MacManus (1954), Kovach (1990) and others claim that the move over the past ten years to 'market driven journalism' has fundamentally changed the daily role of journalists in making the news. The changes are characterized by a gradual and increasing lack of editorial independence within media organizations.

Almost all of the key informants of the study proved as it is so challenging to cover any critical stories on the government in ETV. The researcher asked the respondents to reason out their responses and said the following:

Informant 1: I do have about 23 years of work experience in ETV. All the way through these years, there is hardly any story which negatively disclose about the reputation of government or its official's. I remember the report of my coworker about a certain government organization. He challenged the government officials of the organization and made the report accordingly. Another government official called to our media and then ordered a reprisal to be taken on the reporter. ETV made another report to do a piece on the reporter by labeling him as "yegili tikim abarari" which means as the one who runs for self-benefit. Those who are on management position in ETV also took their own punishment up

on the reporter. This shows as there is no right to cover news which may negatively hurts one of the government officials. If one of them is mentioned, it is taken as if all of them are damaged equally. So we keep our self-refrained from doing the same activity.

The above extract revealed that journalists practice of self-censorship due to the pressures from government in selecting news story. This means that in order to survive within the profession of journalism, the journalists should work for the good name of the government. According to Solomon (2005:11), journalists practicing self-censorship often favor government authorities over other groups with different views in a number of ways. For instance, information could be suppressed in such ways as choosing safe-side, avoiding sensitive issues or giving responsibilities to faithful bosses, suppressing the stories in favor of politicians in power, giving emphasis for official speeches over other significant events and unquestioning the news worthiness of events where government authorities involve. It can be inferred from this that those journalists commit self-censorship serve the interest of those few people in government power. They become the activist of the government.

Informant 6: Sometimes we can do critical stories in ETV, but not in the way the name of government officials is negatively raised. For instance, last time, what we have seen on one Sugar Factory project called '*Tendaho Kasem*' project is too nauseating work when you see the finalized project in comparison with the allotted budget for the project. Here, it is the role of journalists to challenge the concerned body about the budget and the quality of the project. However, we had not done anything. I feel we should work hard, but it requires not only the media practitioner's commitment but also the political commitment leadership too.

What can be deduced from informant number six is that leaving out negative stories about the government is taken as a working culture within ETV. The culture in the newsroom is also one of the factors that affect news production process. As a result, journalists select stories which fit what has been said in editorial meeting. Underwood (1993) states that editors who need to allot space in the news pages well in advance prefer stories that are predictable, and fit the preconceptions that have already been discussed in editorial meeting. As can be deduced from the above view, government pressures on media practitioners resulted in self-censorship. It can be argued that self-censorship became the culture of the news room. However, one informant said this from another angle:

Informant 5: in ETV, I don't think that there is a challenge on journalists not to cover critical stories. Journalists censor themselves. Nobody asks them if they do it by substantiating their data by different evidences. In ETV on "Aynachin" program, different problems of government official are raised and government takes its own judgment. What is more, on the program called "Yegna Guday", the same thing is done. On these programs, different people raise various problems of their social environment then the government takes remedial solutions for the problem. Generally, as far as my knowledge is concerned, the government doesn't order them do this and not to do that. However, the problem is on the media itself. The trend we have experienced doesn't allow us to do an investigative journalism. There is no brave journalist who breaks through and engages himself/herself on such activities. As far as the past trend continues, the same activity will continue.

According to the above response, the journalists have censored themselves due to the problems that had been in the media. The informant claims that there is no pressure on journalists currently. According to the informant, journalists are free to cover critical stories of their own, but the effect of the past trend brought self-censorship. The same informant blames the media as follows:

The problem is not from the government. Though ETV is working about critical stories on certain program as I told you earlier, on news, ETV should work hard in covering the problems of some government officials so that the other officials learn from them. This helps others to correct themselves. Covering such kinds of issues doesn't have any concern with government.

However, one informant has a point of conflict with the above argument.

Informant 3: In Ethiopia the problem is the way the meaning of development journalism is interpreted by government, which focus on success stories only. Almost all of the news deals with the positive actions of the government, in the production of news, those assigned in core positions of the media are assigned directly by government. These people work to keep the interest of the government. These people work to entertain the voices of the political elite. If there is a controversial point, they want to handle the issue by themselves. They do not allow and encourage journalists to do an investigative work and journalists are responsible to do what their boss orders them. There is no chance for journalists to cover critical stories even if they get the opportunity; they pass over such stories because we are looking journalists who are punished by their salary and other vigorous punishments. This is why ETV's tone of news is positive most of the time.

So, most of the informants do agree that due to the order they receive from their bosses, they are not able to focus on investigative reporting. The people on positions in ETV are assigned to serve the interest of the government. Due to this, journalists select stories that meet their bosses' expectations. What they do is to meet the interest of the government. Hence, in ETV journalists are not independent in selecting their own news and sources. Most news stories were presented from the government's point of view. As a result, the media practitioners engage in news stories that promote government positive image and ignore critical stories that may affect the government reputation.

When the researcher asked the informants how they verify information for their report, most of the informants make reference to their news sources. According to the respondents, most of ETV news is event oriented. Due to this, their sources are government officials and public relations officers. Since most of their sources are government bodies. So, they revealed as they do not attempt to verify these sources in view of the fact that they are safe sources in ETV.

Kovach and Rosenstiel (2001) aver that the discipline of verification is what separates journalism from public relations or propaganda. Woolever (2002:44) also advises journalists to verify information they get from one source says "Once you have the information in front of you, the next step is to decide if source is an appropriate" and he emphasizes that one sided nature of news which do not add the opposite, neutral views is poor argument or report. The informant of the study responded their verification system for their report in terms of the following.

Informant 1: Shares his extensive experience by saying:

Most of our news is based on government events. We go to the event and report what government has done. During this time, we get “*ready made*” information in which we need no investigation. For example, the event may be the inaugural ceremony of condominium, what you do this time is to report the statements made by the government officials. People you want to interview are also there who are pleased in getting the chance to live in this condominium. You cannot find people who raise grievances on the system of the lottery or who raise other complaints on government. Even you don’t have time to contact different bodies because of the deadline pressure. ETV doesn’t encourage us to make a report while the project was on progress. Our organization sends us to make a report only after the completion of the whole project. So, you don’t know the ups and downs that the project passed through. Even if you know the problems with the project, they do not allow you to make a report on it. You simply say the government has done this and that. Therefore, to me, in ETV there is no way for information verification especially if the info comes from government sources. As the extract showed, it is possible to raise a number of reasons why ETV reporters often do not verify information, especially those of government officials. Firstly, due to the newsroom influence for deadlines. Because most of the news comes from government events, they copy what government officials said on the occasion. Secondly, government official sources are a safe story for most reporters. There is no need to verify if the information comes from government officials because they fit the agenda of the government and the media too. Thirdly, it is challenging to make an attempt to verify government information. In regards to the third claim, another informant had the following to say:

Though we do have the interest of verifying information especially the statement of government officials, the way to do it is closed. Sometimes when you do it and come up with different perspectives, our editors reject and present only the good version. So, we don’t have the power to verify government sources (informant 2).

Almost all of the respondents agree that because the majority of their sources are government bodies, they do not worry about crosschecking their information, and even neglect to do so to satisfy their bosses. Due to the fear implanted in journalists’ minds, they do not crosscheck from other bodies even if they question the information provided by officials. Scholars like Hadland (2005) recommend that journalists crosscheck every fact. Ironically, ETV journalist’s present information from one side as a result of the pressures weighed upon them. Independence is a major journalistic ethical foundation that should be given emphasis. This is due to the fact that credibility is very crucial for building the image of a given media group in the eye of the public. Kruger (2004:13) states, our credibility is massively affected by any perceived or real conflict of interest. We are unable to work if audiences discount our reporting because they see it as influenced by considerations outside of journalism, such as any personal, commercial or political motives.

VII. CONCLUSIONS

Understanding the source of the news and speakers in news stories reveal something about the station’s practice of journalism. The findings showed that the government sources were the main sources of news in ETV. Similarly, the government officials both at federal and regional levels were the main speakers in each news stories.

In ETV, the major criteria of news selection were based on the value of the news in building the image of the government. The news that lauds the government actions was given coverage no matter what the source is. In contrary, the station neglected any news and its sources if they coupled with negatively affecting the government’s actions/name.

ETV dominantly used government sources and gave coverage for the voices of the government officials. This finding concurs with Gans (2003) point. He contends that top-down coverage reflects the perspective of those who are powerful. Therefore, issues which are of priority to citizens interests were not covered in ETV.

Depending on the findings, it can be concluded that there are a lot of pressures affecting journalists’ news and source selection in ETV. The journalists are not doing critical stories or investigative journalism. They act as the mouthpiece of the government. News can be selected and distributed only if it talks about the positive actions of the government. Even journalists are neglecting to verify information because the source selection is done by the media and journalists lack independence.

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A Study Of Food Consumption Pattern & Nutritional Status Among T.B Patients In Government Hospital At Ranchi, Jharkhand

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Abstract: TB continues to be a major public health problem in India & results in a high burden of morbidity and mortality. Though India is 2nd largest populated country in the world, it accounts for nearly 26% of the global TB burden. **Objective:-** (1) To obtain the food consumption pattern of patients during the food consumption pattern of patients during the course of treatment at DOTS centre running at govt. hospital at Ranchi district of Jharkhand. (2) Assessment of knowledge regarding therapeutic diet regime, cleanliness, prevention and cure of disease. A cross sectional descriptive and community based pilot study was conducted at DOTS centres running at Sadar Hospital and PHC Doranda . A total of 50 patients of age group 10 and above were included in the study. Interview schedule was used for data collection. Data were entered in ms excel and analysed. Out of 50 patients majority were female (56%) between the age group 40 & above (61%), Hindu(78%), illiterate(36%) belonged to lower income group(62%) having poor hygiene status(70%) with no knowledge of TB (44%) and no knowledge of importance of diet (72%) with no consumption of protein or calorie food (64%) and belonged to low BMI status 90%. An overall improvement in education, socio-economic status, living conditions, sanitation and hygiene with correct knowledge of TB & its nutrition is necessary to decrease the prevalence of tuberculosis.

Keywords :- Tuberculosis, Dots centre, RNTCP, Smear, HIV/AIDS, NIKSHAY, NSP, LPG, ignorant, cognitive.

INTRODUCTION

Tuberculosis (TB) is a contagious infectious disease caused in humans mainly by Mycobacterium tuberculosis (MTB). MTB is spread essentially through air when an infectious person coughs, sneezes, talks or spits, saliva droplets containing tubercle bacilli which are projected into the air and can be inhaled by a nearby person.¹ Transmission occurs by air borne spread of infection droplets and droplet nuclei containing the tubercle bacilli, when a person inhale, those micro particles get lodge in the terminal bronchiole and the alveoli to infect a person.² The source of infection is a person with sputum smear positive pulmonary tuberculosis³ Each sputum positive case can infect 10-15 individual in a year if not treated.⁴

As per the Global TB report 2017 the estimated incidence of TB in India was approximately 28,00,000 accounting for about a quarter of the world's TB cases.⁵

Tuberculosis is spread through the air, which means you can only get it by breathing contaminated air. If someone who is actively sick talks, coughs, sneezes, or speaks they can spread TB..The majority of people exposed to the bacteria don't experience TB symptoms right away.^{6,7} Tuberculosis is more likely to enter the active phase in people who have acquired the infection recently (in the past two years). It's also more likely to be active among those whose immune systems are weakened as a result of malnutrition, old age, infection with HIV, immunosuppressant drugs, or among people who are on dialysis.^{8,9,10}

Worldwide, TB is one of the top 10 causes of death and the leading cause from a single infectious agent (above HIV/AIDS). Millions of people continue to fall sick with TB each year. In 2017, TB caused an estimated 1.3 million deaths (range, 1.2–1.4 million) among HIV-negative people and there were an additional 300 000 deaths from TB (range, 266 000–335 000) among HIV-positive people. Globally, the best estimate is that 10.0 million people (range, 9.0–11.1 million) developed TB disease in 2017: 5.8 million men, 3.2 million women and 1.0 million children. There were cases in all countries and age groups, but overall 90% were adults (aged ≥ 15 years), 9% were people living with HIV (72% in Africa) and two thirds were in eight countries: India (27%), China (9%), Indonesia (8%), the Philippines (6%), Pakistan (5%), Nigeria (4%), Bangladesh (4%) and South Africa (3%). These and 22 other countries in WHO's list of 30 high TB burden countries accounted for 87% of the world's cases. Only 6% of global cases were in the WHO European Region (3%) and WHO Region of the Americas (3%). Drug-resistant TB continues to be a public health crisis. The best estimate is that, worldwide in 2017, 558 000 people (range, 483 000–639 000) developed TB that was resistant to rifampicin (RR-TB), the most effective first line drug, and of these, 82% had multidrug-resistant TB (MDR-TB). Three countries accounted for almost half of the world's cases of MDR/RR-TB: India (24%), China (13%) and the Russian Federation (10%). About 1.7 billion people, 23% of the world's population, are estimated to have a latent TB infection, and are thus at risk of developing active TB disease during their lifetime¹¹.

Jharkhand a major TB burden state in India is among the 5 India states that are lowest on the Human development India & is predominantly tribal state. Records shows that about 13000 persons die of TB every year in Jharkhand that is 35 persons per day. RNTCP was launched in Jharkhand in September 2000 under the guidance of central TB Division, GOI, WITH Ranchi & Palamu as the first two implementing districts which was scaled up in phased manner with complete geographical coverage with inclusion of Godda & Giridih. State TB cell under "Jharkhand Rural Health Mission society TB control programme" & 24 districts TB centres under "District health societies – TB control programme" have been established to supervise and monitor the implementation of this programme effectively. Detailed planning for implementation of the programme is done at state & District levels. Jharkhand has made rapid progress in expanding TB control services under Revised National TB control programme . Currently entire state population is having the access to DOTS under the RNTCP. As on today all 24 districts in the state are implementing the programme as per the guidelines of central TB Division & Jharkhand Rural Health mission society (JRHMS) to ensure the free quality services to TB patients¹².

MATERIAL AND METHOD

This study was a cross-sectional, descriptive and community based study. The present study was carried out at DOTS centres running at Doranda PHC & Sadar Hospital at Ranchi district of Jharkhand. The pilot study was informed and advocated to the concerned District RNTCP officer of state TB cell. DOTS centre examines smear positive cases by DMC (Designated microscopy centers) where sputum microscopy is done of suspected patients. After diagnosis of positive smear sputum test, Anti-TB drugs are provided to the patients. Those patients who were >10 years (both pulmonary and extra pulmonary) having history of cough for 2 weeks or more were included as study subjects. All patients registered in DOTS centre were interviewed by schedule. A total of 50 patients were interviewed between October 2017 to December 2017. Data collected through information & was divided in 3 sections. 1st section showed socio-demographic profile which included name, address, gender age, religion education , income, marital status fuel, drinking water, housing condition and locality cleanliness with respect to air light space & ventilation. Following was the criteria for grading as good, air, bad & worst in locality cleanliness –

- (1) Door to door garbage collection.
- (2) Installation of litter bin at all needed places.
- (3) Covered drainage system.
- (4) Boring or supply water.
- (5) Electricity.
- (6) Single toilet for every family member.
- (7) Toilet inside house.
- (8) Proper ventilated rooms.
- (9) LPG

Good	Fair	Worst
>8	6-8	<4

Further, income group was sub categorised as BPL, Low income group middle income group & upper middle income group. Following is the income chart given by World Bank 2016.

Category	Income
BPL	< \$ 1.95 per day (RS 130/-)
Low income group	1,00,000- 2,00,000 per year
Middle income group	8-12,00,000 per year
Upper middle income group	24,00,000 per year

2nd section dealt with the knowledge regarding T.B that is mode of transmission, duration of T.B infection, family history, curing factors, source of knowledge.

3rd section comprised of nutritional profile and status which included height, weight, BMI, food habit, food consumption pattern. An overview of 24hrs. dietary recall was also taken of the patients were informed about the purpose of this study and role of data collection so as to obtain full participation, free & frank answers. Statistical analysis was done in pre-designed Microsoft Excel 2007.

RESULTS

In the present study of 50 respondents who were interviewed, 22, 44% were male subjects and 28, 56% were female subjects. About 18, 36% persons were illiterate and rest 32, 64% persons were educated. Just 6, 12% respondents showed positive case of family history of TB. Coming on to income group, 9, 18% respondents belongs to BPL category, 22, 44% belong to lower income group & 18, 36% belong to middle group. Demographic features that is housing conditions in terms of air, light spaces were considered during the pilot study 14, 28% respondents lived in kaccha houses, 17, 34%, lived in asbestos while 19,38% lived in pakka houses majority of respondents used 22, 44% tap water as usual locality cleanliness of the respondents whom was fair were 15, 30%, 27, 54% has bad conditions while 8, 16% had worst cleanliness. For cooking purpose 32, 64% respondents used LPG, 15, 30% respondents depended on wood charcoal as fuel and just 3, 4% used cow dung cakes. Knowledge regarding nutrition was also considered an important key factor while screening the patients. 24, 48% subjects knew at all coming on to dietary principles 18, 38% respondents took High protein/High calorie diet while majority 32, 64% respondents took none of above. High protein sources like fish, egg, milk were included in only 20, 40% respondents died on weekly, bi- monthly, monthly basis. BMI variables also varied widely as majority of respondents 50%. Fell in 16-16.9 BMI with low weight (41-43kg). 40% respondents with BMI 17-18.4 has just weight ranging in 43-47kg. Minority of the respondents i.e. 10% were in BMI range 18.5 – 22.9 with weight scale ranging from 47-58 kg. Discussing about the current knowledge of nutrition, 35, 70% subjects had low knowledge level, 13, 26% subjects had average knowledge level while just 2, 4% had good nutrition knowledge regarding tuberculosis.

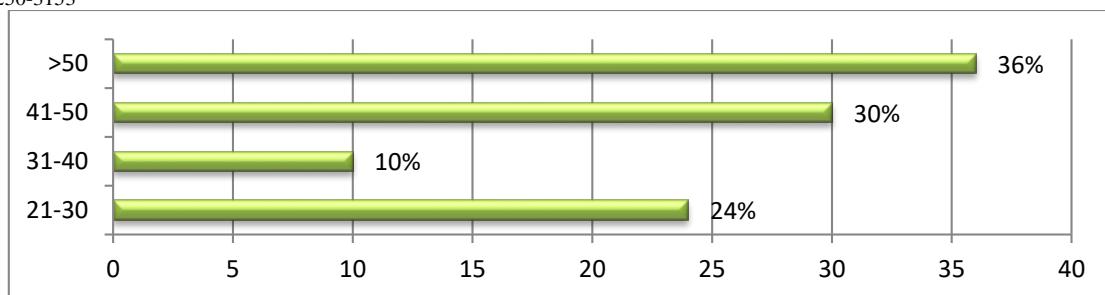
Table 1 :- Sociodemographic characteristics of the respondents. (n=50)

Socio demographic variables	Number n=50	Percentage
Age		
10-20	0	0
21-30	12	24
31-40	5	10
41-50	15	30

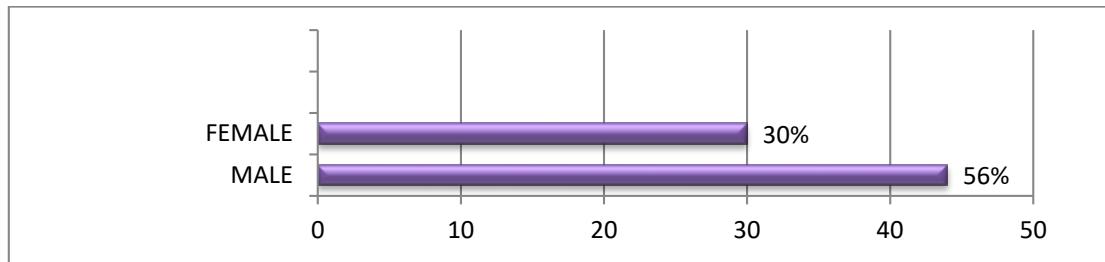
>50	18	36
Gender		
male	22	44
female	28	56
Educational status		
Illeterate	18	36
matric	12	24
Intermediate	12	24
Graduation	8	16
Economical group		
BPL	9	18
LIG	22	44
MIG	18	36
UMIG	1	2
Housing condition		
Kaccha	14	28
Asbestos	17	34
Pakka	19	38
Flat	-	-
Locality cleanliness		
Good	-	-
Fair	15	30
Bad	27	54
worst	8	16
Type of fuel		
coal	15	30
Wood/charcoal	3	6
Cow dung cake	32	64

PERCENTAGE DISTRIBUTION OF SOCIO-DEMOGRAPHIC VARIABLES (n=50)

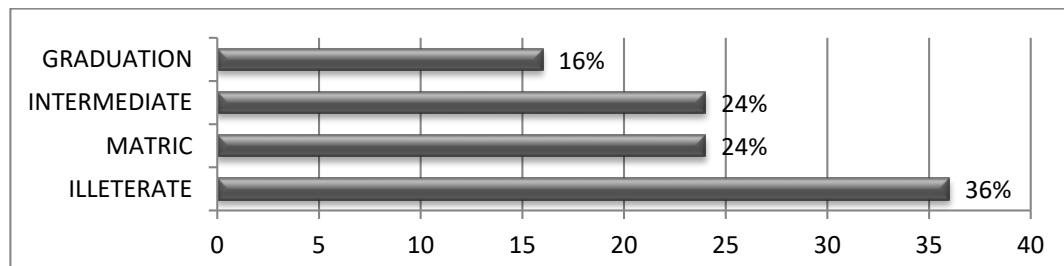
1. AGE



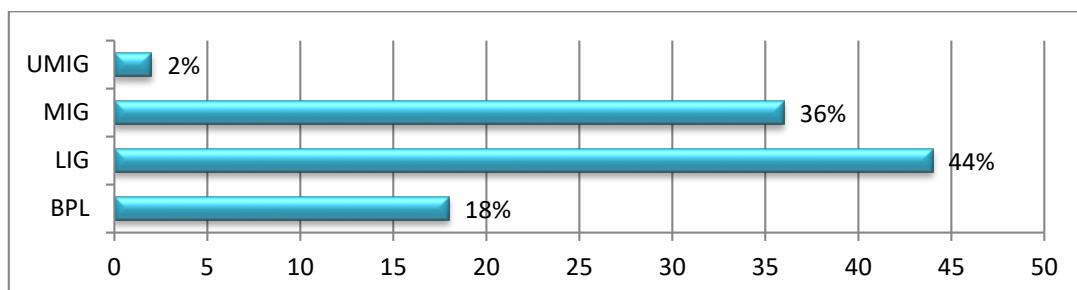
2. GENDER



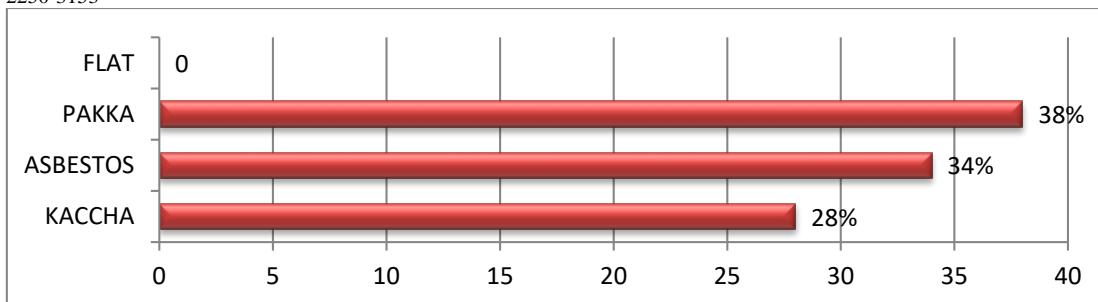
3. EDUCATIONAL STATUS



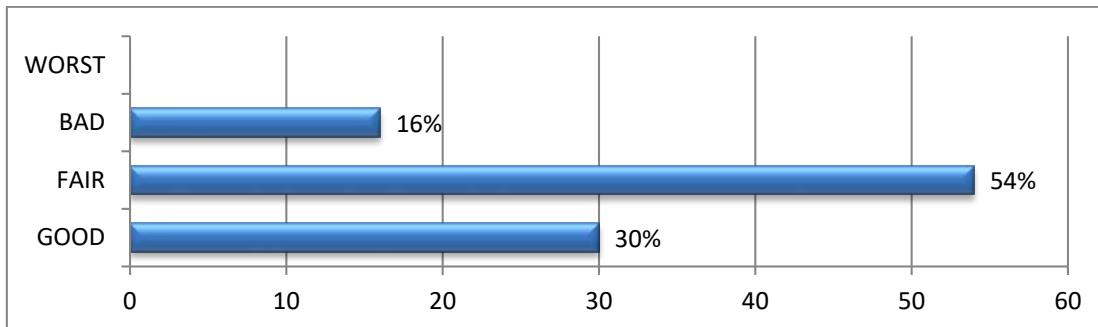
4. ECONOMICAL GROUP



5. HOUSING CONDITION



6. LOCALITY CLEANLINESS



7. TYPE OF FUEL

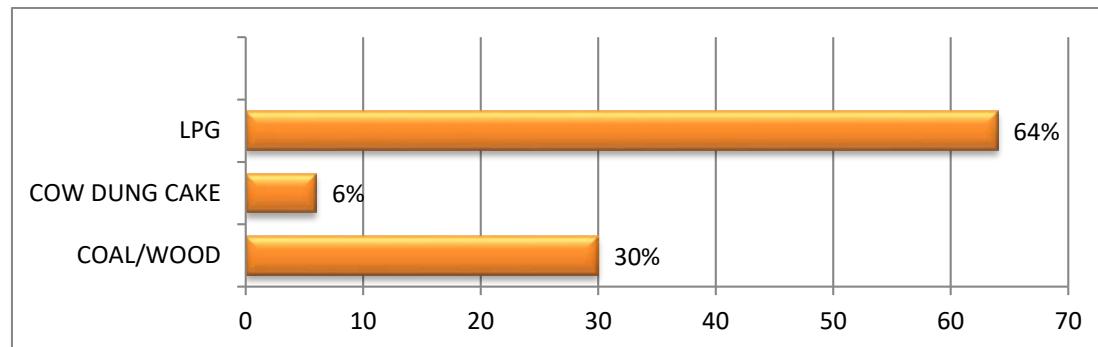


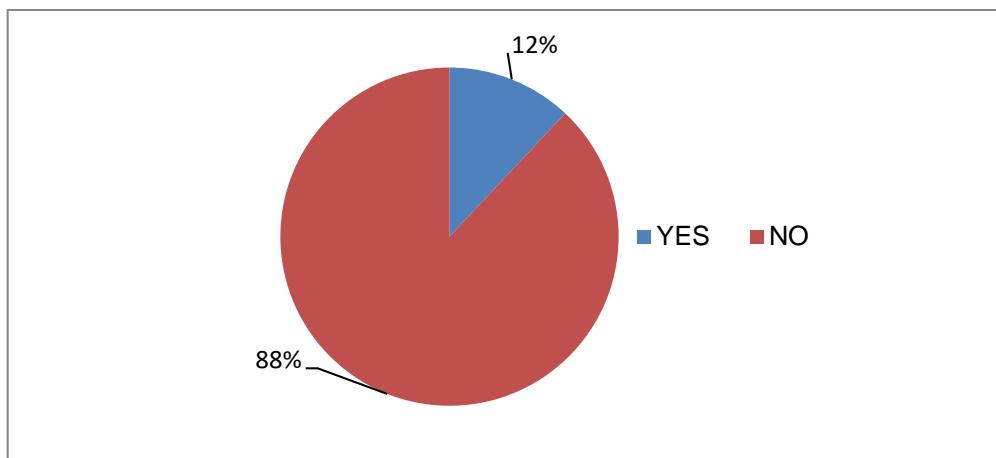
Table 2 : Knowledge regarding TB

Aetiological variables	NO.	Percentage
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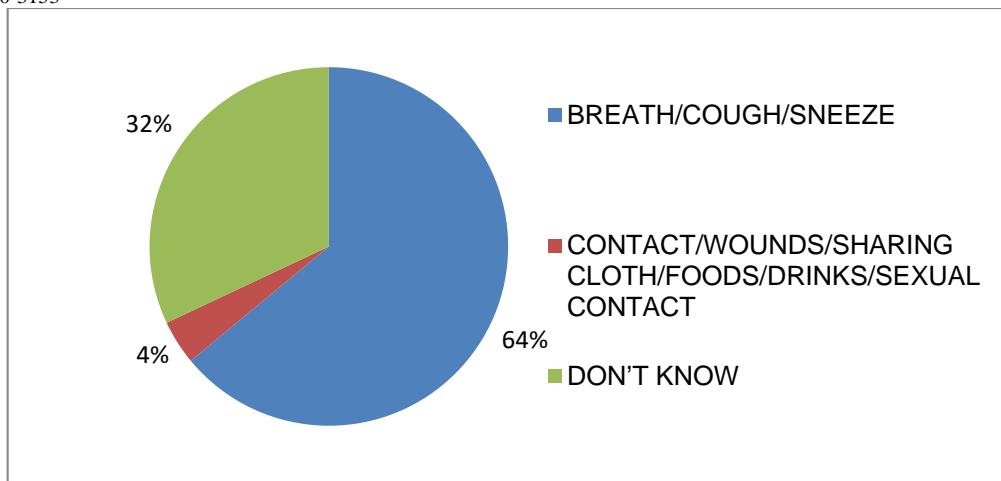
Family history		
yes	6	12
No	44	88
Mode of Transmission		
Breathing/Cough/Sneezing	32	64
Contact & wounds		
Sharing cloths/foods/drinks	2	4
Sexual contact		
Don't know	16	32
Nature of cure		
DOTS	39	78
DIET THERAPY	1	2
DOTS + DIET Therapy	5	10
Don't know	5	10

PERCENTAGE DISTRIBUTION OF KNOWLEDGE REGARDING TB (n=50)

1. FAMILY HISTORY



2. MODE OF TRANSMISSION



3. NATURE OF CURE

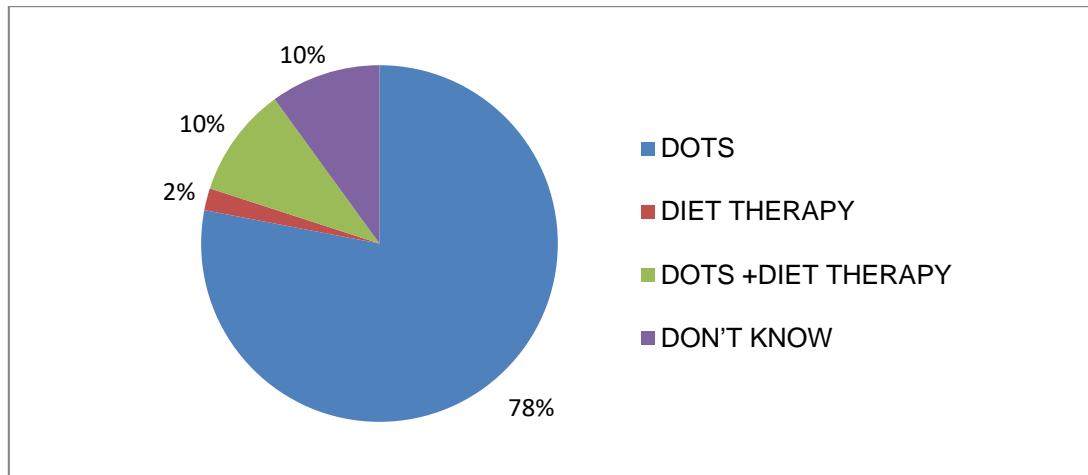


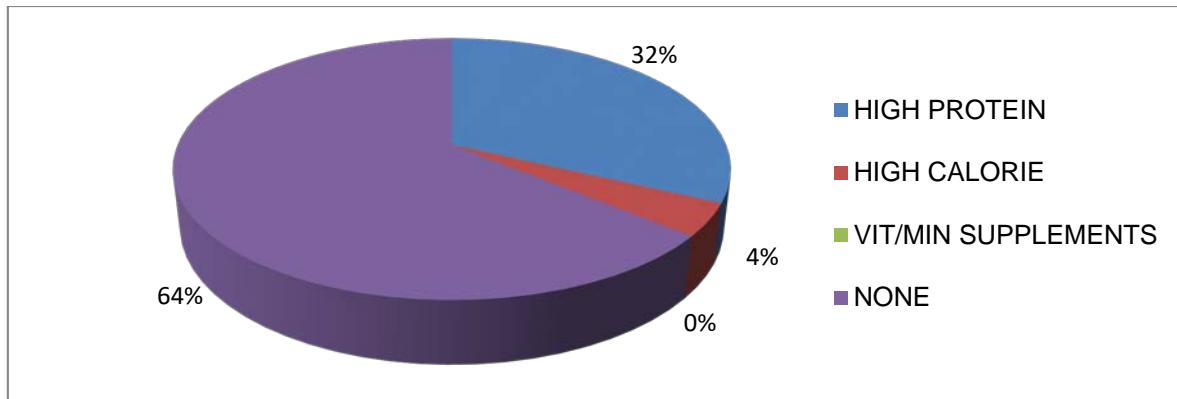
Table 3 : Nutrition knowledge regarding TB

Dietary Variables	No.	Percentage
Dietary Principles		
High protein	16	32
High calorie	2	4
Vit/Min supplements	-	-
None	32	64
High Protein Sources		
Milk	15	30
Egg	12	24
Meat/Fish	10	20
None	13	26
Current nutrition knowledge		
Low	35	70
Average	13	26
Good	2	4

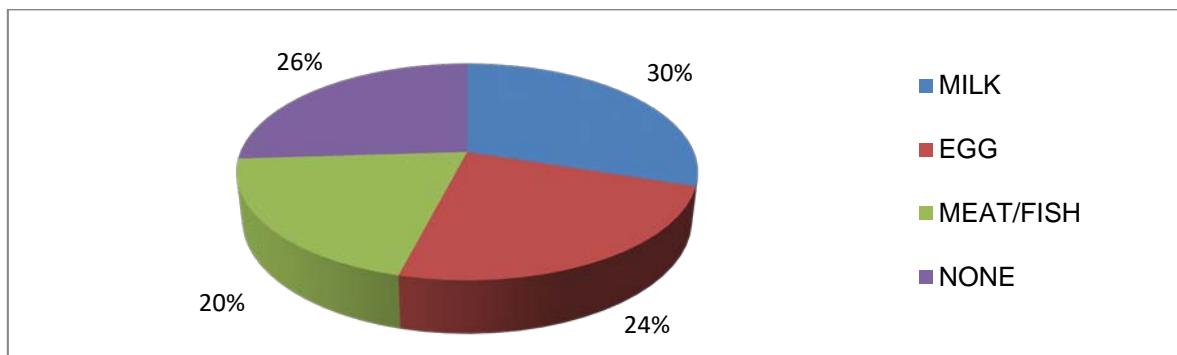
Best	-	-
BMI variables		
18.5-22.9 (47-58kg)	5	10
17-18.4 (43-47kg)	20	40
16-16.9 (41-43.5kg)	25	50

PERCENTAGE DISTRIBUTION OF NUTRITION KNOWLEDGE REGARDING TB (n=50)

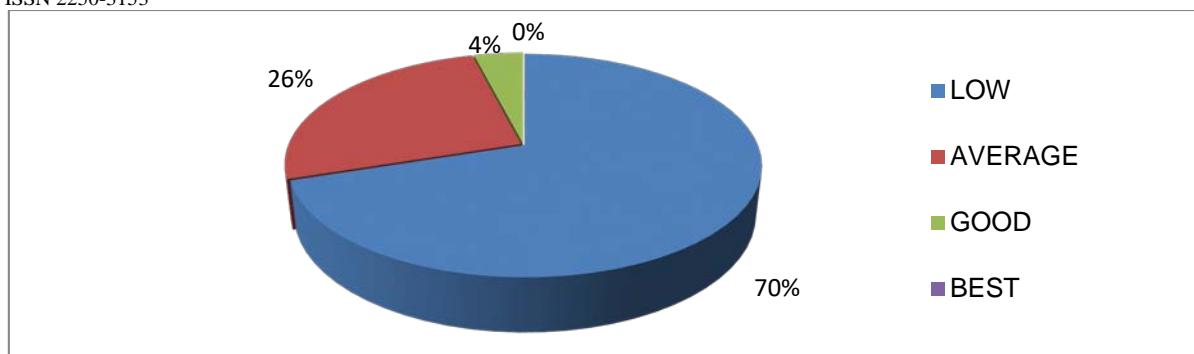
1. DIETARY PRINCIPLES



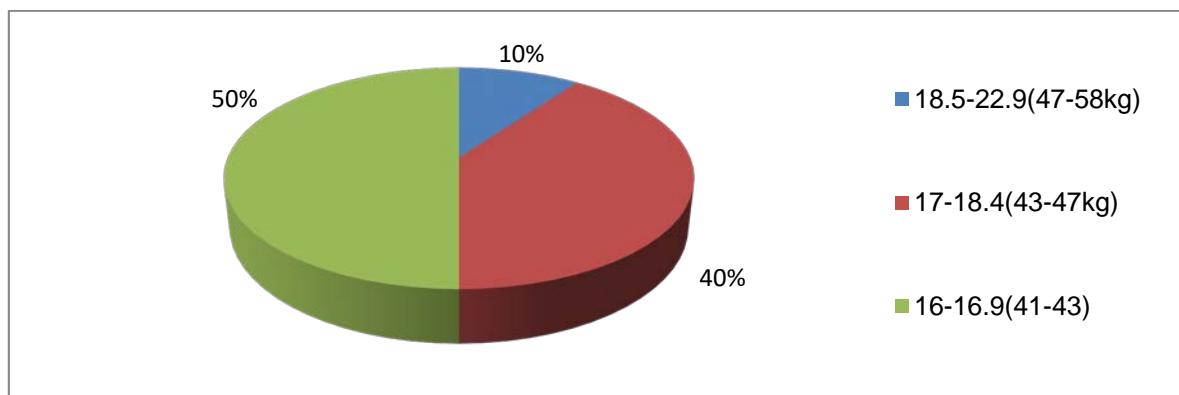
2. HIGH PROTEIN SOURCES



3. CURRENT NUTRITION KNOWLEDGE



4. BMI VARIABLES



DISCUSSION

From the present study it was found that female respondents (56%) were greatly affected than male. The reason behind this difference is that female more often indulge in household activities and often ignore their initial symptoms due to their responsibilities towards family and children majority of the age group affected with TB was between (40-50) yrs and 50 yrs above. The possible reason behind this may be as males and young adults of ages (21-35) yrs had greater awareness about TB & its prevention. It was also noticed that TB was highly prevalent (36%) among illiterate respondents than illiterate one. The reason behind is that the level of education is directly proportional to the health seeking behavior of TB patients. Studies done by socio-economic factors reveals that majority (62%) of TB patients belonged to lower socioeconomic class. It reveals that patients from BPL families, or lower income group that are struggling against poverty and underdevelopment get easily infected from outside environment due to poverty & under nutrition. Coming to family history only 12% respondents share family history & 88% has no family history of TB. So we cannot determine family history as a tool for a common cause of TB. Discussing about the demographical data analysis 70% respondents lack in housing and locality cleanliness in terms of proper covered drainage systems, clean road ventilated rooms, installation of litter bins, garbage disposal, toilets, clean drinking water etc. Thus we can say TB becomes a massive disease burden if associated with deficient in hygiene, sanitation & clean drinking water. It was also noticed that 84% patients were infected with pulmonary TB either latent or active type & just 16% cases were of extra pulmonary. This shows that TB being an air borne disease with high communicability world wide.

Discussing about the TB knowledge associated factors of this study 44% subjects stood for poor knowledge about TB signs symptoms causes, mode of transmission. 46% had partial knowledge while correct knowledge about the cause of TB held on just 10% respondents. The knowledge was analyzed after determining various components for assessing the knowledge which include mode of transmission, causes, treatment and duration of treatment. It suggests that appropriate knowledge is of prime importance for control and prevention of TB.

Finally assessing the nutritional status and importance of diet therapy, 72% respondents had no idea of diet in TB. Only 36% subjects included high protein high calorie food in their diet but not on regular basis. Inclusion of milk, egg, fish, soya in their diet was either in small amount or in moderation. But which is recommended that is high amount was totally negligible TB patients did not know what to include and what not to include in daily diet. Majority of 90% respondents were in low BMI grade that is (16-16.9) & (17-18.4). It shows they were highly malnourished and underweight muscle wasting & weight loss. So, respondents could not fulfill their BMI criteria.

CONCLUSION :

From the above study we conclude that majority of the patients with female gender high in number which fall on higher age group and belongs to lower economic class (or rural background) contribute maximum of TB population in Ranchi district and nearby. Their lower literacy rate makes them ignorant, less cognitive, less knowledgeable & so they easily gets infected their unhygienic housing and surrounding condition makes them highly vulnerable to infection. Also we conclude that their low nutritional status makes them malnourished and underweight which ultimately pushes them to be infected easily. Thus a better food consumption pattern needs to be effective during the course of treatment under DOTS making them quick recover from disease and help build immunity and sound health.

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Risk Management in Ecology

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Abstract- During the 19th and 20th centuries, it was firmly believed that technical progress was a value that should not be specifically discussed, because its process was in accordance with a valid understanding of the position and relation of man and society to the nature contained in anthropocentrism: a man is in the center of the world, and Everything that is good for him is good for nature. The perniciousness of this relationship is increasingly manifested as an ecological crisis, the conditions of which are rising, and existing understandings can not offer a solution.

Index Terms- Technical,progress,ecological,rising,condition.

I. INTRODUCTION

That is why new ecological ethics, ecocentrism, ethically opposed anthropocentrism, which basically puts an ecosystem and with which man equals with other forms of nature, only increases the responsibility for preserving life in general, even human species as well as inanimate nature. Responsibility stemmed from the fact that only a man is endowed with a highly developed consciousness and the ability to be the bearer of moral values.¹ Today's life of all people on the planet involves industrialization that allows for the improvement of the living standards of a large number of people on Earth, but on the other hand negatively affects the quality of the environment and the health of man.

Ecological ethics, now in the focus of ethical discussions, places nature, an eco-system, not a human and or a human society. A man will have to build his future on qualitatively new values in whose scale the dominant role is given to life in general, and then the life of the human species and the development of their consciousness (individual and social) in the function of preserving the life, survival and development of human society in accordance with other forms of life in nature, whereby its place must also have human responsibility and the knowledge that man as a conscious being is given to be the guardian of nature in all its manifest forms.

The greater the ecological crisis and its consequences, the more serious the need for people to change the situation. However, the market is not a universal and rational regulator in the sector of environmental protection and natural values, neither in a short or long term. It is about the relationship between the rational

behavior of entrepreneurs and the social costs that no one is bearing.

Modern economic science has developed a valid methodology of researching flows in economic life, based on a relationship: maximizing income - minimizing expenditures, but when the same methodology is applied to environmental problems, it is shown to be imperfect.² Nature and natural wealth can not be excluded from economic consideration and evaluation, but necessarily subject to state and institutional regulation, constraints and protection.

Ecological rationality must become an integral part of economic theory and economic practice. The classical perceptions of economic wealth are changing, changes in the expert thought array occur in the evaluation of natural resources and environmental factors. Ecological awareness, law, philosophy and culture are triggering a whole chain of activities, processes and practical behaviors that have a significant economic dimension.³ Alternative development chances for a large part of mankind are cost-free technologies, eco-recycling, the development of the use of alternative raw materials, energy and mineral fuels, the installation and commercialization of eco-devices, green products and the like.

Ecological awareness is not achieved by birth, but is systematically produced by the system of overall education, science, culture and (ecological) education. Nations that are unaware of this have a special responsibility before the future and the planet. Each responsible nation must have a strategy of environmental protection and acceptable and sustainable development. These strategies must be based on an objective, well-defined state, economic principles and opportunities. The experiences of environmentally more experienced nations must be combined with competitive regional situations and motives. With the help of social marketing, it is necessary to conduct an active economic-ecological policy, acceptable measures and instruments, adapted to the economic system, the initial economic condition, as well as the culture and tradition of the nation.

II. THE IMPORTANCE OF EDUCATION IN ECOLOGY

In 1975, the first "International Education and Training Program for Environmental Protection" (UNESCO and UNEP) was prepared, and after the Rio Conference, in 1993, it was

¹ Džozef R., Ekološka etika, Uvod u ekološku filozofiju, sl. glasnik,

Beograd, 2006

² Nešković S., Ekološki menadžment, PEP, Beograd, 2010

³ J. Đorđević, „Nova ekološka etika i zaštita životne sredine“, Fakultet zaštite na radu, Niš, 2002.

promoted in order to reorient education and training of the global population in order to achieve sustainable (harmonized) development. This program defines the main goals of education⁴:

- enabling each individual to attain the awareness, knowledge, skills necessary to actively participate in the protection and improvement of the environment and the achievement of harmonious development,
- creating a new environment for preferable behavior and lifestyle,
- developing ecological ethics and ecological culture,
- strengthening education and education for the protection of the environment for all,
- improving quality of life⁵
- Education for the protection of the environment, that is, education for survival, or education for sustainable development, must include all levels of education, from pre-school, through basic and directed to university, post-diplomatic and that its implementation is permanent. It should be included in all forms of school education, in multiple activities outside the school and in the student organization. It must be continued in work organizations, through vocational training of workers for work in individual workplaces, in order to reduce the potential for environmental damage in work process.
- Education can not be reduced to training people for passive protection, but it should be directed to a positive attitude, to training citizens for the planned development of the environment with all its resources and human creatures. Knowledge and understanding of the environment must be exhibited in all teaching subjects where possible: in the subject of knowledge of nature and society, biology, chemistry, physics, geography, etc., and this education must in essence be multidisciplinary and intersectoral so that it allows integrative approach in the process of education and upbringing. Teaching content should cover the whole issue, emphasizing historical and developmental approach
- It is extremely important to understand human destructive powers, limitations of fuel, ore and soil, and to learn about the concrete consequences that a person causes in some of his activities in regional and planetary dimensions. In order to realize all these goals, it is necessary to prepare national strategies for harmonizing the educational process at all levels with the principles of sustainable (harmonized) development and a new philosophy of life and ecological ethics, which is an obligation of the signatory countries of the Rio documents.⁶

It is reasonable to assume that some people will live in the immediate future. Whatever your future people are, they will have certain living needs. In this sense, this duty towards the human offspring is correlate with the minimum of moral requirements that they will have when they exist. In other words, we are obliged not to bring their actions into a state in which they will have "scanty or significantly reduced life opportunities"⁷, which would jeopardize their elemental human needs and dignity.

Thus, the principle of sustainable development is an attempt to specify the obligations and rules that ensure that needs and desires of people today are not met at the expense of the vital interests of future generations. Therefore, moral requirements that imply the principle of sustainable development are the norms of fair treatment of people of the future. This formal principle also initiates a normative question of what are the values that make human life quality and meaningful, thus critically analyzing the very concept of sustainability.

III. RISK ASSESSMENT FOR HUMAN HEALTH

Risk assessment, whether for human health or the environment, is characterized by a series of actions, such as:

1. Effect assessment, which includes:
 - identification of hazards,
 - identification of the negative effects that the pollutant susceptible can generally cause
 - determining the dose (the received concentration of the pollutant) and assessing the expected effects (response to intoxication) that includes the dose ratio that is in function of the exposure (exposure) and the occurrence, or severity, of the negative effects⁸
2. Exposure estimation, which includes:
 - determining the concentration / dose of the pollutant exposed to people (workers, residents, vulnerable categories in the human population) or which has reached some environmental media (water, air, soil).
3. Characterization of risk that includes:
 - determining the frequency of exposure and the severity of the negative effects that may occur in humans or between plants and animals, depending on the measured or estimated pollution size. This is usually associated with this
4. The risk quantification determines the extent and likelihood of occurrence of negative effects⁹.

The risk to human health is most often defined as the probability that describes the degree of endangerment of the health

⁴ UNESCO - UNEP, "International environmental education programm", Paris, 1993

⁵ Ibid

⁶ Risk Assessment Guidance for Superfund, Volume I- Human HealthEvaluation Manual, EPA/540/1-89/002, 1989 & EPA/540/R-92/003, 1991.

⁷ Risk Assessment Guidance for Superfund, Volume I- Human HealthEvaluation Manual, EPA/540/1-89/002, 1989 & EPA/540/R-92/003, 1991.

⁸ Technical Guidance Document on Risk Assessment, II edition, European Chemicals Bureau, EUROPEAN COMMISSION, EUR 20418 EN/1-4, 2003.

⁹ Ibid

of an individual exposed to the action of a particular pollutant or group of pollutants.¹⁰

The amount of the harmful substance - the pollutant that enters the site of exposure - is called a dose.

Environmental risk assessment includes determining the nature of the effects and the probability of the occurrence of adverse effects among plants, animals, or in the environment, as a result of the action of a pollutant. The ecotoxicological risk assessment consists of two basic elements:

- determining exposure (exposure) that describes the interaction of the pollutant (s) and the receptor (e.g., plants or animals). The exposure measure can be described by the concentration of a pollutant in one of the environmental media, or by physical changes in the place of life (habitat, habitat)
- The effect of the analysis is evaluated by changes in nature, as well as the magnitude of this change caused by the exposure to the given pollutant (stressor).¹¹

While risk assessment for a human is referring to a reference, millimeter-risk or tolerant dose, an ecological risk assessment can also be said about the so-called ecotoxicological threshold (ETP) - the concentration of a particular pollutant known to cause adverse effects in specific environmental receptors (specific representatives of flora or fauna).¹²

1. Risk management

Risk management includes respecting information and requirements in the following areas:

- engineering and technology,
- natural sciences such as physical chemistry or chemistry, or biology,
- economic sciences,
- sociology,
- biomedicine,
- legislation, politics and information¹³

Risk management is considered in achieving several of the following goals:

- identification, distribution and movement of pollutants,
- assess the impact of pollutants on humans, ie determining the risk to human health,
- assess the impact of pollutants on characteristic environmental receptors, i.e. determining ecological risk and ecotoxic thresholds,

- designing and implementing activities related to the renewal and purification of the polluted environment,
- assessing the negative impacts of certain pollutants on the environment and for different recovery processes,
- comparing the existing risk before and the expected risk after regeneration.¹⁴

Risk management requires teamwork. The following working groups are most often developed:

- physicochemical-mono-to-toxicological group,
- economic and legal group,
- risk assessment group and modeling of the protection system,
- engineering and technology group,
- communication and cooperation group¹⁵

1.1 Activities significant for risk management:

- preliminary testing of potentially polluted areas including monitoring,
- planning activities,
- additional testing and monitoring of the polluted area,
- basic risk assessment,
- setting priorities and finding the most hazardous pollutants,
- searching and designing an optimal procedure for regenerating the polluted area,
- studying the process of pollution: mobilization, transport and deposition of pollutants,
- comparative analysis of risk assessment results for different pollutants and alternative procedures
- identifying for the final plan of the renewal procedure and its application
- control of the results after the completion of the renewal procedure¹⁶

2. Ecological damage

The ecological damage caused by pollution and environmental degradation causes the negative social consequences. The consequences in society expressed as losses are above all medical-biological character, and then physico-chemical and social character. Today it is easy to prove positive correlation of pollution and various diseases of the population. The disease as the ultimate effect of environmental risk factors on human health is the possibility of recording the resulting physiological and histopathological changes.

¹⁰ Risk Assessment Guidance for Superfund, Volume I- Human HealthEvaluation Manual, EPA/540/1-89/002, 1989 & EPA/540/R-92/003, 1991.

¹¹ Risk Assessment Guidance for Superfund, Volume I- Human HealthEvaluation Manual, EPA/540/1-89/002, 1989 & EPA/540/R-92/003, 1991.

¹² Ibid

¹³ Technical Guidance Document on Risk Assessment, II edition, European Chemicals Bureau, EUROPEAN COMMISSION, EUR 20418 EN/1-4, 2003.

¹⁴ Technical Guidance Document on Risk Assessment, II edition, European Chemicals Bureau, EUROPEAN COMMISSION, EUR 20418 EN/1-4, 2003

¹⁵ Ibid

¹⁶ Technical Guidance Document on Risk Assessment, II edition, European Chemicals Bureau, EUROPEAN COMMISSION, EUR 20418 EN/1-4, 2003.

A group of respiratory illnesses can be used to look at the harmful effects of exposure to air pollution: Pharyngitis acuta et tonsilitis acuta, Infectiones tractus respiratoria superioris multiplices acutae loci non specificatis, Bronchitis acuta and bronciolitis aucta, Asthma bronchia, Tracheitis, emphysema and other obstructive lung diseases.

The problem of defining ecological damage to man and the environment is very pronounced due to the difficulty of measuring and still lacking exact indicators. Environmental damage from environmental pollution is caused by the reduction of the value of resources or their utilization. All forms of protection aimed at stopping ecological damage require certain financial investments, which would enable the conduct of research, control, planning, establishment of technical protection measures.

In this way, the improvement of the environment will not be missed, but also the volume and quality of production through the improvement of technical, economic and working conditions. In order to achieve the projected goals, it is necessary to apply elements of an economic-ecological account:

- costs caused by environmental pollution,
- the value of investments in environmental protection,
- effects of direct and indirect application of environmental protection.

Of particular importance is the effectiveness of protection, which is addressed through three aspects:

- the effectiveness of using environmental resources in the process of production and consumption -finalization;
- effectiveness of economic reserves use for environmental protection
- investment in environmental protection

Determining the source and degree of emission of pollutants, the duration and spatial interference, the display of changes in the middle are shown using a scale. Comparisons include pollution of water, air, plants, ecosystem functioning.

IV. CONCLUSION

People have only recently realized that the issue of further strategy survives a different attitude towards the environment. In essence, the ecological crisis is just an inseparable part of the great civilizational events. First of all, the deep crisis of one mode of production, model of consumption and economic growth, while simultaneously losing basic human values. Such a life has brought out a man from a balance with nature, of which he is only a part,

and it can be regained only by the fundamental sociocultural alternatives in the way of production and consumption.

We can say that it is worthwhile to harmonize production with borders in nature, but in that way not to devastate it, ie, Indeed, this means that the exploitation of natural resources, forests, minerals, water, ores must be limited in such a way that it does not prejudice the human future. The world, in order to recover from the great damage that causes major changes on earth, must first take into account its habits and then on the other. People can with their healthy consciousness preserve nature from further and greater disasters, which can lead to the global destruction of nature around us.

All countries have great responsibility and must capitalize on the potential they have, which will yield results not only with the preservation of energy but also in money, and ultimately the planet. An ecological crisis of great proportions has not yet occurred, if humankind still has the wills and ways to live with existing natural resources.

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- [13] www.theecologist.org
- [14] <http://www.unesco.org>

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Knowledge, Attitude And Practice Towards Breast Cancer Screening Among Female Out-Patients Aged 18-65 Years Seeking Health Care Services At Jaramogi Oginga Odinga Teaching And Referral Hospital, Kisumu County

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Abstract:- Breast cancer is an abnormal growth of a tissue that starts in the cells of the breast. It is a major health burden in women both in developed and developing countries. Most women present with breast cancer at advanced stages when little treatment benefit can be derived. Kenyans aged 18 years and above are at risk of developing breast cancer. Seventy to eighty percent of cancer cases in the country are screened at later stages due to a lack of awareness, inadequate diagnostic facilities, lack of treatment facilities, high cost of treatment and high poverty index. Early detection and screening as cornerstones for breast cancer control play a pivotal role in reducing related mortalities. At Jaramogi Oginga Odinga Teaching and Referral Hospital (JOOTRH) in Kisumu, the number screened for breast cancer is actually low (averagely 4-5 patients on monthly basis). This cross sectional study assessed knowledge, attitude and practices of female outpatients on breast cancer screening hence will induce appropriate interventions e.g. education and correct practice. From the targeted population, systematic random sampling was used to select female outpatients aged 18 to 65 years seeking medical services at JOOTRH. Data was collected using structured questionnaires and then analyzed by SPSS. Seventy five point nine percent of the study population had knowledge on breast cancer screening but very few were seeking screening. Fear and preference of health care provider were at 37.9% and 23.5% respectively and this was observed to have affected attitude of study population towards (BCS). Other than BSE at 69.1%, the rest screening methods were poorly practiced due to lack of knowledge. Association between knowledge and attitude was determined by chi-square. This study found no association between knowledge and attitude among the respondents on breast cancer screening ($p>0.05$). The study recommends that health care providers should employ provider initiated breast cancer screening, carry out mobile out reaches to sensitize and attend to more women, create awareness in the community on breast cancer screening and counselors to be trained on breast cancer screening so as to screen and provide psychological support to the presumed breast cancer cases.

Index terms: Breast Cancer Screening Kenya

Objectives: This study investigated knowledge, attitude and practices towards breast cancer screening among female out-patients seeking health care services.

Method: The study used Cross Sectional research design to randomly select 400 female out-patients who were seeking health care services in the facility.

Results: Three hundred and forty (85%) of the respondents completed the study; 32.1% of them were of age 28-37 years; 37.4% of the respondents had secondary education; 43.5%) of them were unemployed; 58.5%) of them were from Kisumu County. Two hundred and fifty eight (75.9%) of the respondents were aware of the breast cancer screening (BCS), while 37.6% didn't know what causes breast cancer. Smoking and family history was highly associated with breast cancer at 71.2% and 61.5% respectively; 55%) of the respondents believed that in case changes are realized in the breast a doctor should be seen immediately. Breast self-examination at 69.1% and clinical breast examination at 45.0% were the most popular breast screening methods compared to FNAC, mammography and ultrasound.

Conclusion: Social demographic information indicated that majority of the respondents were of age below 40 years, thus implies that the population was made of youthful individuals. The study found out that seventy five point nine percent of the respondents were aware of the breast cancer screening though the uptake of services at the health facility has been very poor.

I. INTRODUCTION

Breast cancer is abnormal growth of a tissue that starts in the cells of the breast. A malignant tumor is a group of cancer cells that can grow into (invade) surrounding tissues or spread (metastasize) to distant areas of the body. Cancer begins when healthy cells in the body change and grow uncontrollably, forming a mass or sheet of cells called tumor. A tumor can be cancerous or benign. A cancerous tumor is malignant, meaning it can grow and spread to the other parts of the body. A benign tumor means the tumor can grow and will not spread (American Cancer Society, 2015).

The assumption is that early detection will improve treatment outcomes. A number of screening tests have been employed, including clinical and self-breast exams, mammography, genetic screening, ultrasound, and magnetic resonance imaging. (Kösters; Götzsche, 2003). Mammography is the only breast cancer screening procedure for which empirical evidence exists to have significantly reduced breast carcinoma mortality by about 63% but mammography screening rate in a study revealed poor uptake of it despite having had of the screening method (Tabaret *et al.*, 2001). Medical evidence, however, does not support its use in women with a typical risk for breast cancer. This could have been due to lack of knowledge or attitude. The goal of screening tests for breast cancer is to find it before it causes symptoms (like a lump that can be felt). Breast cancers found during screening are more likely to be smaller and still confined to the breast. The size of a breast cancer and how far it has spread are some of the most important factors in predicting the prognosis (outlook) of a woman with this disease (American Cancer Society, 2015).

A study showed that knowledge and the practice of BSE is inadequate among young female medical students. The finding that some of them did not practice BSE suggests that there is a need for continuing education programs to change attitude and behavior towards BSE. It was suggested that BSE should be included in the curricula of both undergraduate and postgraduate medical schools (Saadeldin, 2013).

II. METHOD

Design: The study used Cross Sectional survey targeting female out-patients seeking health care services.

Study site: The study was carried out at Jaramogi Oginga Odinga Teaching and Referral Hospital which is a major Referral Hospital in Western region of Kenya serving averagely 8700 female out-patient on monthly basis.

Subjects: The study population was made up of female aged 18 to 65 years who were seeking out- patient health services in all the departments.

Data collection and analysis: Quantitative data was collected from those who were willing to participate in the study through structured questionnaires divided into three sections that's knowledge, attitude and practice of breast cancer screening. The association between knowledge and attitude was measured using the Chi-square test.

III. RESULTS

1. Knowledge on breast cancer screening

Two hundred and fifty eight (75.9%) of the respondents were aware of the breast cancer screening (BCS); 78 (22.9%) were unaware while 4 (1.2%) of the respondents were undecided.

Table 4.1: Knowledge on Breast Cancer Screening

Response	Frequency	Percent (%)
Yes	258	75.9
No	78	22.9
Don't know	4	1.2
Total	340	100.0

4.2.8: Awareness of methods used in breast cancer screening

Sixty nine point one percent of the respondents agreed that they are aware of the BSE used in BCS. Forty five percent of the respondents in addition agreed that they are aware of the CBE by doctor. Further, 19.1% of the respondents agreed that they are aware of mammography as a method used in BCS. Ultra sound scored 30.0% while FNAC was at 12.6% as a method used in BCS.

Table 4.9: Awareness of methods used in breast cancer screening

Method	Yes	No	Don't Know
Fine Niddle Aspiration Cytology(FNAC)	43 (12.6%)	63 (18.5%)	234 (68.8%)
Breast Self-Examination(BSE)	235 (69.1%)	21 (6.2%)	84 (24.7%)
Clinical Breast Examination by doctor	153 (45.0%)	27 (7.9%)	160 (47.1%)

Mammography	65 (19.1%)	49 (14.4%)	226 (66.5%)
Ultra sound	102 (30.0%)	43 (12.6%)	195 (57.4%)

2. Attitude towards breast cancer screening

4.3.1 Respondents preferred healthcare provider during clinical breast examination

Up to 80 (23.5%) of the respondents stated that they preferred health care provider during CBE, 259 (76.2%) of them did not have preferred health care provider during CBE while 1(.3%) of the respondents were undecided on the preferred health care provider during CBE.

Table 4.15: Respondents preferred healthcare provider during Clinical Breast Examination

Response	Frequency	Percent (%)
Yes	80	23.5
No	259	76.2
Don't know	1	.3
Total	340	100.0

4.3.3: Fear of breast cancer screening.

One hundred and twenty nine (37.9%) of the respondents feared Breast Cancer Screening while 211 (62.1%) of them did not.

Table 4.17: Fear of Breast Cancer Screening

Response	Frequency	Percent (%)
Yes	129	37.9
No	211	62.1
Total	340	100.0

3. Practice towards breast cancer screening

4.4.1 Respondents ever done breast self-examination

One hundred and eighty six(54.7%) of the respondents had ever done BSE while 152 (44.7%) of them haven't carried out BSE. Only 2 (0.6%) of the respondents did not know whether they had ever done BSE.

Table 4.18: Respondents ever done breast self-examination

Response	Frequency	Percent (%)
Yes	186	54.7

No	152	44.7
Don't know	2	.6
Total	340	100.0

4.4.2 Respondents ever done mammography

Three hundred and fifteen 92.6% of the respondents had not done mammography while 23 (6.8%) had experience of mammography. Only 2 (.6%) of the respondents did not know whether they had ever done mammography.

Table 4.19: Respondents ever done mammography

Response	Frequency	Percent (%)
Yes	23	6.8
No	315	92.6
Don't know	2	.6
Total	340	100.0

4.4.3 Respondents ever done clinical breast examination

Eighty four (24.7%) of the respondents had done clinical breast examination while 254 (74.7%) of them had not. Only 2 (.6%) of the respondents did not know whether they had ever done Clinical Breast Examination.

Table 4.20: Respondents ever done clinical breast examination

Response	Frequency	Percent (%)
Yes	84	24.7
No	254	74.7

Don't know	2	.6
Total	340	100.0

4.5: Association between the knowledge and attitude on breast cancer screening among the respondents.

Chi-square test done on the association between the knowledge and attitude on breast cancer screening among the respondents. The Chi-Square test result was 8.085 with a p-value of 0.089. There was no association between knowledge and attitude.

Table 4.21: Association between the knowledge and attitude on breast cancer screening among the respondents.

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.085	4	.089
Likelihood Ratio	8.813	4	.066
Linear-by-Linear Association	3.689	1	.055
N of Valid Cases	340		

IV. DISCUSSION

Social demographic information indicated that majority of the respondents were of age below 40 years, thus implies that the population was made of youthful individuals. Most of the respondents were literate enough to handle the questions in the research tool without or with little support from the researcher and this is because 64.1 % had attained secondary and above level of education which was useful in answering the questions related to knowledge, attitude and practice on breast cancer screening. The finding of the study concurred with Janz, (2002) who highlighted that formal education provided an advantage in understanding various health issues and that people with less education have significantly less knowledge of breast cancer screening.

Life style was highly associated with breast cancer at twenty seven point one percent. Family history, smoking, alcohol consumption, high fat diet and aging were highly associated with breast cancer and women were believed to be most at risk of developing breast cancer compared to men. Ulceration of breast, lump and pain in the breast were believed to be the major signs of breast cancer. The finding of the study was in line with Milaat, (2000) findings who established that beliefs and misconceptions among the population vary with several factors, such as ethnicity, age, education and socio-economic status.

Generally the respondents were not knowledgeable about the methods used in screening breast cancer though sixty nine point one and forty five percent new about breast self-examination and clinical breast examination as screening method respectively. Fine needle aspiration and mammography were not as popular. There is need for the population to be made aware of all the available screening methods through education by the health care providers. About whether breast cancer is treatable or not, the findings implied that majority of the respondents agreed that breast cancer is treatable and this gives hope that with breast cancer one can live.

APPENDIX

Appendix III: Authorization by board of postgraduates' studies



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE & TECHNOLOGY

BOARD OF POSTGRADUATE STUDIES
Office of the Director

Tel. 057-2501804
Email: bps@jouust.ac.ke

P.O. BOX 210 - 40601
BONDO

Our Ref: **H153/4329/2014**

Date: Monday, May 15, 2017

TO WHOM IT MAY CONCERN

RE: ROSEMARY AKOTH OKOMO - H153/4329/2014

The above person is a bona fide postgraduate student of Jaramogi Oginga Odinga University of Science and Technology in the School of Health Sciences pursuing Master's Degree. She has been authorized by the University to undertake research on the topic: "Knowledge, Attitude and Practice towards Breast Cancer Screening among Out-Patients Attending Services at Jaramogi Oginga Odinga teaching and Referral Hospital, Kisumu County".

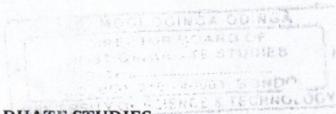
Any assistance accorded to her shall be appreciated.

Thank you.

A handwritten signature in black ink, appearing to read 'Prof. Beatrice Anyango'.

Prof. Beatrice Anyango
DIRECTOR, BOARD OF POSTGRADUATE STUDIES

cc. Dean, SHS



Appendix iv: Research approval and authorization from JOOTRH



MINISTRY OF HEALTH

Telegrams: "MEDICAL", Kisumu
Telephone: 057-2020801/2020803/2020321
Fax: 057-2024337
E-mail: ercjootr@ gmail.com
When replying please quote

JARAMOGI OGINGA ODINGA TEACHING &
REFERRAL HOSPITAL
P.O. BOX 849
KISUMU

2nd October, 2017

ERC.1B/VOL.I/386

Date

Ref:

Rosemary Akoth Okomo,
JOUST.

Dear Rosemary,

**RE: REQUEST FOR ETHICAL APPROVAL TO UNDERTAKE A STUDY ENTITLED:
"KNOWLEDGE, ATTITUDE AND PRACTICE TOWARDS BREAST CANCER
SCREENING AMONG FEMALE OUT-PATIENTS AGED 18-65 YEARS ATTENDING
SERVICES AT JARAMOGI OGNGA ODINGA TEACHING AND REFERRAL
HOSPITAL, KISUMU CO8NTY."**

The JOOTRH ERC reviewed your protocol in a meeting held on 31st August, 2017. Issues were raised by reviewers which you satisfactorily addressed. You are therefore, permitted to commence your study immediately. Note that this approval is granted for a period of one year (2nd October, 2017 to 1st October, 2018). If it is necessary to proceed with this research beyond the approved period, you will be required to apply for further extension to the committee.

Also note that you will be required to notify the committee of any protocol amendment(s), serious or unexpected outcomes related to the conduct of the study or termination for any reason.

In case the study site is JOOTRH, kindly report to the Chief Executive Officer before commencement of data collection.

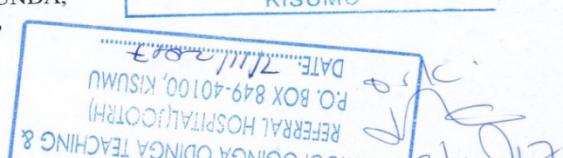
Finally, note that you will also be required to share the findings of the study in both hard and soft copies upon completion.

The JOOTRH ERC takes this opportunity to thank you for choosing the institution and wishes you the best in your endeavours.

Yours sincerely,

WILBODA N. MAKUNDA,
SECRETARY - ERC,
JOOTRH.

JOOTRH ETHICS & REVIEW
COMMITTEE
P. O. Box 849 - 40100
KISUMU



ACKNOWLEDGEMENT

We are very grateful to Jaramogi Oginga Odinga Teaching and Referral Hospital to allow us to collect data from female outpatients department. This study was carried out as part of Corresponding Author's Thesis in partial fulfillment of the requirements of her Masters of Science degree program at Jaramogi Oginga Odinga University of Science and Technology.

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Factor Assessment Of Pupils' enrolment And Remediation Of Impact Of Insurgency On Schools In Maiduguri, Borno State, Nigeria

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Abstract : The study was designed to investigate factors responsible for school enrolment of pupils in primary schools in Maiduguri and Jere local government area of Borno state. Documents studied included school enrolment registers and school attendance registers. 95 primary school were involved in study (Maiduguri = 52, Jere = 43). Ten (10) schools were sampled and surveyed. In addition, 211 teachers were sampled, 46 parents and 55 pupils to elicit information on reasons for non-enrolment or otherwise. Data in the study showed that between 2008 and 2010 there was steady school enrolment in the state. However, between 2011 and 2015 the enrolment rate dropped to an unprecedented level with closure of schools following the insurgency. From 2016 to date school enrolment gain momentum following collaborative efforts of government and NGOs in the state. Results showed that there were improvements in schools infrastructure, training and retraining of teachers, recruitment of teachers and provision of learning materials. It was therefore concluded that the intervention done by government and NGOs has revitalised education which in turn has improved the school enrolment. Parents and Pupils were interviewed using a simple designed questionnaire with 10 items while teachers 15 item questionnaire was administered by research assistants. The questionnaire was designed to elicit the same information concerning school enrolment. The reliability of the instruments were ascertained using three private schools in the state. The reliability index of $r = .86$ was obtained. This is considered high enough to be used in the study.

The study recommended that facilities put in place should be effectively utilised for teaching, teacher/pupil ratio should be improved upon and further in-service training should be provided to teachers and administrators.

Key words: school enrolment, remediation, insurgency

Introduction

Maiduguri has witnessed brutal confrontation and massive assault from terrorists group which is undoubtedly the most blood thirsty and destructive. The impunity with which the group caused havoc in the state left many families bewildered as many children were forced to drop out of school. Although the fight against terrorism is still on in the Northern part of Nigeria, it is not surprising the reports by UNESCO (2018) about the rate of out of school child being 13.5 million. This is so far the highest number of out of school child proportion in the world. In 2014 alone over 100,000 children dropped out of school in Borno state while over 900 schools were burnt down (GCPEA, 2014). The situation was as frightening as that when the group over ran the 27 Local Government councils and schools were forced to close down for fear of having more people killed.

The relative peace that returned to the state now has brought about more social activities with schools being active and life returning to normal. Pursuant to this, school enrolment is expected to rise in the state. To achieve this, emphasis must be made

in line with Basic Education policy statements of the country. According to the National Policy on Education (2013), Basic Education is the education given to children aged 0-15 years. It encompasses the early childhood education (0-4) and 10 years of formal schooling. In this regard, early childhood education however, is said to be segmented into 0-4 years situated in day-care or crèches, fully in the hands of the private sector and social development services, whilst ages 5-6 are within the formal education sector (NPE, 2013).

Conversely, the policy does not contain in its entirety any provision in the interest of common good for education of every child in the state, including children with special educational needs. It is therefore not possible to think that education system is accountable to pupils and students in Borno state given the fact that people have respect for diversity of values, beliefs and tradition. However, the enrolment has been impressive following the proactive intervention of Government, and NGOs. As at 2017 the Children enrolment in schools in the state rose to 687,733 children.in 1,627 schools in the state (<https://reliefweb.int>). Prior to this period, the dropout incidence in Borno was majorly attributable to distance to school, child labour needs at home and monetary costs of education. Other reasons adduced were, the perception that the child was too young to attend school, and the poor quality of schools (<https://endorennigeria.files.wordpress.com/2004>).

It may be argued that with spirited efforts of the government, International agencies and Non-Governmental Organisations (NGOs) there has been increase in the access to education, school enrolment and attendance in Borno in general and Maiduguri in particular (UNICEF, 2018). What must have facilitated this increase? It may not be far from the following factors; double shift schooling strategy, construction of schools/classes, provision of uniforms, organised educational campaigns/enrolment drive, water and sanitation services, education and recreation materials, recruitment and training of teachers or capacity building for teachers and community/school based participation/management as well as monitoring and evaluation and so on (<https://reliefweb.int>).

Double shift schooling strategy

According to Bray (2000) double shift schooling has been used to describe schools which have different pupils in the mornings and afternoons but the same number of classroom hours. It appears many African countries (Botswana, Zimbabwe, South Africa, and Namibia) practiced the double shift schooling including Nigeria. The purpose of double-shift schooling is to increase the supply of school places while limiting strain in budget. Introduction of double shift allows a single set of buildings and facilities to serve more pupils (<https://unesdoc.unesco.org/ark:/>). This strategy of schooling has gained popularity in Maiduguri where Non-Governmental Organisations intensively utilise government own school facilities to run school shifts for internally displaced children. Moelanyane (2004) commenting on this kind of schooling, observed that the atmosphere of double shift is inferior to that of single school due to the fact that children who attend school at second shift lost concentration due to the low span of interest. Similarly, Harper (2007) has observed truancy as one of the weaknesses of double shift schooling. Above all,

the time for lessons are normally too short that the school might not run the normal 8 hours period stipulated by the Ministry of Education. The greater advantage of double shift schooling has to do with facilities and equipment in the schools used for teaching and learning. Although Bush (2003) and Bray (2003) have both criticised the system giving the fact that the class equipment becomes overstretched in most cases with furniture deteriorating, reading materials torn and classrooms poorly kept. Examining the effects of double shift schooling in Zimbabwe, teachers sought that the system be abolished owing to the problems associated with it (Tichaona et al, 2015).

The Republic of Philippines adopted a double shift school policy in 2004 to address classroom shortage in the country. The reasons adduced for the adoption was the perennial problem of inadequate classrooms as a result of the annual increase in enrolment and continuing severe budget constraints (www.deped.gov.ph). It could be observed that creating school time tables are most often problematic in many schools that have to deal with school shifts as the complexities are practically difficult to handle. In this case if schools do not have enough resources, they are forced to work several or double shifts. Bray (2008) pointed out that double shift schooling is aimed to extend access and minimise unit costs. Apparently, it is sometimes done at the expense of educational quality.

Construction of Schools

It is a known fact that most schools prior to 2009, at the emergence of armed conflict in North eastern states of Nigeria, schools had deteriorated to the extent of disrepair. The existing primary and secondary schools were dilapidated and without furniture. Coupled with this was the spade of wanton destruction of the already dilapidated facilities. According to Human Rights report (2012) over 910 schools in Borno state were destroyed by members of Boko Haram sect. This alone has displaced an estimated number of 800,000 school aged children out of school in Maiduguri. Construction of schools and classrooms remains another factor in remediating the insurgency problems. There have been several interventions directed towards extending access to quality education and providing psychosocial support to pupils and students in many areas of the state. For example, AICS, that is, Italian Agency for Development Cooperation constructed and rehabilitated some schools in Maiduguri (www.coopi.org). Among these spirited interventions was that provided by Education Crisis Response programme which established 180 temporary learning centres in Maiduguri and renovated 16,000 formal schools. The group has been able to enrol 5,778 out of school children and supported them with school items in Maiduguri (bags, textbooks, writing materials) (www.hrw.org). This has, to a great extent, increased school enrolment in the State. Borno state in a report in www.pulse.ng claimed to have reconstructed 50,000 houses, schools, and clinics. The report specifically said the government has reconstructed 26 mega schools to take care of increasing number of orphans in the state. Similar constructions being supervised by NEMA include the construction of primary and post-primary education for IDPs living in camps among host communities with UNICEF deploying schools on wheels and school in the Box. These has added up to the enrolment pattern in the state (<https://reliefweb.int>).

Other factors

The roles played by NGOs in increasing the school enrolment has been tremendous. Hitherto, most schools lacked good water supply, sanitary facilities, reading materials and other things that facilitates teaching and learning. In a study by Mohammed and Yalwa (2018) the role of NGOs in Post-conflict region complemented the efforts of government in provision of relief materials, establishment of schools, counterpart funding, provision of health care services, advocacy/awareness campaigns and resettlement of internally displaced persons. The activities of NGOs has further increased school enrolments in affected places. For instance, www.reliefweb.int reported that among the key intervention programmes embarked upon by NGOs are increased access to basic education, and improved quality of education. All these include and not limited to provision of uniforms, reading materials, enrolment drive, water and sanitation services, recreation facilities, teachers training and community based management committee.

Methodology

The study surveyed 10 out of the 95 Primary schools in Maiduguri, Borno state at least representing over 10% of the schools. The documents observed in the sample consisted of schools attendance register, transfer registers and new enrolment files by schools. Ten (10) out of 95 schools were sampled in Maiduguri Metropolis and Jere Local government areas. To compliment the data, 211 teachers were sample, 46 parents and 55 pupils using the sample of convenience. A proforma was designed to check the availability or otherwise of facilities in the schools. Records from State Universal Basic Education Board (SUBEB) also formed part of the data collection. Parents and Pupils were interviewed using a simple designed questionnaire with 10 items while teachers 15 item questionnaire was administered by research assistants. The questionnaire was designed to elicit the same information concerning school enrolment. The reliability of the instruments were ascertained using three private schools in the state. The reliability index of $r = .86$ was obtained. This is considered high enough to be used in the study.

Table 1. school enrolment in Maiduguri and Jere Local government areas

Year	Pupils	% Male	% Female
2008 **	12,623	7,133 (56.5%)	5,490 (43.5%)
2009 **	12,127	8,241(68%)	3,886 (32%)
2010 **	11,565	6,322 (54.7%)	5,243 (45.3%)
2011	7,240	5,441 (75.2%)	1,799 (24.8%)
2012	5,594	3,321 (59.4%)	2,273 (40.6%)
2013	1,736	1,121 (64.6%)	615 (35.4%)

2014	2,274	1,363 (59.9%)	911 (40.1%)
2015	2,365	1,464 (61.9%)	901 (38.1%)
2016 **	11,727	8,781 (74.9%)	2,946 (25.1%)
2017 **	13,776	7,195 (52.2%)	6,581(47.8%)
2018 **	15,154	7,637 (50.4%)	7,517(49.6%)
Total		56.5%	35.2%

Table 1. shows school enrolment in a number of public Primary schools in Maiduguri Metropolis and Jere local government areas. The school enrolment decline drastically between 2011 and 2015 at the pick of the insurgency with enrolment rate of 7,240 students to 2,365 pupils per year in the area of study. The percentage of enrolment over the years stood at 56.5% males and 35.2% females.

Table 2. School facilities supporting enrolment

95 primary schools

Facilities	New facility	Number usable	No unusable
Classrooms	15	All	None
Water source	15	All schools	None
Toilets	15	All schools	None
Play ground	6	All schools	14 Not well kept
Praying places (mosque)	All	All	None
Library	0	None	Not available
Staff rooms/offices	3	68	27
Male teachers latrines	4	95	-
Female teachers latrine	15	95	-

Source: Borno state Universal Basic Education Board (SUBEB, 2018)

Table 2 show school facilities supporting school enrolment in Maiduguri and Jere local government. 95 schools were surveyed in Maiduguri and Jere. There were 15 additional make shift schools established by NGOs in the area of study. Some of these facilities have few classrooms partitioned by blocks, plants and other materials. The new facilities have no sufficient play ground for pupils during free time. No libraries in the new facilities nor the schools. The new facilities have few areas designated as staff

rooms. Whereas in the 95 schools visited 68 have staffrooms but 27 of 95 schools have no well furnished staff rooms. Of the 15 new facilities, 4 have staff toilets though not designated male or female. Whereas the 95 schools have male and female staff toilets.

Table 3. reasons for non-enrolment

N = 312

Responses	Teachers (211)	Parents (46)	Pupils (55)
School too far from home	21 (9.95 %)	15 (32.6%)	0 (0%)
No enough teachers	211 (100%)	38 (82.6%)	52 (94.5%)
Lack of classrooms	198 (93.8%)	32 (69.55%)	49 (89.1%)
Lack of security	201 (95.3%)	39 (84.9%)	49 (89.1%)
Families prefer Islamic education	52 (24.6%)	15 (32.6%)	19 (34.5%)
Lack of school fees	0 (0.0%)	11 (23.9%)	0 (0.0%)
Lack of uniforms	187 (88.6%)	38 (82.6%)	51 (92.7%)
Lack of books	0 (0.0%)	9 (19.6%)	0 (0.0%)
Parental attitude	209 (99.1%)	6 (13.0%)	49 (89.1%)

Table 3. is a percentage distribution of respondents views for non-enrolment in primary schools in Maiduguri and Jere local government areas. In their views teachers about 10% of teachers said distance from school accounts for non-enrolment of pupils and 33% of parents agreed it could be the reason while the pupils said distance from school is not actually a reason. Shortage of teachers have been implicated by all respondents. It is a known fact that lack of classrooms have been a long time reason for poor school enrolment as shown by this study. However, the rate of enrolment dropped in 2011-2015 due to security reasons as shown in table 2. Majority of the respondents did not view preference for Islamic education as a reason for non-enrolment

Similarly, lack of school fees did not account for non-enrolment in school but lack of school uniforms do because parents have to provide schools uniforms. Where there are many children in a household, choice of who goes to school is critical in a family. Lack of books is not a reason for non-enrolment. However, parents' attitude is a strong reason.

Discussion

This study was designed to investigate the factors responsible for school enrolment in remediation of the insurgency in the state. Data in this study showed that between 2008 and 2010 the school enrolment was steady with slight decline in enrolment in 2009 and 2010 when the insurgency started. However, between 2011 and 2015 there was sharp decline in enrolment due to insurgency characterised by abduction, killings, burning of schools and total school closure. Accordingly, the crisis caused by the Boko Haram insurgency in the northeast Nigeria means that over 57 percent of schools in Borno, the epicentre of the insurgency, are closed even as the new school year begins (<https://reliefweb.int>).

By 2016 to date there has been renewed efforts to revitalised education in the state especially in Maiduguri and Jere as well as many other local government areas of the state. The increase in enrolment in the schools investigated showed the effort of government of the state along with other organisations to reinforce enrolment and make schooling conducive. This attest to the drive by UNCEF and partners to enrol nearly 750,000 children in schools as well as establishing over 350 temporary learning, distributing nearly 94,000 packs of learning materials to get children back to school (<https://reliefweb.int>).

School enrolment have so far gone high as opposed to the regular enrolment year in year out prior to the insurgency. This is because the government was awakened to the need to provide amenities in schools that would promote enrolment and indeed learning, for instance, provision of safe drinking water, improvement in school hygiene by the increase in toilet facilities for pupils and teachers. Although UNICEF and other organisations have done much in rehabilitating schools and classrooms, much is still desired in terms of adequacy. The number of pupils per class still shows that spaces are not enough or that teachers are still in short supply as revealed by this study. The teacher/pupil ratio is 1-95 which indeed is to high for effective teaching and learning given the fact that teaching is still done in the tradition method despite the training and retraining of teachers in the use of new pedagogy. This is because the training is not complimented by modern teaching equipment like the use of ICT.

The reasons for poor enrolment were investigate in this study and in the respondents' views for instance, about 10% of teachers said distance from school accounts for non-enrolment of pupils and 33% of parents agreed it could be the reason while the pupils said distance from school is not actually a reason. In this regard, the choice of school matters to parents and teachers. That is to say, some parents preferred taking their children to some schools rather than the ones closer to their residents. The choice of schools is therefore not bound by law. Shortage of teachers have shown the long neglect of schools over the years. Over half Borno school teachers abandon work (Haruna, February, 08, 2017). To ameliorate this trend, the US Agency for International Development (USAID) trained 7,169 teachers in Borno to mitigate the shortages of teachers caused by Boko Haram insurgency (<https://pmnewsnigeria.com>)

It is a known fact that lack of classrooms have been a long time reason for poor school enrolment as shown by this study. However, the rate of enrolment dropped in 2011-2015 due to security reasons as shown in table 2. Majority of the

respondents did not view preference for Islamic education as a reason for non-enrolment. This means that there has been remarkable change in people's perception and attitude toward western education.

Similarly, lack of school fees did not account for non-enrolment in school but lack of school uniforms do because parents have to provide schools uniforms. Where there are many children in a household, choice of who goes to school is critical in family decision . Lack of books is not a reason for non-enrolment. However, parents' attitude is a strong reason. In this regard, the choice of boy child against girl-child still remain a strong factor in school enrolment in the state. Most girls help parents run household chores. Children in impoverished households often contribute to their family's welfare by managing household responsibilities (UNICEF, 2007). To this end, school enrolment involving girl-child appears low (35.2%) in this study which is a statement of fact that with population of female gender in communities there is still apathy towards girl-child education in the North.

Conclusion/Recommendation

Based on the findings in this study and the limitation thereof, it is concluded that school enrolment has increased in Borno state owing to several factors contributing to the phenomenon. There has been increase in facilities to support enrolment, training and retraining of teachers, provision of school materials needed by learners and above all increase in security has allayed peoples' fear of danger.

It is therefore recommended that government should argument NGOs efforts by funding the education sector appropriately. For example, NGOs efforts in training teachers should be sustained through retraining and in-service training. Provision of ICT materials and effective use of the materials is required.

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The Predictor of Organizational Citizenship Behaviour Using Social Exchange Theory

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Abstract- This research aims to test variables that are able to predict Organizational Citizenship Behavior using Social Exchange Theory. Social Exchange Theory is a very influential concept to comprehend employees' behavior in their workplace. There are three variables assumed to become the predictor for extra behavior using social exchange theory concept, namely Perceived Organizational Support, Leader Member Exchange, dan Psychological Contract. There are 390 manufacture employees in Yogyakarta used as respondents in this research, using structural equation model as the analysis tool. Variables in this research are measured using multidimensional measurement. The result of this research shows that those variables are predictor for Organizational Citizenship Behaviour.

Index Terms- Organizational Citizenship Behaviour, Social Exchange, Leader Member Exchange, Perceived Organizational Support, Psychological Contract

I. INTRODUCTION

Exchange theory differentiates the correlation between parties in two forms, namely social exchange and economic exchange. Social exchange needs trust between parties that get mutual benefits from the exchange. Meanwhile, economic exchange is based on special obligation dimension, time dimension, and reciprocal norm. In a short term, the obligation becomes a specific part; mechanism for ensuring obligation fulfilment is a formal contract, and economic exchange is limited by time dimension (Blau, 1964). Reciprocal norm provides benefits in the form of the increase of trust, leading to an opportunity to discuss and to implement long-term responsibility. Social Exchange Theory (SET) is an influential concept to comprehend the behavior in the workplace. Social Exchange Theory (SET) is a theory about social behavior paradigm, namely paradigm that study human behavior continuously. Social Exchange Theory began in 1920 (Malinowski & Mauss, dalam Cropanzano & Mitchell, 2005). This theory initially was developed in Anthropology (Firth, 1967; Sahlins in Cropanzano & Mitchell, 2005). In its development, this theory changes into Socialpsychology (Gouldner, 1960; Homans, 1958; Thibault & Kelley 1959 in Cropanzano& Mitchell, 2005) and in Sociology (Homans, 1961; Emerson, 1962 and Blau (1964).

Social exchange theory is based on communication and exchange between organization and employees that are identified through benefits obtained from social emotional exchange,

commitment, and trust. Social Exchange Theory is a theory which underlies several literature in social study in an understanding that one's behavior depends on reaction from other party (Blau, 1964). Wayne, Shore & Liden (1997) states that Social Exchange Theory is the right theory to explain Perceived Organizational Support & Leader Member Exchange, Organizational Citizenship Behaviour (Organ, 1997) and Psychological Contract (Barling & Cooper, 2008). Leader Member Exchange (LMX), Organizational Citizenship Behaviour (OCB), Perceived Organizational Support (POS) dan Psychological Contract (PC) are the main variables on Social Exchange Theory (SET).

The development of measurement of Organizational Citizenship Behaviour which are characterized as intentions to provide more benefits for the company. LePine, Erez & Johnson (2002) found that Organizational Citizenship Behaviour has a single dimension. This emphasizes that researchers do not study various expressions of Organizational Citizenship Behaviour with a variety of different constructs. Organ (1988) explains that there are 5 dimensions in Organizational Citizenship Behaviour, namely (1) Altruism represents behavior aimed at helping coworkers (2) Courtesy is an action that is highly related to others before taking actions that can affect work (3) Conscientiousness , employee behavior in accepting and complying with organizational rules and procedures (4) Civic virtue is a behavior indicating that employees have an active interest in organizational life (5) Sportsmanship is defined as the ability of employees to tolerate less-ideal conditions without complaints and raising problems from the actual state.

The study of multidimensional organizational citizenship behavior is carried out by many researchers (Moorman & Blakely, 1995; Padsakoff et al 2000; Padsakoff & Mac Kenzie, 1994), and it cannot be denied that there are many evidences of different dimensions. William & Anderson (1991) divides Organizational Citizenship Behavior into two dimensions in the form of Organizational Citizenship Behavior-O and Organizational Citizenship Behavior-I although there is little literature to provide empirical confirmation of these two dimensions.

The important role of Organizational Citizenship Behaviour in the success of the company requires research on variables that will affect the level of extra corporate behavior. Wayne et al, 1997; Illies et al., 2007; Shapiro & Jacqueline, 2002 state that Leader Member Exchange, Perceived Organizational Support and Psychological Contract are predictors of Organizational Citizenship Behaviour.

II. LITERATURE REVIEWS AND HYPOTHESIS DEVELOPMENT

Previous studies have shown the correlation of Perceived Organizational Support with several variables such as: affective organizational commitment (Eisenberger et al., 1990; Setton, Bennet & Liden, 1996; Lynch, Eisenberger & Armeli, 2001; Shore & Tetrick, 1991); effort – reward Expectation (Eisenberger et al, 1990); continuence commitmen (Shore & Tetrick, 1991); Leader Member Exchange (Setton et al., 1996; Wayne, Shore & Liden, 1997); supervisor support (Kottle & Sharafinski, 1998; Malatesta, 1995; Shore & Tetrick, 1991); procedural justice (Andrews & Kacmar, 2001; Rhoades et al., 2001); job satisfaction (Aquino & Griffeth, 1999; Eisenberger et al., 1997; Shore & Tetrick, 1991) A certainty that the organization is able to maintain the continuity of work in the future is expected to be an indication of the high level of Perceived Organizational Support (Allen, Shore & Griffeth, 1999). Van Dyne, Graham & Dienesch (1994) support the expectation that there is a positive correlation between Social Exchange Relationship and Organizational Citizenship Behavior. When individuals feel being treated well by the organization, they will give reciprocity by working more than just the minimum work required. On the contrary, if someone feels that they are not treated well, they will not give extra behavior.

H1: Perceived Organizational Support is positively related to Organizational Citizenship Behaviour

Leader Member Exchange and Organizational Citizenship Behaviour become the basis for a new era in managing a diverse workforce in the global world. It is believed that the correlation of Leader Member Exchange has an important influence on behavior (including Organizational Citizenship Behavior). Deluga (in Asgraffi et al. 2008) states that the Organizational Citizenship Behavior carried out by subordinates is not formally valued. They are valued informally in terms of gaining support and obtaining the necessary of supporting resources from the leader. Consequently, subordinates will be motivated to maintain a pleasant relationship. Leader Member Exchange significantly influences the level of Organizational Citizenship Behavior among workers. The high quality of relationship of Leader Member Exchange will motivate workers to do more roles without formal rewards from the organization.

H2 : Leader Member Exchange is positively related to Organizational Citizenship Behaviour

Workers will be motivated to improve their work if they feel that their employment relationship is based on a fair social exchange (Blau, 1964). The Psychological Contract consists of unwritten beliefs from each party regarding reciprocal contributions (Cheung & Chiu, 2010). If the workers feel that their expectations of the leader are fulfilled, they will feel confident at interacting with the organization, both now and in the future, with the supervisor. Workers who obtain the suitability of the promises given will provide reciprocity by doing extra behavior (Organizational Citizenship Behavior) (Coyle-Shapiro & Jacqueline; 2002). Leader Member Exchange significantly influence the level of Organizational Citizenship Behavior among workers (Ilies et al, 2007, Setton et al, 1996, Wayne et al, 1997)

H3 : Psychological contract is positively related to Organizational Citizenship Behaviour

III. OPERATIONAL DEFINITION AND MEASUREMENT

The operational definitions for this research variable are:

1. Organizational Citizenship Behavior is defined as a behavior that is more than a routine expected to be carried out by a worker (Daniel et al., 2006). Multidimensional Organizational Citizenship Behavior consists of Organizational Citizenship Behavior Individual and Organizational Citizenship Behavior Organizations developed by Willian & Anderson, 1991. Organizational Citizenship Behavior Individuals consist of 7 questions while Organizational Citizenship Behavior Organizations consist of 7 questions.
2. Leader Member Exchange is defined as a system consisting of components where there is a relationship involving two people in a dyadic manner, involving behavior patterns that are interdependent, sharing results and producing conceptions about the environment and values (Scandura et al, 1986). LMX_M was developed by Liden & Maslyn, 1988. It consists of 5 indicators namely affection, loyalty, contribution, and professional respect, which consists of 12 questions.
3. Perceived Organizational Support is defined as the global belief of labors that organizations value their contributions and pay attention to their welfare (Eisenberger et al, 1986; Kraimer & Wayne, 2004). POS measurement developed by Eisenberger et al, 1997 consists of 8 questions.
4. Psychological Contract is defined as the perception of workers towards the organization that the organization is responsible for workers in various ways (Rousseau, 1995). Multidimensional Psychological contract was developed by Rousseau in 1989 consisting of 2 indicators, namely relational psychological contract and transactional psychological contract with 8 numbers of questions.

IV. RESEARCH METHOD

1. Population and Samples

The population in this study is large/medium manufacturing workers in Yogyakarta. The Special Region of Yogyakarta has 304 large and medium processing companies spread across 5 districts. It is selected companies that have employees of at least 200 people, and there are 57 companies with employees of at least 200 people. The sampling technique in this study is convenience sampling, which is based on the availability of elements and the easeness of obtaining them.

2. Research Models and Analysis Tools

Figure 1

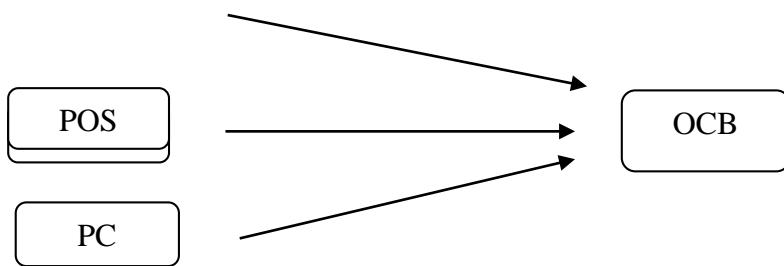


Figure 1. Research Conceptual Framework
Source: Wong et al., 2005; Wayne et al., 1997; Piccoli et al., 2017

Analysis tools used in this research is structural equation model (SEM).

Data Analysis Method

Validity test in this study was conducted using factor analysis (Second Order Confirmatory Factor Analysis = CFA) because CFA is able to measure how far the indicator size reflects its theoretical latent construct is (Ghozali, 2008). In addition to convergent validity, discriminant validity for the measurement of constructs is different and should not be highly correlated. Convergent validity is calculated from the average percentage of variance extracted (AVE) values between items or indicators. Reliability test is used to measure the consistency of measurement instruments in measuring the consistency of respondents in answering the items of questions. To test reliability, construct reliability (CR) is used. Hypothesis testing uses Structural Equation Modeling (SEM) by testing the Goodness of Fit Structural Model. This measurement is relative criterion using some goodness of fit indexes which allow researchers to get an acceptance of the proposed model (Hair, 1998).

Results and discussion

1. Respondents Characteristics

Respondents in this study are workers in manufacturing companies, as many as 390 people. From the total of 390 respondents, 54% are male and 46% are female, while viewed from the age, 22% of them are 20-30 years, 38% are 31-40 years, 28% are 41-50 years and 12% are over 55 years old. Education is dominated by respondents with high school education level, namely 292 people or 75% of the total respondents. Respondents in this study are workers in manufacturing companies, as many as 390 people. From the total of 390 respondents, 54% are male and 46% are female, while based on the age, 22% of them are between 20-30 years, 38% are 31-40 years, 28% are 41-50 years, and 12% are over 55 years old. Education is dominated by respondents with high school education level, namely 292 people or 75% of the total respondents. Additionally, 85% of respondents in this study are permanent employees with a dominance of income between IDR 1,000,000 and IDR 2,500,000 (78%).

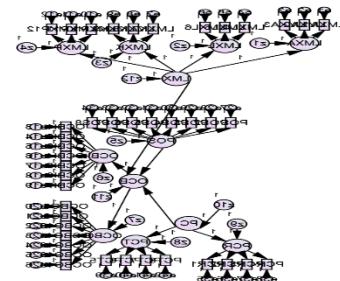
The conceptual framework of research in this study describes the predictors of Organizational Citizenship Behaviour can be seen in

2. Test of Validity and Reliability.

H1

The model developed in this research is as follows:

Figure 2: Structural Model of Research



The validity test is done by paying attention to the factor loading on each question item. After removing the question item with the low factor loading, the construct validity is then calculated which consists of the convergent validity measured from the standardized loading estimate, and the discriminant validity measured by AVE. The standardized value of the loading estimate must be equal to 0.50 or should be worth 0.70. The standardized loading estimate value in this research was 0.40 - 0.80, indicated that the construct validity is high on a factor (latent construct), and this indicated that all items or indicators converged at one point. The discriminant validity can be calculated based on the percentage of the average variance extracted (AVE) values between the items or indicators of a set of latent constructs.

The Reliability test is one indicator of the convergent validity. In this research, the reliability test was carried out using Construct Reliability (CR) which provided better reliability than other methods (Ghozali, 2008). The results of the validity and reliability test for all constructs in this research are shown in the Table 1.

Table 1. Test Results of Validity and Reliability

Variables	Total Questions	AVE	Information	CR	Information
OCB	5	0.50	Valid	0.78	Reliable
POS	7	0.52	Valid	0.88	Reliable
LMX	12	0.57	Valid	0.94	Reliable
PC	4	0.5	Valid	0.78	Reliable

The results show that all variables are valid and reliable. The next stage is to assess the overall model by calculating the values of the goodness of fit model. After modifying the model, as shown in the Figure 3, the results of the goodness of fit model are then shown in the Table 2.

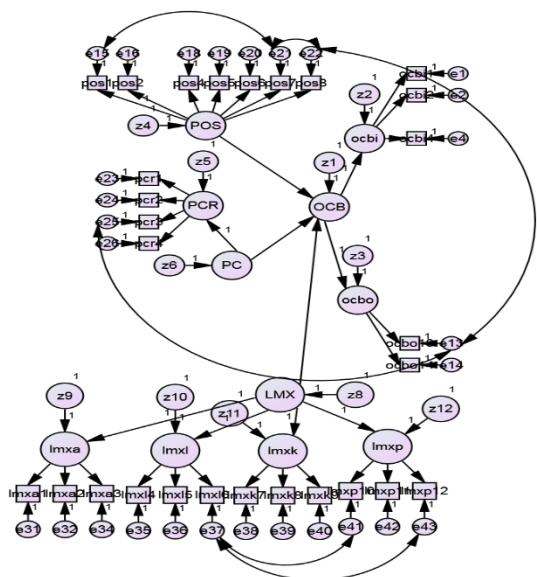


Figure 2. Structural Model of Research After Modification

Table 2. Values of Goodness of Fit Model

Criteria of Goodness of Fit Model	Index of Goodness of Fit Model	Result Supported by a probability value < 0.05, and an estimation of	Information
<i>Absolute fit measure</i>	Chi-Square Statistic	1356.38	Good
	GFI	0.80	The Hypothesis 3 states that the Psychological Contract has a positive influence on the Organizational Citizenship Behavior.
	RMSEA	0.08	Marginal
<i>Incremental fit measure</i>	AGFI	0.76	Marginal
	CFI	0.76010	The test results in Table 3 shows that the estimated value is Marginally smaller than 1.96, with the CR is Marginally which is smaller than 1.96, with the probability < 0.05.
<i>Parsimonious fit measure</i>	Normed χ^2 (CMIN/DF)	3.98	Probability < 0.10. This statistically shows that the Hypothesis 3 is supported where there is a positive influence of the Psychological Contract on the Organizational Citizenship Behavior with an estimated value of 0.010 and the probability < 0.05. This means that the higher the Psychological Contract, the higher the Organizational Citizenship Behavior.

The Table 2 shows that the Chi-Square, RMSEA, and CMIN/DF are at the values that satisfy the requirements, which means that the model is declared fit with the values below the cut-off good fit index. While based on the GFI, AGFI, and CFI, the

model is declared marginal fit with the values closing to the cut-off good fit index. The modification results show better results than the initial model thus it can be interpreted that the model is optimal in explaining the relationship between the organizational citizenship behavior and its predictors. If there is one or more parameters that have been fit, the model is declared to be in accordance with the data or fit (Solumun, 2002). The next step is to test the hypothesis. By using SEM, the results of the hypothesis test are shown in the Table 3.

Table 3. Hypothesis Test Results

Hypothesis	Relationship	Test Result			Information
		Estimation	CR	p	
H1	POS <--- OCB	0.170	0.338	0.01 *	Significant
H2	LMX <----- OCB	0.235	0.440	0.096 *	Significant
H3	PC < --- OCB	0.010	0.261	0.10 **	Significant

*) 0.05 significant

*) 0.10 significant

The Hypothesis 1 states that the Perceived Organizational Support has a positive influence on the Organizational Citizenship Behavior. The test results in the Table 3 show that the Perceived Organizational Support has a positive influence on the Organizational Citizenship Behavior with a coefficient of 0.170, a CR value of 0.338 which is smaller than 1.96 with a probability < 0.05. This statistically shows that the Hypothesis 1, which states that there is a positive influence of the Perceived Organizational Support on the OCB, is supported by a probability value < 0.05 and an estimate of 0.139. This means that the higher the Perceived Organizational Support, the higher the OCB.

The Hypothesis 2 states that the Leader Member Exchange has a positive influence on the Organizational Citizenship Behavior. The test results in the Table 3 show that the Leader Member Exchange has a positive influence on Organizational Citizenship Behavior with a coefficient of 0.235, a CR value of 0.440, which is smaller than 1.96, with a probability < 0.05. This statistically shows that the Hypothesis 2 states that there is a positive influence of the Exchange Member Leader on the OCB.

The test results in Table 3 shows that the estimated value is Marginally smaller than 1.96, with the CR is Marginally which is smaller than 1.96, with the probability < 0.05. This means that the higher the Psychological Contract, the higher the Organizational Citizenship Behavior.

V. DISCUSSION

The Perceived Organizational Support in hypotheses has a positive influence on the Organizational Citizenship Behavior; the research results were not supported. The belief that organizations maintain the continuity of work in the future is expected to be an indication of the high Perceived Organizational Support (Allen et al, 1999). When individuals are treated well, they will give extra behavior to the organization. The results of the research significantly showed that the extra behavior was caused by the employees' perceptions that the organization would be toward the organization (Eisenberger et al, 1986).

The Leader Member Exchange has a positive influence on the Organizational Citizenship Behavior, which means that the quality of the relationship between superiors and subordinates will increase extra behavior. When the quality of the relationship between superiors and subordinates is high, the extra behavior will increase. The respondents in this research had a positive perception of superiors. The Leader Member Exchange is the predictor of the Organizational Citizenship Behavior (Shapiro & Jacqueline, 2002; Wayne et al., 1997; Illies, Nahrgang & Margeson, 2007).

The Psychological Contract has a positive influence on Organizational Citizenship Behavior, which means that when workers feel that an organization can fulfill what it promised, it will encourage workers to behave beyond their job description (extra behavior).

The social exchange theory provides a basis for understanding how workers respond to an organization in fulfilling its promises or obligations. Workers will develop their awareness of the obligation to help organizations achieve their goals when they realize that their contributions are valuable to the organization (Eisenberger et al, 1986), this will encourage workers to show extra behavior (Setton et al, 1996).

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National Integration and Sustainable Development of Nigeria: The Emergent Issues

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Abstract- Nigeria became a fostered nation in 1914 through the amalgam of the conquered areas by the British. Since then, deliberate efforts were made to nurtured the amalgam communities into nationhood during the colonial period. With the attainment of independence in 1960, successive government lost no sight in manuring the Nigeria nationhood project through a number of policies and programmes. Though these efforts have kept the hope of evolving a strong united Nigeria nation live, a catalogue of issues and challenges continued to undermine the project. It is in the light of this, that the paper attempts an examination of essential issues towards Nigeria national integration and sustainable development. Using historical research methodology and content analysis the paper sum- up that the issues notwithstanding, the project Nigeria nation is not only releasable but set her on the path of growth and sustainable development.

Index Terms- Integration, Sustainable, Development

I. INTRODUCTION

The project Nigeria Nation began long before the 19th century colonial process as the people, communities and polities that occupied the area has been involved in high level and meaningful interaction over time. The colonial process that began on the second half of 19th century led to the birth of Nigeria nation through conquest and gradual amalgamation of the various groups within the geographical entity. The creation in 1914 by the British was meant to solve and meet the essence of colonialism; maximum exploitation of both human and material resources for the benefit of the metropolis. The creation of Nigeria nation was therefore in the submission of Knottla who opined that such institutions are more importantly social arrangement for dealing with or meeting up with human needs, drives and problems.¹

The British creation of Nigeria nation state was not without minimal problems but relatively met the needs and aspiration of the colonial government up to the time of independence in 1960. The creation also became the foundation of centralized political development and statehood of the country² and the basis for its sustainability. However, since independence in 1960, the much expected unity/integration of the various ethnic groups, culture and polities, sustained socio-economic and political development has been plagued by a catalogue of problems such as misconception of Nigeria nation, political instability and spate of insecurity among others. It is on the note, the paper attempt to look

in to emergence issues in Nigeria national integration and sustainable development.

II. CONCEPTUAL CLARIFICATION

Understanding Creation of Nigeria

For us to understand the emergence of Nigeria as a political entity, we need to appreciate historical process involved. This process and underlining factors could be explained from two dimension. The first being internal dynamics and the other external influence occasioned by contact with Europeans most especially the British.

The most striking internal dynamics was the geographical compactness which no doubt formed the basis of the historical process. Nigeria has advantage of being located on a coastal shore of Atlantic Ocean in West Africa, with two district vegetation of forestry south and savannah belt. The land is well drained by a number of rivers anchored by Niger and Benue rivers that empty in to the ocean. The ecology was never a barbaric but a unifying factor that encouraged high level of interaction among the people across the geographical divide. The compactness of the environment, according to Ajayi and Alagoa comes from two factors;

The first is the complementality of the Sudan belt and the forest zone with the intervening transitional middle belt dominated by the Jos plateau... the second factor engendering compactness has been the essential unity of the river system... the unity of these waterways encouveraged a network of relationship within the basin. The river networks provided routes of contact between people cutting across the north and south axis and supplementary. It's because of this compactness that despite the fortuitous manner in which the political unity of Nigeria came to be achieved, culturally and economically Nigeria was not really an arbitrary creation.³

The environmental differences of the Nigeria area was never a basner to interaction, rather it encourages migrations trade and intermingling of people and overlapping of settlements. these developments encouraged cross-fertilization of culture and idea that probably contributed to the formation and growth of states in Nigeria. In the course of time and most especially in the 18th – 19th centuries, most states that emerged strong in the area, there political enclave were not limited to their ethnic boundary but have people of different ethnic groups and culture within its area of influence.⁴ For instance, old Oyo in the peak of its power incorporated people of not only Yoruba origin so also was the

case with the Sokoto caliphate whose socio-cultural and political inference was felt down south.

The import of the above is that long before the British creation and contrary to arbitrary creation the Nigeria state was already in the process of formation. This is was at the level of interaction, exchange of ideas and the nature of some existing states that are not homogenous in response to the internal dynamics.

The external factor is anchored on the contact with Europeans and developments from therein. Prior to the contact, conquest and naming of geographical area called Nigeria in 1914, therein existed a number of independent political entities with different and complex system of government. Some of these entities were centralized and others were decentralized in their administration. Among these states, the kingdom of Benin was the first to come into contact with Europeans in 1472 when RoydeSequeira of Portugal ventured into the palace of Oba Ewuare, the Great. The contact introduced catholic faith in to the kingdom and commercial relations based on trade in pepper. Which was overtaken by trade in slaves from the time when other European nation's joined.⁵ The trade in slaves lasted up to 19th century when it was abolished due to success in industrial revolution.

The industrial success came with its attendant problems. The critical being the need for raw materials, hence the shift from slave trade to the commodity trade. The basic raw materials needed by industrializing Europe were palm oil, cotton, coffee, ground nut among others. The competition for raw materials and areas of influence among European nations led to negation and signing of treaties with coastal chiefs. Some of the chiefs in southern Nigeria that such treaties were signed with mere with Brass (1834) Bonny (1839) Calabar (1841) and Aboh (1842).⁶ This process was followed by appointment of consult to the Bight of Benin and Biafra, expedition into the interior, establishment of Consulate at Lokoja in 1854 and cut through competition that motivated European conference and partition, (Berlin Conference) to military confrontation and British conquest between 1886 and 1903.

The Berlin conference outcome of the effective occupation made British government to grant charter to Goldies company that became Royal Niger company in 1886. The charter was withdrawn on 29th December, 1899 and on 1st January, 1900 northern protectorate was proclaimed at Lokoja by Fredrick J.D. Lugard, the appointed high commission to the area⁸ From this period, the process to Nigerian nation became accelerated till final amalgamation in 1914.

From the above, the area British conquered and administrated as colonial territory known as Nigeria and since then onward lies along the shore of Gulf of Guinea, an arm of the Atlantic ocean in west African and the unity from therein to the southern rivers of Niger Republic to its west republic of Benin while Chad and Cameroon formed the eastern axis of its boundary. In landmass it covers 913,073 km² and with a population of over 180,000,000 cutting across about 250 ethnic groups and culture.⁹

National Integration

For us to appreciate the concept of national integration, we need to reflect and understand the twin words. The word national stemmed from nation which has been given different

interpretation. However, the following are intends with our belief. Cobbarn drawing his analogy from Western Europe experience defines 'nation' as any territorial community, the members of which are conscious of themselves as members of a community, and wish to maintain the identity of the community.¹⁰ In a related definition, Cokman refers to a nation as a large group of people who feel that they are a single and exclusive community destined to be an independent slate¹¹. And, leeds who was more precise simply described nation as a group of people who consider themselves as one.¹²

The unity of these definition and its import lies in their common denominator of people or group, community or territory they so occupied. This apthy applies to Nigeria and Nigerians as it is today a defined territory with group of people, who are conscious of themselves and identity with the community and its territory.

Irrespective of counter argument put toward by different scholars and opinion leaders of Nigeria Nationhood, Nigeria qualified a nation as no single country is homogenom. Most arguments from opinion and community leaders in Nigeria was as a result of their inability to attained what they wish to achieved despite this, they at one time or the other occupied or which to occupy national offices.

Integration according to wiener is the entire process of bringing together culturally and socially discrete group into a single terri tonal unit and the establishment of a national identity¹³. Integration is therefore the unificationof a different components to make a whole and identity as a whole. From the definition of Integrator, Weiner went further to described national integration on a subjective feeling which individuals belonging to different social groups or historically distinct political units have toward the nation.¹⁴.

On the other hand, Goleman and Rosberg defined national integration as the progressive reduction of cultural and regional tensions and discontinuities.... In the process of creating a homogenous political community.¹⁵

From the above definition, national intergraion is a continuous process most especially in the developing countries and indeed to our area of study. Nigeria with a population of over 180,000,000 million people divided into about 250 ethnic group and culture and different believe system.

Sustainable Development

The concept of sustainable development emanated from concern for environment where resources are continuously being exploited without care of future needs. The concern led to series of meeting, studies and establishment of commissions and agencies across the globe. Thus, in one of such meetings organized by World Commission on Environment and Development in 1987 defined sustainable development as the development that meets the needs of the present without compromising the ability of the future generations to meet their own needs.¹⁶ in application to our area of study and subject of discussion, sustainable development gives beyond environment but encompacy economic, social and political. It is thus, the ability to forge a strong and virile nation hood, strong economic base, mutual respect for each other and social responsible citizens. Is also connotes evolution of equal opportunities for all based on trust, rule of law and peace or co-existences.

Periscoping Nigerian national integration and sustainable development.

Sustainable development is only achievable in a heterogeneous society where national integration is based on fairness, equity, justice and harmonious resolution of differences. It is on this basis that Duuherger sees national integration as the process of a unifying a society where members are regarded and treated equally and harmoniously.¹⁷ Thus, the British conquest and creation of Nigeria marked the foundation of a unifying or establishment of a centralized political system for the divergent groups. This began with the amalgamation process that ended in 1914 when Northern and Southern Protectorates were brought under one political umbrella with appointment of Fredrick J.D. Lugard as the Governor General.¹⁸ The unification thus created an opportunity for diverse people to identify with new political unit and see themselves as Nigerians.¹⁹

The cementing of new political unit and promotion of unity among the people was to be enhanced through subsequent constitutional developments. Thus, from 1946 when Richard's constitution came into effect to the time of independences, a federal framed work was put in place to take care of diversity in unity. This led to the creation of three regions of North, West and East, each with legislative and executive arms. Nigeria thus became a political unit of federal system with three regions.

Since attainment of independence successive government have been in the fore front in promoting national integration and stimulating sustainable development. This began with the formation of coalition government by the Northern People Congress (NPC).²⁰ It was followed by thirty month civil war to keep Nigeria as a political unit and subsequent developments. Among these were declaration of 'no victor no vanquish', the establishment of National Youth Service Corp, federal character, and related establishment among others.²¹ Despite deliberate effort of building or evolving a strong nationhood and enhance sustainable development, the country is plagued by a number of challenges. These challenges have put to rest the national integration question and shook the very foundation of the nation. Some of these challenges we shall discuss as the 'Emergent issues'.

The Emergent issues of Nigeria National Integration and Sustainable Development.

Sustainable development of any nation including Nigeria apart from material resources is precipitated on human resource. However, human resources cannot be effectively employed for any meaningful development in the presence of disunity and related vices. Nigeria since 1914 has been struggling to build a nation through integration of people and unification of social, political and economic forces. The process most especially since 1960 has put to question the corporate existence of Nigeria and evolution of Nigeria nationhood. If recent time challenges has led to emergence of issues, some of those we discussed below.

Security Issues

Apart from the thirty months civil war of 1960s, the evolution of Nigeria nationhood has been challenged by the security question most especially as in the last two decades. Security which is mostly seen as absence of threat or danger to life and properties or state of being secure or free from any physical

attack²² has been a major challenge to individual, groups and the nation since return to democratic governance in 1999. The spate of community conflict, ethno religious and politically induced conflict has been on increase which has transcended to anational affair in forms of insurgency. Insurgency and military whose activities are liken to gorilla action to unleash violence on the unsuspecting populace and frustrate government.

To achieve their goals of overthrowing government or effect power shift or the sharing of resource,²³ appeared in Nigeria a Boko Haram,²⁴ Oduduwa people congress (OPC) Movement for the survival of Ogoni people (MOSOB) and indigence people of Biafra (IPOB)²⁵ among others. These groups in their various areas of operation has not only constitute threat to the people and government but caused the death of thousands of people, destruction of properties, undermined government and cause dislocation in its socio-economic life of the nation. The end result being that people or rather Nigerians who have been living for years and decades together now at war with one another. Mutual trust and question of sessions became order of the day. This made Audu in 2004 to observe that

Nigerians at home and in diaspora what was their biggest concern about their country and the collective and overwhelming response will be the growing insecurity in Nigeria forget hunger, forget the parlous economy as target the political disenfranchising of the foremost problem is insecurity.²⁶

Nigeria is a multi:- ethnic nation of about 250 ethnic group and culture mostly brought together firstly through colonial conquest and secondly by amalgamation. The amalgamation was an attempt to build a Nigerian nation-state base on the principle of peaceful co-existence among the ethnic nationality.²⁷ To cater for the difference noted, a federal political structure was instituted in 1946 with a strong centre. However, and most especially since independence the minority and fear of domination became a national question. This has led to the creation of states and local government. The fear of 1950s and 1960s of recent has reached again and manifest in the unending ethnic and religious conflicts, Armed banditry, herdsmen-farmer conflicts.²⁸ The situation have seen the rise of ethnic nationalist urging people to identify more with their ethnic cocoon as revealed thus;

It is unfortunate that times are changing that people are again becoming hyper-ethnically conscious these days and some public commendation are even advising that each Nigeria should move nearer him or her home base.²⁹

Apart from asking people to move closer to their homes or ethnic territory, government policies and actions have not been devoid of the interpretation that the president, Muhammadu Buhari being a Fulani man is in support of the activities hence no government response to it.

Religious Cocoon.

Nigerian no doubt are religious people divided across two major world religions of Islam and Christianity with the remaining population sticking to traditional religion. In recognition of this diversity and to promote peaceful co-existence the constitution acknowledged the right of citizen to choice and freedom of worship.³⁰ However the constitutional provision notwithstanding, Nigerian political and ruling class have used religion to gain acceptance and ascended to positions of authority.³¹ In the First Republic and to some extent in the Second

Republic this was given prominence, apart for religion being exploited for individual or group gains, Nigerian have witness spate of religions disturbance most especially in the northern part of the country. For examples in the early 1980s, Nigeria saw the case of Maitasine uprising and of recent were the shettes saga in Kaduna And the greatest of all being Boko haram which technically has gone beyond religions explanation. In these crises thousands of lives and properties were lost.³²

The religious uprising though not acceptable and condmnable most especially after over half a century of independence, the worrisore aspect of it is the interpretation and technical encouragement by individual and groups across the two religion. Using Boko Haram as an example, the group is a Muslim fundamentalist whose activities have gone beyond the teaching of Islam. Their action has not been targeted against any religious group but Christians, and Muslims alike have been killed in place of worship. State establishment such as schools, government office, police stations and Military Barack were attacked. Innocent villages and towns were involved and destroyed and end here claimed responsibility. Yet, the voiceful individual and groups that supposed to educate and persuade people have now interpret it otherwise. For example of recent and to be precise on 22nd June, 2018 a group of Christians under, the augies of National Christians Elders Forum (NCEF) in a press conference sees Boko Haram Fighting a jihad on behalf of muslim and nations leadership being led by a muslim muhammedu Buhari.³³

Apart from the conflict, every action of government such as appointment of state officers, Fighting corruption and arresting corrupt officers in the country has been given religious coloration. The most worrisore issues being the fact that while other nations of the world are discarding divisive factor we are re-inventing them with much vegorr. These' not doubt affects national integration and development of the nation

Leadership Syndrome

Nigeria is humanly endowed with a population that is richly divided across the strata along with the human population Nigeria is blessed with both agricultural and mineral resources. The combined resources if well utilized for the good of the country, Nigeria will not only be talking of integration and development but be a leading nation in the comity of nation. For them to happen, Nigeria need a selfless and in corruptive leader and willing followership who are ready to give their support. To this end Chinua Achebe contended that the problem is the unwillingness or inability of its leaders to rise to their responsibility to the challenges of personal example, which is the hallmark of true leadership.³⁴

The problem of leadership began from the colonial period. The political activities that grew out of these was the alienation of national feeling for skewed ethnics and regionalism. The skewed national consciousness of the leadership was to be compa by selfishness corruption and unwillingness to transform the economy for the betterment of the country. The end result being moral decadence, and decayed infrastructure and collapsed system.

Unfortunately, nearly six decades after independence, the characteristics of Nigerian politicians to leadership and governance have not move away from J.S Tarka's position that "as

a politician, I seek power in order to reward myself and my friend and to punish my enemies.³⁵

Towards Nigeria National Integration and Sustainable Development

Irrespective of the circumstance of Nigeria nation emergence over a century of time is enough to reduce the difference and uphold the area of simulation to build a strong geo-economic and political society. a society where ethnic, religion and economic status shall not be the basis of relationship and interaction but that of fairness, justice and equality. To attained this the need for reorientation and building of consciousness towards nationalism. The led and the leaders need to move away from their ethnic, religion and geo-political sentiment for national interest.

Religious, ethnic and political leaders must shun corruption, avoid divisive statement and promote oneness of people irrespective of affiliation. The rule of law must be followed to the letter.

Conclusion

In this paper, attempt was made to examine some silent emergent issue on Nigeria national integration and sustainable development. The conquest and unification of people and regions that gave birth to Nigeria for whatever reason that informed colonial decision, it created not only a political entity but basis for people that lived therein to identify themselves with the politics. Over a century after that political development, Nigeria is still faced with the question of integration and development. Among the issues identified and discussed are security challenge, ethnicity, religion cocoon and above all leadership failure. Despite this, the survival of Nigeria as a political entity after civil wars, unstable politics, ethno-religion conflicts point to the fact that what we need must is a reorientation of the citizenry.

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The impact of Downstream Oil Deregulation Nexus Petroleum Gross Domestic Product: The Nigerian Experience

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Abstract- This paper examines the “impact of Downstream Oil Deregulation Nexus Petroleum GDP and the causal relationship between downstream deregulation. Petroleum GDP.ARDL technique was used in analyzing the regression estimates. Based on the findings, the study found a Two-way causation to have existed between PPMS and petroleum GDP and between PPMS and PMSP. The regression estimate has indicated a positive significant impact between PMSP and economic growth (proxy petroleum GDP). The study also revealed a negative but significant impact between, PMSC, IPMS and PPMS with economic growth. The coefficient of the ECM (-0.5785) which is highly statistically significant (0.000) implies that the disequilibrium occurring due to a shock is totally corrected at a rate of about 57 percent. The study recommends that Importation of refined premium motor spirit (IPMS) grossly affects the petroleum GDP of the economy negatively; therefore total deregulation of the downstream sector must be gradually and consistently pursued to revive maximum result to all stakeholders and the nation. While that is being pursued, adequate infrastructure, especially refineries should be put in place. The four refineries already established shall be maintained and made to operate at full capacity. Hence, while “deregulation” is needed to allow space for private initiative and competition, “re-regulation” is needed to establish a set of rules that allow the market to function properly by correcting the imperfections and by accounting for the social costs of the petroleum sector.

Index Terms- Downstream, Deregulation, Petroleum Gross Domestic Product

I. INTRODUCTION

The petroleum industry remains central to the Nigerian economy and accounts for about 95% of the country's exports. The country's proven oil reserves stands at about 37.2 billion barrels; this was in addition to over 187 trillion cubic feet of proven natural gas reserves. The petroleum industry is thus the mainstay of the Nigerian economy. Official records from the budget office of the Federal Republic of Nigeria showed that the petroleum industry accounted for about 29.1% of Gross Domestic

Product (GDP) and 78% of total government revenues in the fiscal year 2015¹¹.

The Nigeria National Petroleum Co-operation (NNPC) formerly known as Nigeria National Oil Co-operation (NNOC) was established in 1971 by act No. 18. The NNPC was charged with the responsibility of exploring and producing oil and gases, transporting as well as marketing and distribution of petroleum products. With the activities going on in this sector, four (4) refineries were installed by the Government which were located at Port Harcourt, Warri and Kaduna. These refineries were commissioned between 1965 and 1989 with combined installed capacity to refine over four hundred and forty-five thousand barrels of crude oil per day (445,000) bpd. Gradually and steadily, the importance of crude oil has become more noticeable in terms of its massive revenue generation for national development as well as its spin off effects of its downstream activities. Revenue from crude oil has been used to finance major core industrial projects like the steel complexes, fertilizer plants, as well as social infrastructure. With this ever growing contribution to the GDP, the Nigerian economy became highly dependent on the sector (the oil industry).

Since the discovery of crude oil in commercial quantity, the economic trajectory of Nigeria has changed, which to some extent led to change in policy focus of the government, it has either positively or/adversely affected other sectors of the economy. On the negative side, this was considered with respect to some activities taking place in the downstream oil subsector which has direct link with the local consumers. These activities were seen from under utilisation of the refineries which brought about the scarcity of petroleum product to meet the domestic demand, pipe line vandalism, smuggling, corruption and hikes in prices among others. It was as a result of this, government decided to deregulate the sector with a view to enhance the performance of the oil industry on the economic growth, this means allowing other interest groups to participate in the economic activities.

The Nigerian petroleum industry comprises of upstream and downstream subsector. The upstream is basically concerned with technicalities involved in exploration and exploitation of crude oil. On the other hand, the downstream subsector includes but not limited to; refining, processing, exporting/re-importing and inter-linkage between refineries and depots. The downstream subsector

is so categorised largely due to its functions in production/distribution chain of refined petroleum product where large proceeds were obtained from the domestic sales and export of petroleum products, the main actors in this chain constitute majorly of government agencies and multinational oil companies. This had run contrary to the spirit of capitalism (free market) which posit that government role in business activities if at all necessary should be minimal. Thus, thorough regulation of the petroleum industry by the government had adverse consequences on the economy. This was because the policy will deteriorate the economic condition in the state thereby amounting to hikes in transport fare, prices of food and services, closure of local industries and job losses and unemployment, resulting into increase in poverty level and reduced standard of living of many citizens. Therefore, these posed major impediments that affect the economic growth negatively¹.

In spite of the Nigerian's position in the Organisation of Petroleum Exporting Countries (OPEC), as the major exporter of crude oil in Africa and six (6) exporter of oil in OPEC. The supply of petroleum product (PMS) has been the major concern of its citizens, because over the years, hardly would Nigerians live-out full calendar year without one form of fuel crisis or the other, these were attributed to the regulation activities in the downstream oil subsector. It was an irony that domestic supplies of petroleum product particularly (premium motor spirit) in the country have been erratic while its prices have been on the increase. These unending erratic supply of PMS and price hikes brought untold hardship to the citizenry and economic growth.

Needless to say, subsidy has been the major economic issue in Nigeria, with different opinion leaders offering divergent views on it. In view of this, this paper examined the impact of Downstream Oil Deregulation Nexus Petroleum Gross Domestic Product.

Statement of the Problem

Nigeria has witnessed considerable ups and downs in its quest to economic growth and development. The odds against the country's economic development efforts became higher due to over dependence on crude-oil for foreign exchange. Any slightest disequilibrium in the production/distribution chain in petroleum industry affects all facets of economic activities. For instance, commuters all over Nigeria have had to contend with numerous hikes in price of commuting; delays on transit due to fewer vehicular services. It thus meant that traders, farmers, producers had to factor in cost of transporting farm produce and other related output cost multipliers in their daily commercial activities; all these are consequences of petroleum products induced problems and is attributed to the regulation activities in the downstream subsector.

The nation's downstream subsector of the oil industry comprises activities relating to the distribution and marketing of petroleum products and derivatives throughout the country. The subsector is particularly volatile in recent times due to government policy on deregulation of the industry, which has removed price control mechanisms that have undermined the growth of the industry in previous years¹⁵. The subsector has also been constrained by the unenviable state of the nation's refineries, which have been producing at minimal capacities in the past few years, despite huge expenses incurred on turnaround-maintenance

of the crisis-ridden refineries. This development has led to massive importation of petroleum products to fill demand gaps that exist in domestic consumption.

However, the huge cost associated with importation of petroleum products was the major reason for government emergent deregulation and the hike in prices of petroleum products from 36% to 90% at the end of 2015.

It is against this backdrop that this paper assesses the impact of Downstream Oil Deregulation Nexus Petroleum Gross Domestic Product and also to analyse the causal relationship between petroleum GDP and deregulation.

II. LITERATURE REVIEW

Conceptual Issues

This section of the literature review will focus extensively on reviewing literatures that will provide a conceptual clarification of issues related to deregulation with focus on "downstream petroleum subsector and the Nigerian Economy.

To fully understand the concept of deregulation, it will be of great importance to define the term deregulation in a simple parlance. Deregulation literary means removal of regulation or control. This includes removal of monopoly rights over certain issues. In the case of petroleum industry, deregulation could be the removal of monopoly right over production, distribution and pricing of refined petroleum product with sole aim of allowing interest group to participate in the economic activities. This implies the gradual withdrawal or removal of regulation in the way of liberating the economy. The concept also refers to a restrictive use of the state's legal power to direct the conduct of private actors³⁹¹⁴ It was asserted that deregulation and privatization are elements of economic reform programs charged with the goal of improving the overall economy in a structured process.

²⁰Contributing to the concept of deregulation, it was viewed from an economic perspective which implies freedom from government control. ³Meanwhile some assert that deregulation is the removal of government interference in running a system. This implies that the normal regulatory rules and enforcement in managing the operation of a system is replaced by the market forces of demand and supply as a determinant of price².

Prospects of the Deregulation on the Downstream oil Subsector

Since 1999, the Nigeria government decided to emulate oil producing nations by deregulating the downstream sector of her petroleum industry which, hitherto, was monopolized by the Nigerian National Petroleum Corporation (NNPC) like every policy measure; deregulation will not be without costs. A cost – benefit analysis always forms sound basis for adopting a particular policy, and it was believed in this case, that the benefits of deregulation outweigh the cost²⁴. He noted that the most obvious cost of deregulation is potential to have a shape price increases from transportation of food, to a lot of other items and services. He maintained that this chain of price increases is inevitable since, in economics everything affect everything else, however remotely and oil of course, a unique commodity and its effect are expected to cause a onetime jump in overall inflation, which needs not become perpetuating if it not accommodating, say through monetization of budget deficits and large wage awards.

In other words, once fiscal and monetary discipline and associated exchange rates stability remain in place, inflation should return to the original declining path quickly²⁴. ¹⁶It is true from the consumer's perspective that the benefits of deregulation may not be intuitively obvious, especially with the hassle factor of making sense of various offers and the confusion of meeting the challenges of price increases on commodities and services in the immediate term.³⁵ Meanwhile others believed in the long – term advantages of deregulation and it is worth the attendant short – term disruptions and consumer confusion.

The negative perceptions of Nigerian public that arose from the sensitization campaigns to deregulate the downstream subsector which were registered through protest and strike by labour unions were resisted by the government. The government on the other hand, defended her position by pointing to the successes of other countries as USA, Germany, Mexico, etc. who run a deregulated downstream subsector as her models an adhering to the policy.⁷ It was stated that the benefits of deregulation are enormous, apart from its essence to eradicate huge revenue spent as subsidy, the following benefits among others are being enjoyed from the deregulation policy in Nigeria;

- i. Products are now available all over the country and no one needs to queue for days at filling stations waiting for non – existent products.
- ii. Motorists no longer hoard fuel in their homes or jerry cans of fuel when travelling; this has eliminated the fuel – induced accidents and fire that claimed thousands of lives in the regulated economy.
- iii. Marketers are now investing in new facilities such as storage tanks, retail outlets, trucks, the railway rolling stock, etc.
- iv. There is now competition among the marketers who now treat the consumer as king.
- v. The marketers, who in the past depended on NNPC for all products, now import their own; some are planning to build refineries in Nigeria.
- vi. Jobs have been created in the sector, for example, NNPC is now confident enough to build its own retail outlets (Mega Stations) and has already built and is operating in each states of the federation.
- vii. Apart from new investment in new facilities, old ones are being expanded because of increase in activities.
- viii. Investment in the downstream sector is now more attractive to the international and local business communities as evidences by the interests express in the refineries privatization programme.

However, the above benefits appear to be experienced in the short and mid – term. It was pointed out to the long term advantages²⁴. ³⁵The following benefits were indicated as the flip side of the costs of subsidization in regulated downstream;

- i. Deregulation free resources for government to spend on productive ventures and social sectors, in education and health.
- ii. A market price will encourage efficiency in the use of petroleum products, which would reduce traffic congestion, and loss of productive time, this will

save the country money in terms of reducing oil import.

iii. Removing the subsidy will reduce the incentive to smuggle as the domestic price approaches those in neighbouring countries. This will save the country foreign exchange, which would have been used to replace the smuggled portion, and also allow government to realize the full complement output would have been lost to smugglers.

iv. Fundamentally, deregulation will depoliticize petroleum pricing and eliminate the speculation, rent seeking and other practices usually associated with government announced price increases.

v. Automatic pricing would allow the benefits of cost reductions, through world oil price fall passed on to consumers.

However, other acknowledged the benefits of deregulation from different perspectives that; the deregulation of the energy sector in the United State was forth with hindsight as the policy makers, by their rulers suggest that they lost the fundamental purpose of deregulation. As a result a few big companies that figured out how to gain the rules profited enormously, while everyone else suffers. This view appears to be the case with the Nigerian downstream because the major marketers who have capacity and a good network of marketing outlets are benefiting from the policy far above their counter parts, the independent marketers. Deregulation would also remove the current incentive which exists for people smuggling our oil elsewhere. Removal of the smuggling incentive would greatly improve local product availability and this would in turn, exerts a downwards pressure on product prices within the economy²⁹.

Deregulation Policy of Petroleum Industry

The policy framework for the deregulation of downstream oil industry evolved with the inauguration of a 34 member Special Committee by the government on 14 August 2000. The Special Committee to Review Petroleum Products Supply and Distribution (SCRPPSD) members constituted from various stakeholders and other interest groups were charged to review the petroleum products supply and distribution and also other problems of the downstream petroleum subsector. On October 2000, the Committee's reports and recommendations were published in the government white paper²⁹. Some of the decisions were;

- i. Deregulation and liberalization of the importation of petroleum products by oil marketers and basing prices of products on import parity to encourage the participation of other players other than the NNPC.
- ii. The privatization of all four government refineries and encouraging private sector participation in the establishment of private refineries.
- iii. The establishment of a pipeline management authority for the pipelines, jetties and depots, which will charge private and public users a tariff per throughput litre of products.
- iv. The immediate setting up of a Petroleum Products Pricing Regulatory Agency (PPPRA) with sufficient autonomy to superintend the various phases of the

proposal embodied in the report of (SCRPPSD) especially the deregulation and liberalization of the downstream sector of the petroleum industry.

The decision led to the establishment of PPPRA by an Act of the National Assembly in May, 2003 as an agency to monitor deregulation implementation. The PPPRA is an agency of the government of Nigeria established in 2003 to, among other responsibilities, monitor and regulate the supply and distribution, and determine the prices of petroleum products in Nigeria. Below are its major functions;

- i. To determine the pricing policy of petroleum products;
- ii. To regulate the supply and distribution of petroleum products;
- iii. To create an information databank through liaison with all relevant agencies to facilitate the making of informed and realistic decisions on pricing policies;
- iv. To oversee the implementation of the relevant recommendations and programmes of the Federal Government as contained in the Report of the Special Committee on the review of the Petroleum Products Supply and Distribution;
- v. To moderate volatility in petroleum products prices, while ensuring reasonable returns to operators.
- vi. To establish parameters and codes of conduct for all operators in the downstream petroleum sector.

Domestic Price of PMS

Petroleum prices in the domestic market have been under government control since 1973 when the government took it over from the private oil companies²¹. The prices of various grades of petroleum products have been adjusted upward more than 20 times since the introduction of uniform pricing on October 1973. The prices of petroleum products in Nigeria should theoretically be derived from International Crude oil prices since the marginal supply (litres) comes from import, it should therefore reflect import price. In other words, when the marginal unit of consumption is imported the economic price should be import parity price. However, this has not always been the case for a number of reasons particularly socio-political ones. ²²Three factors that have influenced government position were identified; First, was the desire to protect the interest of the poor that were affected with higher prices. The second was the need to reduce industrial cost as energy products are seen as critical inputs in production processes. The third factor relates to the potential inflationary impact of higher energy prices.

Government of both oil producing and consuming countries invariably intervene in the market to influence product price. The extent of such intervention depends on the specific needs of the country and importance of the product in question. It has also been noted that crude oil cost was not the only cost incurred in the supply and distribution of petroleum products as other costs such as refining costs, transportation and distribution costs were involved. The trends in petroleum products pricing in Nigeria has a long history.

The Military Head of State of General Gowon increased fuel price from 6 kobo to 8.45 kobo. It was raised to 9kobo in 1976 by Late General Murtala Administration. On October 1, 1978, the then military government of Obasanjo increased the pump price of

petrol from 9 kobo to 15.37kobo. There was another hike on April 20, 1982, when price was marked to 20 kobo. On March 31, 1986, General Ibrahim Babangida increased pump price of fuel to 39.5 kobo. On April 10, 1988, it was increased to 42 kobo per litre. On January 1, 1989, it was announced another increase whereby private car were to pay 60 kobo per litre while commercial cars continue paying 42 kobo.

Subsidy Payment

²³The Federal Government of Nigeria has made a savings in excess of N1.4 trillion since removal of subsidy on petrol earlier this year (2016). Deregulation by his estimation has thrown up unexpected gains, as we now experience reduced consumption in petrol from about 1,600 trucks being delivered daily to 850 trucks per day. Also, this has reduced daily consumption at the pumps from 45 million litres per day to less than 30 million litres daily. The estimated daily consumption of PMS is 45 Million Litres per Day (MLPD) but there had been no accurate records of the actual quantity of imported PMS. Hence, there existed varied subsidy repayment values in the records of the various government agents.

III. THEORETICAL FRAME WORK

Public Interest Theory

The first group of regulation theories proceeds from the assumptions of full information, perfect enforcement and benevolent regulators. According to these theories, the regulation of firms or other economic actors contributes to the promotion of the public interest. This public interest can further be described as the best possible allocation of scarce resources like petroleum product for individual and collective goods like provision of national defence and services in society. In western economies, the allocation of scarce resources is to a significant extent coordinated by the market mechanism. In theory, it can even be demonstrated that, under certain circumstances, the allocation of resources by means of the market mechanism was optimal⁴. Because these conditions do frequently not apply in practice more so in the Nigerian context, the allocation of resources is not optimal from a theoretical perspective and a quest for methods of improving the resource allocation arises⁸. This situation was described as a market failure. A market failure is a situation where scarce resources are not put to their highest valued uses. In a market setting, these values are reflected in the prices of goods and services. A market failure thus implies a discrepancy between the price or value of an additional unit of a particular good or service and its marginal cost or resource cost. Ideally in a market, the production by a firm should expand until a situation arises where the marginal resource cost of an additional unit equals its marginal benefit or price. Equalization of prices and marginal costs characterizes equilibrium in a competitive market which deregulation aims to achieve. If costs are lower than the given market price, a firm will profit from a further expansion of production. If costs are higher than price, a firm will increase its profits by curtailing production until price again equals marginal cost. Market equilibrium, and more generally equilibrium of all markets is thus a situation of an optimal allocation of scarce resources. In this situation supply equals demand and under the given circumstances can market players do no better. A great

number of conditions have to be satisfied for an optimal allocation in a competitive market economy to exist¹⁰.

One of the methods of achieving efficiency in the allocation of resources when a market failure is identified is government regulation^{4,5}. In the earlier development of the public interest theories of regulation, it was assumed that a market failure was a sufficient condition to explain government regulation⁹. But soon the theory was criticized for its Nirvana approach, implying that it assumed that theoretically efficient institutions is seen to efficiently replace or correct inefficient real world institutions¹². This criticism has led to the development of a more serious public interest theory of regulation by what has been variously referred to as the "New Haven" or "Progressive School" of Law and Economics²⁸. In the original theory, the transaction costs and information costs of regulation were assumed to be zero. By taking account of these costs, more comprehensive public interest theories developed. It is argued that government regulation is comparatively the more efficient institution to deal with a number of market failures⁴⁰. For example, with respect to the public utilities it was argued that the transaction cost of government regulation to establish fair prices and a fair rate of return are lower than the costs of unrestricted competition¹⁷. These more serious versions of the public interest theories do not assume that regulation was perfect. They do assume the presence of a market failure that regulation was comparatively the more efficient institution and that for example deregulation takes place when more efficient institutions develop. These theories also assume that politicians act in the public interest or that the political process is efficient and that information on the costs and benefits of regulation is widely distributed and available²⁷.

The Chicago Theory

'The Theory of Economic Regulation' by George Stigler appeared and was the start of what some called 'the economic theory of regulation' and others 'the Chicago theory of government'^{27,34}. Stigler's central proposition was that 'as a rule, regulation is acquired by the industry and is designed and operated primarily for its benefit'. Government can grant subsidies or ban the entry of competitors directly so that the level of prices rises. The government can maintain minimum prices and restrict entry more easily than a cartel. The government can suppress the use of substitutes and support complements. An example of each is the suppression of transport by trucking to protect the railroads and the subsidization of airports for the benefit of airlines. On the one hand, therefore a demand will arise for government regulation. The political decision-making process on the other hand makes it possible for industries to exploit politics for its own ends. For this proposition^{13,30}. In the political process, primarily interest groups will exercise political influence, as opposed to individuals. Individuals will not participate because forming an opinion about political questions is expensive in terms of time, energy and money, while the benefits in terms of political influence will be negligible. Individuals will only be informed on particular interests as member of an interest group. Democracies will thus mostly be a platform for interest groups. Some groups can organize themselves less expensively than others. Small groups have the advantage because the transaction costs are lower and the 'free-rider' problem is smaller than is the case with large groups. Furthermore, in small groups the preferences will be more

homogeneous than in large groups. Small groups also have the advantage in that for the same expected total revenue, the revenue per member of the group is greater. The fact that apparently large groups can still be well organized is explained by Stigler through concentration and asymmetry³⁹. The large companies in a concentrated branch will see themselves as a small group. In the case of asymmetry in the industry , for example as a result of product diversity or widely varying production techniques, separate companies will wish to prevent unfavourable regulation and will participate in the organization.

Explanations of deregulation

Once the Chicago theory of regulation had been developed, social developments seemed to refute it. While this theory explained regulation as aiming for transfers of income, at the end of the 1970s and the beginning of the 1980s, many complexes of rules were dispensed with in a process of deregulation and privatization. This process of deregulation and privatization was mainly concerned with economic regulation of sectors such as transport (airlines and freight), telecommunications, energy and the financial sector. In the US, where these sectors were regulated, deregulation took place and in Europe, public enterprises were privatized. From the public interest theories of regulation two general explanations of deregulation can be derived. In the first place, it is possible that the cause of market failure is removed by technological or demand factors. Through increasing demand for, for example, transport facilities, a former natural monopoly may change into a competitive market. Furthermore, technological developments such as communication via satellite or through wireless facilities instead of by cable can undermine natural monopolies. A second explanation for deregulation may be the presence of more efficient alternatives to regulation to solve the market failure.

IV. METHODOLOGY

Sources of Data

The sources of data for this study were mainly from secondary source, the data were obtained from Central Bank of Nigeria (CBN) Statistical Bulletin, National Bureau of Statistics (NBS), Nigerian National Petroleum Corporation (NNPC) statistical bulletin, Organization of Petroleum Exporting Countries (OPEC) statistical bulletin and World Bank data bases.

Method of Data Analysis

Auto-regressive Distributed Lagged Estimates (ARDL)was used to analyse the objectives because the technique possessed the following advantages; it does not formally require pretesting of unit root, more so, using ARDL, both short run and long run coefficient can be obtained simultaneously, and it can be applied to variables irrespective of their order of integration whether they are purely I(0) and I(1) or mixed, it is efficient for limited sample data and large sample³².

ARDL Modelling Approach to Cointegration Analysis

Several methods are available for conducting the cointegration test. The most commonly used methods include the residual based test, and the maximum likelihood based tests¹⁸. Due to the low power and inconsistency associated with these methods,

the OLS based autoregressive distributed lag (ARDL) approach to co integration has become popular in recent years. Moreover, a dynamic error correction model (ECM) can be derived from ARDL through a simple linear transformation⁶. The ECM integrates the short-run dynamics with the long-run equilibrium without losing long-run information. It is also argued that using ARDL approach avoids problems resulting from non-stationary time series data²⁵. Therefore, these methods of cointegration (OLS based) are not appropriate and cannot be employed. Hence, this makes ARDL more appropriate and suitable as a method choosing for analysis in this study because it provides unbiased estimates of the long run model and valid t-statistics even when some of the regressors are endogenous. The model for the error correction is shown below. Model

Granger Causality Test

Although regression analysis deals with the dependence of one variable on the other, it does not necessarily imply causation. In other words; the existence of a relationship between variables does not prove causality or the direction of influence¹⁹.

Granger causality tests will be conducted in order to know whether lagged values of one variable predict changes in another, or whether one variable in the system explains the time path of the other variables. Hence, a variable x is said to Granger cause another variable y ($x \rightarrow y$) if past values of x can predict present values of y. Granger posits two cardinal principles namely the cause precedes the effect and; 'the causal series contains special information about the series being caused that is not available in the other available series'¹⁸. Similarly, there is an instantaneous causality from x to y ($x \Rightarrow y$) if present and past values of x predict present value of y. If causality is in one direction e.g. from x to y, we have uni-directional causality while if x Granger causes y and y Granger causes x, we have bi-directional or feedback causality ($y \leftrightarrow x$). There are two commonly used causality tests. However, one is more widely used in applied econometrics, partly because of its simplicity and also because it is less costly in terms of degrees of freedom. The granger causality equation is given bellow:

$$Y_t = a + \sum_{i=1}^{\infty} \alpha_i X_t - i + \sum_{j=1}^{\infty} \beta_j Y_t - j + U_1 t \text{ equation 3.7}$$

$$X_t = b + \sum_{i=1}^{nn} \phi_i X_t - i + \sum_{i=1}^n \delta_i Y_t - i + U_{2t} \quad \text{equation.....3.8}$$

Where Y and X in the above equations represent dependant and independent variables respectively. It is assumed that the

disturbances μ_{1t} and μ_{2t} are uncorrelated. The F statistic will be used for joint test of the hypotheses that in equation (3) $a_1 = a_2 = \dots = a_n = 0$; and in equation (4) $\delta_1 = \delta_2 = \dots = \delta_n = 0$. The null hypothesis in equation (4) is that "X does not granger-cause Y" and in (3) that "Y does not granger-cause X"

Model Specification

ARDL Approach to Regression

The variables operationalization of the model estimating the impact of deregulating petroleum downstream subsector and Nigeria's economic growth was obtained from the public interest theory as postulated in the theoretical framework. The theory portrays regulation policy, PMS scarcity, hikes in price and subsidy payment have increased Nigeria's external debt profile, decreased foreign reserve, increased fiscal burden have adversely affects economic growth.

The study employed the following indicators; quantity of premium motor spirit produced per litre (PMSP), quantity of premium motor spirit consumed per litre (PMSC), quantity of premium motor spirit imported per litre (IPMS), and price of premium motor spirit per litre (PPMS) as the independent (explanatory) variables to measure the impact of downstream oil deregulation while petroleum Gross Domestic Product(PGDP)as dependent (explained) variable to measure the performance of the economic growth. Here, petroleum Gross Domestic Product (PGDP) was proxy for the level of economic activities.

The functional form of the model for the study is specified as follows:

PGDP = F (PMSP, PMSC, IPMS and PPMS).....
 3.10

Adopting a log-linear specification and assuming linearity among variables in order to remove serial correlation from the model and to reduce the variance, skewness and kurtosis statistics, thus, the multivariate specification of the model evolves as;

Where:

α = the intercept, U_t = error term. $\gamma \varepsilon \Theta j m z \sum$ are coefficients of short run dynamics, Π is the speed of adjustment.

PGDP= Petroleum Gross Domestic Product

PMSP= Quantity of PMS produced per litre

PMSC= Quantity of PMS consumed per litre

IPMS= Quantity of PMS imported

PPMS= Price of PMS per

μ_i = Stochastic error term

V. RESULTS

Error correction Estimate for the Selected ARDL Model

The result in table 1 shows the error correction specification restricts the long-run behaviour of the endogenous variables to converge to their cointegrating relationship while allowing a wide range of short-run dynamics. The size of the error correction term indicates the speed of adjustment of any equilibrium towards a long-run state since the deviation from long-run equilibrium is corrected gradually through a series of partial short-run adjustment. Moreover, the error correction Model parameter is (ECM), is negative, less than one and significant at 1% level. The coefficient of the ECM (-0.5785) measures the speed at which the level of economic growth adjusts to change in the explanatory variables in order to attain long run equilibrium and it can be said that it will take about 57% for the short run deviation to converge to the long run. This implies that the disequilibrium occurring due to a shock in petroleum subsector is totally corrected a rate of about 57 percent. Therefore it can be said that the speed of adjustment is low and this reflects the inefficiency in the downstream petroleum subsector over the years.

The ECM result indicates that the intercept of the equation is 6.0073; it represents the autonomous growth rate of the economy assuming all the independent variables are held constant. The coefficient value of PMSP which is 0.180 indicated that a positive and significant relationship at 5% exists between PMSP and PGDP. It shows that PGDP increases by 0.434 units as a result of a unit increase in domestic production of refined PMS, keeping all the other independent variables constant. The coefficient of PMSC shows that there is negative but significant relationship between PMSC and PGDP at 1% level. This implies that PGDP decreases by -0.758 units as a result of a unit increase in PMSC, keeping all the other independent variables constant. More so, the coefficient of IPMS revealed a negative association with PGDP, which means that a unit increase in IPMS will result to a decrease in PGDP by -0.208 when all other independent variables are held constant.

The value of the PPMS which is Price of Premium Motor Spirit reveals that the coefficient is -0.669, indicating that a negative and significant relationship at 5% level exist between PGDP and PPM. The result suggests that if all the independent variables are kept constant, there will be a decrease in petroleum GDP by -0.669 units as a result of a unit appreciation in the price premium motor spirit. This result contradicts a priori expectation, but it is not surprising; considering the fact that the Nigeria's petroleum refineries operate below capacity and hardly could they supply the product adequately to meet the domestic demand hence embark upon massive importation of the product that is based on import price parity.

The coefficient of determination $R^2 = 0.97$ shows a 97% contribution of PMSP, PMSC, IPMS and PPMS. This implies that there is a strong linear dependency existing between deregulation variables and economic growth. The result also indicates that there is absent of first order auto-correlation since the Durbin-Watson value (2.1)

Table 1: Error correction Estimate for the Selected ARDL Model

[1]	Regres	[2]	Coeffici	[3]	Stand	[4]	T-	[5]	Pro
	sor		ent		ard		Rati		b.
[6]	dPGD	[7]		[8]		[9]	3.62	[10]	0.0
	P1		0.43444		0.119		52		03
			***		84				
[11]	dPMS	[12]	0.18003	[13]		[14]	2.08	[15]	0.0
	P				0.086		13		59
					49				
[16]	dPMS	[17]	-	[18]		[19]	-	[20]	0.0
	P1		0.36461		0.083		4.34		01
			***		84		88		
[21]	dPMS	[22]	-	[23]	0.151	[24]	-	[25]	0.0
	C		0.75844		96		4.99		00
			***				11		
[26]	dPMS	[27]		[28]	0.183	[29]	5.52	[30]	0.0
	C1		1.0111*		02		46		00
			**						
[31]	dIPM	[32]	-	[33]	0.126	[34]	-	[35]	0.1
	S		0.20835		80		1.64		26
							32		
[36]	dPPM	[37]	-	[38]	0.192	[39]	-	[40]	0.0
	S		0.66917		20		3.48		05
			***				17		
[41]	Dc	[42]		[43]		[44]	0.89	[45]	0.3
			6.0073		6.712		49		88
					3				
[46]	dTRE	[47]	-	[48]		[49]	7.72	[50]	0.0
	ND		0.66917		0.032		93		00
			***		77				
[51]	ecm(-1)	[52]	-	[53]		[54]	-	[55]	0.0
			0.5785*		0.150		9.14		00
			**		80		14		
[56]	R-Square	[57]	0.97173	[58]		[59]		[60]	
[61]	DW-statisti	[62]	2.1619	[63]		[64]		[65]	

Note: ***, ** denotes significant at 1%, 5% level respectively

Discussion of Results for Pairwise Granger Causality Test

The granger causality test is presented in Table 5. The test was applied to determine the direction among PGDP, PMSP, PMSC, IPMS and PPMS. The result revealed that no causation was found to exist between PMSP and petroleum PGDP, no causation was found to exist between PMSC and petroleum PGDP and no causation existed between IPMS and petroleum GDP. Moreover, one-way causation was found to exist between PPMS and petroleum GDP and the causation flows from PPMS to petroleum GDP. This indicates unidirectional causality running from PPMS to PGDP which means that, it is price that granger cause petroleum GDP and not the other way round. This implies that the value of PPMS is useful in predicting the future value of PGDP.

More so, no causation was found to exist between PMSC and PMSP, no causation was found to exist between IPMS and PMSP. One-way causation was found to exist between PPMS and PMSP and the causation flows from PPMS to PMSP implying that the value of PPMS is useful in predicting the future value of PMSP.

Table 2: Pairwise Granger Causality Test Results

[66] Pairwise Granger Causality Tests	[67]	[68]	[69]	[138] PMSP does not Granger Cause PPMS	[139]	[140] 0.02538	[141] 0.9750
[70] Date: 02/09/17	[71]	[72]	[73]	[142] IPMS does not Granger Cause PMSC	[143] 22	[144] 0.02699	[145] 0.9734
Time: 11:38				[146] PMSC does not Granger Cause IPMS	[147]		
[74] Sample: 1991	[75]	[76]	[77]	[150] PPMS does not Granger Cause PMSC	[151] 22	[152] 1.74922	[153] 0.2038
2014				[154] PMSC does not Granger Cause PPMS	[155]	[156] 0.69833	[157] 0.5111
[78] Lags: 2	[79]	[80]	[81]	[158] PPMS does not Granger Cause IPMS	[159] 22	[160] 0.83696	[161] 0.4501
[82] Null Hypothesis:	[83] Obs	[84] F-Statistic	[85] Prob.	[162] IPMS does not Granger Cause PPMS	[163]	[164] 1.99028	[165] 0.1673
[86] PMSP does not Granger Cause GDP	[87] 22	[88] 0.67476	[89] 0.5224				
[90] GDP does not Granger Cause PMSP	[91]	[92] 3.16088	[93] 0.0681				
[94] PMSC does not Granger Cause GDP	[95] 22	[96] 0.73220	[97] 0.4954				
[98] GDP does not Granger Cause PMSC	[99]	[100] 0.53316	[101] 0.5962				
[102] IPMS does not Granger Cause GDP	[103] 22	[104] 0.84377	[105] 0.4473				
[106] GDP does not Granger Cause IPMS	[107]	[108] 0.96853	[109] 0.3996				
[110] PPMS does not Granger Cause GDP	[111] 22	[112] 8.33284	[113] 0.0030				
[114] GDP does not Granger Cause PPMS	[115]	[116] 3.44586	[117] 0.0554				
[118] PMSC does not Granger Cause PMSP	[119] 22	[120] 1.61515	[121] 0.2279				
[122] PMSP does not Granger Cause PMSC	[123]	[124] 0.18893	[125] 0.8296				
[126] IPMS does not Granger Cause PMSP	[127] 22	[128] 0.67967	[129] 0.5200				
[130] PMSP does not Granger Cause IPMS	[131]	[132] 1.02997	[133] 0.3783				
[134] PPMS does not Granger Cause PMSP	[135] 22	[136] 3.47556	[137] 0.0543				

Source: Eviews 8

Source: own computation

The following were deduced from the findings of the study.

- i. The study found a positive significant impact between PMSP and petroleum PGDP.
- ii. The study revealed a negative but significant impact between, PMSC, IPMS and PPMS with petroleum GDP
- iii. The study found a Two-way causation to have existed between PPMS and petroleum GDP and between PPMS and PMSP.
- iv. Finally, the hypothesis of the study tested revealed that PMSP, PMSC, IPMS and PPMS were jointly and statistically significant in impacting on the economic growth (proxy petroleum GDP).

Summary of the findings and policy implications

The empirical test results show that deregulation of the downstream petroleum subsector in Nigeria has brought a mixed impact on petroleum GDP in Nigeria.

The study uses the bound testing (ARDL) approach to cointegration to examine the impact of downstream oil deregulation nexus petroleum. The result showed that downstream oil deregulation exercise significantly influences Nigeria's economic growth. Moreover, among the control variables only price of premium motor spirit and domestic production of premium motor spirit are found to have long-run and short-run influence on the Nigeria's economic growth.

The granger technique was adopted to determine the direction of causality between determinants of downstream petroleum deregulation and Nigeria's economic growth. It was found that two-way causation exists between PPMS and petroleum GDP and between PPMS and PMSP, implying a bi-directional causality running from price of premium spirit to petroleum Gross Domestic Product. Also price of premium motor spirit to domestic production of the product.

VI. CONCLUSION

From the discussion so far, it was clear that the current state of the deregulation of the downstream petroleum Sub-sector is adjudged as inefficient in service delivery and ineffective at promoting national developmental objectives.

One of the main finding emerging from this study indicates that deregulation of the downstream petroleum subsector in Nigeria does not lower price, although it enhanced availability of the product in the short run. Hence, it can be concluded that underutilisation of refineries constitutes major setback in reaping the benefit of deregulation. This is at variance with the hypothesis that deregulation leads to lower or zero benefit.(i.e the null hypothesis that says there is no significant impact between petroleum GDP and downstream petroleum deregulation is rejected).

Deregulation or Subsidy removal is a germane economic policy for sustainable democratic transformation of Nigeria, provided social vices like unethical marketing practices of middlemen in the purchase, and distribution of the petroleum products are removed. The corrupt practices of both officials of NNPC and government must be tackled head-on while the proceeds from the downstream should be used to provide social infrastructure. This will engender and accelerate self-employment, job creation and efficient mass transportation. With deregulation, subsidy, which has been a conduit pipe and source of fraud in Nigeria, will be a forgotten issue.

VII. RECOMMENDATIONS

Having empirically examined the impact of downstream oil deregulation nexus petroleum, in the light of the major findings above, the following policy recommendations are proposed;

- i. Importation of refined premium motor spirit (IPMS) grossly affects the petroleum sector of the economy negatively; therefore total deregulation of the downstream sector must be gradually and consistently pursued to revive maximum result to all stakeholders and the nation. While that is being pursued, adequate infrastructure, especially refineries should be put in place. The four refineries already established should be maintained and made to operate at full capacity.
- ii. The free market is not everything. Effective as market forces are in optimizing the allocation of resources for short and medium term objectives, the market is to be short-sighted, not to respond spontaneously to long term signals. As the World Bank put it, “liberalising energy markets, however may not be the complete answer”. Long-term and social signals should be introduced by government thereby promoting sustainability in the petroleum sector, while using market mechanism to the best of their potentials. Hence, while “deregulation” is needed to allow space for private initiative and competition, “re-regulation” is needed to establish a set of rules that allow the market to function properly by correcting the imperfections and by accounting for the social costs of the petroleum sector.

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‘Qeerroo Fi Qarree’: The Engine of Current Transition In Ethiopia Politics

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Abstract: *Qeerroo fi Qarree from the whole parts of Oromia region emerged to stop the accumulated humiliation, decimation, and marginalization of Oromo people through strong peaceful struggle in Oromia region since 2014 G.C. The main objective of this study is to make the issue of Qeerroo fi Qarree the part of academic discussions, debates and critics. In doing so, the study attempted to review and describe specifically Qeerroo fi Qarree (youth Male and Female) of West Shewa Zone struggle movements in the pre-transition period and changes and uncertainties took place since the transition period in the west shewa zone. Social movement (SMT) and political process (PPT) theories are employed as the major theoretical frameworks. Both primary and secondary data were used to get necessary information. Purposive sampling was employed to select the setting and key participants of the study. Accordingly, six public figure Qeerroo fi Qarree (four male and two female) who have organized the protest movements, three officials from West Shewa Zone Administration office, West Shewa Zone Communication Office, and West Shewa Zone police Station, and two instructors from Ambo university political science department were purposively selected to get firsthand information. Besides, documents from both government and private reliable online sources were used as secondary source of data. In-depth-interview, document analysis and researcher own observations were used as tools to gather necessary information. The gathered data were analyzed qualitatively. Lastly, the paper found out that the current transition period of Ethiopia shares the characteristics of civilian coup d'état since Qeerroo fi Qarree peaceful struggle movements is main cause for the transition. The name Qeerroo fi Qarree have conceptual political meaning than a literal one. They have struggled barehanded and voiced the political, economic and socio-cultural marginalization of Oromo people through well-organized tactics. As a result, they brought the current transition and achieved great missions within five years of pre-transition protest movements. In this regard, social media plays a great role to organize different peaceful demonstrations, and business or service boycotts. However, Qeerroo fi Qarree of west shewa zone have still doubt on the current reformations made by existing government. On one hand, the absence of clear transitional political roadmap, heightened ethnic-border based violence at the beginning of the transition period and ununiformed reformations from federal to local government structure are the source of their political dilemma on the success of the transition. On the other hand, absence of renewed relationship between Qeerroo fi Qarree and the currently ruling party, ODP (Oromo Democratic Party), and lack of competent and financially strong opposition parties vis-a-vis incumbent government makes Qeerroo fi Qarree of west shewa zone uncertain about the current transition and expected changes in post-transition period. Clear transition political roadmap, uns spontaneous discussion and practical reformation evidences should be needed to clarify Qeerroo fi Qarree confusions and ensure democratic transition.*

Key Words: Qeerroo, Qarree, Politics Transition, Protest

THE WRITER INTENTION

The current political transition is the result of all Oromo people struggles for centuries. For the current political juncture, *Qeerroo fi Qarree* sacrificed their unreturned soul to voice the accumulated grievances of Oromo people and bring the current transition in Ethiopia. The writer strongly believes that all *Qeerroo fi Qarree* from all parts of Oromia region stand for the same goal and achieved unthinkable missions in the Ethiopian political history. Thus, necessary recognition should be given to all *Qeerroo fi Qarree* of Oromo people. *Qeerroo fi Qarree* of west shewa zone, however, is taken as a sample for the purpose of this paper. It should be noted that the writer has no intention to make any comparison of *Qeerroo fi Qarree* in terms of a specific area.

‘Na ofkoolcha! ‘With an apology for the unintended mistake in this paper’

1. INTRODUCTION

A transition from a political perspective is simply a change in the characteristics of a political system. This transition could be triggered by the participation of elite and the mass albeit the nature and strategies of their involvement in the transition process varies.

Since 1990s dozens of Africa countries have attempted political transitions. Majority of them attempted to transform from dictatorship or autocracy to a democratic system through elections. Unfortunately, the leaders of most of the African countries cannot bring genuine democratic system for long decades in the continent. Conversely, they opt for extreme dictatorship and autocratic system and totally excluded the mass participation and privileges. As a result, there were African countries which where collapsed and succeeded in the transitional process (Lewis, 1992; Seely, 2009; Barbara, Joseph, and Eric, *et.al.*, 2014)

Ethiopia is one of Africa country which has been passed through different political transitional eras. For instance, the existing government, EPRDF, conducted Peace and Democracy conference and established Transitional Government of Ethiopia (TGE) and adopted a transitional charter which recognized freedom of association and speech, multi-party democracy, referendum for Eritrea and the right of nations, nationalities, and peoples' to self- determination after it overthrew the *Derg* military junta (Aalen, 2002; Bahru, 1991; Marcus, 1994, and Turton, *et.al.*, 2006). Again, the current transitional government of Ethiopia took place by incumbent government due to accumulated public grievances for the last two decades erupted by Oromo people unprecedented and unsupernatural protest movements. As a result, the existing government made immediate and necessary reformation to restore the country from the edge of state collapse before one year ago. The current transition expected to be optimistic to bring genuine democracy and fix the wrongly manifested ethnic federalism consequently brought disrespect and hatred among ethnic groups in Ethiopia which have been propagated by autocratic EPRDF lead by TPLF for the last two decades.

Oromo people are the largest ethnic group in Ethiopia. However, they have been marginalized by different regimes for centuries. The Oromo people have been protesting to ensure their human and constitutional rights at different focal points though their legitimate question ended by the government mass killing (Aseffa, 1993 &1998). However, since 2014 strong Oromo protest movements have been made in very well organized manner by students of different educational level and workers of different institutions. For instance, the land grabbing strategy of the government called "*Integrated master plan of Addis Ababa*" which aimed to expand the capital city around 1.5 million hectares onto surrounding Oromo farmers land and privatization which evicts and makes the Oromo farmers beggars in the name of false capitalism were the triggering causes of the protest. In this case, social media played as medium of informing and organizing protest movements, the youth male and female called '*Qerroo fi Qarree* in Afaan Oromoo language as an engine and Oromo bloggers and activists as the wheel played a crucial role. In fact, there were '*Qube Generations*' Oromo elites group in 1991 fought for real democracy in Ethiopia politics before *Qerroo fi Qarree* protest movements. The accumulated injustice for the last 27 years of Oromo people lastly erupted and shook the Ethiopian politics by *Qerroo fi Qarree* of Oromia region (Aseffa, 2011, Ezikel, 2018, and Forsén, *et.al.*, 2018). Therefore, this paper attempts to describe the achievements of West shewa zone *Qerroo fi Qarree* in the pre-transitional period and their political confusion in the contemporary transition period.

2. STATEMENT OF THE PROBLEM

Oromia region is the heart of the Ethiopian economy and politics. More than half percent of Ethiopia economy depends on Oromia region agriculture. For instance, Oromia accounts for 51.2% of the crop production, 45.1% of the area under temporary crops and 44% of the total livestock population of Ethiopia. There are numerous mineral deposits in Oromia region including gold, platinum, nickel, iron-ore, soda ash, diatomite, limestone, feldspar, silica sand, kaolin, granite and other non-metallic construction materials. Mining activities that are already underway include are gold (Borena and West Wellega), soda ash in the Rift Valley, limestone, gypsum and clay soil (Muger), tantalum (at Kenticha) ornamental and construction minerals (in Hararghe and Wellega) and ceramic in Borena. With its vast and varied natural resources the region has ample opportunity for investment. There are more than 761 investment projects in the region. These projects have a capital of 3.4 billion Birr (<http://www.ethiopia.gov.et/oromia-regional-state>). Politically, Oromo people are the source of democracy. *Gadaa* system is essentially an indigenous democratic socio-political organization of the Oromo people. *Gadaa* has been considered as a democratic and just system than other forms of governance in the region. It governs the life of every Oromo from birth to death. It is also an example of a traditional African form of democracy (Tadesse, 2018). However, the Oromo people have been denied equal access to participate in the political and economic arenas of the country. The Oromo people systematically and forcefully marginalized from the political arena since the imperial monarchy albeit they are the largest ethnic group in the nation. Several opposition political parties represent the Oromo people were also labeled and attacked by the name of 'terrorist group'.

Among different parts of Oromia, west shewa zone is a fountain of the Oromo protest movements. The zone is known by strong struggle against the minority TPLF (Tigray People Liberation Front) party lead EPRDF corrupted system for years. Since 2014, *Qerroo fi Qarree* of west shewa zone with all *Qerroo fi Qarree* of different parts of Oromia region made well-organized protest and lastly overthrew the minority TPLF party which had an absolute power over the three coiled parties, OPDO, now ODP (Oromo Democratic Party), ANDM, now ADP (Amhara Democratic Party), and (SEPDM) Southern Ethiopian People's Democratic Movement. In this process, few members of ODP and ADP officials played a great role to bring the current transition and made necessary reformations in an effort to realize democracy in Ethiopia. In this regard, several opposition parties particularly representing Oromo people like OLF and its banned flag which adored and believed as a symbol of Oromo people resistance waved in all parts of Oromia region. Hundreds of political prisoners by false TPLF allegations were released from prison. Necessary power shift which encourages female for political position also made in federal and regional levels. These and others deeds brought great appreciation

and acceptance nationally and globally within a short period of time for an effort made by revolutionary leaders (Prime Minister Abiy Ahmed (PhD) and President of Oromia regional state, Lemma Megars and his team). As a result, the protest movements were gradually decreasing in the west shewa zone.

However, *Qerroo fi Qarree* of west shewa zone gradually get into confusion about the current direction of the transition and expected change in the post-transition period. On one hand, lack of total genuine reformations by the existing government leads to *Qerroo fi Qarree* suspicion on government trustworthiness. In fact, *Qerroo fi Qarree* of west shewa zone has no smooth relationship with ODP (Oromo Democratic Party) due to the fact that the party was acting as tool of TPLF mischievous propaganda and harsh governance on Oromo people till the transition period. Even if *Qerroo fi Qarree* support the revolutionary leaders from ODP, their 27 years painful wound was not fully healed yet. On the other hand, there is strong political influence of OLF (Oromo Liberation Front). *Qerroo fi Qarree* trust an armed OLF opposition party which has been fought for Oromo people liberation and sovereignty since 1973. Since OLF started the negotiation process with the existing government in current transition period, several ethnic and border based violence have been ignited and thousands of Oromo people were died and displaced in the different parts of Oromia region. In this regard, there are groups who argue soldiers of OLF are responsible for such inhumane act happened in Oromia region. Conversely, there are groups who make an attachment the act with ODP secretive agenda to blackmail OLF. These contradicting and contesting arguments create an obscure view and suspicion among *Qerroo fi Qarree* of west shewa zone about the general political context of the transition period. Therefore, this paper intends to describe struggle movements and achievements of *Qerroo fi Qarree* of west shewa zone in the pre-transition period and the causes of their confusion or suspicions on the current political transition.

3. OBJECTIVES OF THE STUDY

The general objective of this paper is to describe the role of *Qerroo fi Qarree* of West Shewa Zone, Oromia region to bring the current transition period in Ethiopia. The study specifically attempts to:-

- I. review the nature of current political transition of Ethiopia
- II. analyzes an explication of the name '*Qerroo fi Qarree*'
- III. describe the struggle movements of '*Qerroo fi Qarree*' of West Shewa Zone during the pre-transition period
- IV. analyze changes happened in west shewa zone since the transitional period
- V. Investigate the sources of *Qerroo fi Qarree* of West Shewa Zone confusions on the current transition period

4. THEORETICAL FRAMEWORKS

Social movement theory (SMT) and political process theory (PPT) theories are used as theoretical frameworks. Social movement theory (SMT) focus on any '*change*' in society and analyze how and why such change happen through the effort of societies. To contextualize the broad concept of SMT, the paper employed SMT from the political perspective in which marginalized group purposeful and organized attempt to create or resist change. In addition, political process theory (PPT) which is an important part of SMT is employed to describe the protest cycles, mobilizing structures, political opportunities, framing processes, and contentious repertoires that determine factors for the success or failure of a social movement (Tarrow, 1994; Caren, 2007; McAdam, Tarrow, Tilly, et.al, 2001).

5. METHODS AND MATERIALS

The descriptive qualitative research design was employed to describe the major achievements of *Qerroo fi Qarree* of west shewa zone and their political confusion in the current transition period. Both primary and secondary sources of data were used to get comprehensive information. Purposive sampling was employed to select the sources of data and tools of data gathering and analyzing. The primary sources were totally thirteen (13) key informants. Accordingly, Six (6) public figure of *Qerroo fi Qarree* (four male and two female) who have organized the protest movements, three (3) higher officials from West Shewa Zone Administration office, West Shewa Zone Communication Office, and West Shewa Zone Police Station, three (3) informants from ruling and opposition parties (Oromo Federalist Congress party (OFC), Oromo Liberation Front (OLF), and Oromo Democratic Party (ODP), and one (1) instructor from Ambo university political science department were purposively selected to get professional and first-hand information on the subject under investigation. In addition, documents, news and features from private and government legible websites were used as a secondary source of data. To get the necessary information from both aforementioned sources of data, researcher own observation, in-depth interview and document analysis were employed as the main data gathering tools. A qualitative approach was used to analyze the gathered data

7. RESULT AND DISCUSSION

7.1 The Current Transition Model of Ethiopia

Transition is a critical juncture in the form of political, economic, social, technology, and so on in a specific period. For the purpose of this study, transition refers to the process of political shift from one form of government to another radical form of government obviously has an optimistic result. As Seely (2009) clearly stated political transitions focus on the factual changes happened from previous political practices in the post-transition system. These changes could be seen in terms of the party hold the power, updated and new policies and strategies to bring a range of feasible outcomes despite the new system is democratic or not.

Political transition usually analyzed from multi-perspectives of models and stages. There are three political transitional paradigms that could be an insight to analyze the current political transition model of Ethiopia. The first is a replacement or overthrow. In this model, political transition is triggered when an armed opposition group/s overthrew the incumbent government and holds the political power. Replacement characterized by fight, war, and violence among the people. In this case, for instance, EPRDF came to power overthrew the *Derg* military Junta and formed Transitional Government of Ethiopia (TGE) in 1991. During this period, there were great famines and conflicts in the country. Transformation or reform is another transitional paradigm when the transition is promoted by the incumbent government itself. It is a kind of *inner-out* political change. The government by itself is in charge of bringing transition without negotiation or consultation of any opposition parties. The incumbent government makes necessary reforms, introduce different rules, legislation, create different strategies. Lastly, transplacement or compromise transition emerges from both existing government and opposition groups/parties. There is a political bargain from both sides. In this regard, an extreme stands usually compromised to create consensus on the common interest of both parties. Furthermore, political transition is a sequential process passed through the opening, breakthrough, and consolidation stages (Carothers, 2002; Ezekiel, 2018; Mukerrem, 2018; Lefort, 2018; Lewis, and *et.al.*, 1992).

In the process of transition, when one a regime loses power, three things would take place. First, an election will be conducted in the country. In this regard, the old regime (autocratic or dictatorship) is replaced by a democratically elected political party. Secondly, an immediate reform has made by the existing government which starts from replacing a new leader from the existing government for the survival of the regime. Lastly, the opposition party overthrows the ruling party and control power. However, it is difficult to state clearly political transition that represents the current Ethiopia transitional period depend on the above political transition models and phases. Of course, the socioeconomic requisites, political culture, institutional, comparative historical/political economy, elite bargaining models, and ethnic conflict models are determining factors on the nature and characteristics of political transition particularly democratic kind of transition (Davis, 2014; Scott, 2003; Giuseppe, 1990; Haggard, and *et.al.*, 1995).

The current Ethiopia transition seems in the middle of both transformation and transplacement models. The current Ethiopian political transition is not a pure transformation model. This is due to the fact that some of current reformations are made purposively to calm down aggressive public quest for the continuation of existing government status- quo. Unlike transformation, transplacement transition model is not the pure path for Ethiopian political transition. Of course, the incumbent government attempted to organize different discussion and negotiation forums to discuss with some political parties. However, these discussions and negotiations were not fruitful as they were expected due to competitive nature of negotiation than collaborative one among opposition parties and existing government. Thus, as Mukerrem (2018) mentioned that the current political transition of Ethiopia inconclusive and it seems a "hybrid" or "grey zone".

Again, focusing on political transitional phases, Ezekiel (2018) puts the political transition of Ethiopia as "a political limbo between the promising opening of the system and expected attainment of a breakthrough". Opening phase indicated an initial point where the public protest movements erupted and then the incumbent government implemented necessary reformation like an appointment of new prime minister after the executive committee meeting of December 2017. The breakthrough phase shows when the EPRDF made political bargain forums with opposition parties which were tagged as terrorist groups on the transition roadmap and coming national election agenda. Different opposition parties also merged to be strong and competitive. Besides, EPRDF made the necessary internal demotion and promotion. Several new officials were assigned on minister positions and, conversely, former corrupted higher officials were jailed as a step forward to clean the political mess. The Consolidation stage is still not become practical. This stage would be became realistic when opposition political parties and existing government build consensus and agreed on the concept of '*Medemer*' or inclusion, the new Prime Minister Dr. Abiy Ahmed unification rhetoric to bring pragmatic and inclusive change in Ethiopia.

To conclude, the transition model of Ethiopia share the characteristics of civilian coup d'état. As Seely (2009) stated civilian coup d'état political transition made by the actor's resistance or public protest and boycotts to make necessary political shift through reformation in the old organs of government or overthrew the existing government, electing a transition prime minister and legislative body and laying the groundwork for a meaningful political transition. Accordingly, *Qeerroo fi Qarree* brings the contemporary political transition in Ethiopia. They initially emerged to stop the marginalization of Oromo people using social media as a major channel of informing, and organizing several protest movements. *Qeerroo fi Qarree* became more powerful vis-a-vis the incumbent government lastly after five years well organized and strong protest movements. The power of *Qeerroo fi Qarree* shook the country political economy and forced the existing government to make necessary reforms. As a result, new transition government PM Dr. Abiy Ahmed was appointed and reformations have been made in Ethiopia politics.

7.2 Clarification for the Name '*Qeerroo fi Qarree*'

The origin of the word *Qeerroo fi Qarree* is associated with the animal name '*Qeerrensa*' or 'Tiger'. This association emanated from the comportment of the tiger. Tiger is fast, furious and fortitude animal. As *Qeerroo* Informant (personal interview January 7, 2019) says "*Qeerroo fi Qarree* is symbolized as '*Qeerrensa*' due to their energetic, powerful and determination. People frequently used the

name *Qeerro* than *Qarree* though they are inspirable. *Qeeroof Qarree* is an Afaan Oromo term which has an equivalent word in English ‘Youth male and female’. In fact, there is no single and precise definition for the word ‘youth’. However, age is preferably taken as a criterion to define youth though the age interval varies from county to country or organization to organization.

‘*Qeeroof fi Qarree*’ is a common name majorly refers the age, gender, ethnicity and sometimes marital status bachelor and bachelorette respectively. In the context of Ethiopia, *Qeeroof Qarree* or youth is the society’s class range in 15-29 year (Ministry of youth, Sport and Culture of Ethiopia, 2004 and USAID, 2017). *Qeeroof Qarree* also shows gender reference. *Qeero* refers to male while *Qarree* refers to a female. Even though female are culturally not motivated to participate on political issues and burdened to keep in house activities, *Qarree* (bachelorette) discredited the negative cultural perception towards females being underground or covert forces fighters in the Oromo protest movements. Lastly and most importantly *Qeeroof Qarree* signifies ethnicity. As Seely (2009) ethnicity is an important element of Ethiopian politics. *Qeeroof Qarree* of the *Gadaa* system emerge from Oromo ethnic group to resist the TPLF cruel activities and guard their society and land. Similarly, different youth group like *Fanno* in Amhara region, *Ejetto* in Sidama, *Berberta* in Somali, *Jeldim* in Gambela, *Yelaga* in Wolaita and others from different ethnic groups raised for the equal economic and political benefit of their respective ethnic group (Retrieved on March 14, 2019 from <https://oromiatimes.org/2018/01/08/who-is-queerroo-what-is-queerroo/>).

Furthermore, *Qeeroof Qarree* has more conceptual political meaning than a literal one. *Qeeroof Qarree* become more powerful after strong struggles and achievements made in pre transition period. People from all age strata, gender, and profession took part in all *Qeeroof Qarree* protest movements. Majority of *Qeeroof Qarree* are students from elementary, secondary, technic and vocation, colleges, and university and unemployed youth due to ill treatment of TPLF corrupted system. In addition, politicians, activists, and civil servants agitated and coordinated the protest movements. Currently, *Qeeroof Qarree* is perceived as liberation front from any marginalization on Oromo people. They represents an idea of relentless pursuit of liberty equipped with mental readiness and resilience which leaves no stone unturned to get what it pursues in the current transition period of Ethiopia (Retrieved on March 19, 2019 from <https://queerroo.org/resources-afaan-oromo-amharic-and-english/guidelines-of-queerroo bilisummaa - resistance>).

7.3 Major Struggle Movements of *Qeeroof fi Qarree* of West Shewa Zone in the Pre-Transition Era

Several protest movements took place in the twenty-two (22) woredas and twenty-eight (28) towns found in the west shewa zone for years. All series of *Qeeroof fi Qarree* protest in west shewa zone aimed to stop economic and political suppressions imposed by TPLF minority party lead EPRDF on the Oromo people for the last 27 years. The protest movements were passive and unorganized. The military forces were easily terminate the protest and took harsh measures on the people. However, the accumulated grievances of Oromo people erupted in well-organized manner in the west shewa zone since 2014 G.C. In this regard, social media as primarily medium to share information and organize protest movements, and popular activists Jawar Mohamed as the captain of *Qeeroof fi Qarree* struggle made undeniable contributions. Universities, colleges, technic and vocational institutions, and schools were an organizing and erupting revolt centers. In the west shewa zone the majority of *Qeeroof fi Qarree* protest of movements took place in Ambo city, the capital of west shewa zone. This is due to the fact that both private and government higher education found in the Ambo city (Forsén, 2018; Dandii, 2014, and Aseffa et.al, 2014).

The driving factors for *Qeeroof fi Qarree* protest movements can be seen from local and national perspectives. The national problems emanated from deliberately manifested ethnic- federalism in the Ethiopia politics for the last 27 years by the minority TPLF lead EPRDF to get economic and political capital. This contributes to ethnic tensions and conflicts, widening the disparities than bring respect and unity among the ethnic groups. Abbink (2011) and Bekalu (2007) also asserted that ethnic federalism was intentionally propagated by TPLF elites to perpetuate their virulent form of internal colonialism and ethnic apartheid supremacy. The local problems are usually emanated from national problem. Accordingly, the major triggering factor for west shewa zone *Qeeroof fi Qarree* protest is the issue of land grabbing in Oromia region through different deceiving strategies. For instance, the issue of an ‘*Integrated Regional Development Plan for Addis Ababa and the Surrounding Oromia Region*’ was a systematic land grabbing strategy of which evicted thousands Oromo farmers from their own land. In fact, issue of land is the source main struggle movements in Ethiopian political history. It is an economic, political and socio-cultural representation of ethnic groups found in Ethiopia. As the Australian Department for Foreign Affairs and Trade (DFAT) (2016:37) report shows about the Addis Ababa master plan,

The announcement of the Master Plan led to major demonstrations, centered on the town of Ambo (originally beginning at Ambo University before spreading to the town itself and then surrounding areas). The protests started out peacefully, but once the security forces moved in violence occurred against unarmed protesters.

This plan was temporarily suspended in 2014 G.C and totally canceled in 2016 G.C after a strong protest was made in the whole parts of Oromia region and around 5000 *Qeeroof fi Qarree* were killed by armed force. In addition, the accumulated grievances of Oromo people related to lack of good governance, lack of necessary infrastructure, poverty and political repressions were factors for *Qeeroof fi Qarree* of west shewa zone strong protest movements. As Ethiopia: Oromos and the ‘Oromo Protests’ (2016) reported “the current wave of protest is the result of a governance black spot. The severe lack of public consultation on state developmentalism and the

absence of a platform for the voices of Oromo to be heard have led to an unexpected local expression of grievance (Retrieved on March 10, 2019 from <https://qeero.org/statement/qeero-bilisummaa-oromoo-freedom-justice-equality>).

Large number of *Qeero fi Qarree* were arrested and killed in the past four consecutive years (2014-2018) of pre-transition protest movements. From April- May, 2014 particularly a large number of *Qeero fi Qarree* were killed by military forces in west shewa zone. Similarly, massive number of *Qeero fi Qarree* were abducted and killed across Oromia in 2015 G.C due to peaceful demonstration on the issue related to land grapping in west shewa zone, Ginchi town. (Addis Standard, December 2015). Thus, it is worth to summarize the major *Qeero fi Qarree* of west shewa zone struggle movements took place in the 2014 G.C, the critical political juncture in west shewa zone.

Table.1 Selected protest movements took place in West Shewa Zone in 2014

Date	Place/s	Agendas Of Demonstration	The Protest Outcome
February-March, 2014	Ambo city Wallisoo town Gedo town	➤ Stop terrorizing Oromo people ➤ Ambo University students protested in order to armed forces leave the campus by making a hunger strike.	• Government military forces arrested and tortured protesters
March 6- 22, 2014	Gedo town Midaqanyi	➤ Stop torture and arrest Oromo people. ➤ Release students jailed and suffered being a member of an opposition party, OLF.	• Abduction and torture of students continued by government military forces
March 25, 2014	Ambo city	➤ Job opportunity for jobless graduated students from different universities.	• <i>Qerroo fi Qarree</i> who organized the protest were abducted.
April 16, 2014	In the majority of Woredas of west shewa zone	➤ Commemorate Oromo Martyrs Day	
April 25, 2014	Ambo city	➤ Emporer Minilik is a monster ➤ Finfinne [Addis Ababa] the capital city of Ethiopia found in Oromia region is ours.	• Number of <i>Qerros</i> were arrested
April 29-30, 2014	Ambo city	➤ Around 25, 000 people protested the existing government economic and political discrimination imposed on the large Oromo people. ➤ Justice, freedom and equality for Oromo people. ➤ This protest was a decisive point for further unification and strength of <i>Qerroo</i> for other protest movements	• No of protesters wounded and killed by the government armed forces • Cars and buildings were ablaze on fire. • Ambo city changed to war Zone
May 1-3, 2014	Ambo city Gudar town Mida Qanyi XuqurHincinni Tokke Kusaye	➤ Stop killing Oromo people	• Ambo town remained closed. • The military camp located in the Guder town was burned by <i>Qeero fi Qarree</i> . • <i>Qeero fi Qarree</i> controlled the administration office and the police station in Midaqanyi.
May 8, 2014	Ambo City	➤ The protest movement continued, but not aggressively.	• Armed forces arrested a large number of people without any randomly

	Midaqanyi		
June 4, 2014	Ambo city	➤ Release jailed innocent students	
August 25, 2014	Ambo city	<ul style="list-style-type: none"> ➤ Stop deceiving us. We feed up of falsehood of TPL propaganda ➤ Qerroo continued protesting against the hidden political agenda promulgation in the name of government training which have been given for decades for different sector 	<ul style="list-style-type: none"> • A large number of ambo university Qerroo arrested for consecutive three days

Note: the table is not comprehensive. Only the major protest movements are included

7.4 Changes in West Shewa Zone since the Transitional Period

It seems some changes are shown in west shewa zone in terms of political stability, peace and security and economic development in the transitional period. Some of the changes are visible while others are expected to happen in the near future.

7.4.1 Political Stability

Since the transition period, there is relative political stability in west shewa zone. The necessary demotions and promotions on irresponsible and corrupted officials have been made in the different government sectors to stabilize the political tension. The rearrangement trembles the corrupted officials who tried to hamper the current glimpse of reformation in the zone. *Qeerroo fi Qarree* also clearly know these corrupted officials and their shameful deeds. As a respondent from west shewa zone Administration Bureau says,

"Necessary position shift has been made in the west shewa zone since the transition period. Officials who have the potential to gear up the reformation process and have acceptance in the eyes of the people were assigned at a key government positions. On the other hand, the former officials who cannot make significant contribution and became the source of public violence were demoted from their position and shifted from their former working place." (Interviewed on February 10, 2019)

In fact, the frequencies of demonstrations and boycotts in west shewa zone reduced since PM Dr. Abiy Ahmed and Lemma Magarsa the president of Oromia regional state from Oromo came to power. This is due to the fact that the major constitutional question of Oromo people for decades to lead the country is answered for the time being. However, work place shift and relegate the position of corrupted officials is not a guarantee to ensure political stability in zone. It has been seen the demoted officials from their former position have been suddenly promoted to the highest political position. Thus, legal action there should be taken on these officials to ensure long lasting political stability.

7.4.2 Peace and Security

One of the major problems in west shewa zone was lack of peace and security. As a respondent from west shewa zone police station Bureau said that there was a strong conflict between *Qeerroo fi Qarree* and armed forces in the pre-transitional period. But, *Qeerroo fi Qarree* are currently cooperating with the police force to keep the peace and security of their area. Of course, this change is shown in the whole Oromia region. As Armed Conflict Location and Events Dataset 13 Oct 2018 states

"Since Abiy has been in office, events in Oromia and particularly western Oromia have declined. The protests in that region have petered out. Between October 2017 and April 2018, there were 264 violent events in Oromia, comprising 68% of violent events total; since April, there have been 199 events in Oromia, constituting 47% of events — a decline of over 24%"

In fact, there are different gangs in the west shewa zone, Ambo city who commit crimes in the name *Qeerroo fi Qarree*. However, as west shewa zone police station Bureau said that these groups are not real *Qeerroo fi Qarree* who have been struggling to bring democracy, equality and justice in west shewa zone. They are tools of political brokers who have targeted to create chaos in the west shewa zone. (Interviewed on March 4, 2019)

7.4.3 Economic Development initiation

Job opportunity for jobless *Qeerroo fi Qarree* has been repetitive protest movement agenda in west shewa zone. As an informant from West shewa Zone administration office says, "The number of jobless *Qeerroo fi Qarree* increased from year to year in west shewa zone. In 2018 G.C only there were around sixteen thousand (16,000) registered *Qeerroo fi Qarree* jobless in west shewa zone before one year ago." Lack of infrastructures and large unemployment rate are the major problems of west shewa zone. As one of *Qeerroo fi Qarree* leader says "the major causes for unemployment rate in west shewa zone is mistreatment and corruption. Individuals who could give bribe or had relationship with these officials got a job opportunity" (Interviewed on January 12, 2019). However, there are some attempts to create job opportunity for *Qeerroo fi Qarree*. With this regard, as an informant from west shewa zone administration office mentioned that for eight thousand two hundred (8,200) jobless *Qeerroo fi Qarree* created job opportunity in different small and micro industry. In addition, on the fundraising program held in Finfinne, February 23, 2019, around 460 million

birr were collected for Ambo town development projects. The fund also will be utilized to build a secondary school, medium-size stadium, a research center named after Laureate Tsegaye Gebremedhin and other development projects that could create a job opportunity for west shewa zone *Qeerroo fi Qarree* (Addis Herald, April 11, 2018)

7.5 The Sources of *Qeerroo fi Qarree* of West Shewa Zone Confusions on the Current Transition Period

Confusions or/and uncertainties often happened among the people during the transition period. The sources of these confusions or uncertainties are usually created due to contradicting and contesting political messages disseminated by different political parties, activists, and experts through different medium of communication. Transition period is also characterized by conflict and tension. As Addis Standard (September 25, 2018) reported that the current transition of Ethiopia is unpredictable due to lack of absence of a structured transitional roadmap. Unpredictability stands for uncertainty of the political transition. This in turn creates despair and leads to violence. Accordingly, factors for the uncertainty of *Qeerroo fi Qarree* of west shewa zone about the current transition are the part and parcel of lack of transitional roadmap.

First, *Qeerroo fi Qarree* of west shewa zone didn't make clear demarcation between political party, political elites, and activists at the beginning of the transition period. In fact, democracy needs good activists and good politicians. Good activists can and often do advance the goals of good politicians. As a respondent from Ambo university department of Political Science and International Relations says,

"Currently, it seems Qeerroo fi Qarree do not understand the clear differences between political party and an individual politician, activists, pressure groups, and so on. Though these actors play in the same field, a political party is broader than a single politician. It is an organization that consists of politicians and a group of voters organized to support certain public policies. A politician is someone who represents and acts on behalf of a general ideology and/or a specific agenda of the party. An activist is someone who organizes and acts for the purpose of changing public policy or law" (Interviewed on Febr.26, 2019).

Qeerroo fi Qarree had been protesting against the dictatorship of EPRDF wearing the T-shirts having the picture of PM. Dr. Abiy Ahmed and the president of Oromia regional state, Lemma Megersa who are the senior members of the OPDO, now ODP one of EPRDF collation party representing Oromia region. *Qeerroo fi Qarree* strongly support these revolutionary leaders due to the fact that the leader's political quality, commitment and visible reformations took place in the transition period. Besides, *Qeerroo fi Qarree* of west shewa zone have been seen when they support the existing government revolutionary leaders waving the flag of opposition party, OLF. In fact, there is a strong bondage between OLF party and Oromo people. They believed OLF as identification of *Oromummaa*, being an Oromo, thus; *Qeerroo fi Qarree* believe OLF party is the representative of Oromo people. As one of *Qarree* respondent says, "OLF is my blood. I have told by my elder brothers that OLF is the one who has been fighting to liberate Oromo people from 'Woyane' colonialism. Thus, I cannot detach OLF from Oromo and Oromo people from OLF". Such strong perception inculcated in the mind of *Qeerroo fi Qarree* through political narration about OLF and the harsh measures made by TPLF on Oromo people. Therefore, the source of these evident confusion scenarios emanated due to lack of understanding clearly the role and mandates of individual politician, political party/s, and activists.

Second, there is still lack of strong trust between *Qeerroo fi Qarree* of west shewa zone and ODP (Oromo Democratic Party) in the current reformation process. The party has been serving the interest of the dictator TPLF for more than two decades than the interest of the people it represents. In fact, since transition period the party has made necessary reformations. First, OPDO changed its name and logo to Oromo Democratic Party (ODP). Then, fourteen (14) long serving officials retired from the party and energetic individuals are assigned to foster the reformation process. Besides, the 'Team Lemma' group and PM collaboratively made decisive steps like lifting a state of emergency and free political prisoners which was a stepping stone to build the image of ODP among *Qeerroo fi Qarree*. However, lack ODP immediate response and weak stand on several ethnic-boarder conflicts and the death of innocent Oromo people regenerated uneasy relationship between ODP and *Qeerroo fi Qarree*. For instance, a large number of Oromo people have been living around Somali-Oromia borders were killed and the rest were displaced from their homes due to clashes on the border issue. An armed group from Benishangul-Gumuz killed and burned the houses of Oromo people in east wallaga zone. Furthermore, the issue of *Koye Foccee* condominium houses located in Oromia special zone which is handed by the Addis Ababa City Administration Savings & Houses Development Enterprise (AASHDE) on Wednesday, March 6, 2019, put the loyalty of the party under question. As a result, as one of *Qarree* respondent says,

"Lemma Megersa is a strong leader of Oromia regional state. But, OPDO or ODP is simply changed its' name, not its old fashioned political trend. The party's mischievous practices still exist. Even though ODP got power by Qeerroo fi Qarree uninterrupted peaceful struggle, the party still cannot fully exercise its power. Thus, it is difficult to fully trust ODP. However, Qeerroo fi Qarree never back and hesitate to say enough is enough" (Interviewed on March 3, 2019)

Lastly, lack of competent and financially strong opposition parties represent Oromo people makes *Qeerroo fi Qarree* uncertain about the current transition brought real democracy in the country. Among several parties representing Oromo people, OLF was a senior political party represents Oromo people. Briefly, the Oromo Liberation Front (OLF) is a political organization established in 1970 to struggle against the Abyssinian colonial rule. The OLF was part of a transitional government led by the Ethiopian Peoples' Revolutionary Democratic Front (EPRDF) coalition when the *Derg* regime was overthrown in 1991. However, OLF left the

transitional government in 1992 due to political ideology difference happened between OLF and TPLF (Tigray People's Liberation Front). Since then the party has made a low-level armed struggle against the government to ensure the Oromo peoples' right to self-determination (Retrieved on February 28, 2019 from <https://unpo.org/members/7917>, 2015). The fundamental objective of the OLF is the right to national self-determination, terminate a century of oppression and exploitation, and to form, where possible, a political union with other nations on the basis of equality, respect for mutual interests and the principle of voluntary associations. However, As Jawar Mohamed (2009: 2) states "because of weak, undisciplined and incompetent leadership, through exile politics and a cult-like outdated organizational tradition, the OLF could not produce any result over the past decade." Thus, OLF cannot liberate Oromo people from tyrant TPLF governance for the last 27 years. Since OLF ceasefire and signed negotiation agreement with existing government in the transition period still there are pressures that cripple the party not step forward. As a result, *Qeerroo fi Qarree* did not get OLF as they are expecting for years.

8. CONCLUSIONS AND RECOMMENDATIONS

Oromo people have been politically, economically, and socially marginalized for centuries. Since EPRDF came to power, the Oromo people decimations, displacement and evictions from their own land continues for the last 27 years in both systematic and forceful ways. Oromo people have made a continuous struggle to liberate from tyrant EPRDF governance. In the history of Oromo people struggle, the current *Qeerroo fi Qarree* protest movements are another successful chapter that shakes the Ethiopian politics within five years. *Qeerroo fi Qarree* have been protested in a well-organized manner when an incident such as the unlawful arrest of Oromo politicians, journalists, freedom fighters, activists, school dismissals related to student unrests, incidents of land grabbing, eviction of Oromo farmers, and so on occurs at any corner of Oromia. The incumbent government has used harsh measures to stop *Qeerroo fi Qarree* protest movements in the Oromia region. Unfortunately, they became unstoppable and source of Oromo unification. Their death, torture and arrest for the last five years lastly brought a political shift in the Ethiopia politics. As a result, the incumbent government forced to make internal reforms. New Prime Minister was appointed under the transitional government and the former dictator political elites dominantly from minority TPLF overthrown and even some of the party's highly corrupted officials put in jail. *Qeerroo fi Qarree* as the engine of current political transition, social media as the main medium of communication and activists (diaspora and local) as a wheel of the protest accomplished the first step mission which is liberating Oromo people from EPRDF dictatorship lead by TPLF in the pre-transitional period. In this first stage, *Qeerrof Qarree* guard the land grabbing through evicting Oromo farmers around Finfine, ensure freedom of speech, media freedom and partly other human and constitutional rights of Oromo people.

West shewa zone is taken as an epicenter of *Qeerroo fi Qarree* protest movements. *Qeerroo fi Qarree* of west shewa zone has protested and achieved indispensable roles for the current transition period. Since the transition period, there is relative peace and security, economic political stability in west shewa zone. However, lack of genuine reformation by the ruling party, ODP, lack of competent opposition parties due to internal and external problems and lack of *Qeerroo fi Qarree* political awareness to demarcate the role of politicians and activists create uncertainty about the success of the transition and changes to be expected in the post transition period among *Qeerroo fi Qarree* of west shewa zone. Lastly, the study urges that *Qeerroo fi Qarree* should see themselves as an independent body and play the watchdog role. They should not emotionally driven by any political party propaganda and act responsibly to any existing government misdeeds. Besides, the existing government should publicize the transitional roadmap and make uns spontaneous discussion with *Qeerrof Qarree*. Moreover, politicians, activists and media should work hard with the responsibility to inform and enforce necessary reformations. ***This Research has methodological gap. The study used qualitative research approach with small size participants and limited setting to review and describe the issue under investigation. Thus, it recommends other researcher to investigate and analyze the issue thoroughly and bring a comprehensive and critical analysis.***

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Preservation of Philippine Culture Through Notation of Century-old Passion Tunes

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Abstract-This study was conducted to identify, record, notate and compile the original tunes of the ‘Pasyon’, which was part of Philippine tradition and cultural heritage. It aimed to preserve and promote the century-old passion tunes so that the next generation will continue to treasure it. It dealt on the identification, gathering and notation of holy week passion tunes in the town of Santa Maria, Bulacan, Central Luzon, Philippines. The respondents in this study included old folks who frequently join in the *Pabasa ng Pasyon* during holy week. The population was composed of fifty (50) old folks of the town, whose ages range from 60-100 years old. The study was conducted in March of 2019. Interviewing of old folks and recording of holy week passion tunes were used as procedures in gathering data in this study. These century-old passion tunes were notated and used by local band musicians in accompanying Passion chanters.

Index Terms- passion tunes, passion chanters, passion notation

I. INTRODUCTION

Every nation has their own beliefs, traditions and cultural heritage, which were usually unique in their place. People who give importance to the preservation of these beliefs, traditions and culture cling to them in order to preserve and pass them on to the next generation. They will take the necessary steps and undertakings in order to continue to promote and preserve their beliefs, traditions and cultural heritage.

The singing of the ‘Pasyon’, known as *Pabasa*, which is practiced every holy week in the Philippines, is one example of a unique tradition in our country. At the onset of Ash Wednesday, which signals the start of holy week, the singing of the ‘Pasyon’ will be heard in almost every street and barangay in the Philippines. This tradition, which has been practiced for more than 200 years, started during the Spanish period when it was written by Padre Mariano Pilapil, a Bulacan Priest.

However, as years go by, there have been changes in the singing of the ‘Pasyon’ during holy week. The old fashioned tunes, as the younger generation described the original tunes of the ‘Pasyon’ have been slowly replaced with modern tunes, even with dance tunes from famous foreign artists. This practice brings the original tunes of the ‘Pasyon’, which is part of our cultural heritage, into the brink of disappearance and extinction. If the younger generation will continue to replace the original tunes of the ‘Pasyon’, these tunes will be dead and gone in the coming years. This means that our culture will not be preserved and will just be kept in treasure boxes of the old generation and will be buried with them in the graveyard of forgetfulness.

In this regard, that this study was conducted. As the original tunes of the ‘Pasyon’ and the singing of the ‘Pasyon’ or *Pabasa* itself is part of our traditions and cultural heritage, it must be preserved and promoted so that the next generation will continue to treasure it.

II. LITERATURE REVIEW

The centuries-old singing of the ‘Pasyon’ or *Pabasa* plays a significant part in the Lenten rituals and traditions of the Philippines. According to the Philippine Daily Inquirer article written by Mr. Danilo G. Mendiola, published on February 26, 2015, depending on the organizer or host, a *pabasa* is done any day between the first Sunday of Lent and Good Friday. It is commonly carried out in village chapels or houses before a makeshift altar adorned with pictures and statues of saints and of the suffering Christ. The sponsor or host of a *Pabasa* is normally a family or clan whose elders have made a *panata* (vow) to hold it yearly in thanksgiving for blessings received from God. The Catholic Bishops’ Conference of the Philippines describes the *pabasa* as “an epic poem in stanzas of five lines of eight syllables.” Apparently, it was originally intended by the Church as an instrument for evangelization. Thus, the Spanish friars used it as a means to indoctrinate the faithful in the early years of Christianity in the Philippines. The book used for the *Pabasa* is titled “*Pasyong Mahal*,” with the cross-carrying Nazarene on its cover, implying that it is about Christ’s passion. A scrutiny of its contents, however, would reveal that it is not just about the passion, that in fact the subject matter of the *Pabasa* is the whole history of salvation from the creation of the world to Christ’s passion, death and resurrection from the dead.

Another article of the Philippine Daily Inquirer article written by Levine Andro Lao, published on April 14, 2014, mentioned that the chanting of the “*Pasyon*” was originally done by Filipinos when a member of the community was about to die. This is according to Regalado Trota Jose, former commissioner of the National Commission for Culture and the Arts. “The belief was that when a person was dying, his soul could be stolen by the devil,” Jose said. “With the ritual of chanting *pasyon*, the dying was supported by the community in his struggle against evil.” He added that if we are to observe how the *Pabasa* is done in various regions of the country, we will see how they are distinct from each other. He explained that the manner how the different groups of Filipinos chant the *Pasyon* can be traced from how they had traditionally recited the indigenous epic in their region.

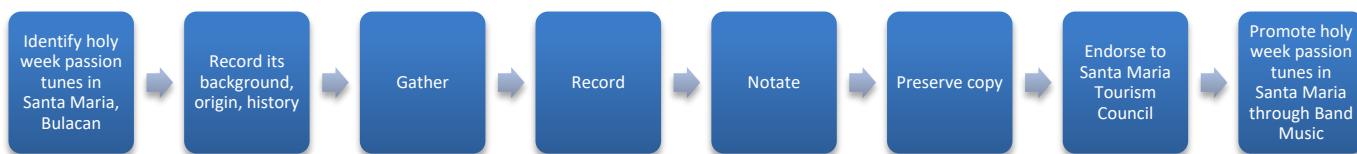
‘*Pasyon*’ was written 205 years ago by a Bulacan priest, another article published by Philippine Daily Inquirer article written by Carmela Reyes-Estrope, published on March 24, 2016, described how it began. “*Pasyong Mahal ng Panginoong Hesukristo*,” was written by Fr. Mariano Pilapil of Barangay San Jose, Bulakan, Bulacan in 1814. He is a doctor of theology and a representative to the law-making body, the Spanish Cortes, who also wrote the book, “Gramatica Hispano-Latina,” which drew attention to his linguistic prowess before he gained popularity for writing the “*Pasyon*”. It was also known as “*Pasyong Pilapil*.” It was described as an epic narrative of the passion, death and resurrection of Jesus Christ, often set to dolorous music by the faithful and chanted during the Lenten season. The singing of the *Pasyon*, indeed, is a unique tradition that should be preserved. Emeritus Manila Archbishop Gaudencio Cardinal Rosales said the *pasyon* appears to be dying in some parts of the country because the parents and the elders in the community, failed to pass on the tradition to the younger generation. This statement was published in The Philippine Star on April 1, 2015 by Evelyn Macairan, with the title, “Traditional *pabasa*, a dying passion?”

A similar view on the survival of this Lenten tradition is also expressed by those who loved the tradition and are doing the chanting of the *Pasyon* by heart. In an article published by The Philippine Star on April 15, 2014 entitled “Will the *Pasyon* survive?” by Iral, Mendoza and Lopez, it mentioned that some experts believed that the tradition will survive but will evolve into something that can be grasped by young people and the masses. However, views are divided on whether devotees are ready to hear the fusion of the life of Christ and the songs of contemporary performers like Miley Cyrus and Lady Gaga. This would be a clash between the traditional and modern views and beliefs.

As a musician, who loves to promote the original tunes of the *Pasyon* and this Lenten tradition, conducted this study to help in its preservation and promotion.

III. RESEARCH METHODOLOGY AND RESULTS

The figure showed the conceptual framework of this qualitative study.



According to the narration of the old folks of the town of Santa Maria, whose ages range from 60-100 years old, the reading and singing of passion tunes during Lenten season started from the Spanish Era and handed down orally from generation to generation until the present time, from the hearts of the town people who were so devoted to the Virgin Mary, the very reason that the name of the town was taken after her. They sung the *Pasyon* under the tune of *Tagulaylay* (Sorrowful motif), *Treskieda* (Waltz music style) and the *Pasodoble* (March music style).

26 out of 50 respondents or 52% told the researcher that *Pasodoble* (March Tempo) was the most common passion tune that they used in singing during *Pabasa* (Passion Chanting during Holy Week), 30% said it was *Treskieda* and 18% said it was *Tagulaylay*. Below was the musical score of one of the century-old passion tune that they used under a March Tempo or Pasodoble.

The musical score for "PASODOBLE (MARCH TEMPO)" is presented on four staves of a musical staff. The key signature is B-flat major (two flats), and the tempo is marked as J = 110. The score is transcribed by Reynaldo DC. del Rosario. The first staff begins with a quarter note followed by eighth notes. The second staff continues with eighth notes. The third staff begins with a quarter note followed by eighth notes. The fourth staff concludes with a half note followed by a final measure ending with a double bar line and repeat dots.

The next musical score under *Treskieda* (Waltz music style) is also one of the century-old passion tune that they used.

SCORE

TRESKIEDA
(WALTZ TEMPO)

TRANSCRIBED BY
REYNALDO DC. DEL ROSARIO

WALTZ TEMPO $J = 100$

The musical score below, *Tagulaylay* (Sorrowful motif) is also one of the century-old passion tune that they used.

SCORE

TAGULAYLAY
(SORROWFUL MOTIF)

TRANSCRIBED BY
REYNALDO DC. DEL ROSARIO

$J = 70$

IV. CONCLUSION

The researcher compiled the notated century-old passion tunes, endorsed them to Santa Maria Tourism Council and promoted them in Santa Maria, Bulacan through band music in order to preserve the notated century-old passion tunes. At present, Passion chanting in Santa Maria are accompanied by Brass Band Musicians composed of seven to ten members. The usual instruments that they play are tuba, baritone, trombone, French horn, trumpets, clarinets, saxophone and snare drum. Before bands in Santa Maria are playing through what they call in Filipino term "uwido" or an ear for music, this means they are playing without musical notation. This holy week of 2019, our band are accompanying passion chanters using the notated century-old passion tunes.

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Biometric Security In Business Organisation: An Assessment Of Its' Impact On Checking Corporate Crime In Business Organizations In Cross River State Nigeria

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Abstract- This study examines the use biometric security in business organization and its impact on checking corporate crime in Cross River state, Nigeria. In carrying out this study adopts the descriptive survey research method was adopted in selecting three hundred and eighty one (381) samples from four corporate organizations in Cross River state, using the purposive, proportional stratified and simple random sampling technique. The instrument of data collection is the questionnaire. Data collected from the field was analyzed using tables, frequency distribution and ANOVA (one way analysis of variance). Findings revealed that biometric security helps in checking corporate crime in business organizations in Cross River State, Nigeria. Organizations should undertake training for all its personnel's as a way of equipping them with the necessary biometric technology.

Index Terms- Biometric security, corporate crime, Business organization,

I. INTRODUCTION

The smooth running of the day to day operations of business organizations is of great concerns to managers, supervisors and management. With the adoption of information technologies by business organization to enhance productivity and to meet up with the needs of the modern market; management are now concerned with new security treats “hackers and computer criminals” these criminals have devised techniques and means to break into organization that make use of computers and network security systems with hacking software such as crackers, rootkits, sniffers and many others, which can be found free in the world wide web. These treats are on the rise and have become a major challenge of management of organizations (Bidgoli, 2012).

The rise of sophisticated hacking devices in the financial industry has increased the demand for a more secure means identifying employees and customers that services are provided for. This is because lack of adequate securities and protection of technological equipment used in business organizations often cause devastating financial and transactional data breaches and lead to great financial loses, loss of data and large regulatory fines by regulatory agencies. Hence, the adaptation of biometric technology by business organization. This study examined the

biometric security in business organization: an assessment of its' impact on checking corporate crime in business organizations in cross river state Nigeria.

1.2 objective of the Study

The objective of the study is to investigate the relationship between biometric systems and crime control in Calabar Metropolis, Cross River State, Nigeria.

1.3 Hypothesis Statement

There is no significant relationship between biometric systems and crime control in Calabar Metropolis, Cross River State, Nigeria.

II. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Literature Review

2.1.1 Meaning of Biometric Security

The word biometrics is derived from the Greek words bios meaning life and metrics meaning measurement. It refers to an automated method of recognizing an individual based on measurable biological and behavioral characteristics. This recognition is through the measurement and analysing the behavioural and psychological characteristics of human. Uludag, Pankanti, Prabhakar and Jain (2004) see biometric technology as an automated methodology for the recognition of a person based on behavioral or physiological characteristics. These characteristics include features such as hand geometry, handwriting, face, fingerprints, vein, voice, retina, and iris. It is a pattern recognition device that acquires physical or behavioral data from an individual, extracts a salient feature set from the data, compares this feature set against the features set stored in the database and provides the result of the comparison. Therefore, a biometric system is composed of four modules (Jain, Flynn & Arun, 2007).

According to Al-Raisi and Al-Khoury (2008), the desired biometric system should be capable of scanning all incoming arrivals and provide positive or negative hit feedback.

- i. The ability of identifying a single person from a large population of people.
- ii. Ease of use.

- iii. Does not change over time.
- iv. Quick response time.
- v. Suitable for mass transit locations,
- vi. Safe and no medical side effects (disease control)

2.1.2 Empirical review of Literature

Research on biometric methods has gained renewed attention in recent years brought on by an increase in security concerns. The recent world attitude towards terrorism has influenced people and their governments to take action and be more proactive in security issues. This need for security also extends to the need for individuals to protect, among other things, their working environments, homes, personal possessions and assets. Many biometric techniques have been developed and are being improved with the most successful being applied in everyday law enforcement and security applications. Biometric methods include several state-of-the-art techniques. Among them, fingerprint recognition is considered to be the most powerful technique for utmost security authentication.

Uludag, Pankanti, Prabhakar, and Jain (2004) defined biometric technique as an automated methodology for the recognition of a person based on behavioral or physiological characteristics. These characteristics include features such as hand geometry, handwriting, face, fingerprints, vein, voice, retina, and iris. The authors concluded that biometric technologies are now the key to an extensive array of highly secured identification and personal verification solutions. Welzl (2004) states that the biometric system is a pattern recognition technology that makes personal identification of an individual by determining the authenticity of a specific physiological or behavioral characteristics possessed by the user. Burrows, Hopkins, Hubbard, Robinson, Speed and Tilley (2005) suggests forensic evidence is the main source of evidence in securing around one quarter of primary detections of volume crimes. Studies have shown the impact biometric technology on crime (Peterson, Mihajlovic & Gilliland, 1984; Ukwayi, Okpa, Adewoyin, Angioha, & Udom, 2017; [Morosan](#), 2012; Angioha & Ugal, 2019; Joseph, Angioha, & Ojiong-Ejoh, 2017; Ukwayi, Obafaye & Akintola, 2019)

Peterson, Mihajlovic and Gilliland (1984) undertook a major study based on the examination of 2,700 investigations drawn randomly from police and biometric files in four US jurisdictions: cases involving biometric evidence were over-sampled (1,600 cases were examined where biometric evidence was collected and examined. The biometric evidence cases covered homicide, rape, aggravated assault, robbery and burglary; 'the analysis of the study revealed that biometric evidence cases generally had higher rates of prevention and detection of crime. [Morosan](#) (2012) carried out a study analyze the applicability of biometric systems in travel and explain how they can be used in response to today's increasing security problems, this research is conceptual. Its analysis is based on an extensive review of literature on biometric systems. findings revealed that Biometric systems can improve travel security without compromising consumer value, convenience, and privacy. Deployment of various applications of biometric systems (i.e. immigration/visitor management systems, trusted traveler programs) improves specific aspects of travel security.

2.2 Theoretical Foundation

The study adopts the Diffusion of Innovation theory. Credited to the works of Rogers in (1962, 1995). The theory introduced several factors that determines the decision to adopt a new technology (i.e. new innovation). By the help of empirical research, Rogers (1995), identified relative advantage, compatibility, technical complexity, trialability and observability as the key factors that shapes the decision process considering adoption of new technology. Rogers' diffusion of innovation theory postulate that diffusion of innovation occur as potential users become aware of the innovation, judge its relative value and make a decision based on their judgment, to either implement or reject the innovation. The theory consists of three components: 'the innovation decision process, characteristics of an innovation and adopter characteristics (Bates, Manuel & Oppenheim, 2007). The 'innovation decision process' categorizes the steps an individual or organization takes from awareness of an innovation, through the formulation of an attitude to the innovation, on to the decision as to whether to implement or adopt such innovation.

In adapting this theory to this study, this study sees diffusion of Innovation as there being a new innovation (Biometric security) available that can help in preventing crime, organisations become aware, come in contact with such technology and recognise that this new innovation will help in preventing crime and providing security, make a conscious decision to adopt these new innovation.

III. METHODS AND MATERIALS

3.1 Research design

The study made use of the descriptive research design. The descriptive research design allows a researcher to gather of data and information about prevailing conditions or situations for the purpose of interpretation and description. It is not simply gathering and tabulating facts but includes proper analyses, interpretation, comparisons, identification of trends and relationships (Aggarwal, 2008).the researcher adopted the descriptive design because it not only concerned with with the characteristics of individuals in this study but with the characteristics of the whole sample understudy.

3.2 Population and Sampling

The population of this study is staffs of business organization in Cross River State, Nigeria. The business organizations selected are banks, Lafarge Nigeria LTD, and Flower Mill Nigeria LTD in Cross River State, Nigeria. The list of business organizations are highlighted in the table below. The sample used for the study was 381.in selecting the sample for the study; the purposive sampling technique was used in selecting the organization to be studied. The proportional stratified sampling technique was used to the number of staffs to be selected from each organization. The proportional stratified sampling technique is appropriate in selecting a given sample in an organization when the population of such organization is given. From this, the simple random sampling technique was used in selecting the needed sample from the organization.

S/N	Institution	Population Size (N)	Proportion of Staff	Sample Size (n)			
1	First Bank	308	0.28	108			
2	Zenith Bank	148	0.14	52			
3	Lafarge	428	0.39	150			
4	Flower Mill	204	0.18	71			
	Total	1088		381			
					36-45	121	31.8
					46 and above	49	12.9
					Total	381	100
					Marital status	Single	122
						Married	188
						Divorced	41
						Widow	24
						Widower	6
						Total	381
							100
					Total	381	100

3.3 Instrumentation

A structured questionnaire was adopted as the instrument for data gathering. The questionnaire was made up of three sections, with section A containing the bio data of the respondents. Section B contains questions on the independent variable and the section C containing questions on the dependent variable.

3.4 Ethical Considerations

The researcher soughted each organization's management and employees consent before involving them in the research. This included briefing them about the research objectives and roles of the respondents and how they were going to benefit from the research. The Researcher also assured the respondents about the degree of confidentiality in the information that was gathered from them

3.5 Method of data analysis

In analysing the data, The variables of each hypothesis were identified followed by the statistical tool employed. Each hypothesis were analysed and tested at 0.05 level of significance.

IV. RESULTS AND FINDINGS

4.1 Demographic distribution of Respondents

Out of the 381 respondents used in this study, 278 representing 70% were male, while 118 respondents representing 30% were female. Respondents description based on age reveal that, 74 (19.4%) are between below 25 years; next in the list 137 (35.9%) are between 26 – 35 years; followed by 121 (31.8%) who are between 36 – 45 years, while 49 (12.9) are 46 years and above. Respondents description based on marital status shows that 122 (32.0%) are single, while 188 (49.3%) are married, 41 (10.8%) are divorced, 24 (6.3%) widow, and 6 (1.6%) widowers.. Respondents description based on religious affiliations reveal that, 255 (66.9%) are of the Christian religion, 34 (8.9%) are Islam, while 81 (21.2%) are of the traditional religion, and only 11 (2.9%) subscribe to other forms of religion not mentioned here.

Table 1

Demographic data of Respondents

Variable	Category	N	%
Gender	Male	263	70.0
	Female	118	30.0
	Total	381	100
Age	25 and below	74	19.4
	26-35	137	35.9

Source: Field Survey 2019

4.2 Data Analysis

There is no significant relationship between biometric security and corporate crime control in business organizations in Cross River State, Nigeria. The independent variable in this hypothesis is biometric security, while the dependent variable is corporate crime control. Simple linear regression statistics was used to test this hypothesis at 0.05 level of significance and the result is presented in table 1

Simple linear regression analysis of Biometric security and corporate crime control

Variables	Std. Deviation	
	Mean	Standard Deviation
Biometric security	16.2564	3.7578
Corporate crime control	17.4461	8
	3.6680	9
Model	R	Adjusted R Square
	Sum of Squares	Df
Regression	2021.137	1
		23.51
		.253 ^a
		.064
		.061
		.000 ^a
Residual	29563.03	344
		6
Total	31584.17	345
		3

p <

0.05

Source: Field Survey, 2019

The result of analysis as presented in table 1, revealed that the R-value of 0.253 is significant at 0.05 alpha level (p-value of 0.000 is less than 0.05) hence the stated null hypothesis is rejected. This implies that there is a significant relationship between biometric security and corporate crime control in business organizations in Cross River State, Nigeria.. Also, the R^2 -value of 0.064 implies that 64% of total variance of corporate crime control is accounted for by predictor variable (biometric security). Furthermore, the regression ANOVA revealed that, there was a moderate joint linear association (contribution) of the predictor variables (biometric security) and corporate crime control given by the F-ratio ($1, 344$) = 23.518 ; $p < 0.05$. The adjusted R^2 (0.061) shows some shrinkage of the unadjusted value (0.064) indicating that the model could be generalized on the population. Based on the result, it was concluded that biometric security helps in checking corporate crime in business organizations in Cross River State, Nigeria.

V. CONCLUSION AND RECOMMENDATION

This study examined the biometric security in business organization: an assessment of its' impact on checking corporate crime in business organizations in cross river state Nigeria. Result from the analysis of the data gathered from the field revealed that biometric security helps in checking corporate crime in business organizations in Cross River State, Nigeria. this is because R-value of 0.253 is significant at 0.05 alpha level (p-value of 0.000 is less than 0.05). With this finding, we can conclude that biometric technology increases overall security in organizations. However, biometric identification is not perfect - it is never 100% certain, it is vulnerable to errors and it can be hacked. Organizational management need to understand the level of security guaranteed through the use of biometric systems and the difference that can exist between the perception and the reality of the sense of security provided. The biometric system is only one part of an overall identification or authentication process, and the other parts of that process will play an equal role in determining its effectiveness. Hence, organizations should undertake training for all its personnel's as a way of equipping them with the necessary biometric technology. Also organizations should provide other security measures aside biometric technology that will help their organization to be more secured.

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Examining The Level Of Relationship Between Working Condition Predictor Variables; Remuneration, Working Hours, Office Design, Job Security And Workers Wellbeing And Productivity In Commercial Banks In Cross River State, Nigeria.

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Abstract- An employee who works under good working condition works with the feeling of safety and this increases productivity. But bad working condition affects employee wellbeing and performance. This study seeks to examine the level of relationship between working condition predictor variable variables (remuneration, working hours, office design and job security) and workers wellbeing and productivity in commercial Banks in Cross River State, Nigeria. An objective and hypothesis which was stated in the null form were raised to guide the study. A comprehensive review of empirical literature was carried out and the effective event theory was used for the study. The survey research design was adopted for the study. A total of 232 samples were selected from the staff of five (5) banks in Cross River State, Nigeria using the purposive, proportional stratified and simple random sampling technique. The instrument of data collection was the questionnaire. Data collected from the field was analysed using graphs, chart and multiple regression. Out of the 232 questionnaire distributed, 213 was collected and used for analysis. Results revealed relative contribution of the four (4) predictor variables (remuneration, working hours, office design and job security) to workers wellbeing and productivity. Results also revealed that three of the predictor variables (working hours; office design and remuneration) alone are predictors of commercial workers wellbeing and productivity. But one (Job security) does not. The study recommends among others that There is an urgent need for commercial bank Management to improve on the existing working conditions of their staff that will attracts, retain and motivate them so that they can work comfortable and increase their productivity.

Index Terms- working condition, remuneration, working hours, office design, job security, wellbeing, productivity

I. INTRODUCTION

The success of any enterprise set up to make profit depends on the performance of its workers. Hence, employees are the most important and valuable resources and asset of any organisation. For any organisation to achieve its' set objective, its'

employees must perform to their optimum best. When employees of an organisations have the desired motivation to work, their performance increases and this impacts positively on the organisation. Dynamic and progressive organisations make it a duty to attract and retain the best hands by creating the best working conditions.

Researches have revealed that good and conducive working condition is one of the strategies that corporate organisations in recent times have adopted to improve the productivity of their employees (Agba, Nkpoyen & Ushie, 2010; Angioha, Nwagbosso, Ironbar & ishie, 2018; Ukwaiyi, Angioha & Ojiong-Ejoh, 2018). Organisation have also recognised that good working condition is important and essential to organisational's customer satisfaction and the performance and wellbeing of its employees (Agba, Mboto & Agba, 2010). According to Gerber, Nel, and Van Dyk (1998) asserts that working condition is created by employee interaction with the organisations' physical and psychological environment. When the employees of an organization have negative perception of their working conditions, they are likely to be absent, have stress related illness, and their productivity and commitment tend to be low. Also, organizations that provide good and conducive working condition that is friendly, trusting, and save will , experience, Greater productivity, communication, creativity, and financial health (Ali, Ali & Abdigani, 2013).

The banking sector in Nigeria is one of the strength and pillars of the Nigerian Economic and the industry is growing at a very fast pace. In recent years, the sector has under gone changes in its structures which has made the industry more competitive. These changes have made the industry to contend with new demands and greater responsibility towards the Nigerian financial sector development. These changes have had tremendous effect on management, who in turn have put more demand on their employees without putting much consideration on the conditions that their staff work in. bank staff because of the demand put on them are now faced with increased workload, long working hours, without improved remuneration, insufficient work, lack of safety treasure, poor work place design etc and this have impacted on their wellbeing and productivity. Most bank workers are now finding too difficult to fulfill their obligations because of the

stressful nature of their job and working condition, which is characterized by an immense workload, shortage of staff, death of technical and financial resource, long working hours, lack of job security, poor office design and insufficient remuneration. This study seeks to examine the level of relationship between working condition variables and worker's wellbeing and productivity in commercial bank in Cross River State Nigeria.

1.1 Study Questions

- (i) What is the level of relationship between working condition predictor variable; remuneration, working hours, office design, job security and workers wellbeing and productivity in commercial banks in Cross River State, Nigeria?

1.2 Research Objectives

- (i) To investigate the level of relationship between working condition predictor variable; remuneration, working hours, office design, job security and workers wellbeing and productivity in commercial banks in Cross River State, Nigeria

1.3 Research Hypothesis

- (ii) There is no significant joint relationship between working condition predictor variable; remuneration, working hours, office design, job security and workers wellbeing and productivity in commercial banks in Cross River State, Nigeria

II. REVIEW OF RELATED LITERATURE AND THEORETICAL FOUNDATION

2.1 Review of Related Literature

Several scholars have carried out studies on the impact of making conditions and performance of employees (. Mokaya, Musua, Wagoki and Karaya (2013) examined the effect of organization working conditions on employee job satisfaction in the hospitality industry in Kenya. The descriptive explanatory design was adopted for the study. 84 samples were drawn from 170 employees of a hotel in Kenya. A self-administered questionnaire was employed to gather data for the study; findings revealed that there was high job satisfaction with working conditions which has strong and positive correlation. In his study, Pitaloka (2014) investigated the effect of work environment, job satisfaction, and organizational commitment on OCB of materials auditors. The study aim was to investigate the impact of work environment on jobs satisfaction and organizational commitment 162 questionnaire were distributed by self or email and path analysis was used to analyses the data gathered. Results from the analysis showed that work environment leads to job satisfaction and organizational commitment.

Agba and Ocheni (2017) attempted to empirically examine the effect of work environment on job performance of academic staffs in public and private universities in Nigeria. The survey method was adopted for the study. A sample of 300 respondents were selected from both private and public tertiary institution using the purposive sampling technique data gathered from the field more analyzed and coded using the independent t-test technique. Restricts revealed a relationship between work environment and job performance. Awan and Taliur (2015) came out a study on the pact f working environment on employee's productivity: a case study of banks and insurance companies in

Pakistan. A close ended questionnaire was developed to get feedback from target and different statistical methods were used to gather data from the field. Results revealed that factors such as supervisor supports, relations with co-workers, training and development, attractive and face incentives and recognized plans, adequate work load at the pace of work help in developing conducive work environment that has a positive relationship with worker's level of performance. Akinyele (2010) study objective was to examine the impact of work environment on future worker's productivity. The study adopted primary data was used for the study. A structure questionnaire was developed which was self-administered by the researcher. Independent t-test was used to analyze data gathered from the field result revealed that conducive working environment stimulates creativity of workers. Duru and Shimawua (2017) assessed the effect of work environment on employee productivity using Edo city transport services. Both primary and secondary data were gathered and analyzed. The findings revealed that if good office environment is provided for employees. It will go a long way to enhance their morale and performance. Akintayo (2012) study was aimed at determining the influence of work environment, work morale and perceived productivity among industrial workers. A descriptive design was used to collect data from 311 respondents from private and public organizations using stratified sampling technique. The instrument of data collection was three types of questionnaire. Data was analyzed using regression, Pearson product moment correlation and t-test. Results revealed that a significant relationship exist between working that a significant relationship exist between working environment is significantly related to work morale and it also have a relationship with worker's productivity.

Igbe, Okpa and Aniah (2017) study examined the relationship between working conditions and deviant behavior among the employees in the university of Calabar data from the study was gathered from 361 respondents purposively selected to twelve departments of the University of Calabar. The instrument of data collection was the questionnaire. Data gathered from the field was analyzed using Pearson product moment correlation at a 0.05 level of significance results reveal that there it's a significant relationship between working condition variables such as non-payment of allowance poor worker's safety and deviant behavior of employees in the university of Calabar.

Agba, Mboto and Agba (2013) carried out a study on wages or other work conditions and worker's performance in Nigeria - 300 respondents were selected from four organizations using the purposive sampling technique in selected geopolitical zones in Nigeria. Data collected were presented in pie charts bar charts and graph finding revealed that employee job performance is greatly influenced by regular and good wages followed by conducive work environment, available of internet facilities, regular promotion, training opportunities.

2.2 Theoretical Foundation

The study adopts the affective event theory of Weiss and Cropanzano (1996). According to the affective event theory, employees emotional experience in terms of important events influences their approach to jobs. The theory tries to give meaning to employees internal motivation and their reaction to incidents that happen at work. The affective event theory argues that both

positive inducing and negative emotional incidence in the work place affects workers psychologically and this influences their work performance and commitment. The affective event theory focuses on the kind of motivation people get from their work, what cause the motivation and how these motivations influence their commitment, wellbeing and their overall performance. The theory identifies job commitment and performance as attitude that may be affected by working conditions in the workplace over a period of time.

III. MATERIALS AND METHODS

The study adopted the survey design. According to Robson (1993), the survey design is commonly used to collect data from a specific sample population and typically utilises a questionnaire or an interview as the survey instrument. The survey method enabled the researcher to focus on respondents' attitude and behaviour on working conditions and the workers' wellbeing and productivity in selected banks in Calabar, Cross River State, Nigeria. This allowed the researcher to focus and draw a good sample from the population (staffs) of the selected banks. The population of the study are staff of five selected banks in cross river state. The entire population of the study stands at 548. The selected banks are First Bank, Guaranty Trust Bank, United Bank for Africa, Access Bank and Zenith Bank. The sample size for the study was 232, arrived at using the survey monkey sample determinant technique. The purposive and proportional stratified sampling technique was applied in selecting the samples from the banks. The purposive sampling technique was used in selecting five banks that were used for the study. The proportional stratified sampling technique was used in selecting the number of samples from each bank used. The proportional sampling technique was also used in selecting the number of staff that were used from each bank branch in Cross River state. The simple random sampling technique was used to select sample (staff) that the questionnaire was given to elicit information on the topic under investigation. The instrument of data collection was the questionnaire. Data collected from the field was analysed using graphs, chart and multiple regression. Out of the 232 questionnaire distributed, 213 was collected and used for analysis.

IV. FINDINGS

4.1 Distribution of Respondents

This result gathered from the field shows that, employees in commercial banks in Cross River State host more male workers than female workers, a graphical presentation is reported in figure 1.

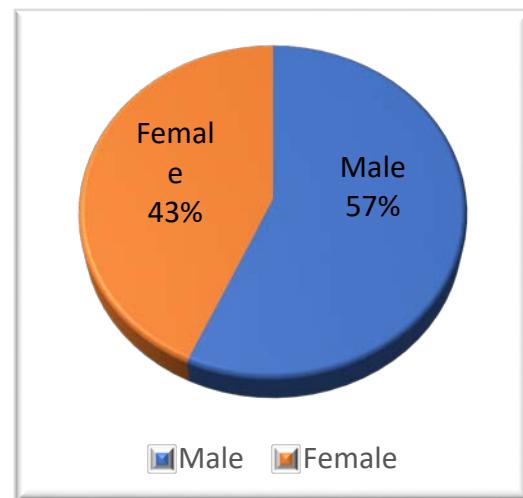


Figure 1
Showing the sex distribution of respondents
Source: Field survey, 2019

Respondents distribution based on age reveal that, most of the employees of commercial banks 47.9 per cent are between 31 – 40 years; next in the list 42.7 per cent are those between 20 – 30 years while only 9.4 per cent of respondents 41 years and above. This trend is a true representation of commercial bank employees as the needed work force are those in their prime because of high competition in the industry. A graphical illustration is presented in figure 2.

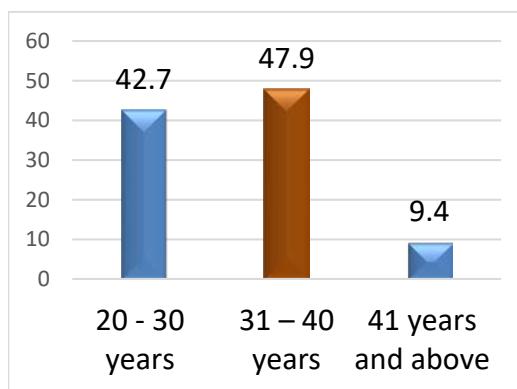


Figure 2
Age distribution of respondents
Source: Field survey, 2019

Distribution of respondents based on marital status reveal that, most 50.2 per cent of the commercial banks employees were married; 47.9 per cent were single while a very small number 2 per cent were divorced. This trend is consistent with the ages of the employee as most of them are attained the age of marriage and since they are working, can take up family responsibility. A graphical illustration is presented in figure 3.

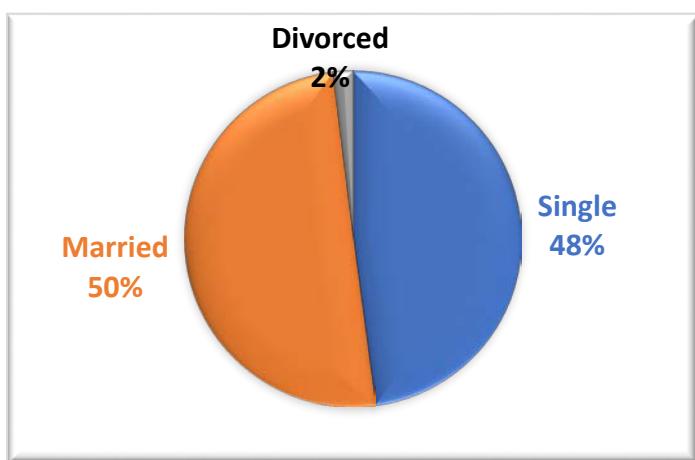


Figure 3
Showing the marital status of respondents
Source: Field survey, 2019

The distribution of respondent's base on educational qualification shows that, most of the respondents' 57.3 per cent were Bachelor (B.Sc/B.Ed/B.A) degree holders; next in the list 36.6 per cent were Masters (M.Sc/M.Ed/M.A) degree holders while only 6.1 per cent were diploma or holders of Higher National Diploma (HND) or its equivalent. This result is expected as the competition in the market demand good hands. A graphical illustration is presented in figure 4.

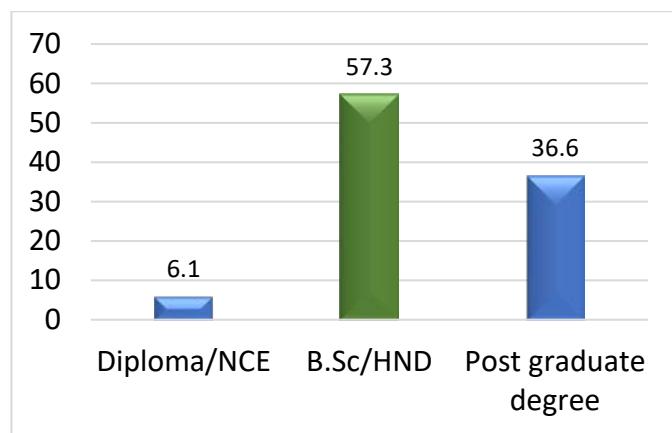


Figure 4
Showing the educational qualification of respondent
Source: Field survey, 2019

Out of the 213 respondents used in this study, most 53.0 per cent of the respondents were employees at First Bank PLC; 24.8 per cent were employees at Zenith Bank; 8.9 per cent were employees' at United Bank of Africa (UBA); 8.4 per cent were employees at Guaranty Bank while only 4.6 per cent were employees at Access Bank. This result is a true representation of the population in terms of staff strength. A graphical presentation is reported in figure 5.

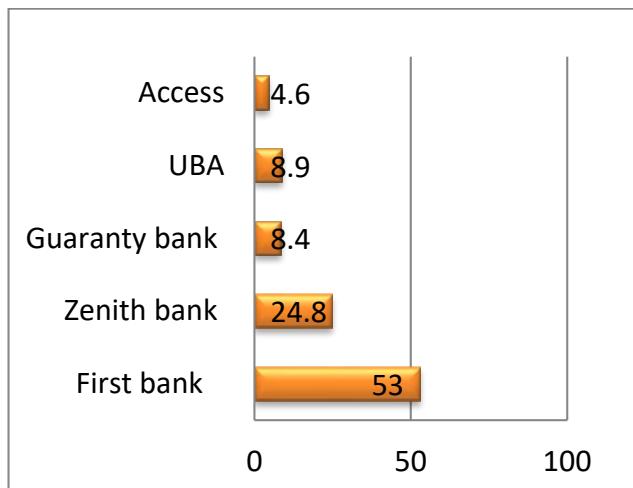


Figure 5
Showing the distribution of respondents by bank
Source: Field survey, 2019

Out of the 213 respondents used in this study, most of the respondents 64.8 per cent were core staff in the commercial banks while only a small number 35.2 per cent were non-core staff. A graphical presentation is reported in figure 6.

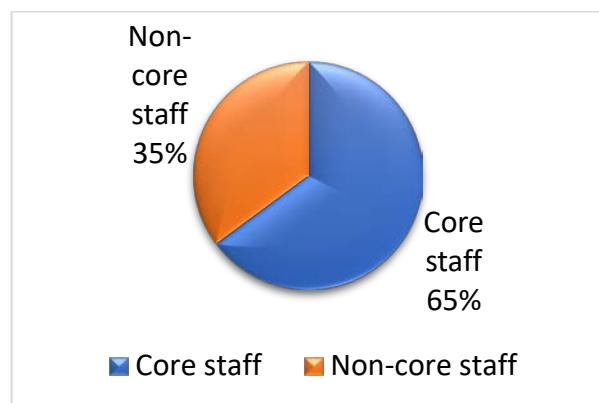


Figure 6
Showing the distribution of respondents by staff position
Source: Field survey, 2019

4.2 Data analysis

There is no significant joint relationship between remuneration, working hours, office design, job security and workers wellbeing and productivity in commercial banks in Cross River State, Nigeria. The choice of multiple regression (modelling application) was to help explain the linear relationship that exist between and or among the independent variables at $p < 0.05$. The regression equation is given thus:

$$Y_i = B_0 + B_1 X_1 + B_2 X_2 + B_3 X_3 + B_4 X_4 + e_i \dots \text{Eqn 4.1}$$

Where:

Y is the predicted value of the DV (workers wellbeing and productivity)

X_1 = remuneration

X_2 = working hours

X_3 = office design

X_4 = job security

B_0 is the Y-intercept and

e_i is the error of prediction known as residuals

Table 1
Inter-correlation matrix of the variables (Source: Field survey, 2019)

	DV	Remu	Work	Office	Jobs
DV	1.00				
Remu	0.467	1.00			
Work	0.147	0.120	1.00		
Office	0.165	0.287	0.145	1.00	
Jobs	0.061	0.101	0.087	0.044	1.00
Mean	14.49	12.73	7.50	17.88	7.79
SD	2.64	2.12	1.18	1.60	1.11

Source: Field survey, 2019

KEY: DV = Workers wellbeing and productivity

Remu = Remuneration

Work = Working hours

Office = Office design

Jobs = Job security

TABLE 2

Regression Model Summary of working conditions predictor variables and wellbeing and productivity of workers

Model	R	R square	Adjusted square	R	Std error of the estimate
1	0.478	0.229	0.214	2.34	
Source of Variables	Sum of Df		Mean square	F	Sig.
	Squares				
Regression	340.319	4	85.080	15.430	.000
Residual	1146.920	208	5.514		
Total	1487.239	212			
Variables	Regression weight				
	B	Std error	Standard. Coef.	t.value	Sig.
(constant)	4.041	2.480		1.630	.105
Remu	.547	0.081	.438	6.748	.000
Working hours	.227	0.140	.102	1.625	.106
Office design	.089	0.107	.054	0.836	.404
Job security	.024	0.146	.010	0.166	.868

Key:

Remu = Remuneration

Work = Working hours

Office = Office design

Jobs = Job security

Table 1 shows that multicollinearity does not exist among the four (4) predictor variables (remuneration, working hours, office design, job security), because the zero-order correlation are less than 0.85. More importantly, none of the correlations among the independent variables is greater than 0.55.

The result in Table 2 shows that the combination of all the predictor (remuneration, working hours, office design, job security) is joint predictor of workers wellbeing and productivity in commercial banks in Cross River State, Nigeria. The predictors accounted for 21.4 per cent of the variance in workers wellbeing and productivity.

Furthermore, the regression ANOVA revealed that, there is a moderate joint contribution of the predictor on the criterion

variable (workers wellbeing and productivity) F (4, 208) = 15.430; $p < 0.05$. Based on the result, it was revealed that when all the contributor variables (remuneration, working hours, office design, job security) were used together significantly contribute to workers wellbeing and productivity.

Also, Table 2 reveals the relative contributions of the four (4) predictor variables (remuneration, working hours, office design and job security) to workers wellbeing and productivity as it was given by beta (β) weight. The β value indicates the relative contribution of each of the four predictor variables to the criterion variable (workers wellbeing and productivity). The higher the β value the greater the contribution of the predictor variable. This implies that remuneration when used alone is germane, and

contributes significantly to workers wellbeing and productivity. This means that, if commercial banks employees are given their remuneration timely and regularly they will be very effective. Three of the predictor variables (working hours; office design and job security) alone are predictors of commercial workers wellbeing and productivity. Therefore, we can conclude that, there is statistical significant joint relationship of all the predictor variables (remuneration, working hours, office design and job security) on commercial bank workers wellbeing and productivity in Cross River State, Nigeria.

V. CONCLUSION AND RECOMMENDATION

The study sets out to investigate the level of relationship between working contention predictor variables; remuneration, working hours, office design, job security and workers wellbeing and productivity in commercial banks in Cross River State, Nigeria. Results from the analysis of data gathered reveals a relative contributions of the four (4) predictor variables (remuneration, working hours, office design and job security) to workers wellbeing and productivity. Results also revealed that three of the predictor variables (working hours; office design and remuneration) alone are predictors of commercial workers wellbeing and productivity. But one (Job security) does not. When tested alone 2.7 per cent of the variance in workers wellbeing and productivity in commercial banks is accounted for by office design. 2.1 per cent of the variance in workers wellbeing and productivity is accounted for by working hours and 21.8 per cent of the variance in workers wellbeing and productivity is accounted for by remuneration. There is no significant relationship between Job security and the effectiveness of employees, this result is because the banking sector of recent time has retrenched her staff more frequently due to economic recession and the global economic meltdown. When all the variables are combined we can conclude that, there is statistical significant joint relationship of all the predictor variables (remuneration, working hours, office design and job security) on commercial bank employees' effectiveness in Cross River State, Nigeria.

From the findings made by the study, it is therefore recommended that;

- i. There is an urgent need for commercial bank Management to improve on the existing working conditions of their staff that will attracts, retain and motivate them so that they can work comfortable and increase their productivity.
- ii. Bank management should put in place appropriate programs that will create employees work life balance, as this will help motivate and help retain them.

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The Effect of Substitution Lesser Yam (*Dioscorea esculenta*) Flour on Texture and Inulin Levels of Boiled Tuna Nugget-Okara

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Abstract- The lesser yam flour is made from the lesser yam through the drying, refining and sifting process. Lesser yam flour contains high inulin which can be used as a prebiotic and healthy for the digestive tract. The substitution of yam lesser flour using concentrations of 0%, 5%, 10% and 15%. Texture analysis using a texture analyzer and inulin using spectrophotometry. The highest texture value at F1 treatment is 9,16N and the highest inulin level is at F4 treatment is 3,06%

Index Terms- Lesser Yam Flour, Texture, Inulin, Nugget.

I. INTRODUCTION

Nugget is a type of food that is popular among everyone. Nugget is made from small and irregularly cut meat, then processed again into a relatively larger size.¹ Preparation of processed nuggets starts with ground meat and added spices, then coated with flour adhesive, re-coating using breading and half-cooked frying followed by freezing to maintain good quality nugget during storage.² Nugget products can be nutritious products with the addition of okara containing high dietary fiber and other nutritional components.³

Lesser yam flour is flour obtained from tuber species of *Dioscorea esculenta* through the process of drying, refining and sifting. Lesser yam flour has the potential to be a very high carbohydrate source of 86.84%, and other components such as water by 8.39%, ash by 0.72%, fat by 0.15%, protein at 3.92%.⁴ and also high inulin in the amount of 14.77%.⁵

Inulin is a polymer of a combination of fructose monomers. Inulin generally covers all linear fructose with glycosidic beta (2-1) fructosyl-fructose bonds. This specific type of glycosidic bond gives different inulin structural and physiological properties. Because of the beta configuration of the bonds between fructose monomers, the inulin type cannot be enzymatically hydrolyzed by human saliva and small intestinal digestive enzymes, especially in its alpha-glycosidic bonds. So that inulin cannot be digested and fermented in the large intestine.⁶ the high and low texture values and inulin levels are influenced by the number of percentages of substitution of lesser yam flour used.

II. MATERIALS AND METHOD

Materials

The materials used in this study were pindang tuna which was obtained from Blimbing Market, okara from tunggulwulung tofu factory, lesser yam tuber obtained from Pasar Besar Malang, tapioca flour, garlic, sugar, salt, skim milk, pepper, coriander, ice water. Breading material is panir flour. The materials used for the analysis were cysteine 1.5%, H₂SO₄, carbazole 0.12%, buffer sodium phosphate 0.1M, standard inulin solution.

Method

The method used an experimental method. The treatments are used in this study is variation of the concentration of the lesser yam flour. The experimental design was used as a completely randomized design with 4 treatments and 5 replications. the lesser yam flour concentration used were 0%, 5%, 10% and 15%.

Preparation of okara

The okara preparation process, first thing to do is the fresh okara obtained from the tofu factory. Then the okara is squeezed with a blurry cloth so that the water in the okara does not drip. Then the okara is steamed for 30 minutes. After that, it is cooled at room temperature.³

Processing of lesser yam flour

The process of making lesser yam flour. First, the lesser yam tubers are washed with running water to clean the dirt and soil attached. Then the blanching process was carried out at 80°C for 1 minute. Continuing to do the stripping of lesser yam tuber skin with a knife. Then thinly sliced 1-2 mm thick, then immersed in a 5% (b / v) salt solution and 0.3% (b / v) metabisulfite for 2 hours. Then wash with running water to remove the mucus that comes out from the slices of the yam tuber. Then the oven was drained at 80°C for 24 hours. Then mashed with a blender and carried out sieving with a size of 80 mesh.⁷

Processing of Nugget

First, boiled tuna obtained from Climbing Market, was washed with water to clean the dirt, then the flesh was taken without skin, thorns and head. Furthermore, the meat obtained is crushed with a chopper. Then the pulverized meat and spices are mixed into the mixer and added with okara, tapioca flour, lesser yam flour (according to treatment), skim milk, and 2 eggs until the mixture is evenly mixed. Then the mixture is added to the baking sheet and steamed for 30 minutes then cooled to room temperature. While the dough is cooled to room temperature, butter mixture (eggs and tapioca) is made. The cooked and cold dough is folded with a rectangular rectangle with a size of 2x1x1 cm. Then dip it into the dough (butter) and continue breading with panir flour, and get raw nuggets that are ready to be stored or fried.³

Texture Analysis

Texture is measured using a texture analyzer. The first, sample must be placed under a probe 1.5 cm in diameter. The upper limit of the probe is set at a distance of 2.5 mm, then the bottom is 1.0 mm. Then set the pressing speed is 10 mm / minute. Recorded data, read with excel. The result of texture measurement is the maximum power (Newton) that is able to be held by the sample, as an illustration of the hardness level of the sample.⁸

Analysis of Inulin Levels

Analysis of inulin levels by spectrophotometric methods. First the samples are cut into smaller sizes and weighed according to the provisions. Then blended accompanied by the addition of water 1: 2 (b / v). Then heated at 80°C for 1 hour with constant stirring. Then it is cooled, filtered and the filtrate is taken.⁹ Next, take 1 ml of filtrate and add 0.2 ml 1.5% cysteine and 6 ml 70% H₂SO₄. Then homogenized, then 0.2 ml of 0.12% carbazole in ethanol solution was added. Then heated at 60°C for 10 minutes. Then the absorbance is cooled and measured at a wavelength of 560 nm. And then standard curve is made using samples containing inulin more than 20 µg / ml.¹⁰ Calculate the percentage of inulin in the sample using a standard curve.

$$\text{Kadar inulin} = \frac{\text{konsentrasi inulin } (\mu\text{g/ml}) \times \text{faktor pengenceran (ml)} \times \sum \text{filtrat (ml)}}{\text{jumlah bahan} \times \text{total padatan terlarut}}$$

Statistic Analysis

Data were analyzed using SPSS 22 computer program. The study design used one way ANOVA with 5 replications and if the results were obtained significantly different DMRT follow-up tests (5%).

III. RESULT

The results showed that the substitution concentration of the lesser yam flour on a higher nugget would reduce the level of hardness (texture). however, it will increase inulin levels in nuggets.

The highest texture on the 0% substitution lesser yam flour substitution treatment was 9.16±0.61 N and the lowest was on the 15% substitution treatment of yam lesser flour of 7.74±1.91N. while the highest inulin content of 0% substitution of lesser yam flour was 3.06% and the lowest was at 0% substitution lesser yam flour treatment of 0.70%.

Table 1 : Texture (Hardness)

Treatment	Unit	Result*
0%	N	9.16±0.61 ^{tb}
5%	N	8.70±1.04 ^{tb}
10%	N	7.92±1.69 ^{tb}
15%	N	7.74±1.91 ^{tb}

*superscript notation tb states no real difference between treatments

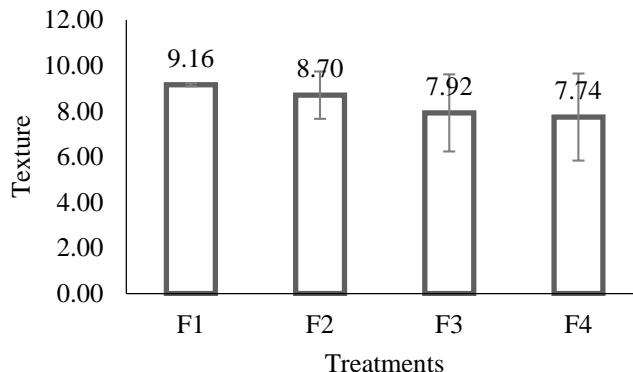


Figure 1: Diagram of Texture

Table 2. Inulin Levels

Treatment	Unit	Result*
0%	%	0.70±0.03 ^a
5%	%	2.42±0.01 ^b
10%	%	2.74±0.07 ^c
15%	%	3.06±0.02 ^d

*superscript letter notation states the real difference between treatments

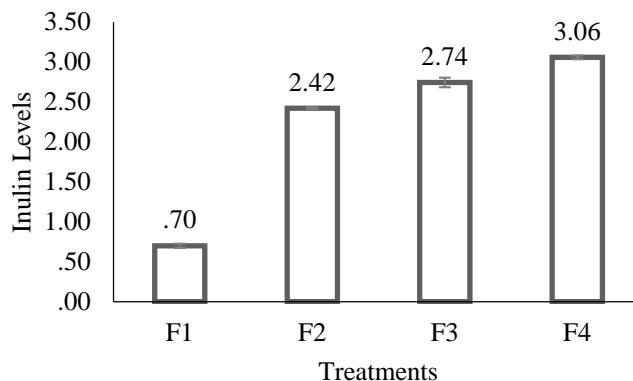


Figure 2. Diagram of Inulin Levels

IV. DISCUSSION

Based on the ANOVA results can be analyzed which proves the substitution of lesser Yam flour does not significant difference ($p > 0.05$) on texture of tuna-okara nuggets. In the Table. 1 shows that between treatments F1, F2, F3 and F4 are not significantly different from each other. The highest texture value in F1 treatment (0% substitution of lesser Yam flour) was (9.16 ± 0.61) and the lowest texture value was in treatment F4 (15% substitution of lesser Yam flour) of (7.74 ± 1.91) .

The texture value of boiled tuna nugget-okara in each concentration treatment decreased. This shows that the lower the compressive power on the nugget is due to the greater substitution of added lesser yam flour, so the level of hardness of the nugget decreases.¹¹ The decrease in the level of hardness is due to differences in the starch content found in the adhesives and fillers used. The high amount of starch content results in the texture of nuggets becoming more dense and harder.¹² Starch has a role in determining the texture of a food. Starch granules and mixed and heated water will form a gel that has irreversible properties, where starch molecules will glue together to form clots and increase the hard texture of the food.¹³ Tapioca flour has a high starch content of 81.40%,¹⁴ whereas in lesser yam flour has a lower amount of starch content, which is 42.16%.¹⁵ So that the substitution of lesser yam flour will reduce the level of hardness of boiled tuna nuggets.

Based on the ANOVA results, it can be analyzed that the substitution treatment of lesser yam flour has a different significance ($p < 0.05$) on the levels of inulin boiled tuna nugget-okara. Then proceed with Duncan's further test. In the Table. 2 shows the results of Duncan's further test that between treatments were significantly different. The highest inulin content was obtained in treatment F4 (15% substitution of lesser yam flour) in the amount of to $(3.06\% \pm 0.02)$ while the lowest inulin content was in the treatment of F1 (0% substitution of lesser yam flour) of $(0.70\% \pm 0.03)$.

The levels of inulin from boiled tuna nugget-okara in each treatment increased the concentration of lesser yam flour. This is because the greater the percentage substitution concentration of lesser yam flour on tapioca flour on boiled tuna nugget-okara. Lesser yam tuber has a high inulin content of 14.63%,¹⁶ while cassava as tapioca raw material contains lower inulin levels of 1.38%.¹⁷ Furthermore, in the formulation of making boiled tuna nugget-okara, garlic was added with 2.32%. Garlic in addition to providing flavor and aroma to boiled tuna nugget-okara is also an ingredient that can increase inulin levels. Garlic has an inulin content of 9-16%.¹⁸ This makes the levels of inulin on boiled tuna nugget-okara increase with the percentage of substitution concentration of lesser yam flour. The inulin content of a product is influenced by the concentration of the lesser yam flour substituted. The greater the amount of lesser yam flour substituted on the product, the higher the inulin content in the product.¹¹

V. CONCLUSION

From the results it can be concluded that the higher the substitution of lesser yam flour is used it will reduce the level of texture, but it will increase the level of inulin on boiled tuna nuggets.

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African Perspective of Sources of an Individual's Motivation to Behaviour and its Implications on Multi-cultural Counselling: Case of Kenyan Universities

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Abstract- Cultural perspectives of individuals motivation are not clearly understood and this presents a challenge in effective conceptualization and contextualization of clients' problems in therapy. To understand this behaviour of Africans in Kenyan culture, both cross-sectional survey and ethnographic research design were used. The study was carried out in Kenyan universities due to their rich cultural diversity. Multi-stage sampling procedures were used for the study. The sample size for the study was 360 but due to the return rate of 82.4% for questionnaires, ended up being 298 participants: students, lecturers, and counselling psychologists. Data collection tools for the study were questionnaires, interview schedules and focus group discussion guides. Quantitative data was analysed in Statistical package for social sciences (SPSS) and presented in tables and figures. The qualitative data were transcribed, and categorised according to themes and sub-themes and later discussed by linking them with the study objectives. The results on sources of an individual's motivation to behaviour showed that: the African family was mainly extended to members outside the nuclear family and thus it influenced an individual's motivation to behaviour. Collective moral standards of the extended family promoted the right behaviour for the individual and social welfare. Prohibitive norms and taboos were strictly observed because of the severe punishments that befell those who violated them. Religious motives enabled Africans to make moral choices and decisions. Punishments and penalties were used to advance the cause for right behaviour among Africans in Kenya. In conclusion, culture influences people's motivation to covert and overt behaviour and thus the therapists especially those from different cultures need to understand it to make therapy relevant and meaningful to the African descent clients. The study recommended that cultural worldview and perspective of personality be incorporated into therapy alongside mainstream Euro-American perspectives to make counselling more meaningful to clients from different cultures.

Key Words- Counselling Psychology, Overt Behaviour, Covert Behaviour, Motivation

1.0 INTRODUCTION

Understanding human personality in culture in terms of what drives, directs and sustains (motivates) behaviour is important in understanding clients' subjective assumptions which they bring to therapy. Mainstream personality theorists provide a framework through which counsellors can understand a client's world. However, the theory that can effectively illuminate the subjective world of a client must consider the worldview of an individual in the culture. European and American mainstream personality theorists take a normative approach to describe, explain, assess, evaluate, and predict personality. Their different approaches to personality studies resulted in different broad paradigms: the psychodynamic, behavioural-cognitive, humanistic-existential and traits (Cheung, Fan & To, 2011). Each paradigm has a principle that views personality in terms of motivation to behaviour both covert and overt (Azibo, 2018). The mainstream theories have been generalized to world populations especially in the areas of psychology and psychotherapy with little regard for differences in cultures of the people (Sue & Sue, 2013; Cheung, Fan & To, 2008). Human covert and overt behaviours are motivated by both intrinsic and extrinsic factors which are largely found in a culture. Motivation is considered to constitute a special and significant element of personality (Hofer & Chasiotis, 2011). Motivation factors to covert and overt behaviour are construed differently in different cultures due to varied worldviews. The western culture and worldview are characterized by the strong emphasis on individualistic beliefs such as personal control and self-concept which demean other persons and mind-body dualism (Azibo, 2003; Thebede, 2008).

The African culture and worldview, on the other hand, is seen by African scholars such as Metz (2012), Idemudia (2015), Thebede (2008) and Mbiti (2002) to be typified upon a strong sense of community and belonging, belief in sacredness of interpersonal relationships and kinship ties, cultural values and practices, social roles, orderly and structured human existence, belief in mystical entities of power where God is the Supreme Being and human being's strong connection to all life and experience. They add that these are germane to the history and culture of Africans. All these influence individuals' covert and overt behaviour in terms of what motivates and sustains it. Thus, motivation and motivation-related values vary from one culture to another. A study conducted in France, Italy, Netherlands, Scotland, and Nigeria showed profound differences in cultural values for motivation with collective interest playing a more important role in Nigeria-Africa (Igusi, 2009). These differences indicate that motivation to behaviour varies from culture to culture, for instance, African's and European's. Therefore, there is a need to unlock the African perspective of motivation to

covert and overt behaviour for effective multicultural counselling. This is done with the understanding that there are limited studies that examine perspectives of personality from populations of Africans descent, which can guide counsellors among Africans.

Africans, since pre-colonial times have social-cultural frameworks which guide their understanding of fellow men and which have been applied to assist those in distress as a way of restoring sick personality to good health (Azibo, 2003). These can be scrutinized especially in understanding covert and overt behaviour so as to help those in need. Thus, factors that motivate covert and overt behaviour are important in understanding human personality in a counselling relationship. Ushe (2010) contends that moral values among Africans motivate people to behaviour and sustain it. In addition, Mbiti (2002), Nyasani (1997) and Gyekye (1996) eluded motivation to communal interests among Africans. Understanding the factors that frame the African behaviour can only be achieved through empirical research. It is for this reason that this study was justified.

The Kenyan population is made up three broad groups: Bantus, Nilotes and Cushites spread out over the whole country. These groups of people have shared a common history and environment, and have interacted among themselves and therefore have many aspects of their cultures that are similar such as their values, practices, and beliefs. Triandis & Suh (2002) contend that historical and cultural diffusion shape cultures. This position presents an opportunity to understand their perspective of motivation to overt and covert behaviour based on their culture and world view to make psychological counselling and therapy meaningful to them. However, little has been documented to guide counsellors practising in Kenya; even when multi-cultural counselling and psychotherapy emphasize the need to take into consideration cultural factors while dealing with clients. Professionals who are sensitive to cultural dynamics can understand and respond better to the development of clients in therapy (Sue & Sue, 2013). Thus, different cultural perspectives of personality need to be clearly understood to effectively conceptualize the problems of clients in therapy. This is important for Kenya which enjoys diversity in the population and therefore necessary for counselling psychologists and therapists to understand the African perspective of personality and its implications on multi-cultural counselling.

1.1 Statement of the problem

Culture greatly shapes the factors that motivate and sustain the overt and covert behaviour of individuals. Mainstream personality theories are important in providing a framework through which counsellors can understand a client's motivation to covert and overt behaviour. The theories need to capture both the nomothetic aspects of personality which focus on the general laws that motivate human behaviour and idiographic aspects which are culture specific. Personality theories crafted in European and United States cultures have influenced much of the direction in mainstream psychology in the world and in particular Kenya since the beginning of the 20th century. The mainstream theories have been generalized to world populations especially in the areas of psychology and psychotherapy with little regard for differences in the cultures of people (Sue & Sue, 2013; Cheung, Fan & To, 2008). Cultural perspectives of motivation to overt and covert behaviour of individuals are not clearly understood and this presents a challenge in effective conceptualization and contextualization of clients' problems in therapy. Little has been documented to guide counsellors practising in Kenya. Therefore, it is important to understand the sources of motivation to overt and covert behaviour of Africans and its implications on multi-cultural counselling.

2.0 Research Methodology

This study employed a mixed method design employing both cross-sectional survey and ethnographic research design. The study was carried out in two public and two private Kenyan universities. One from each category was in the cosmopolitan County of Nairobi and the other two far off near rural areas of Kenya. The public universities are owned by the government and admitted students through the Kenya Universities and Colleges Centre of Placement (KUCCP) from all parts of the country. The private universities are privately owned and admitted their own students from all over the country. The universities are equal opportunity employers hence the human resource represented all parts of the country. Public and private universities were coded for easy data collection and analysis. Codes for public universities were: PCU1 founded in 2006 and PCU2 founded in 1985. Codes for private universities were: PTU1 founded in 1986 and PTU2 founded in 2002. The universities chosen had a rich cultural diversity and taught humanities and psychology courses. It was hoped that from such diversity a wide range of perspectives for the study topic would be examined.

The target population for this study consisted of members of teaching staff, students and counselling psychologists who were Africans from Kenya in the selected four Kenyan Universities. Multi-stage sampling procedures were used for the study to obtain samples from samples. Cluster sampling was first done to categorize public and private universities from the 42 universities in Kenya at the time of the study. The two public and two private universities were purposively selected. From each of these two categories of public and private universities, one was from the urban cosmopolitan county of Nairobi and the other far off near rural areas. This selection was done using purposive sampling on the premise that the different environments of urban and rural areas could yield a broad spectrum of perspectives for the study. From each university chosen, departments of psychology and education psychology were chosen using purposive sampling, as they relate to the technical nature of the study. The sample came from the students and teaching staff chosen using heterogeneity sampling which yielded different groups of participants, for diversity to get a broad spectrum of information concerning the topic of study. The final sample size of 90 participants from each university came from 4 members of teaching staff and 40 students from each of the 2 departments and 2 counselling psychologists totalling to 360 (N). However, due to a response rate of 82.4% for questionnaires, the number dropped to 298 (N) participants.

This study used a questionnaire, interview schedule and focus group discussion guide for data collection. Validity was done by carefully operationalizing the items and reviewing them to measure the outcomes that the study was expected to produce. The reliability of instruments to the specific situation was established through the inter-rater reliability for the interview schedules which attained an agreement value of 70% and Cronbach reliability for the questionnaire which resulted into a coefficient alpha of 0.78.

Quantitative data was collected in closed questions such as Likert scale which were coded and analysed in Statistical package for social sciences (SPSS) and presented in tables and figures. The qualitative data were transcribed, and categorised according to themes and sub-themes and later discussed by linking them with the study objectives.

3.0 Results and Discussions

The results on sources of individuals' motivation to overt and covert behaviour from the participants' communities are presented and discussed. A five-point Likert Scale of "strongly agreed" or "agreed", or "neutral" or "disagreed" or "strongly disagreed" was used. 16 members of teaching staff and 228 students from four universities gave the responses presented in Table 4.1.

Table 3.1 Distribution of Responses on Perspectives on Sources of an Individual's Motivation for Covert and overt Behaviour

Individuals engage in the behaviour because:	SA		A		N		D		SD	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
They want to adhere to the collective moral standards of the community	24	9.8	213	87.2	7	2.8	0	0	0	0
They believe in prohibitive norms, laws and taboos and rituals	51	20.9	186	76.2	7	2.8	0	0	0	0
They want to identify themselves with family, clan, or community relationships	63	25.8	177	72.5	4	1.6	0	0	0	0
They want to avoid penalties and punishments from the community	16	6.5	175	71.7	36	14.7	17	6.9	0	0
They want to adhere to their religious beliefs	83	34	148	60.6	8	3.2	5	2	0	0
They want to meet their needs.	63	25.8	162	66.3	15	6.1	4	1.6	0	0

Key: n= 244 | SA-strongly Agree, A-agree, N-Neutral, D-Disagree, SD-Strongly Disagree

The findings presented in Table 3.1 on the perspectives of the participants about sources of the motivation of an individual's covert and overt behaviour indicate that an overwhelming majority of participants agreed and others strongly agreed with the statements that were provided to them about factors that motivated overt and covert behaviour in their communities. These factors are discussed in order of their scoring as follows:

3.1 Identify with family, clan, or community relationships.

This factor yielded scores of 25.8% and 72.5% for "strongly agree" and "agree" respectively, of the responses given by the participants. However, there were a few of them who were neutral about the statement at 1.6. Other findings came from FGDs and interviews, where the members of the teaching staff called this type of motivation social motives of mutually enhancing relationships, affiliation, and belongingness. From these participants, it was reported that the African family was mainly extended to members outside the nuclear family to include grandparents, aunts, uncles, and cousins. Degbey (2012) and Gyekye (1996) contend that the African family refers to an extended family which goes beyond the nuclear family. Regarding this factor for human behaviour motivation, one participant alluded that social motives of mutually enhancing relationships, affiliation and belongingness make us want to identify with family, clan, and community relationships (Interview1, PCU1). In addition, an FGD participant said, "it is the duty of every member of our extended family to co-operate in all social and economic activities and affairs which promote unity and solidarity. Everyone is expected to behave in a manner that contributes to the welfare of the other people."

These findings showed that the social motives of the need to identify with family, clan and community included behaviour that is for the good of other people and this enhanced good relationships among Africans. This involved mutual and collective responsibility and cooperation for the benefit of others which enhanced unity, harmony, and solidarity. Beliefs in cultural values such as kinship ties entrenched unity and solidarity and this is held above individual interest (Mbiti, 2002; Gichaga, Kerre, Mwaura and Onoka, 2013). Hence, this activated, guided, and sustained African behaviour and contributed to their pro-social personality configuration. In line with this observation, Ejizu (2013) points out that the sense of community and humane co-existence are highly cherished among Africans despite the disarray in modern politics and brutal internece wars in many parts of the continent. Barker (2008) observes that social motives make individuals pursue social affiliations and approval.

Maslow 1970 in Ewen (2010) implies individualism in the hierarchy of needs and places the motivation of need for affiliation as third in it. According to the findings of this study, the need for affiliation falls at the very bottom of the pyramid among the first level needs for the Africans.

3.2 Adherence to the collective moral standards of the community

This factor scored 9.8% and 87.2% for "strongly agree" and for "agree" respectively of the responses given by participants. However, 2.8% of them were "neutral" about it. This is supported by other findings from interviews and FGDs as exemplified in an excerpt which stated that: "since collective moral standards arose out of relations between people in the society, they embraced every aspect of life and were seen in people's daily behaviour, where moral standards became goals of individuals' actions and motivated them". In addition, the FGDs reported that collective moral values such as respect, honesty, hard work, courage, integrity,

responsibility, patience, loyalty among others made Africans act with the welfare of others in mind, become reliable and dependable, determined and endure in pursuing goals that created a society that was peaceful and harmonious.

Africans in Kenya were motivated into right behaviour by the collective moral standards which helped them promote individual and social welfare. These moral standards are cultural moral values such as respect, honesty, hard work, courage, integrity, responsibility, patience, loyalty, hospitality, industry, humility, unity, and chastity. These values serve as functional principles for proper individual conduct which lead to success in life (Ushe, 2010). Wiredu (2006) refers to these as moral motivation which gives an individual a sense of duty, promotes the welfare of others, and raises their social status. Gyekye (2000) posits that a virtue like a sense of responsibility among Africans is a measure of social status expressed through her/his responsiveness and sensitivity to the needs and demands of her/his community.

Thus, African ways of life are based more on solidarity than autonomy, communal than individualistic and cooperation than the competition as noted by Nyasani (1989), Gyekye (2000) and Mbiti (2002). In a study on motivation related values across cultures done in France, Italy, Netherlands, Scotland and Nigeria, the results showed that cultural value for motivation among Africans was collective interest (Igusi, 2009). This value forms part of their personality configuration and motivates behaviour. These beliefs in moral values by Africans are the intrinsic motivation that contributes to their personality configuration. Behaviour forms an individual's personality (MacRae & Costa, 1999). All these contributions validate the findings that cultural collective moral standards motivated behaviour of Africans.

3.3 Beliefs in prohibitive norms, laws, taboos, and rituals.

This factor attracted 20.9% and 76.2 % for "strongly agree" and for "agree" respectively of the responses given by participants. However, 2.8% were "neutral" about it. The findings from interviews and FGDs yielded similar views, but with more details. This is exemplified by the following quote from an interviewee:

"Prohibitive norms and taboos are strictly observed in our community because of the severe punishments that befall those who violate them. The belief that supernatural authority reinforces obedience makes people refrain from violating moral laws such as murder and incest which are moral pollution. These, therefore, guide people on how and why to behave."

This observation underscored the influence of taboos and prohibitive norms on people's behaviour by guiding and sustaining it. The participants also observed that some of the prohibitive norms, laws and taboos, beliefs and rituals in their community were: taboos not to marry close relatives, not to ignore needy old parents and relatives, unwritten laws against stealing and murder, beliefs in rituals which pacify individuals or groups that were in warring state, or with an ancestor, beliefs in rituals which mark important events such as rites of passage such as birth and naming, initiation, marriage or death. Thus, the participants agreed that individuals will avoid certain acts and engage in others because they are motivated by the beliefs in prohibitive norms, laws, taboos, and rituals. Africans' behaviour is guided and sustained by these taboos, laws and beliefs in rituals which aim at promoting peace and harmony in the community. The negative consequences that went with ignoring them made Africans internalise behaviour. This contributed to their personality configuration because they avoided anti-social behaviours or anything akin to evil and thus engaged in pro-social ones. Afe (2013) contends that the motivation for abiding with taboos and prohibitive norms is provided by the sanctions that go with breaching them; instant repercussions. These promoted and motivated covert and overt behaviour of Africans

3.4 Religion motivated behaviour.

This attracted scores of 34% and 60.6% for "strongly agree" and for "agree" respectively of the responses given. A few participants, 3.2% were "neutral" and 2% "disagreed". These scores denoted that the participants agreed that religious factors motivated Africans covert and overt behaviour. The data that came from interviews and FGDs supported this finding. It was from one of these FGDs that one participant said that in their community people act and relate with others and nature with the knowledge that they have a duty to God, by taking care of His creation as a way of honouring Him. Still, an interviewee said that religion motivated people into actions that were morally right and were for the good of others. This was brought by the desire to live according to the divine will.

Religious motives enabled Africans to make moral choices and decisions which directed overt and covert behaviour, as they related to each other and to nature. This finding resonates with Egwu (2001) who describes religion among Africans as the belief which sets essentially adorations to God in human morality. In Africa, religion and morality are intertwined and are lived and exemplified in people's behaviour, which aids in the promotion and realization of harmonious interrelation among individuals and the community (Ejizu, 2013). He further observes that religion to Africans is the womb of people's culture and plays a key role in the realisation of values. These, in turn, inculcated and motivated proper conduct of individuals which was seen in right behaviour which was within the expected societal standards. This resulted in a personality that had pro-social values in behaviour.

Religious motives were also reported to come from the African's belief in the existence of ancestral spirits and other spirits. A participant said that people also believe in ancestors' participation in their lives where beliefs were that ancestors were custodians of moral values. Thus, besides believing in God, the Africans in Kenya believed and venerated ancestors in some communities and believed in their participation in their affairs. This led them into upholding morally upright behaviour because of this responsibility towards God and ancestors. By so doing, their covert and overt behaviour was motivated and sustained. This finding is in line with Thebede (2008), Mbiti (1997), Gunyali, Malusu, Rono, and Owiti (2009) and Gichaga et al. (2013) who indicate that Africans believe in ancestors and their presence and participation in human affairs. Further, the participants observed that there is a religious belief in most communities that when Africans in Kenya died, they only changed in their state from physical to spiritual, for they joined the

living dead (ancestors). This affected how they lived the physical life. The following observation was made by an FGD participant, that:

"There is a belief in our community that death is a transition from the physical to the spiritual state. The way an individual lives physical life affects how he will enter and live the spiritual life. For this reason, people live lives that are morally upright to enjoy the next life. This is when they join the world of the living-dead or ancestors. The ancestors are those people who died and are still remembered by the family or clan members."

Thus, Africans viewed a person as being more than the sum of his/her total parts but consisted of a spirit that was immortal. The belief motivated them to behave in uprightness of conduct to be received in the spirit world and be remembered by their kin as ancestors (Gichaga et al., 2013). The Akan of Ghana have the belief that the person consisted of the soul, body and spirit and their interrelationship (Gyekye, 1987). This motivated behaviour of individuals due to the influence these three caused through their relationship. The Okra (soul) and sunsum (inner dimension in man) belonged to the immaterial, spiritual world, and they interrelated with Honan (the physical body) and thus motivated people's behaviour. This showed that Africans believed that a person has both the spiritual and physical body which interrelated to influence behaviour. Thus, the study found that religious motives motivated the behaviour of Africans in Kenya, which contributed to their personality configuration.

3.5 Desire to avoid punishments and penalties

This factor yielded scores of 6.5% and 71.7% for "strongly agree" and for "agree" respectively of the responses given by participants. However, 14.7% of the participants were "neutral" and 6.9% "disagreed." Reports from interviews with members of teaching staff and from the FGDs with students gave more data on this factor. A participant from an FGD said: "punishments such as ostracization and penalties such as paying fines to curb anti-social behaviour and restore order and harmonious living in our community." In addition, another participant said:

"Council of elders punishes and penalises those people who have gone beyond their families' ability to punish and those who breach the peace and harmonious co-existence of the community; in fact, nobody likes getting to that level because it brings shame to both the individual and the family besides the immediate consequences. The age group is also a strong force because it punishes through reprimand or ostracization. Some punishments are corrective such as ostracization while others act as a deterrent to offenders such as curses and death"

Thus, curbing the behaviour of individuals in society through punishments and penalties advanced the cause for right behaviour among Africans in Kenya. Those who offered retribution did it for the benefit of the community. This controlled people's behaviour and motivated them to behave in a way that would not attract punishment. There was the collective responsibility of ensuring that all adhered to the norms of the society. As indicated, those who had gone beyond the abilities of the family to punish were punished by the elders. The council of elders addressed both legal and moral aspects of behaviour.

These findings resonate with the behaviourist view that argues that one way of discouraging behaviour is through punishment. However, contrary to the behaviourist view that punishment was a faulty way of correcting behaviour, the Africans seem to have embraced it though as the last solution. The severity of the punishment which seemed to strip off some basic needs such as a sense of belonging seemed to motivate people to engage in socially acceptable behaviour. Ejizu (2013) posits that ostracization is the most severe punishment meted on anybody because an outcast in Africa is not allowed to share in the life of the community. These punishments helped in internalizing right behaviour as Africans in Kenya learnt its value in the cultural setting. Therefore, the fear of societal punishment motivated Africans in Kenya and conditioned them to develop pro-social personalities. Behaviourists such as Thorndike (1911), Pavlov (1927), Skinner (1938), Sutton & Barton (1998) and Shultz & Shultz (2009) maintain that rewards and punishments aid in learning and sustaining behaviour. The findings of the study share with behaviourists in the goals of applying punishments but not in the methodology due to cultural variation.

3.6 Meeting of human needs

The scores for this factor were 25.8% and 66.3% for "strongly agree" and "agree" respectively of the responses that were given by the participants. However, 6.1% of the participants were "neutral" and 1.6% "disagreed". This factor for motivation to behaviour was also encountered in the interviews with the members of the teaching staff, who referred to them as needs or drives; and in the FGDs with students. The interviewee noted that: human drives were mastery of the environment, biological needs of hunger, thirst and defence through flight or fight, reduction of anxiety, safety and shelter, avoidance of pain and need for self-actualization, which was the highest when these are arranged in a hierarchy. Another participant from an interview acknowledged that people had different needs at different times of their lives although there were those needs that were so basic which people could not do without. The needs motivated people to move from the lower level needs to higher ones until their full potential was realized. In addition, an FGD participant said that in their community, people always worked to meet their basic needs first: food, shelter, clothing and paying school fees (education) for their family members. When these needs were met then they could work towards other comforts such as a better house (aesthetic need) among others.

Thus, the behaviour is geared towards achieving basic needs and is sustained by individual's constant progress from one need fulfilment to a higher one and these varied from time to time, for example when individuals felt secure in meeting their basic needs such as food and shelter, they got preoccupied with trying to achieve higher needs. This motivated covert and overt behaviour as options were explored to meet these needs. This resonates with the humanistic paradigm's view by Maslow (1970) who points out that individuals pursue deficiency and growth needs from lower levels to higher ones, and this motivates them to achieve these needs. However, the African culture affected how this was done because individuals went up to the hierarchy of needs with their dependent family members. It was reported by an FGD participant that Africans deferred the gratification of achieving higher needs in the

hierarchy to take care of their aged parents or pay school fees for their siblings. Therefore, very often Africans crossed levels such as deferred a physical gratification, for example, sacrificed a basic need if doing so brought them closer to a higher goal in terms of importance such as group loyalty and acceptance, for example, supporting younger siblings in school. This made some of them delay gratification. This was found to be within the cultural context where social interest overrode individualism. This resonates with Gichaga, Kerre, Mwaura, Mambo and Kioko (2011) who contend that family relationships are strong in Africa and entail obligations and rights which extend to all members of the family.

The study also showed that there is a need for people to be role models and have role models. The results from interviews and FGDs echoed similar observations where a participant said:

"In our community, adults behave in a proper manner to teach the young generations right behaviour. This is because young people learn a lot by observing the behaviour of adults. If they observe bad habits such as hearing adults use insults as they communicate or seeing them solve their problems through fights, they will learn those wrong habits and this will affect their behaviour negatively. But if they see them respectful and peaceful in their dealings with other people, this will influence their behaviour positively."

Africans in Kenya were motivated to behave according to socially accepted norms in order to be responsible and good role models to the younger generations. This influenced and motivated the behaviour of the personalities of all those involved. The need to be role models especially for Africans is in line with Fayemi & Adeyelure (2009), who points out that morality is not only taught but demonstrated. This means that those who teach morality also live as role models. Modelling behaviour is also suggested by Bandura (1977) in his social learning theory where he states that individuals observe and model behaviour of people they identify with. Thus being a model plays a key role in motivating the behaviour of Africans.

The study also found that overt and covert behaviour is inherently influenced by peer group norms in African societies – Kenyan. Members of an age-group had their behaviour motivated by group norms as each of them wanted to identify with and be part of the group. There is an African saying that goes, "*you will always be part of your age group and family and this cannot be wished away.*" Gichaga et al. (2011) are of a similar view, where they see age groups' dynamics among Africans to exert great influence on peer behaviour. Therefore, among the Kenyans of African descent, the peer group greatly motivated behaviour through the sanctions that were exerted on members in order to comply with the group norms. This contributed to their personality configuration where individuals' behaviour reflected that of the group members.

From the findings, the factors which motivate individuals' covert and overt behaviour are largely found within the culture of Africans. This is evident from the findings where beliefs in cultural values, beliefs and practices were found to motivate behaviour. Africans' behaviour is calculated towards achieving goals such as enhancing relationships in the family, kinship, and community. Mbiti (2002) argues that Africans have community interests held above individual interests. Thus, among Africans, overt and covert behaviour is motivated and sustained by societal values, norms, taboos, religious beliefs, and the need to conform more to family and community interests than being individualistic.

Counselling psychologists also reported that there were some problematic social-cultural covert and overt behaviour which featured in their practice and were interpreted as associated with the African culture (culture-bound). Some of these were: breaking taboos such as marrying a close relative knowingly or unknowingly, behaviour against the moral codes of society such as stealing or rape and failing to follow due process in getting married and getting into "come-we-stay" marriage without payment of bride-wealth only to be rejected by parents.

4.0 Conclusion and Recommendation

The study concludes that culture influences people's motivation to behaviour (covert and overt) as it determines what drives and sustains it. These findings have implications on multi-cultural counselling in that they unravel worldviews and subjective culture which Africans in Kenya bring to therapy. This is the black box that helps the therapist get to know more about the client and could be implicit or explicit in their presentation. Consequently, the therapists especially those from different cultures need to understand it to make therapy relevant and meaningful to the African descent clients. The study recommended that cultural worldview and perspective of personality be incorporated into therapy alongside mainstream Euro-American perspectives to make counselling more meaningful and relevant to clients from different cultures. This will make multi-cultural counselling richer by helping therapists contextualize and conceptualize clients' concerns in therapy and use appropriate skills and methods by placing culture at the centre of the exercise.

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African Perspective of the Development of a Healthy Personality and its implications on Multicultural Counselling in Kenya

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Abstract- Africans have their own culture which frames their worldview and little is documented about this and what frames their personality. This empirical research was conducted among Africans in Kenya in order to understand their personality development and the implications of this on multicultural counselling. The Kenyan universities were considered as the site of the study due to their cultural diversity. Multi-stage sampling procedures were used to get the final sample population for the study. The sample size for the study was 360 (N): students, lecturers, and counselling psychologists. Triangulation of research tools was employed where questionnaires, interview schedules and focus group discussion guides were used to collect data. Quantitative data was analysed in Statistical package for social sciences (SPSS) and presented in tables and figures. The qualitative data was transcribed, and categorised according to themes and sub-themes and later discussed by linking it with the study objectives. The results on the development of a healthy personality for Africans in Kenya showed that: The informal education provided by family members was an important aid for the development of personality. Family and community members played a vital role in the development of a healthy personality by modelling the right behaviour. Cultural values and morals instilled during the rites of passage and as the child grew up facilitated to a great extent the development of a healthy personality. Finally, folk wisdom in proverbs, songs, riddles, tongue twisters, stories and myths - influenced the development of personality among Africans in Kenya. Therefore, the norms, values, beliefs and practices, social relationships and interactions, knowledge, and wisdom available in culture passed on from generation to generation shaped personality. This study recommends that therapists contextualize the problems of clients in culture and apply appropriate skills and knowledge resources to properly handle the clients in therapy.

Key Words- Counselling Psychology, Overt Behaviour, Covert Behaviour, Motivation

1.0 INTRODUCTION

Culture influences the development of personalities of individuals in different communities; hence there is an unavoidable close relationship between culture and personality. Cultural factors such as worldviews, cultural practices and beliefs, social roles and interactions, norms, values, knowledge, wisdom, and cultural construction of the world through meaning and symbolism influence personality in all its dimensions in significant ways throughout its lifespan. Empirical studies have shown that even when it comes to personality traits which are found in all cultures, environmental factors have mutable or immutable influences on personality traits (McCrae & Costa, 2008; Reitz, et al., 2014; Roberts, Wood & Caspi, 2006; Caspi & Moffitt, 1993; McAdams & Pals, 2006). Cultural context gives rise to specific socialisation conditions which influence the developmental outcomes of a child (Albert & Trommsdorff, 2014). These cultural differences in childhood experiences lead to different personalities that can be linked to predictable adult personality patterns (Le Vine, 2001; Church & Ortiz, 2005).

Among Africans, the rites of passage such as birth and naming rite in early life, initiation into adulthood in puberty (for males) and marriage in adulthood; and the education that goes with each of these stages and as the child grows, help in guaranteeing and lead to a healthy personality for these constitute wholeness of life. According to Mbiti (2002) and Gichaga, Kerre, Mwaura and Onoka (2013), these rites of passage and phases of life constitute wholeness of life among Africans. However, these rites of passage are not captured in the mainstream theories of personality suggesting that these theories may be limited in a holistic approach in addressing the needs of clients from African descent and specifically for this study those in Kenya. Notably, few studies examine the African perspective of personality development, yet Africans do have their own view of personality development and how this impacts on yielding a healthy/mature. This has implications on multi-cultural counselling in that when a healthy personality does not manifest in individuals, means of ensuring that this happens have to be sort and employed with the culture of the client at the centre of the exercise. This helping of fellow humans in need has been going on in Africa even before the colonial invasion (Mutie & Ndambuki, 1999). Africans have social-cultural frameworks which guide their understanding of fellow men and which have been applied to assist those with unhealthy personality get restored to good health

In Kenya where the study was conducted, 95% of the population of about 38.6 million are from African descent from three broad groups of Bantus, Nilotes and Cushite, spread out over the whole country. These groups of people have shared a common history and environment, and have interacted among themselves and therefore have many aspects of their cultures that are similar such

as their values, practices, and beliefs. These have shaped their worldview and personality. However, there are very few studies done on the development of their personalities based on their culture and world view which would make psychological counselling and therapy in this area meaningful to them. The mainstream personality theories mainly from psychodynamic, behavioural-cognitive, and humanistic-existential paradigms which describe, explain, assess, and predict personality may not comprehensively address the problems of all clients from all cultures and in particular African clients. This observation is best underscored in multi-cultural counselling and psychotherapy where frames of helping clients are seen to require adjustments to align them with their cultural environments (Sue & Sue, 2013; Ivey, et.al. 2007 & Corey, 2009). This helps in understanding and conceptualizing clients' problems in therapy. Kenya enjoys diversity in the population and therefore it is necessary for counselling psychologists and therapists to understand the African perspective of the development of a healthy personality and its implications on multi-cultural counselling. Multi-cultural counselling and psychotherapy emphasize the need to take into consideration cultural factors while dealing with clients in order to accurately conceptualize their problems and employ appropriate skills in therapy.

1.1 Statement of the Problem

Culture significantly influences the development of personality. The mainstream personality theories mainly from psychodynamic, behavioural-cognitive, humanistic-existential and trait paradigms have not captured both the nomothetic aspects which are mainly about the general laws that affect human personality and idiographic aspects which are culture specific. In Africa, and in Kenya in particular, personality theories, crafted in European and United States cultures have influenced much of the direction in mainstream psychology since the beginning of the 20th century. This has consequently fashioned counselling and influenced the counselling psychologists understanding of personality development in Kenya. There exists a gap in the African perspective of the development of personality due to little reflection on the influence of culture on personality and the implication of this on multicultural counselling. European and American theories of personality continue to inform multi-cultural counselling in Kenya despite the big differences between the cultures of Africans and that of the Europeans and Americans. Kenyans have their values and concept of the universal reality based primarily upon their history, culture, and beliefs and this influences their development of personality, which the study sought to address. Thus, the study was guided by the question: How do Africans perceive the development of personality?

2.0 Research Methodology

This study employed a mixed method design employing both cross-sectional survey and ethnographic research design. The study was carried out in two public and two private Kenyan universities. One from each category of these was in the cosmopolitan County of Nairobi and the rest far off near rural areas of Kenya. The public universities are owned by the government while the private ones are privately owned. Public universities admitted students through the Kenyan Universities and Colleges Centre of Placement (KUCCP) from all parts of the country while private ones admitted their own students from all over the country. The universities are equal opportunity employers hence the human resource represents all parts of the country. Public and private universities were coded for easy data collection and analysis. Codes for public universities were PCU1 founded in 2006 and the PCU2 founded in 1985. Codes for private universities were PTU1 founded in 1986 and PTU2 founded in 2002. The universities chosen have a rich cultural diversity and teach humanities and psychology courses. It was hoped that from such diversity a wide range of perspectives for the study was to be examined.

The target population for this study consisted of members of teaching staff, students and counselling psychologists who were Africans from Kenya in the selected four Kenyan Universities. The multi-stage sampling procedure was used for the study to obtain the final sample size. Cluster sampling was first done to categorize public and private universities from the 42 universities in Kenya at the time of the study. The two public and two private universities were purposively selected. From each of these two categories of public and private universities, one was from the urban cosmopolitan county of Nairobi and the rest far off near rural areas. This selection was done using purposive sampling on the premise that the different environments of urban and rural areas could yield a broad spectrum of perspectives for the study. From each chosen university, departments of psychology and education psychology were chosen using purposive sampling, as they could relate to the technical nature of the study. The final sample came from the students and teaching staff chosen using heterogeneity sampling which yielded different groups of participants, for diversity in order to get a broad spectrum of information concerning the topic of study. The final sample size of 90 participants from each university came from 4 members of teaching staff and 40 students from each department and 2 counselling psychologists totalling to 360 (N). However, due to a response rate of 82.4% for questionnaires, the number dropped to 298 (N) participants.

This study applied triangulation of research tools were questionnaires, interview schedule and focus group discussion guide was used to collect data. Validity was done by carefully operationalizing the items and reviewing them to measure the outcomes that the study was expected to produce. The reliability of instruments to the specific situation was established through the inter-rater reliability for the interview schedules which attained an agreement value of 70% and Cronbach reliability for the questionnaires which resulted into a coefficient alpha of 0.78. Quantitative data was collected in closed questions such as Likert scale which were coded and analysed in Statistical package for social scientist (SPSS) and presented in tables and figures. The qualitative data was transcribed and then categorised according to themes and sub-themes. This data was later discussed by linking it with the study objectives.

3.0 Results and Discussion

To get data on the African perspective of the development of healthy personality, the participants were provided with questions with the five dimensions of personality: behaviour, attitudes, ways of thinking, ways of feeling and adapting to situations and were asked to match the factors responsible for their development. The findings from the four universities from both students and teaching staff are given in Figure 3.1 after which discussions of the findings are done.

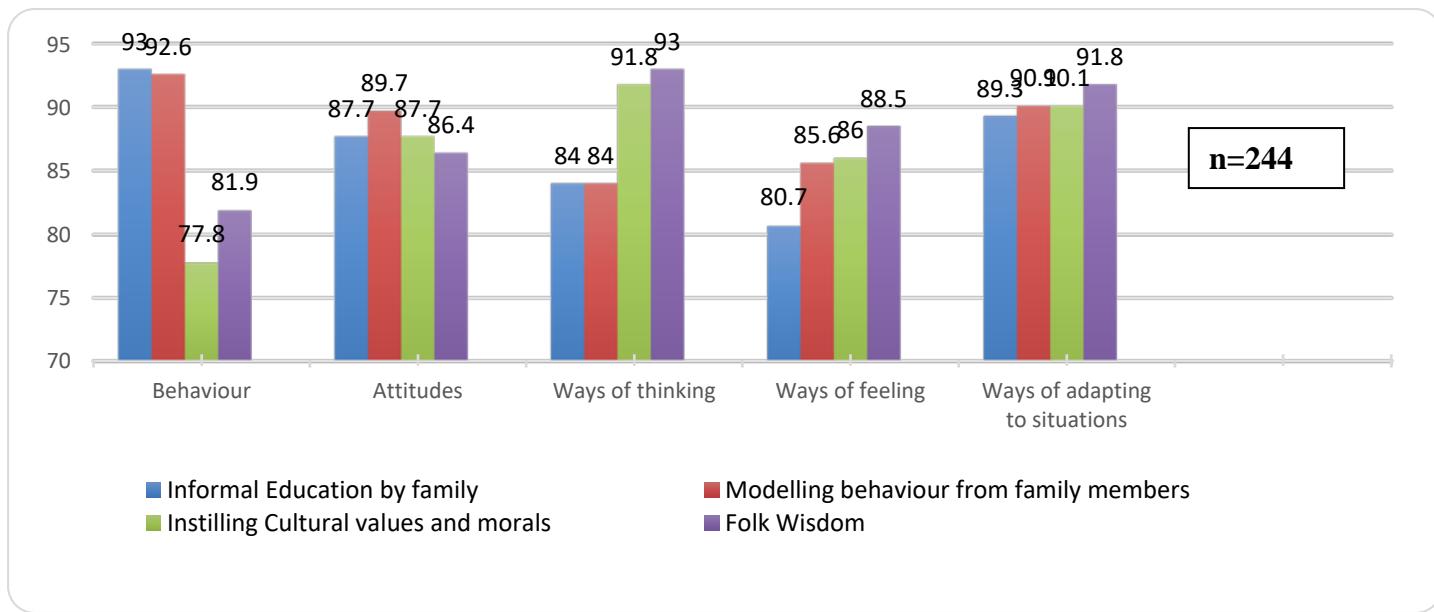


Figure 3.1: Distribution of Responses on Perspectives of Development of Healthy Personality.

Figure 3.1 shows the responses of participants in percentages. The focus is on how each of these factors: informal education by family, modelling behaviour from family members, instilling cultural values and morals and folk wisdom; influence the development of the various dimensions of personality namely, behaviour, ways of thinking, ways of feeling, attitudes, and ways of adapting to situations.

3.1 Informal Education by Family Members.

Figure 3.1 shows that majority of the participants saw informal education by family members to have aided in the development of behaviour of Africans in Kenya where a score of 93% is indicated. Findings from interviews and the FGDs supported this view as exemplified by what one participant from an FGD said that in their community, it was the responsibility of the parents and the extended family to ensure that children grew up well behaved according to the moral standards set by the community. In Africa, good behaviour is taught through the socialisation of individuals throughout their developmental stages marked by rites of passage. In this study, findings showed that socialisation by parents, the extended family members and elders enabled virtues to emerge in individuals based on cultural, moral, and collective values. Gunyali, Malusu, Rono, and Owiti (2009) point out that among Africans, it is the responsibility of parents and close relatives to provide the necessary education to the children as they grow up in order to ensure that the children are well behaved throughout the life span. This helped to develop pro-social personalities. Further, Rohner (2011) has shown reliable links between socialization practices and personality

Figure 3.1 shows that informal education by family members helped in developing ways of adapting to situations among Africans in Kenya where a score of 89.3% of the responses from participants is indicated. These findings were supported by views from FGDs and interviews where participants noted that informal education by family members helped to prepare people for change through creating awareness of what is likely to happen, and how to bridge the gap between expectations with what happens. For example, individuals were taught to be prepared and ready to respond to changes through mock sessions of hypothetical nature that helped to sharpen adaptability skills. Informal education was crucial in preparing individuals by creating awareness which enables them to respond to various situations in life. This aided in personality development. Gunyali *et al* (2009) indicate that children are taught their roles and responsibilities as they grow and during puberty, this is intensified in order to prepare them for adult roles. Socialization process among Africans in Kenya was throughout the life cycle and especially when they were in the formative years. This helped mould their personality into individuals who would adapt well to changes in life.

Figure 3.1 also shows that informal education by family members helped to develop attitudes of Africans in Kenya. A score of 87.7% of the responses given by participants is indicative. Other findings from interviews and FGDs supported this quantitative finding as exemplified by an FGD participant who said that in their community people are trained informally on the right attitudes, which are to be expressed in the way people behave towards others or in given circumstances for instance attitude of respect to older people, and attitude of reverence to God. In addition, an interviewee said: "When people are taught the right values such as respect, hospitality, mutual responsibility and modesty, they will develop the right attitude." Right attitudes were a way of keeping the right relationships and keeping away from eventualities which could emanate from having inappropriate attitudes. The mental attitude towards life among Africans in Kenya was based on their cultural values and this contributed to an individual's personality configuration. Gunyali *et al.* (2009) point out that Africans are taught moral values that inculcate right attitudes - respect, sharing, responsibility, cooperation tolerance and loyalty. Gyekye (2000) posits that virtues such as communal sharing, respect, and sense of responsibility among Africans are moral good that are cultivated in individuals as they are brought to social relations. These attitudes

help an individual and the group to be attenuated to one another in social commitments. Through such, the right attitudes were cultivated among Africans in Kenya and these yielded pro-social personalities.

Figure 3.1 shows a score of 84% for informal education by family members aiding in the development of ways of thinking among Africans in Kenya. The participants from the interviews and FGDs shared similar views with this finding where a participant said that right ways of thinking are imparted on people through informal education by parents and relatives from a very tender age and they grow up knowing how and what to think about certain issues of life-based on the community's moral values and norms. In addition, interviewee observed that when teaching people social skills like creative and critical thinking, problem-solving and standards for right behaviour, the mental abilities are developed. Thus, Informal education aids in moulding ways of thinking by sharpening thinking skills. This requires critical thinking in order to analyse and make value judgments and decisions in situations of life. Making moral choices calls for moral thinking because a person is able to differentiate between right and wrong. (Agulana, 2008) contends that morality entails human principles of right and wrong. Learning enhances knowledge by observing moral codes. Therefore, ways of thinking among Africans in Kenya were developed through informal education and this enhanced personality development

The results in Figure 3.1 show a score of 80.7% of the responses given by participants for the view that informal education by family members developed ways of feeling among Africans in Kenya, Similar observations came from findings from interviews and FGDs as exemplified by a participants' observation that in their community, children are taught many things by their parents and close relatives as they grow up and these arouse different feelings when experienced. This later influences their feelings towards different issues, people, events, and other phenomena hence developing this dimension of personality. Therefore, Informal education equipped Africans in Kenya with ideas and information which was later lived and tested. They experienced the arousal of emotions, but cognitive appraisal helped produce more refined feelings and behavioural response. This resulted in the development of different feelings which contributed to their personality configuration

3.2 Modelling behaviour from family members

Modelling of behaviour from family members helped develop the personality of Africans in Kenya where a score of 92.6% of the responses given by participants was realized. Findings from FGDs and interviews were in support of this. Several sayings on modelling behaviour were given: "*Mtoto umleavyo ndivyo akuavyo*" meaning the way you bring up a child makes him/her become that very image of the type of socialization. "*Mtoto wa Nyoka ni Nyoka*", or in Luyha "*omwana wa injukha ni injukha*"; that is, a child of a snake is a snake; and also "*Mwana wa ngari akunyaga ta nyina*" meaning that the child of a leopard "pinches" (scratches) like the mother. These African sayings were used in place of ordinary words to refer to modelling of the behaviour of family members especially of parents and older siblings as they played their roles. Children learnt through emulating family members who had good behaviour. This aided in moulding individuals into pro-social personalities.

Further, other participants observed that extended family helped in training the children important virtues such as obedience, hard work, loyalty, respect including self-respect, honesty, responsibility, self-control and mutual concern and sharing among others, by showing them how these are necessary through the way they behaved within the family and towards members of the society. Fayemi & Adeyelure (2009) observe that moral behaviour among Africans is not only taught but demonstrated and exhibited. Thus, they posited that courage is not only taught; it is exhibited. In line with this, Shultz & Shultz (2009) stress the importance of models in motivating and sustaining behaviour. This shows that modelling behaviour, especially of parents and family members, is responsible for moulding a personality. It was also observed that the African kinship is close-knit and therefore interactions for social learning are frequent especially because children are exposed to different roles daily which allowed the opportunity for learning valuable practices and skills. Gichaga, Kerre, Mwaura, Mambo and Kioko (2011) posit that the African concept of kinship, an important cultural value; is close-knit. They add that roles are learnt as children accompany parents and close relatives of the same gender when they are performing their roles. This aspect of African culture allowed for observation learning which resulted in healthy personality formation.

Modelling ways of adapting to situation scored 90.1% as shown in Figure 3.1. Findings from the interviews and FGDs support this where a participant noted that the way people in a family react to change or prospects of change is observable; children are able to make observations on the patterns that emerge during such periods where they can note anxiety, fear and whether people envision a positive or negative outcome from the way the close relatives discuss their feelings and display their style of thinking. This leads to learning how they adapt to situations in the same manner. Thus, ways of adapting to situations among Africans in Kenya was reported to be observable where children learnt them, as they grew. Pajares (2002) argues that people's confidence can be gauged by the emotional state they experience as they contemplate an action, such as stress, anxiety and mood state. These can help individuals observe how well or not, family members are adapting to situations and this influences the observer's personality by learning what is observed. People's behaviour can be determined by their environment where observational learning occurs through modelling behaviour (Bandura, 1986).

Modelling of attitudes from family members scored 89.7%. A participant from FGDs said: "explicit (conscious) and implicit (unconscious) attitudes are seen in our behaviour and beliefs about people, issues, events or objects. In a community, children spend a lot of time observing their parents' and other family members' attitudes as they play their roles, interact, and communicate and these become avenues for learning these attitudes." Africans in Kenya learnt attitudes that were being espoused by the family members around them in their cultural environment, in the way they communicated and behaved towards people, issues, events or objects. When someone they admired greatly espoused an attitude, they were more likely to develop the same attitudes. Thus, Parents' attitudes affected children's personality greatly since attitude is a learnt tendency to evaluate things in a certain way. In the same vein, Bandura (1989) posited that observational learning influences the behaviour of individuals. Chaiklin (2011) argue that attitude has

three components: cognitive, affective, and behavioural which ultimately interact and form the attitude and consequently impact on the personality of individuals and in this study, the personality of Africans in Kenya.

Figure 3.1 also shows a score of 85.6% of the participants' responses to the statement that modelling behaviour from family members aided in the development of ways of feeling. Findings from interviews and FGDs indicated similar views. A participant observed that the feelings can be observed and learnt through observation of expressions such as anger or affection through facial expressions or tone of voice. It was further noted that feelings of disappointment and sadness are expressed by supporting the head below the jaw, total dismay by clapping hands severally and tapping the laps, shock by holding the back of the head with the inner sides of the hands and joy by ululating. Thus, among Africans in Kenya expression of feelings varied depending on the type of feeling and these were modelled by observers. Bandura (1986) posited that people learn feelings by modelling what others do, through the stages of attention, retention, reproduction, and motivation. In this study, this applied among Africans in Kenya and contributed to their personality development.

Development on ways of thinking through modelling scored 84% as shown in Figure 3.1. The findings from FGDs and interviews showed similar views as seen in one participant's observation: "when children are growing up in our community, they accompany their parents and other close family members especially those of the same gender when they are doing their work or attending important social functions. Additionally, children acquire important information, store it in their memories and these keep on building up in their various fields, refined with time and eventually thinking abilities develop." Majority of participants acknowledged that they stored those experiences and kept improving their value by refining them with time and later reproducing them. This called for a cognitive process, differentiating relevant from the irrelevant information. This led to the development of ways of thinking and consequently the personality. Thus, observation learning is important in acquiring knowledge structures and beliefs which include self-efficacy beliefs from the environment (Bandura, 1989). Mental processes contribute highly to the development of ways of thinking and hence the development of personality among Africans in Kenya.

3.3 Instilling Cultural and Morals

Cultural values and morals instilled during the rites of passage and as the child grew up influenced the development of personality among Africans in Kenya. The findings from interviews and FGDs indicated that Africans in Kenya went through a life rhythm which constituted the wholeness of life. This was their worldview of the wholeness of life. This was marked by rites of passage at the beginning of each stage of life and the end of the previous one. A remark from interviews stated: "the wholeness of life is a process of growth which is marked by rites of passage: birth and naming, initiation, marriage and death in our community." These rites indicated a change in the development of an individual which comprise physical, cognitive, social, emotional, and spiritual; among Africans in Kenya. Gunyal et al. (2009) and Gichaga et al. (2013) point out that these rites of passage in Kenya include ceremonies, rituals, and rules to be followed at each stage of transition in one's life, where virtues or vices were acquired. This is because these stages were associated with resolving various crises of life. These stages of life have distinct ways of developing the personality of Africans in Kenya for instance, initiation effected the transition from childhood to adulthood thus influenced the development of personality. It was observed by most participants in interviews and FGDs that individuals went through the rites of passage as generation age-sets/groups. It was also observed that "those who went through the rite of passage together especially during the initiation rite, belonged to one age-set/group." Gichaga et.al (2013) indicate that among Africans, initiation helps structure the community through age-sets/groups and each acquires a special name. The age-groups facilitated personality development in all dimensions through their norms which influenced their members.

A score of 91.8% in Figure 3.1 indicates that instilling cultural values and morals during rites of passage and as a child grew up developed ways of thinking. Further findings from interviews and FGDs corroborated the findings where it was observed that the naming rite which comes soon after birth is important in African community because it gives the child identity and enables him/her to be incorporated into the family and clan. Thus, Africans in Kenya developed their ways of thinking early in life and as they grew up. This was made possible by the acquisition of identity which made the children grow up with the knowledge that they are members of a certain family or clan (Gunyal et al., 2009; Gichaga et al., 2013). This attuned them to moral thinking that they must be loyal and responsible to and have a mutual concern and sharing with the family, clan, and community. They also point out that these families and clans immediately take up the responsibility of providing the necessary education and ensure that they are morally upright. These interrelated processes facilitate the development of children's ways of thinking. FGDs also observed that the initiation rite of passage developed ways of thinking in several ways such as training initiates leadership and social skills, secrets of their community and warriorhood.

Participants also observed that ways of thinking developed during marriage and initiation rites, they developed through the knowledge that the status has changed and that one has new rights and privileges - rights to own property, to inherit the father's property and to bury him and the privilege to leadership and to defend the community. The change in status among Africans in Kenya prepared them mentally for new rights and privileges which had to be tackled. This transition brought in new identity and thoughts Gunyal et al. (2009). This changed the ego of the individuals thus developed the personality further. Thus, in this case, development of personality took place during the transitions in the rites of passage among Africans in Kenya.

The dimension of the personality of adapting to situations was developed through instilling cultural and morals values during the rites of passage and the child grew, indicated by a score of 90.1%. This finding corresponded with the data that came from FGDs and interviews which noted that as a child grew up, s/he was given responsibilities that matched her/his age. Moreover, the challenges in each stage brought in opportunities to learn new ways of coping. Thus, Africans in Kenya learnt ways of adapting to situations from the experiences in their new status such as new responsibilities, rights, and privileges during the stages of life marked by rites of

passage. Those who graduated from childhood to adulthood learnt how to cope with adult responsibilities while those who entered marriage learnt to cope with married life. Gichaga et al. (2013) observe that before the initiation ceremony, young people are prepared physically and psychologically to face the challenges of adult life and its significance. They add that they may inherit and own property and take up adult responsibilities, thus incorporating them into adult life. All these adjustments helped to develop their personalities as they became more autonomous individuals.

Cultural values and morals instilled during the rites of passage and as the child grew developed attitudes as indicated by a score of 87.7% in Figure 3.1. This finding got support from interviews and FGDs where the participants reported that the rites of passage played a role in developing attitudes among Africans. A participant said: "During the rites of passage such as initiation and marriage, the teaching of values related to the new status of the next stage of life is done. Such values included but are not limited to respect, loyalty, patriotism and mutual concern and cooperation." Thus, Gichaga et al., (2013) observed that the right attitudes to new responsibilities, obligations and rights were inculcated and this helped to develop their personalities. These moral values created the right attitudes among Africans in Kenya and this contributed to their personality development.

Development of ways of feeling through cultural values and morals instilled during the rites of passage and as the child grew up scored 86%. The participants reported that: there are different naming ceremonies among Kenyans, which reflect the personality, feelings of acceptance by the community and show gratitude to Almighty God. Acceptance brought a sense of belonging in an individual and this was a need fulfilment which paved the way for progression to higher levels of needs and self-actualisation. This is in line with Maslow's (1970) progression trajectory in the hierarchy of needs. In Kenya, the sense of belonging among Africans was valued as one of the basic needs, which led to emotional stability as part of their personality configuration. According to Rogers (1963) in Corey (2009), when individuals are provided with the appropriate conditions of warmth and acceptance they automatically grow in positive ways, hence developing stable personalities. Participants also observed that: after birth and naming rite, the child continued to develop emotionally through continuous care by the mother. This helped to make the child develop ways of feeling that the world is a safe place to live in. Thus, caregiving in early life among Africans in Kenya ensured an emotionally stable individual and therefore the development of a healthy personality. It was established that the initiation rite of passage helped individuals develop emotionally through the psycho-emotional education that was offered and the experience itself during the stage: initiates are taught self-control, courage, and bravery. Gichaga et al., (2013) indicates that the virtues for the new status are enforced during initiation and this makes individuals transform to mature members of the community, among Africans. The marriage rite for Africans in Kenya is important as: "it comes with a package of new roles, obligations, rights and relationships – spouse, children and a new kinship to relate with." Gunyalı et al. (2009) indicate that marriage helps people to develop emotionally.

Figure 3.1 shows that cultural values and morals instilled on Africans in Kenya during rites of passage and as the child grew up developed their behaviour as indicated by a score of 77.8%. The findings from interviews and FGDs supported this view where a participant indicated that the psycho-social and psycho-emotional education offered during rites of passage help in making people learn about behaviour which prepares them for life. It was further observed that the important cultural moral values for developing individuals' behaviour included but not limited to obedience, hospitality, hard work, honesty, self-control, showing gratitude and responsibility.

Psycho-social education given during the rites of passage and as children grew up, moulded their behaviour in accordance with societal expectations (Gunyalı et al., 2009; Gichaga et al., 2013). This education was not only taught but also demonstrated (Fayemi & Adeyelure (2009). The young saw their instructors sharing with and respecting others, obeying, restraining themselves and being responsible and modelled the same. The participants also noted that there were certain moral values which enhanced behaviour and were related to the rites of passage: unity and mutual concern were learnt when kinship and community members came together to witness and celebrate the birth and naming of a child, initiation and marriage rites or mourning during a death rite. During the rites of passage, principles of right behaviour and goals of social and individual actions were learnt by Africans in Kenya (Gunyalı et al., 2009; Gichaga et al., 2013). This developed their behaviour thus contributed to their personality development.

3.4 Folk Wisdom

Folk wisdom in proverbs, songs, riddles, tongue twisters, stories, and myths - influenced the development of personality among Africans in Kenya. Figure 3.1 shows that folk wisdom aided in the development of ways of thinking among Africans in Kenya where a score of 93% is indicated. Further findings from interviews showed that: folk wisdom helps in the development of ways of thinking in many ways - proverbs develop critical and creative thinking in the way they transmit creative knowledge as a medium for the projection and fulfilment of a variety of socially desired goals. It was also noted that adults used proverbs when they were communicating to help develop ways of thinking, by provoking thoughts to the listeners. Examples that were given were: the best way to eat an elephant on your path is to cut him up into little pieces, meaning the best approach to solving a problem is to take it bit by bit, one at a time and do not look where you fell but where you slipped, meaning, don't look at your mistakes, look at what caused you to make the mistake otherwise you may repeat the mistake. Among Africans in Kenya, critical and creative thinking was developed using proverbs. These put many words in one capsule and let the listener put that into interpretation which may help address the problem or issue at hand (Nkuzi, 2007; Appell & Laura, 2012). Thus, proverbs were able to compress wisdom of ages that had helped many people; in a way that they could easily and vividly remember and make available to many generations. Folktales, metaphorical riddles and tongue twisters enhanced knowledge and communication skills. "Folktales have themes and ideas that are told to the listeners in a way that will help them remember what was said. Interactions and language skills used such as different voice tones, and ways of expressing ideas helped in developing ways of thinking."

Folk wisdom aided in the development of the dimension of personality- adapting to situations. Figure 3.1 shows a score of 91.8% of the responses given by participants for this statement. Findings from FGDs and interviews showed support of this view as exemplified: ways of adapting to situations were learnt from some genres of folk wisdom such as problem solving riddle/brain teaser; which tried to teach life skills such as problem solving: "You have a leopard, a sheep and sweet potatoes vines on one side of a river that has to be crossed to the other side on a narrow bridge. Due to the narrowness of the bridge, you are required to cross with one item at a time. Explain how you would ensure that all the three items get to the other side." In this brain teaser, it is important to note that: if the leopard and the sheep are left on one side, the latter will eat the former, and if the sheep and the sweet potato vines are left, the same would happen. Therefore, such folk wisdom instilled problem-solving skills and creativity which developed ways of adapting to situations. This, in turn, helped to create personalities who would see problems as challenges which were to be overcome by individuals. Another participant observed that songs are sung among Africans in Kenya carry important life lessons which help people adapt to situations such as married life. In occasions like the rites of passage such as marriage and initiation the wisdom of songs sung guided people in negotiating challenges of the next stage of life. Garnes (2012) argues that music is an integral part of the African culture, and various ceremonies are preceded by some sort of music which is used to communicate and pass literature. Africans in Kenya developed their ways of adapting to situations by benefiting from the lessons learnt in songs sung in their communities.

Figure 3.1 shows that ways of the feeling of Africans in Kenya were developed by use of folk wisdom as indicated by a score of 88.5% of the responses given. Further findings from the FGDs and interviews supported this as seen in a participant's observation that the stories told to children helped them develop feelings of self-confidence and this boosted their self-esteem: "stories of small animals who beat the odds and overcome bigger ones in wisdom, help children learn that one can achieve big things in society no matter how small, inexperienced or different/he may be. This teaches a lesson that size does not preclude intelligence and this helps to develop ways of feeling. Shoniwa (2013) argues that folktales depict animal characters whose confidence can be emulated. Thus, Africans in Kenya benefited from the wisdom in folktales which helped them develop ways of feelings which boosted their self-confidence, self-esteem and self-worth. This developed individuals into pro-social personalities.

A score of 86.4% in Figure 3.1 shows that participants agreed with the statement that folk wisdom developed attitudes of Africans in Kenya. The participants from the FGDs and interviews gave views which corresponded with this finding. A participant observed that different genres of folk wisdom had their unique ways of developing attitudes. Further findings showed that folk wisdom could teach and correct wrong attitudes: Africans use songs to teach attitudes by praising what is acceptable and ridiculing what is unacceptable in society. Thus, they helped develop Africans' attitudes by shaping the way they value what is acceptable in relationships and interactions among themselves and with their environment. These contributed to the development of pro-social personalities. (Appell & Laura, 2012; Gichaga et al., 2011) argue that songs educate people on the right attitudes to adapt in accordance with what is prescribed by society.

Development of behaviour by use of folk wisdom scored 81.9% of the responses given by participants. Findings from FGDs and interviews underpinned this view where it was observed that folk wisdom imparted moral values in the young for instance, a story can depict a character whose behavioural vices like selfishness cause bad relationships with members of the community. The moral values in folktales were found to shape the behaviour of Africans in Kenya. Stories which had varying moral lessons were told to teach moral values and virtues in the young. Chesaina (2007) points out that good behaviour can be learnt from animal characters in narratives who are rewarded for their good values while those with vices are punished. These vivid lessons created unforgettable memories in children and therefore helped them uphold acceptable values. This helped develop pro-social healthy personalities.

Wise sayings which moulded the behaviour of Africans in Kenya were also reported: "*Kiara kimwe gituiragaga ndaa*" meaning one finger does not kill a louse or *umoja ni nguvu utengano ni udhaifu* meaning unity is strength while disunity is a weakness.". These wise sayings taught team spirit and unity. They instilled the right virtues in young people as they grew up and these contributed to the development of personalities who had team spirit. On the same note, Appell & Laura (2012) indicate that they express timeless truths and guide to good conduct which portrays society's values. Regarding Africans in Kenya, they promote values such as but not limited to unity, cooperation, interdependence and sharing. These enhance pro-social personalities.

Counselling psychologists also reported that they encountered social-cultural problems in their practice, which revolved around personality development in African culture as seen in some of the factors discussed. Some of the areas were in the rites of passage such as some male clients who felt that a skipped initiation rite could be interfering with their personality health since this was considered to be a transition to adulthood and behaviour that fall short of society's expectation such as lack of cultural moral values seen in interpersonal stress due to discord with a family member especially those who are much older than someone. For Africans, this is interpreted as disrespect and sometimes ingratitude if it is a parent or a relative who has supported someone in some way.

4.0 Conclusion and Recommendation

The personality of Africans in Kenya developed within African culture. The norms, values, beliefs and practices, social relationships and interactions, knowledge, and wisdom available in culture and passed on from generation to generation shaped personality. Thus, a healthy personality was pro-social. The implication of these findings on multi-cultural counselling is that therapists may encounter personalities in a culture whose issues and problems revolve around their development of personality. The subjective culture that influences this personality may be implicit or explicit in its presentation. Therefore, a multi-cultural counsellor or therapist would be better placed if s/he is culturally aware of how the development of a healthy personality takes place in African culture. This study recommends that therapists contextualize the problems of clients in culture and apply appropriate skills and knowledge resources to properly handle the client in therapy.

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Transboundary Water Resources Management: A Review of the River Omo Basin

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Abstract- Transboundary water resources need the cooperation of national governments in the development of policies and strategies for development. A holistic approach on sustainable development with an emphasis on protection of the water basin for the continued use of the resources for all partners is ideal but often hard to achieve. Despite this, there have been 295 water agreements made over the world compared to 327 conflicts. As climate change and anthropogenic activities continues to hold ground as major aspects in water resource management, sustainability is key in ensuring development, peace and adaptation reign. Focusing on the Omo River basin, a DPSIR with qualitative analysis was done on policies and strategies that are will come into effect and are already in place to establish their social, cultural, economic and environmental effects. Based on the current trend, the main focus of both governments seems to be on economic development with an avoidance of any possible negative effects of energy, agricultural and industrial projects.

Index Terms- River Omo Basin, Transboundary Water Resources, DPSIR Framework, Qualitative Analysis. Lake Turkana

I. INTRODUCTION

Transboundary water resources are water sources such as rivers, lakes, aquifer ad river basins that are shared by two or

There may have been 37 conflicts over water since 1948 but there have also been around 295 international water agreements that have been negotiated and signed since then. In light of this The Convention on the Protection and Use of Transboundary Watercourses and International Lakes (UNECE Water Convention) was adopted in Helsinki in 1992 and enforced from 1996. It was a legal framework for the transboundary management of water resources in the Pan European area but has been available to the rest of the world since 2003, though it was enforced in 2013 as tool for worldwide cooperation. It aims to facilitate cooperation in the management of transboundary water resources to protect its quality, quantity and sustainable use. All United Nations members can demand the use of the Convention since 2016. However, despite this around two thirds of transboundary resources do not have any cooperative management

more countries. These resources are important to a vast number of people for their livelihood and life support. There are 300 transboundary aquifers serving 2 billion people that rely on groundwater and 276 transboundary river basins and lakes that cover approximately half of the Earth's surface. [1] As climate change continues to morph the way water is spread out in the world, cooperation is key to providing water to these vulnerable areas. If not avoided, over exploitation of aquifers, rivers, and lakes make water supple unreliable and unsustainable causing international tension and conflict.

Sometimes even the best intensions have negative consequences such one country building a dam as a measure to adapt to climate change which reduces flow downstream into another country. Management of water resources at this scale needs cooperation between countries on strategic plans in heavily water dependent sectors like agriculture, industry, energy, navigation, water supply and sanitation to enable sustainable development. The efficient and cooperative management and development of shared water is very crucial as it benefits all parties improving international trade, climate change mitigation, economic growth, security and governance. A basic Qualitative Document Analysis is discussed in regards to any action plans, strategies, bilateral agreements and interactions between any relevant bodies regarding water recourse management; sustainable development; and potential socio-economic and environmental effects.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

frameworks. In addition, climate change adaptation has become a major factor in transboundary water resources management as there has been growing evidence on its continued effect on the global landscape. [2] This creates an even bigger need for the integration of sustainability in decision making strategies.

One such way is through assessing the interactions between development and these water resources. When it comes to integrated environmental assessment and reporting, the DPSIR (Driver-Pressure-State-Impact-Response) framework is the most widely adopted mostly due to its proven track record in understanding the creation and progression of environmental problems.

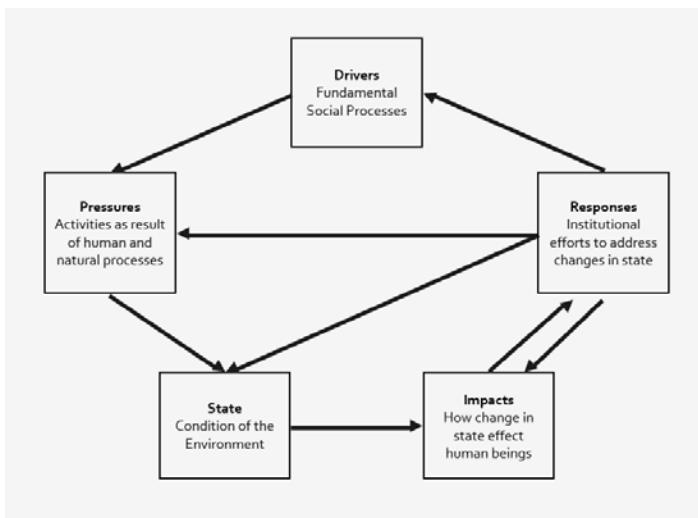


Figure 1: DPSIR Framework Flow Chart

It was developed in 1999 by the European Environmental Agency (EEA) and has been used on both the global and local scale. Its use has further evolved into tackling such issues but not without some critics on how its setup doesn't accommodate local knowledge in the Impact and Response portions and social and cultural factors in the Drivers portion, especially when it is used in the Global South. [3] To mitigate these critics, the assessment of the transboundary water resource will focus on the large scale country level as well as local ones within the watershed through qualitative document analysis.

When it comes to permanent desert lakes, Lake Turkana comes out on the top of that list. The Omo River provides around 80% of the lake's water with it getting the rest from the Turkwel and Kerio Rivers. It covers an area of 7,560 km² and has no outlet and only relies on evaporation to get rid of its water. The lake provides potable water for people in the area as well as food in terms of aquatic life from its rich wildlife. It supports over 300 bird species, both indigenous and migratory. The surrounding Sibiloi, Central Island and South Island National Parks are UNESCO World Heritage Sites with one of the last indigenous Nile Crocodiles, some hippopotami and various venomous snakes. [4]

III. WRITE DOWN YOUR STUDIES AND FINDINGS

Drivers

Population.

In 2017, Ethiopia laid the groundwork towards providing electricity to all its citizens by 2025 by launching the 'Light to All Program'. [5] This is meant to balance the inequality in electricity access with urban areas and rural areas having 87% and 5% of the population connected to the national grid [6] especially as the population is set to rise to 171.8 million by 2050. [7] This change is more than double the population in 2012 that was 83.7 million which has pushed the government to make policies that can cater to this doubling in population by the half of this century. [8] Biomass is the primary source of energy in Ethiopia accounting for 91% of the energy used with petroleum products and electricity at around 7% and 2% respectively. [9] This has pushed the country to look to hydropower as its saving grace due to its untapped potential. [10]

Case Study: Assessment of Omo River Basin

The Omo River Basin is an endorheic drainage basin that spans the area of 146,000 square kilometres. It comprises of the Shewa Highlands, the Omo River, its tributaries and Lake Turkana. The River Omo starts off at its source 7600 ft high up in the Shewa Highlands, a mountainous plateau in Southern Ethiopia. It also has tributaries that include the Gibe, Gojeb, Denchya, Mui, Usno and Wabi, with Gibe being its most important one. The river continues meandering 760 kilometres south and flows down an elevation of 2000m, finally emptying out into Lake Turkana which is mainly situated in Kenya.

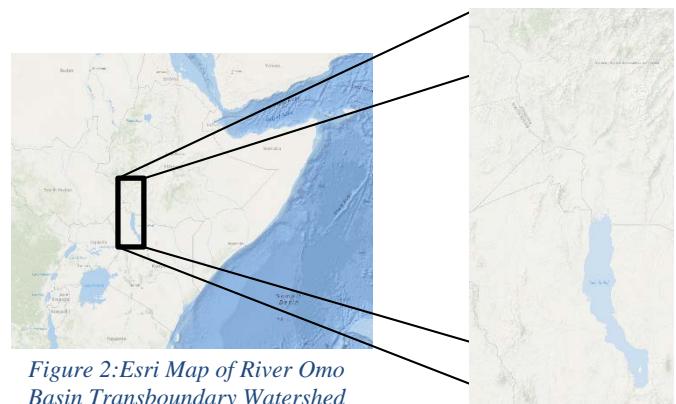


Figure 2: Esri Map of River Omo Basin Transboundary Watershed

Energy Generation

Ethiopia has the potential to produce over 60,000 MW of power from renewable energy sources. This comprises of 45GW hydropower, 10 GW wind energy, 5GW geothermal and 4.5 - 7.5 kWh/m²/day solar irradiation. [11] They have set in place a target for 35,000 MW by 2037 to sustain the country's economic growth. The country currently relies on hydropower, other renewables and thermal energy for 86%, 8% and 6% of its energy which is a capacity of 2261 MW that provides 23% of the country with electricity. To boost production of electricity, Ethiopia is focusing on increasing hydropower by constructing more dams and hydropower stations in the Omo River Basin. [12]

Food Security

With a growing population, comes the need to create new jobs and provide sources of food. Ethiopia has an irrigable land potential of between 3.7 and 4.3 million hectares of which 7 – 10% of this is actually irrigated. This area consists of 55% irrigation schemes that are traditional, 20% modern small-scale schemes and 25% medium to large scale commercial farms. The country is focusing on improving crop production through constructing several dams and reservoirs; and expanding irrigation schemes. Irrigation in the country is heavily reliant on rainfall but the country has plans to change that. [12]

Pressures

Water Abstraction

Hydropower Generation

Ethiopia has three power stations in the Omo River Basin; Gibe I, Gibe II and Gibe III with plans for the future Gibe IV and V. The

Gilgel Gibe I is a 1,700 m long and 40 m tall rock-filled dam on the Gilgel Gibe River that started construction in 1988, commissioned in 2014 with a hydroelectric power plant with an installed capacity of 184 MW. Water from the dam is diverted to the power station and then discharged back to the Gilgel Gibe River. This water is then channelled through a 9.2 km long tunnel to the Gibe II Station that goes through a mountain ridge. Gibe II power station has an installed capacity of 421 MW which consist of four 107 MW generators that are operated by four Pelton turbines which are powered by water from a headrace that runs 26 km under the Fofa Mountain and eventually converts into a penstock with a 500 m drop. The water is then discharged into the Omo River.

Ethiopia is in the process of increasing its hydropower capacity from 2.3 Gw in 2016 to 10 GW in 2018, 17 GW by 2020 and 35 Gw by 2037 to establish the country as a regional renewable energy hub. Gibe III Dam is in the Southern Nations Nationalities and Peoples' Region. It is a 610 m long and 243 m high roller-compacted concrete dam with a reservoir capacity of 14.7 km³ and a surface area of 201 km². Water is fed into the power house Nationalities and Peoples Regional State which is in the Omo River Basin and sets to include tracts of land from the Omo National Park and Mago National Park.¹ Four sugar mills and factories are also planned for development in this area.

Cotton is grown in the country on about 80,000 hectares of land which a drop in the ocean compared to the 1,000,000 hectares the government has earmarked for cotton irrigation for 2030. However, Ethiopia is currently the second highest producer of cotton in Africa and looks to improving its foothold in the cotton production sector. A 15 year national cotton development strategy covers the need for an environmentally, economically, socially and industrially beneficial system for producers and the nation alike. This strategy looks to providing stakeholder engagement and promote sustainable production practices while improving textile and garment production, industrialization process, foreign currency earnings, job creation and the country's GDP. [13] It is not clear what part of the country this strategy will focus on for the development of the cotton farms but due to the water irrigation plans in the Southern Nations, Nationalities and Peoples Regional State, the area could see some potential development for this purpose.

State

Looking at the water level changes of Lake Turkana over time, the late 1800 to the mid-1900s saw the water level drop 20m. The level then rose 5- 10 m from the 1970 – 1980 and reduced to current levels of an average of 30.2 m in 1990. [14] These infrastructural projects have various effects on the environment as they take away water from the basin changing the ecology of the water system. One of the objectives of Gibe III is to regulate flow of the Omo River and modify the annual flood regime downstream. [15] During its construction, the project will destroy natural vegetation, whole ecosystems and completely change the geography of the area it is being constructed in. further downstream as the dam is filling up, water flows will reduce leading to loss of aquatic life and effects on ecosystems downstream. At the south end of the basin, Lake Turkana is projected to reduce 20 metres or more

through two penstocks that branch into five tunnels for each turbine that operates ten 187 MW generators for a total capacity of 1870 MW. A Memorandum of Understanding to purchase electricity from the dam has been signed by Kenya will transmission lines currently under construction, potentially linking the electricity grids in both countries. Ethiopia is also looking to export electricity to Sudan, Uganda and Djibouti. The Gibe IV and V are proposed to be built further downstream with 1,470 MW and 660 MW capacity respectively. Gibe IV would likely have similar effects on the water system as Gibe III. [12]

Irrigation

The Lower Omo region is set to be Ethiopia's largest irrigation area with 445,000 hectares of land available for agricultural development. One such project in the area under the Ethiopian Construction Works Corporation is the construction of a 41 km long canal, which will supply 125,000 m³ of water for irrigation. Within this region, 200,000 hectares of government run plantation and seven sugar processing factories are planned that would rely on water from this water canal. 100,000 hectares of this irrigation land lies in the Southern Nations, reducing fish numbers and potentially reducing biodiversity. As inlet water quantity reduces, the salinity of the water would increase contributing to biodiversity loss. [16]

The irrigation project on their own have the potential to cause a lot of harm to the water ecology of the area and downstream. Apart from the destruction of local natural habitats for crop irrigation, cotton and sugar have large water requirements taking away more water than other drought resistant crops would. This water abstraction has negative impacts on aquatic ecosystems downstream. Furthermore, their irrigation can lead to soil salinization as well as freshwater salinization in arid areas such as Ethiopia. Pesticide and fertilizers from cotton and sugarcane irrigation can also be transported into the water system through runoff and have been attributed to biodiversity loss, degradation of water systems and poisoning of wildlife. Sugarcane mills produce runoff rich in organic matter that is known to kill aquatic life and also contains heavy metals, oil, grease, cleaning agents that are poisonous to the ecosystem. [17] As the water upstream continues to be diverted into dams and irrigation schemes, the fish community in the Lake Turkana will be diminish due to their dependency on the flood pulse and the receding areas at the end of the shores for breeding cues. Increased salinity and alkalinity are also a threat to fish populations as the water level reduces. [18] Due to the lack of monitoring of the issue, these could very well be issues that are currently occurring and not a projection into the future state of the dam.

Impacts

As has happened in previous dam projects, the Gibe IV and V are projected to lead to the displacement of people for their constructed as has occurred with the Gibe I, II and II dams. Concerns have also been made on the safety and proposed life expectancy of the Gibe III such as fractures, leaks, mudslides that could potentially fill the dam, and real-life lower efficiency of operation in general. Further downstream as Gibe III fills up, increased competition for water for communities could cause more clashes. Communities that rely on fishing, pastoralism and

agriculture will also be affected by loss of water access, aquatic biodiversity loss and number reduction, as well as regional wildlife like migratory birds that rely on Lake Turkana as a stopover. This will affect the self-sustainability of such communities which would need government assistance to mitigate clashes and provide water and food for the foreseeable future. Residents that rely on the potable water of Lake Turkana would be faced with a future with no reliable drinking water as the lake becomes more saline from the reduction in inlet water. [19]

In the past, a 30,000 hectare palm oil plantation was established in the Omo Valley in 2010 that was forcefully taken by the government from the members of the Suri tribe, which led to few arrests and led to some of the members protests that led to the death of 54 unarmed Suri people at the hands of the government. Despite this, displacement of people for 300,000 hectares of land is set to happen in South Oromo for proposed sugar and cotton plantations. The past is set to repeat itself if not handled correctly. This will disrupt these people's way of life including their social, economic and cultural connection to the land with around 200,000 indigenous people are heavily reliant on the Omo River for their survival. The emphasis on large scale cash crop farming takes the conversation away from small scale farming which is the basis of livelihood for many communities. The main form of farming in the Omo Delta is through the use of flood retreat cultivation will be threatened by the dam's flood control measures which will affect their cultural and economic way of life. Flood waters that bring down rich silt will no longer be available making farming in the area obsolete.

Responses

There has been some backlash by some organizations such as the Friends of Lake Turkana against the construction of the Gibe III dam and subsequent dams as well as the abstraction of water for the irrigation use. These organizations call for the need for cultural protections of the people's ways of life and historical sights through opening dialogue with the UNESCO World Heritage Committee, pushing the Governments of Kenya and Ethiopia to both take an independent environmental assessment of the effects of the Gibe II dam to shed a light on the potential negative effects of the dam on the ecosystem and the livelihoods of the indigenous people that rely on the basin. Their main basis is an Environmental Impact Assessment by the African Development Bank that pointed to the loss of 85% of annual flow during the filling of Gibe III; the drying up of the Ferguson Bay in Lake Turkana which is an area that communities rely on for fishing; the capture of sediment that would reduce the fertility of flood plains from farming; a change of water quality that could make Lake Turkana saline and no longer a potable water option for communities and wildlife; and the loss of 30% of water downstream from irrigation projects. [17] However, UNESCO rejected the notion to add Lake Turkana as a World Heritage Site in 2012 but has been keen to push for Strategic Environmental Assessments from both governments from 2012 to 2017 despite getting no responses from each side. The last push was made in 2017 where the deadline of February 2018 was set for the submission of both SEAs on the impacts of agricultural and hydropower projects on the Lake Turkana National Parks and the Lower Valley of the Omo. [20] Due to all

these factors, the lake has been added to the List of World Heritage in Danger in 2018 by UNESCO. [21]

IV. CONCLUSION

Despite portions of the lake and lower Omo Delta having been zoned as an international biosphere reserve, the region will continue to face foreseeable threats from a combination of human activities (hydropower dams and irrigation schemes), climate anomalies as well as changes in demography and population. [14] On the other side of the Kenyan border, Ethiopia has the most to benefit from exploiting the water resources in the basin and has plans to do so to improve water security, generate electricity and provide water for crop production under its Growth and Transformation plan. [12] To do so the plan looks at improving agricultural practices of farmers, a shift from low to high value crops and providing water for accelerate and sustainable agricultural growth. This contributes to the country's plan to become a middle-income country by 2025. As it pushes to do, it puts a strain on the water shed.

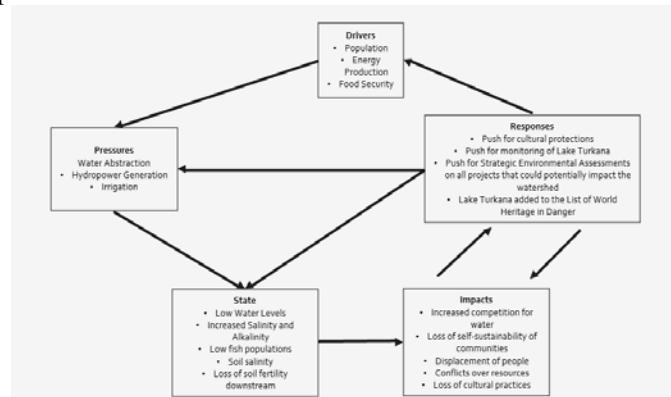


Figure 3: Summary of the DPSIR Framework of the Omo River Basin

The main challenge of this case study is the lack of accurate and updated water information. Its unavailability makes quantitative analysis impossible thus heavily relying on projections from old data and hydrological modelling from secondary sources such as satellite imagery. These tools are able to provide a clear direction on how development could affect the ecosystem but first hand water analysis would be the best option in terms of provide clear fact-based data that can be used to push for the protection of the Omo River Basin transboundary water resource. Despite this a qualitative analysis of the management of the transboundary was possible and thus achieved. The main trend of the cooperation between the two countries was purely on an economic development level with unclear information on cooperative cost sharing and benefit sharing arrangements.

In general, there is a lack of monitoring and evaluation on water based energy, industrial and agricultural projects, the avoidance of the acknowledgment of an Environmental Impacts Assessment from the African Development Bank and the lack of Strategic Environmental Assessments from either countries despite a push from UNESCO due to the possible effects on Lake Turkana National Park – a world heritage site. Despite all these issues, the projects are still underway with a clear lack of sustainability due

to the avoidable future negative impacts on the environment and the lives of the people that rely on the water basin. It's only a matter of time when these issues will create real avoidable repercussions that these two countries will have to deal with.

ACKNOWLEDGMENT

I thank all the researchers who have put their heart, soul and time into quantifying the changes that are occurring to our natural landscapes from which policies and decisions can be based on to protect these resources.

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Effects of Regular Exercise Programme on the Health Related Physical Fitness of Obese and Non-Obese Female Undergraduate Students

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Abstract- The purpose of this study was to investigate the effects of regular exercise programme on the health related physical fitness of obese and non-obese undergraduate students. To achieve this, purposive sampling technique was used to select a total of sixty four (64) subjects who were further divided into experimental and control groups through the simple random sampling technique from Ahmadu Bello University, Zaria, Nigeria. The experimental groups of obese and non-obese went through interval training programme for twelve (12) weeks. Both the experimental and control groups of obese and non-obese went through pretest and post-test in the 12 minutes Cooper distance run test. Results of the experimental groups after 12 weeks of training reveal a Vo₂ max (Obese; 23.9<29.3 and non-obese; 24.6<35.1), standing broad jump (Obese; 101.6<134.0 and non-obese; 109<153.1), modified sit ups (Obese; 36.0<53.8 and non-obese; 40.8<59.1), and flexibility rating of the subjects (Obese; 11.36<19.1 and non-obese; 13.4<19.2). The effects of the training on the weight of the subjects (Obese; 88.4>80.9 and Non-obese; 61.>59.1) and percent body fat were (Obese; 34.8>31.7 and Non-obese; 26.2>25.4). The analysis of variance two (ANOVA 2) was used to determine the differences and interaction effects among the obese experimental and control groups. The study showed generally significant differences in weight, percent body fat, Vo₂Max, muscular strength, local muscular endurance and flexibility of the obese and non-obese female adults but the effects were more among the obese group. It is recommended that regular exercise programme of 30-45 minutes, 3-4 days per week at 60-70% of an individual Vo₂Max are most effective in improving and maintenance of health and physical fitness of female adults and should therefore be encouraged among Nigerian women.

I. INTRODUCTION

Exercise scientist and Health/fitness professionals have for years maintained that regular participation in physical activity is the best defense against many hypo kinetic diseases, metabolic diseases and disorders (Haruna, 2000). The importance of regular physical activity in preventing these diseases and maintaining a high quality life has recently received recognition in Nigeria. Number of previous studies have clearly supported how regular physical activity enhances health and reduces the risk of coronary artery diseases (CAD), hypertension and stroke and as well as

diabetes, osteoporoses, obesity and other metabolic chronic disorders. Regularly Exercise is the least expensive medicine commonly recommended in the treatment of obesity as a means of increasing energy expenditure (Haruna, 1994).

Heyward, (1998) suggested that physical activities which are continuous in nature and have moderate or high energy expenditure such as running, walking, cycling, swimming etc. are recommended. Haruna (1994) stated that there are several benefits that can be obtained by obese individuals with regular exercise training, stressed that in addition to the possible body composition change, it may increase aerobic capacity, increases high density lipoprotein cholesterol, decreases blood pressure, increase insulin sensitivity, reduce psychological stress and ones sense of well being. If regular exercise is long enough per session, intense enough and done at least three to four times per week, it causes effective weight loss and greatly enhances dietary restriction (Haruna, 1994).

Regular exercise at appropriate level is currently the most significant factor contributing to physical fitness, health and productivity of an individual. There is evidence to show that moderate amount of regular exercise is needed for the maintenance of functions integrity of the cardiovascular system, muscles, bone and ligaments (Haruna, 1993). There is also evidence that regularly performed exercise will protect against coronary artery disease, diabetes and obesity (Chado, 1992; Haruna, 1994).

Obesity can be defined as body fat weight that exceeds the desirable level for a given age, sex and skeletal frame by more than 20% (Sharkey, 1997; Public Health Service, 1988). These excess body weight and fatness pose a threat to both the health and quality of one's life. Obese individuals has a shorter productive life and great risk of coronary heart disease, hypercholesterolemia, hypertension, diabetes mellitus, cancer, chronic obstructive pulmonary disease (Sharkey, 1997; Heyward, 1998).

The number of people who are found nowadays overweight today is much more than what it was a century ago. This statement is especially true, for the increasing number worldwide of obese adults. Unfortunately, statistics on obese persons are not significantly available in Nigeria to buttress this point (Preh, 2002). But the available statistics for countries like the United States of America was reported that about 60 Million women, between the ages of 18 to 79 are too fat and should reduce their weight (Preh, 2002). Since many of these chronic diseases have

their roots in childhood and adolescence, the amount of adipose tissue is currently of interest since body fat distribution, adipose tissue, metabolism abnormalities in lipid and carbohydrate metabolism are associated in adults (Haruna, 2001). Fat distribution refers to location of fat and not to the absolute or relative amount of fat. Adults with a more central distribution of fat (e.g relatively more on the abdomen than the extremities) are apparently more at risk of cardiovascular diseases and non-insulin dependent diabetes (Preh, 2002).

Exercise fatness has a negative effect generally on performance, especially on those tasks that require be moving or projecting. Hence, there is the need to consider health related physical fitness and physical performance among female adults. This study therefore was carried out to investigate among others the effects of regular exercise programme on obese and non-obese female adults selected from among the undergraduate students in Ahmadu Bello University, Zaria, Nigeria.

II. METHODOLOGY

SAMPLE:

The subjects of this study were drawn from the various Faculties in Ahmadu Bello University, Zaria based on interest and willingness to participates in the programme. The purposive sampling technique was used in this study because only subjects who satisfied the predetermined criteria of been females and undergraduate students were selected. The Body Max Index (BMI) was used to classify the obese and non-obese individuals in accordance with Heyward (1998) classification using the formula, weight in kilograms divided by the square of height: wt(Kg).

BMI of 23% to 30%	Normal (Non-Obese)
BMI >32%	= Obese (Obese)

A total of sixty four (64) female undergraduate subjects from Ahmadu Bello University in Nigeria were selected for the study, thirty two (32) Obese and thirty two non-obese. The simple random sampling technique was used to classify subjects into experimental and control groups through folded pieces of papers in which "EXP", meaning (Experimental) and "CON" meaning (Control) were picked by the subjects. At the end of the exercise, sixteen obese were in the experimental group while sixteen were in control group. Similarly, sixteen non-obese subjects were in the experimental group while sixteen non-obese were in the control group.

ASSESSMENT OF SUBJECTS

For the purpose of this research, the following assessments were conducted for the determination of the health related physical fitness of the obese and non-obese female undergraduate subjects.

WEIGHT AND HEIGHT

Heyward (1998) procedures were followed to measure the weight and height of the subjects. The height was recorded in metres (m) and the weight in kilograms (Kg). the subjects were dressed in minimum amount of clothing, such as sportswear without shoes. The measurements of height and weight were done using the "Shemong Model Weighing Scale Machine" (2000).

PERCENT BODY FAT

The Percent Body Fat measurement was determined using the Skin folds method (Lange) date. The Skin folds measurements were taken on the right side of the body mainly triceps and sub-scapular and recorded in millimeter (mm), then, converted to body density and late transformed into percent body fat.

The body density was calculated using the equation reported by Heyward (1998). This equation was fond to predict body density for black female adults using the following formula.

Body Density = $1.0970 - 0.00046971 \text{ (triceps skin fold)} + 0.00000056 \text{ (sub-scapular skin fold)} - 0.00012828$. The body density values were then converted to percentage body fat through the Siri formula (Heyward, 1998).

$$\% \text{ Body Fat} = \frac{(4.85 - 4.39)}{\text{Body Density}}$$

VO₂ MAX

The Vo₂ max was estimated using the "Field test", (12 minutes cooper distance run test) as reported by Heyword (1998). A standard track (400 metres) was used for the test with placed markers that divided the course into quarter or eight of a kilometer so that the exact distance covered in 12 minutes were easily determined (Heyward, 1998). The subjects were instructed to run as fast as possible in 12 minutes. They ran until a whistle was blown at the end of 12 minutes. The distance covered by each subject was calculated and recorded in metres.

The Vo₂ max was calculated using cooper equation reported by Heyward (1998).

$$\text{Vo}_2 \text{ max} = \frac{(\text{Distance in metres} - 504.9)}{44.73}$$

MUSCULAR STRENGTH

The explosive power of the lower limb was measured using the "Standing broad jump" as recommended and described by Heyward (1998) for explosive power of the lower limb in jumping forward. The subjects were encouraged to jump as far as possible to a long distance. The subject stands with feet parallel to each other and behind the starting line, the subject bends the knee and swings the arm and jump forward as far as possible. Only three (3) trials were allowed in which the amount of force generated in one best maximum effort was recorded. The distance to the nearest centimeter at the end of the jump was measured.

LOCAL MUSCULAR ENDURANCE

The local muscular endurance was determined using "Modified sit-up" as described in Heyward (1998). The modified sit-ups was chosen considering the female physiological disadvantage from the hip which is comparatively heavier than that of the male.

To assume the starting position, the subject lies on her back with the knees flexed, feet to the floor, with the heels between 12 and 18 inches from the buttocks. The arms are crossed on the chest with the hands on the opposite shoulders. The feet are held by partners to keep in touch with the testing surface. The sit-ups are completed when the subject returns to the down position until the mid-back makes contact with the testing surface.

The timer gave the signal "ready – go", and the sit-ups performance started on the word "go". Performance was stopped on the word "stop". The number of correctly executed sit-ups performed in 60 seconds was recorded as the score. Rest between

sit-ups was allowed and the subject was aware of this before initiating the test. However, the objective was to perform as many correctly executed sit-ups as possible in 60 seconds.

FLEXIBILITY

The flexibility of the subjects was determined using the vertical toe sit and reach test of lumber flexibility. The test was reported to be both valid (Dikki, 1992) and reliable (Dikki, 1994).

- The subjects sat flat on the mat with the legs stretched straight, toes pointing up.
- The hands with fingers stretched wide apart, go over the toes with the head and body erect.
- Ruler, calibrated in centimeters (cm) was placed under the finger to measure part of the fingers that extended over the toes. What was obtained was recorded.
- The score was measured to the nearest centimeter.

STATISTICAL TECHNIQUE

Groups	T ₁	T ₂	D
Obese experimental	88.4 ± 8.7	80.98.1	WEIGHT (Kg)
Obese control	91.0 ± 15.9	92.0 15.4	
Non-obese experimental	61.3 ± 5.9	59.1 5.7	
Non-obese control	58.8 ± 4.7	59.7 4.4	
Obese experimental	34.8 ± 23	31.7 2.2	% BODY FAT
Obese control	34.8 ± 2.1	34.9 2.1	
Non-obese experimental	26.6 ± 0.1	25.4 1.0	
Non-obese control	26.03 ± 1.2	26.6 1.9	
Obese experimental	23.9 ± 3.1	29.3 3.0	VO ₂ MAX
Obese control	22.5 ± 2.8	19.0 5.3	M ² /Kg ⁻¹ m ⁻¹
Non-obese experimental	24.6 ± 2.6	35.1 3.7	
Non-obese control	24.1 ± 3.0	22.0 3.1	
Obese experimental	101.6 ± 20.6	134.0 21.1	MUSCULAR
Obese control	110.9 ± 17.6	94.8 31.0	STRENGTH (cm)
Non-obese experimental	109.2 ± 19.6	153.1 17.9	
Non-obese control	118.8 ± 5.0	109.8 19.9	
Obese experimental	36.0 ± 6.4	53.8 6.7	LOCAL MUSCULAR
Obese control	35.6 ± 3.4	26.4 7.8	ENDURANCE (No/m ²)
Non-obese experimental	40.8 ± 2.7	59.1 5.7	
Non-obese control	39.3 ± 2.7	34.9 4.0	
Obese experimental	11.3 ± 2.4	19.1 8.3	FLEXIBILITY (cm)
Obese control	10.3 ± 4.7	07.8 5.4	
Non-obese experimental	13.4 ± 8.2	19.2 3.0	
Non-obese control	11.5 ± 3.1	10.3 3.1	

KEY:

- T₁ = Pre-test (Before training)
 T₂ = Post-test (Test conducted after 12 weeks of training)
 D = Amount of Training effects after 12 weeks

Table 1.1 shows improvement with training among the obese and non-obese experimental groups in all the measured variables. The mean weight of obese experimental group before training was 88.4 while the post-training weight was 80.9 compared to obese control group whose pre-training weight mean was 91.0 and post training weight mean was 92.0. Similarly, the non-obese experimental group had a pre-training weight mean of 61.3 and post training weight mean of 59.1 compared to non-obese control group whose pre-training weight mean was 58.8 and post-

The descriptive statistics of mean and standard deviation were computed for the purpose of interpretation.

Analysis of variance two (ANOVA 2) was the statistics used to see the differences and interaction effects between the obese experimental and control group, non-obese experimental and control group.

Scheffe's post-hoc analysis was used to locate the point of significant difference.

III. RESULT

Table 1.1

Mean and standard deviation of results of the obese experimental and control and non-obese experimental and control in weight and health related fitness tests.

training weight mean of 59.7. the result on the weight of subjects showed that both the obese and non-obese experimental groups lost much weight as a result of the training but the obese group lost more weight than the non-obese group. On percent body fat, the obese experimental pre-test mean was 34.8 while the post test mean was 31.7 compared to obese control group whose pre-test mean was 34.8 and post-test mean 34.9. similarly, the non-obese experimental group had a pre-test percent body fat mean of 26.2 and post-test mean of 25.4 compared to the non-obese control group whose pre-test mean was 26.0 and post-test mean 26.6. The

result on percent body fat of subjects showed that both the obese and non-obese experimental group lost some fats as a result of the training but the obese group lost more fats than the non-obese group. On $\text{VO}_2 \text{ MAX}_1$ the obese experimental pre-test mean was 23.9 while the post-test mean was 29.3 compared to obese control group whose pre-test mean was 22.5 and post-test mean of 24.6 and post-test mean of 24.6 and post-test mean of 35.1 compared to non-obese control group whose pre-test mean was 24.1 and post test mean 22.8. On muscular strength, the obese experimental pre-test mean was 101.6 while the post-test mean was 134.0 compared to obese control group whose pre-test mean was 110.9 and post-test mean 94.8. Similarly, the non-obese experimental group had a pre-test mean of 109.2 and post-test mean of 153.1 compared to non-obese control group whose pre-test mean was 118.8 and post-test mean 109.8. On local muscular endurance, the obese experimental group had a pre-test mean of 36.0 and post-test mean

of 53.8 compared to obese control group whose pre-test mean was 35.6 and post-test mean 26.4. Similarly the non-obese experimental group had a pre-test mean of 40.8 and post-test mean 59.1 compared to the non-obese control group whose pre-test mean was 39.3 and post-test mean of 11.3 and post-test mean of 19.1 compared to obese control group whose pre-test mean was 10.3 and post-test mean 7.8. Similarly, the non-obese experimental group had a pre-test mean of 13.4 and post-test mean of 19.2 compared to the non-obese control group whose pre-test mean was 11.5 and post-test mean 10.3. Generally, the experimental groups of both obese and non-obese performed better in $\text{Vo}_2 \text{ max}$ test, muscular strength test, muscular endurance test and flexibility test. However, the non-obese experimental group performed better than the obese experimental group in the above variables.

Table: 1.2

Summary of anova two for differences between groups in body weight percent body fat, $\text{Vo}_2 \text{ Max}$, muscular strength, local muscular endurance and flexibility.						
	Variable	Source	Df	Ss	Ms	f-ratio
1	BODY WEIGHT	BTW-GRPS	11	38055.5	3459.6	38.8
		W-GRPS	180	16050.8	89.2	
		TOTAL	191	54106.4		
INTERACTION						
	BODY WEIGHT	GROUPS	4	37800	12600.1	141.33**
		TRAINING	2	67.6	33.8	0.4
		TRAINING&GRPS	6	187.5	31.3	0.4
	$R^2 = 0.70$	**Significant				
		BTW-GRPS	11	3014.1	274.0	101.2
		W-GRPS	180	487.5	2.7	
		TOTAL	191	3501.6		
INTERACTION						
2	PERCENT BODY FAT	GROUPS	4	2968.8	989.6	365.4**
		TRAINING	2	11.5	5.7	2.1
		TRAINING & GRPS	6	33.8	5.6	2.1
	$R^2 = 0.86$	**Significant				
		BTW – GRPS	11	3205.3	291.4	29.2
		W – GRPS	180	1798.2	10.0	
		TOTAL	191	5003.5		
INTERACTION						
		GROUPS	4	18.39.1	613.0	61.4**
		TRAINING	2	259.7	129.9	13.0
		TRAINING & GRPS	6	1106.5	184.4	18.5
	$R^2 = 0.64$	**Significant				
		BTW – GRPS	11	42534.8	3866.8	9.8
		W – GRPS	180	71395.4	396.6	
		TOTAL	191	113930.2		
INTERACTION						
		GROUPS	4	13245.4	4415.1	11.1**
		TRAINING	2	6582.4	3291.2	8.3
		TRAINING & GRPS	6	22706.9	3784.5	9.5
	$R^2 = 0.37$	**Significant				
		BTW – GRPS	11	15172.4	1379.3	54.0
		W – GRPS	180	4597.6	25.5	
		TOTAL	191	19770.0		
INTERACTION						

		GROUPS	4	8944.8	2981.6	111.7
		TRAINING	2	1094.1	547.0	21.4
		TRAINING & GRPS	6	51.5	855.6	33.5
	R ² = 0.77	**Significant				
	FLEXIBILITY	BTW – GRPS	11	2635.9	239.6	9.0
		W – GRPS	180	4845.6	26.0	
		TOTAL	191	7481.5		
	INTERACTION					
		GROUPS	4	1808.0	602.6	22.4**
		TRAINING	2	195.3	97.66	3.6
		TRAINING & GRPS	6	632.6	105.4	4.0
	R ² = 0.35	**Significant				

Table 1.2 is a summary of ANOVA TWO indicating differences between four groups of obese experimental and control and non-obese experimental and control in body weight, percent body fat, Vo₂ max, muscular strength, local muscular endurance and flexibility.

Column 1 of the table focused on body weight of the four groups and the 12 weeks training programme the experimental groups went through. It shows that significant difference exists in weight loss between the experimental groups (Obese and non-obese) and the control groups. The experimental group lost some weight while the control groups do not.

Column 2 of the table is a summary of ANOVA 2 indicating differences between the four groups as a result of the 12 weeks regular training programme the experimental groups went through. It shows that significant difference exist in percent body fat loss between the experimental and control groups. The obese and non-obese experimental groups lost some body fats while the control groups did not.

Column 3 of the table is a summary of ANOVA 2 indicating differences between the four groups in Vo₂ max as a result of the 12 weeks regular exercise programme the experimental groups (Obese and non-obese) went through. It shows that significant difference exit in Vo₂ max between the experimental and control groups (Obese and non-obese). The experimental groups of obese and non-obese improved in their Vo₂ max as a result of the training.

Column 4 of the table is a summary ANOVA 2 indicating differences between the four groups in muscular strength as a result of the 12 weeks regular exercise programme the experimental groups of both obese and non-obese went through. It reveals that significant difference exist in muscular strength between the experimental and control groups. The experimental groups of obese and non-obese performed better in explosive power of the lower limb as a result of the training.

Column 5 of the table in summary of ANOVA 2 indicating differences between the four groups on local muscular endurance as a result of the 12 weeks regular exercise programme the experimental groups of obese and non-obese went through. It shows that significant difference exists in local muscular endurance between the experimental and control groups. The experimental groups of obese and non-obese performed better than the control groups in modified sit-ups for local muscular endurance as a result of the training.

Column 6 of the table is a summary of ANOVA 2 indicating difference between the four groups on flexibility as a result of the 12 weeks regular exercise programme the

experimental groups of obese and non-obese went through. It reveals that significant difference exist in flexibility between the experimental and control groups of obese and non-obese. The experimental groups of obese and non-obese performed better than their control groups counterparts in the sit and reach test flexibility.

IV. DISCUSSION

The results of this study showed significant effect of 12 weeks of regular exercise training on the body weight of the female adults. The result showed that the obese lost more weight than the non-obese (4.4563< 0.05) and (3.1375< 0.05) respectively. The finding is in agreement those of studies reported by Vebjateswarky (1987), Chado (1992) and Haruna (1994). They reported that regular exercise will lead to weight loss especially among the obese. This was in agreement also with the findings of Peckham, et al (2002) in Hayward (1998) who stated that effective weight loss after long-term commitment to a regular programme of exercise. The amount of weight lost as a result of regular training was more on the part of the obese than the non-obese. On this instance, the obese benefited more from the regular exercise training or the training had more effect on the obese than the non-obese. This result is in line with the findings of Epstein et al, (1994) in Hayward (1998) who reported that weight loss from regular exercise programme averaged about 0.3 pound per week for obese individuals and 0.11 pounds per week for normal weight subjects. This result was also supported by Haruna (1994) who reported that regularly exercise reduces weight and is the least expensive medicine commonly recommended in the treatment of obesity.

Both the obese and non-obese subjects in the experimental group had significant decrease in their body fat percent due to the 12 weeks regular exercise programme. The Scheffe post-hoc analysis revealed that the obese group lost more fats than the non-obese as a result of the training. The result revealed that the obese group benefited more from the 12 weeks regular exercise programme with mean (2.06) as against the non-obese (0.81). The result of this research agrees with the findings of Standford (1987) who reported that exercise is associated with the loss of body fat in both obese and non-obese persons. Haruna (2000) expressed that an improvement in physical fitness is accompanied by a reduction in body fat. Heyward (1998) was of the opinion that, regular exercise ensures that the weight loss is due to loss of fat rather than muscle tissue. Also in agreement with this result are

Oscai and Millers (1986) in Hayward (1998) who maintained that exercise is associated with the loss of body fat in both obese and non-obese persons although, the losses are usually small.

The result of this research showed significant effects of 12 weeks regular exercise programme on the experimental groups of obese and non-obese female adults. The findings are in line with those of studies reported by Chado (1988). He reported significant improvement in $\text{Vo}_2 \text{ max}$ of female as a result of regular exercise training programme. He further reported that during the initial three weeks of regular training, the oxygen consumption of the girls improved. This shows generally of the training effects to improve maximal oxygen consumption. Similarly, Chado, (1988) reviewed studies $\text{Vo}_2 \text{ max}$ adaptation to physical training programme in general, and reported that regular exercise training programme in general, which is 3-4 days/weeks, 30-45 minutes duration and with workload up to 60% maximal heart rate was enough to cause improvement in cardiovascular and respiratory system.

Significant effects of 12 weeks regular exercise programme was noticed in obese and non-obese experimental groups in the area of muscular strength. The findings are similar with those of studies reported by Sharkey (1997) and Chado, (1988). They reported that training effects on muscular strength are most noticeable in fast twitch fibers. These include increases in contractile (contracting) proteins (actin and myosin) and tougher connective tissue. They further revealed that the increased strength comes from the increased cross-sectional area, which means more contractile protein to exert force.

The local muscular endurance also improved significantly as a result of 12 weeks interval regular exercise programme among the obese and non-obese experimental groups. The findings are in line with those of studies reported by Sharkey (1997), and Chado (1988). They reported a high level of respiratory control and oxidative phosphorylation which increase the electron transport system capacity. These are often associated with rise in more ATP production, consequently improving endurance performance. They further revealed that the transport system improves first and foremost during exercise training. Then, next is the oxidative metabolic capacity of the active skeletal muscle cells due to improved aerobic enzymes. These changes enhance individual maximal oxygen utilization for a long period therefore delay fatigue during exercise.

In the area of flexibility, significant effect was recorded as a result of 12 weeks regular exercise programme by both obese and non-obese experimental groups. This results goes in line with those studies reported by Verducci, (1980), Dikki, (1992, 1994) and Dikki et al, (1994). Similarly, Nemy (1993) reported that increase in range of movement did occur due to the training routine and the manner in which the exercises were performed. Heyward in (1998) maintained that to improve rate of motion at the joint, the muscle group must be overloaded by stretching the muscles beyond their normal resting length – but never beyond the pain free range of motion. Periodically, there is need to increase both the amount of time the stretched position is maintained and the number of repetition of the exercise to ensure the overload required for further improvement.

V. CONCLUSION

Regular exercise has been shown to promote health and physical fitness. Available research data suggest that regular exercise training serves a protective measure against the incidence of degenerative diseases. It similarly reduces variety of risk factors for the incidence of several disorders like coronary heart disease, hypertension, obesity, cancer and depression. The following were highlighted by this study:-

1. Regular exercise programme involving obese and non-obese experimental groups for 12 weeks significantly lowered the weight and percent body fat of the female adults. The same programme also led to significant increase in $\text{Vo}_2 \text{ max}$, muscular strength, local muscular endurance and the flexibility of the female adults.
2. The training groups differed in their weight and percent body fat. The obese experimental group lost more weight and percent body fat than their non-obese counterpart. This revealed that, the obese group benefited more or that the regular exercise programme had more effects on the obese groups than the non-obese group.
3. The training groups also differed in their $\text{Vo}_2 \text{ max}$, muscular strength, local muscular endurance and flexibility. The non-obese experimental groups were better than the obese experimental group in the above variables.

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Effect of Chitosan on Growth Parameters of Rootstock and Grafting Success of Jack Fruit (*Artocarpus heterophyllus*) Variety Father Long

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Abstract - A study was conducted to investigate the effect of Chitosan on seedling growth and grafting success of Jack Fruit (*Artocarpus heterophyllus*) variety Father Long. Chitosan was applied as a seed treatment and seedling spray to root stock before grafting. It was used alone or combines with fungicide (Mancozeb 70 WP) and Albert's solution i.e. commercial formulation of macro and micro nutrient mixture. Results indicated that spraying of Albert's solution (2g l⁻¹) was the best treatment for higher growth of seedlings. Seed treatment with chitosan (20 g l⁻¹ for 90 min.) or Mancozeb (2 g l⁻¹ for 90 min.) and foliar spraying of Albert's solution showed higher dry matter accumulation of seedling compared to other treatments. Tap root length of the seedlings was higher in all treatments compared to control. Seed treatment by chitosan solution for 90 minutes and spraying of chitosan solution at 10 days after germination of seeds in two weeks intervals was showed early seed germination, higher stem thickness of rootstock and increase grafting success of jack variety Father Long over 80% compared to 40% in control.

Key words - Chitosan, *Artocarpus heterophyllus*, grafting success

I. INTRODUCTION

Jack fruit *Artocarpus heterophyllus* Lam. is an extensively grown tree in Sri Lanka. Although it has very high timber value, it is mainly grown in homesteads due to its food value. Fruitlets or bulbs of jack fruit are used as a vegetable, ripe fruit as well as processed products. Recently Department of Agriculture was released five high yielding, good quality varieties of Jack Fruits. These varieties have a high demand from consumers as well as growers especially due to their excellent quality as a fresh fruit. Among these, Father Long variety is the best variety as a ripe fruit variety. Higher demand is exist for planting materials (grafted plants) of this variety however; production of grafted plants of the variety is very difficult due to lower success rate of grafting. Poor growth of the root stock, larger size of the scion wood of the variety and fungal infection around the graft are the main reasons for lower success rate.

Chitosan, a given name to a de-acetylated form of chitin, is a natural biodegradable compound derived from crustaceous shells such as crabs and shrimps (Sandford 1989). Chitosan has been proven to control numerous pre and post-harvest disease on various horticultural commodities (Bautista-Banoset *et al.*, 2006). It has been reported that both soil and foliar plant pathogens fungal, bacterial and viral may be controlled by chitosan application (Bautista-Banos *et al.*, 2006). In addition to its direct microbial activity, other studies strongly suggest that chitosan induces a series of defence reactions correlated with enzymatic activities (Ben-Shalom *et al.*, 2003). Chitosan has been shown to increase the production of glucanohydrolases, phenolic

compounds and synthesis of specific photoalexins with antifungal activity, and also reduces macerating enzymes such as polygalacturonases, pectin metal esterase etc (Awadalla and Mohmond, 2005). In addition, chitosan induces structural barriers for example inducing the synthesis of lignin-like material (Bautista-Banos *et al.*, 2005). Gorniket *et al.*, in 2008 reviled that application of chitosan increased key enzymes activities of nitrogen metabolism (nitrate reductase, glutamine synthetase and protease) and improved the transportation of nitrogen (N) in the functional leaves which enhanced plant growth and development. Therefore, the objective of the studies was to investigate the effect of chitosan on the growth of the seedlings and success of grafting rate of Jack fruit variety Father Long.

II. MATERIALS AND METHODS

Pot experiment was carried out at the Fruit Crop Research and Development Institute Gannoruwa ($7^{\circ} 15' 47''$ N, $80^{\circ} 36' 10''$ E). Seeds were collected from fully matured jack fruits of variety Hirosa i.e. one of the commonly grown jack variety, located in the fruit research orchard Gannoruwa. Gauge 300, black colour and 20 x 30 cm size polythene bags were used as nursery pots. Compost, top soil and sand ratio of 1:1:1 mixture was used as potting mixture. One seed per bag was established and applied treatments accordingly. Chitosan compounds having different molecular weights were prepared by Atomic Energy Board, Colombo, Sri Lanka by Gamma radiation base technology. Efficacy of the different chitosan compounds on seed germination and growth inhibition of fungal pathogen was identified by in vitro test (Rajapakse *et al.*, 2014). One chitosan compound having good fungicidal ability and other having stimulatory ability of seed germination was mixed and used for the study.

Table 1.The treatment combination

Treatments	Treatment Combination Levels
T1	Seed treatment by dipping seeds in chitosan solution at the rate of 20 g l^{-1} for 90 minutes and spraying of chitosan solution at the rate of 20 g l^{-1} at 10 days after germination of seeds in two weeks intervals and spraying was continued 2 times.
T2	Seed treatment by dipping seeds in chitosan solution at the rate of 20 g l^{-1} for 90 minutes and spraying of both chitosan solution at the rate of 20 g l^{-1} and Albert's solution at the rate of 2 g l^{-1} at 10 days after germination of seeds in two weeks intervals and spraying was continued 2 times
T3	Seed treatment by dipping seeds in fungicide solution-Mancozeb 70 WP at the rate of 2 g l^{-1} for 90 minutes and spraying of fungicide solution at the rate of 2 g l^{-1} at 10 days after germination of seeds in two weeks intervals and spraying was continued 2 times
T4	Seed treatment by dipping seeds in fungicide solution-Mancozeb 70 WP at the rate of 2 g l^{-1} for 90 minutes and spraying of Albert's solution at the rate of 2 g l^{-1} at 10 days after germination of seeds in two weeks intervals and spraying was continued 2 times
T5	Spraying of fungicide solution at the rate of 2 g l^{-1} at 10 days after germination of seeds in two weeks intervals and spraying was continued 2 times
T6	Spraying of Albert's solution at the rate of 2 g l^{-1} at 10 days after germination of seeds in two weeks intervals and spraying was continued 2 times
T7	Control

Treatments were arranged in Randomized Complete Block Design with five replications. Each treatment consisted with twenty plants and data were taken from randomly selected ten plants and mean were calculated. Watering was done every other day. No serious pest damages were observed on seedlings. Days to 50% seedling emergence and percentage seed germination of root stock was recorded by observing the emergence of seedlings. Vegetative growth of plants was recorded since the time of grafting. Plant height was taken from the soil surface to epical bud of plant. Stem thickness of seedlings was measured by using a venire calliper in three and six week after seed germination. Fresh weight, dry weight and length of tap root of seedlings were recorded randomly uprooting two plants and drying in an oven at 105°C in three and six week after seed germination. Ten seedlings in each treatment

of each replicate were grafted with scion of jack fruit variety Farther Long 45 days after seedling emergence. Percentage of graft success was recorded by observing viability of scion 3 weeks after grafting.

III. RESULTS AND DISCUSSION

Most of the seeds were germinated and all treatments showed more than 90% seed germination and seedling survival during study period (Table 2). It was similar to the study by Khan (2004) which showed that fresh jack fruit seeds have more than 85% seed germination. Jackfruit seeds are recalcitrant in nature. Furthermore Jalliet *et al.*, (2012) reported that most of the recalcitrant seeds germinated easily, due to low seed dormancy in recalcitrant seeds. This was the reason for high germination percentage of jackfruit in almost all treatments.

Table 2: Effect of different treatments on percentage seed germination and days to 50% seed germination

Treatment	Seed Germination %	Days to 50% seedGermination
T1	100	23.2 ^d
T2	100	23.0 ^d
T3	98	25.0 ^c
T4	100	25.8 ^{bc}
T5	98	27.5 ^a
T6	98	27.0 ^{ab}
T7	100	27.0 ^{ab}
ns		
CV%	4.1	4.7

However, days taken to 50 % germination were significantly different among the treatments. Seeds treated with chitosan germinated quickly compared to other treatments. Defang et al, 2012 reported that chitosan can apply to plants as seed coat, or spray on foliage and improved the germination of several types of seeds. Chitosan has excellent film-forming property, making it easy to form a semipermeable film on the seed surface which can maintain the seed moisture and absorb the soil moisture, and thus it can promote seed germination. Further, it can cut off excessive soil moisture to prevent the seed from corrupting (Furbank *et al.*, 2004).

Table 3: Mean seedling height, root length and stem thickness of Jak Fruit seedlings of root stock at 3 weeks and 6 weeks after seedling emergence

Treatment	Seedling height (cm)		Root length (cm)		Stem thickness (mm)	
	3 weeks	6 weeks	3 weeks	6 weeks	3 weeks	6 weeks

T1	10.3	32.3 ^{bc}	11.7	14.7 ^a	5.4 ^a	6.9 ^a
T2	11.7	34.8 ^a	10.9	15.0 ^a	4.8 ^b	6.0 ^b
T3	10.4	30.8 ^{cd}	9.9	14.8 ^a	4.3 ^c	5.6 ^{bc}
T4	11.2	34.8 ^a	11.0	15.4 ^a	4.6 ^b	5.4 ^{cd}
T5	9.9	29.5 ^{de}	10.1	14.3 ^{ab}	4.2 ^c	4.9 ^d
T6	11.2	33.8 ^{ab}	10.8	15.2 ^a	4.5 ^b	5.3 ^{cd}
T7	9.9	29.0 ^e	9.8	13.5 ^b	4.1 ^c	5.4 ^{cd}
ns			ns			
CV%	6.3	4.5	4.5	5.1	3.4	6.7

Note: Means with the same letter(s) on the column are not significantly different at P≤0.05.

Mean seedling heights of the different treatments were ranged 9.9 cm – 11.7 cm. However, values were not significantly different. Similarly, root length was not significantly different among treatments. Stem circumference were different among treatments and it was highest in the treatment 1 which is seed treatment with chitosan and spraying of chitosan to growing seedlings in two weeks intervals (Table 3).

Seedling heights of the different treatments are ranged from 29.0-34.8 cm and values are significantly different among treatments. Highest seedling height was recorded the treatments which applied Albert solution in two weeks interval. Root length was significantly different among the control and other treatments. Stem thickness was also significantly different among the treatments. The highest value was observed in treatment 1 and treatment 2 and 3 followed by it. Ranasinghe and Weerakkody (2006) reviled that application of Albert's solution to green plants resulted, greater shoot length increase while reducing stem thickness. The results are similar in this study. Treatment 2, 4 and 6 showed higher seedling length while stem thickness is lower in these treatments. Highest stem thickness was recorded from sole Chitosan (T1) treated plants (Table 3). This indicated that application of chitosan have the ability to increase growth of jackfruit seedlings. This performance shows chitosan, because Chitosan also can increase soluble sugar content in the green tissues of plants. To transport these sugars, phloem tissues eventually become larger as a result stem thickness become larger on sole chitosan treatments in jackfruit.

Table 4: Total dry weight on shoot and root and rate of dry matter accumulation on shoot and root of the rootstock.

Treatment	Dry weight 24 DAP (g/plant)	Dry weight 42 DAP (g/plant)	Rate of dry matter accumulation (g/week)
T1	0.81	5.84	1.67 ^b
T2	0.92	6.20	1.76 ^a
T3	0.81	5.48	1.58 ^c
T4	0.88	6.07	1.73 ^a

T5	0.79	4.68	1.39 ^d
T6	0.82	5.62	1.64 ^b
T7	0.73	4.98	1.42 ^d
CV%	4.2		

Note: Means with the same letter(s) on the column are not significantly different at P≤0.05.

Higher rate of dry matter accumulation was recorded from T2 and T4. These were followed by T1. Lowest value of dry matter accumulation on shoots and roots were recorded from control and T5 treatments. Albert's solution treated plants showed high rate of dry matter accumulation at the time of grafting and highest shoot height. This was happened due to foliage of plants can absorb nutrients much as roots can. Elements such as phosphorus nitrogen and potassium move up and down from the point of application at rates similar to that of roots. Also in many cases, 95% of the mineral sprayed to the leaves are use immediately by plants, compared to roots in same conditions (Osborne, 1998).

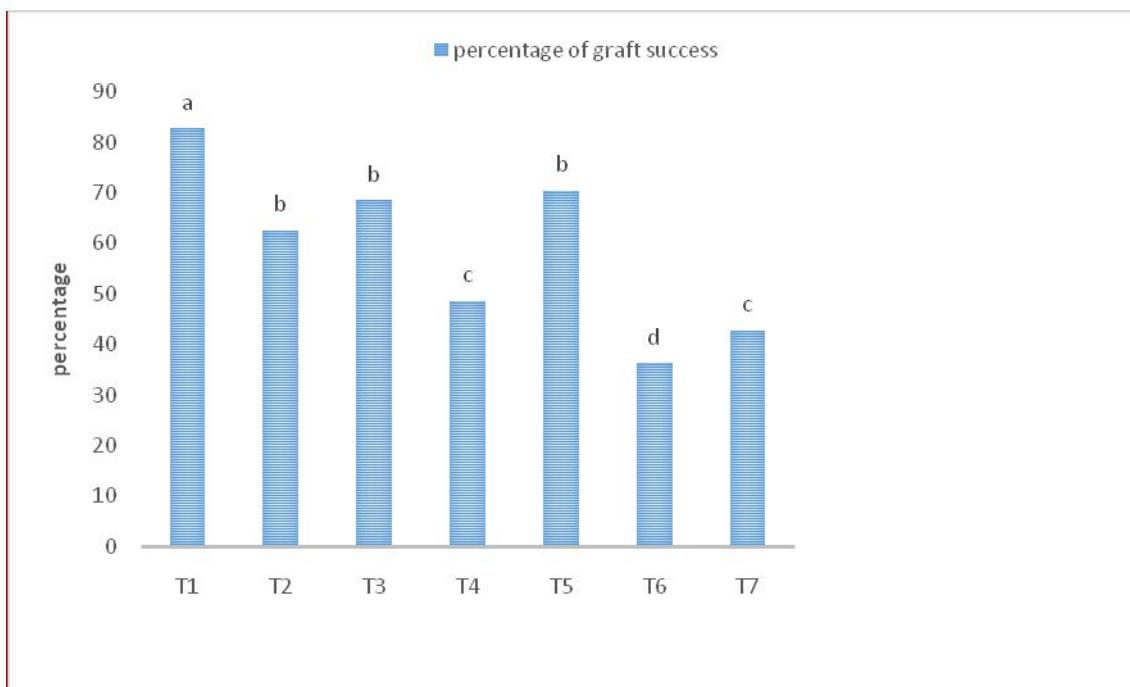


Figure 1. Effect of treatments on grafting success of Jack Fruit variety Father Long

Grafting success was significantly higher in treatment 1 which applied only chitosan compared to the other treatments. Application of chitosan with Albert's solution showed lower grafting success compared to sole chitosan treatment. Fungicide applied treatments also showed higher grafting success compared to control and Albert's solution applied treatments. Several studies showed that chitosan has an ability to accelerate wound healing, delay and inhibit common pathogens in plants and increase vegetative growth of seedlings (Defang *et al.*, 2012, Mondalet *et al.*, 2012, Badawy and Rabea, 2011). Further, Chitosan inherently show anti-fungal properties because chitosan also can increase soluble sugar content and enhance the activity of protease conversion to protein and increasing free amino acid content, which has obvious inhibiting effect for many plant pathogenic fungi. (Chen and Xu, 2005). As a result of this action graft union was not infected by fungi. In this study highest grafting success was observed in chitosan treated plants (T1) compare to other treatments. This may be due to both inhibitions of fungi pathogens as well as wound healing ability of chitosan in stock- scion union of grafted plants.

Furthermore, seedling was grafted; root stock utilizes the stored carbohydrates for survival or growth. Immediate after grafting, shoot does not provide food for survival of root stock until graft union combine. Therefore, seed still intact act as sink for the root stock. chitosan film is also considered to have a good selective permeability, which can prevent oxygen from entering the film, restrict loss of CO₂, and maintain a high concentration of CO₂ in the film, so as to restrain the seed respiration and thus to make the internal nutrient consumption of seeds fall to the lowest possible level. As a result of this, sole chitosan treated seeds provide more food for survival of root stock until graft union combine compare to other treatments.

IV. CONCLUSION

Lower grafting successes of Jack fruit variety Father Long become a problem to expand the cultivation of improved high quality varieties. In present condition grafting success of the variety is below 40%. Seed dipping treatment in chitosan solution (20 g l⁻¹) for 90 minutes and spraying of chitosan solution (20 g l⁻¹) at 10 days after germination of seeds in two weeks intervals was showed early seed germination, higher stem thickness of rootstock and increase grafting success of Jack variety Father Long over 80%.

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Effectiveness of Public Sector Trade Unions: A Case of Public Service Association of Zimbabwe

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Abstract

This study sought to assess the effectiveness of the Public Service Association (PSA) in Zimbabwe, using Harare as the study area. The study employed a descriptive research design with a study sample of 323 respondents. Self-administered survey questionnaires were sent to 317 respondents and in-depth interviews with six key informants were held as data collection methods. The study revealed that the association membership declined by 54.54% from 2010 to the period under study. It was found out that the association has no active workplace workers representative structures as stated by 68.4% of the respondents. 88.3% of the respondents confirmed lack of effective information sharing between union officials and members in Public Service Association. Furthermore, findings show that the Association has no influence over decisions of the employer on issues affecting members such as cutting of wage bill in the civil service and retrenchments, thus failing to protect the interests of members. Serious concerns and expectations were raised by respondents, particularly lack of collective bargaining and a social contract. The results of this study led to the conclusion that the Public Service Association was ineffective and it is recommended that the organisation needed renewal right from the top leadership down to lower structures through a democratic process of free and fair elections as a way of saving the association from collapsing.

Index terms: Labour organisation, industrial relations, collective bargaining, decent work

I. INTRODUCTION

In Zimbabwe, there are fourteen registered public sector unions for civil servants, representing three sectors, namely, health, education and the rest of civil service. The economic challenges experienced from year 2007 to 2018 had a serious impact on private and public sector unions. Despite its liquidity challenges, the Zimbabwe Public Services Commission employs about 188070 civil servants out of its substantive establishment strength of around 280,000 civil servants who occupied various grades and occupations in the service some of which were still vacant since 2006 (Zimbabwe Salary Service Bureau, 2016). Of this number, only 31% belong to public sector unions, with the education sector having 25% majority membership, while the PSA representing rest of civil service having only 4% membership.

The Public Service Association (PSA) is a public sector trade union which represents the rest of the civil service outside the uniformed forces, health and education sectors in Zimbabwe. Although its objectives are to protect and promote the interests of its members, the performance of the association has been a subject of debate among its members and stakeholders for a long time. Some members felt that the association was not performing well while its membership remained low against a wide market share at its disposal. Therefore this research assessed the effectiveness of the Public Service Association in representing the concerns and interests of civil servants. The major objective was to find out what contributes to union effectiveness or decline.

II. REVIEW OF RELEVANT LITERATURE

The theoretical scope of this paper was guided by two theories, namely; the organizational effectiveness and the consumer choice theories. Within the consumer choice theory of union joining behaviour, Farber and Western (2002) argue that higher union effectiveness implies higher returns to membership net of cost. If a union is perceived as "effective" employees are more likely to think they have something tangible to gain from membership either in terms of better wages, better non-pecuniary terms of employment or better insurance against arbitrary employer actions. Thus an increase in union effectiveness will increase the individual's propensity to purchase membership (or remain a member) by shifting the individual's perceptions of the benefits relative to the costs. According to Edwards and Rizzo (2002), relative returns to membership are not the only factors determining employees' union joining behaviour and union membership status, other factors include social background, parental influence, demographic characteristics like age, job characteristics and satisfaction with one's job and working environment.

2.1 Effectiveness of unions in organizing and service delivery

This paper distinguishes and discusses two types of union effectiveness. Firstly, I discuss organizational effectiveness, a term used to describe those factors which give a union the capacity to represent its members by virtue of its 'healthy' state of organization (Bryson, 2003). The second type of effectiveness is the union's ability to "deliver" for members in improving work and working conditions. Together, according to Bryson (2003), these two types of effectiveness signal a union that is effective in representing its membership. The paper considers the meaning of union effectiveness and identifies features of union structures

and behaviour that are correlated with employee perceptions of union effectiveness in delivering for members. Goldman (2002) argued that organizational effectiveness may feed through to improved structures, delivery of outcomes and success in delivering for employees and may encourage non-members to join, providing a sound basis for improved organizational effectiveness. This analysis points to a clear relationship of the two variables. After reviewing some evidence on union effectiveness, Bryson (2003) introduced seven dimensions of organizational effectiveness namely; (1).The union's ability to communicate and share information (2) Usefulness of the union as a source of information and advice (3) The union's openness and accountability to members (4) The union responsiveness to members' problems and complaints (5) How seriously management take the union (6) The union's understanding of the employer's business, and (7)The power of the union.

Bryson (2003) went on to assess unions' ability to deliver improvements in work and the working environment in seven areas as: (a) Getting pay increase (b) Offering protection against unfair treatment (c) Promotion of equal opportunities (d) Making work interesting and enjoyable (e) Working with management for improved performance (f) Increasing managerial responsiveness to employees, and (g) Making the workplace a better place to work.

In the context of trade unions, organizational effectiveness theory argues that, organizing is mobilizing workers and actively involving them in the union, while recruiting is the enrolling of workers into the union (TUC, 2001). Recruitment of membership should focus on all categories of workers regardless of status, sex, religion etc. The theory posits that it is important to give special attention to the involvement of women in trade unions (PSI Study Material, 1995). In organizing women, PSI argues that steps taken in recruiting both men and women are the same. The union's leaders must make sure that members are involved in union activities by organizing seminars, meetings and publishing. When it comes to organizing women, special care must be taken because women have different interest and needs. When women are well organized they can lead, communicate with and persuade others. They can acquire knowledge of trade union techniques and procedures and can lobby for changes in laws and bargain for equal participation and representation in all trade union programmes (TUC 2009). According to TUC, the most overlooked guiding document by many unions is the constitution, yet it is the cornerstone of order and discipline in any organisation.

2.2 Trade union constitution

A constitution is a written document that sets the basic rules and structure of an organization or society in order to carry out its functions smoothly and effectively. Trade union constitutions are regarded as the supreme law of the union. A trade union like any other organization must have a constitution that states its objectives and describes its principles, regulations and how it should run (TUC, 2001). The constitution must be for the interest of its members. It is therefore important that members of the union must know and understand their constitution. TUC (2001) argues that union structures are the functional set up that protect the union democracy and they differ from union to union.

2.3 Union Organisational Structure and Influence

Burchielli (2000) argues that the study of organizational effectiveness in trade unions, an underdeveloped field of academic inquiry, is important as it contributes to the understanding of organizational structure and effectiveness in trade unions. Burchielli, observes that many issues facing trade unions today can only be tackled by strengthening trade union organizational structure. In many cases unions need to look to their organization to ensure that all sections of membership are fully represented and involved.

Fashoyin (2009) argues that unions should consider a number of important areas, to tackle practical problems and consider union policies and experiences and look at the use of relevant legal rights. Unions should improve the way they organize, involve, represent and bargain for their members (ILO, 1997). Emphasis should be placed on practical strategies, and on learning from the experiences of different unions. Increasing skills and techniques to communicate effectively and getting the message over to the members and to the public is a requisite for union organizational capacity.

Barnes and Reid (1981) in their studies on governments and trade unions observed that since 1945 all governments have been concerned about the consequences of trade union power. They argue that governments have regarded the wage increases produced by collective bargaining as inhibiting their attempts to maintain full employment, stable prices and a satisfactory balance of payments and increase the rate of economic growth and generally manage the economy. They found out that when unions have increased industrial power and political influence, their membership increased and vice versa. They noted that in Britain several Acts were created which prohibited civil servants from belonging to unions in membership with Trade Union Congress (TUC) after it incited widespread strikes.

During that period of strife, Ramsay and MacDonald as cited in Barnes and Reid (1981) described the attitude of trade unions representatives as practically a declaration of war, saying: " if we yield now to the TUC we shall never be able to call our bodies or souls or intelligences our own". In support of this statement, Stanley Baldwin in Barnes and Reid, (1981) echoed that it was an attempt to take over power by a body that has not been elected. He said 'if it succeeded it will be the end of parliamentary democracy, which they have taken centuries to build, there can be no negotiations and it can only end in a complete surrender'. These statements reflect how powerful a trade union can be when it has the full support of its membership.

2.4 Membership Concerns and Expectations

2.4.1 Legislation constraints

Most governments allow their employees to form unions/associations yet they prohibit them from engaging in collective bargaining over one or more benefits such as pay, personnel rights, health insurance, or pension contributions, as well as preventing them from going on strike against the government (Edwards 2003, Freeland 1999 & Goldman, 2002). Public sector unions are usually prohibited from collective bargaining with respect to pay or their membership benefits and or rights on the grounds that their employer, the general public, is not represented in such collective bargaining agreements but rather by administrative officials who cannot fully represent nor bind the voter or tax payer to rules or procedures that may conflict with existing or subsequently executed laws and regulations (Nyanga & Chifamba, 2012).

This implies that the legislation might be in place but it may not be implemented. For example, the Public Service Act Chapter 16:04 in Zimbabwe does not give public sector employees outright power to bargain (Mawerera & Lee, 2000). The Zimbabwe Public Service Act does not recognize the right to engage in collective bargaining in the civil service; neither does it recognize the right to strike. This is a major concern in the public sector union membership as PSA is not accorded full rights as workers' organization (ZCTU, 2012). The public service legislation only recognizes consultations and the employer has the final say in decision making. Collective bargaining without the recognition of full right to strike is useless as this tilts the balance of power in favour of the employer. It also violates the International Labour Organization (ILO) Convention of Freedom of Association, which embodies the right to strike and is inseparable from the convention on collective bargaining.

2.4.2 Absence of Social Contract:

In industrial relations, a social contract arrangement was described by Edwards (2003) as one in which both parties, government and trade union, agree to work together to their mutual advantage and to achieve a climate of more cooperative and therefore less adversarial industrial relations. A social contract agreement may include understanding from both sides; for example, government may offer job security linked to productivity and the union may agree to new forms of work organization that might require more flexibility on the part of employees. Five key values for social contract have been set down by Roscow and Casner-Lotto (1998).

- Mutual trust and respect,
- A joint vision for the future and the means to achieve it,
- Continuous exchange of information,
- Recognition of the central role of collective bargaining, and
- Devolved decision making

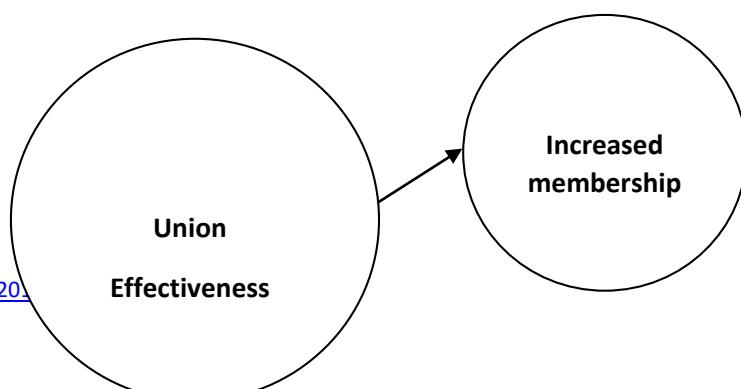
Although the list is not exhaustive, this is what is missing and what the PSA membership expects from the employer for quality service to prevail in the civil service.

III. RESEARCH METHODOLOGY

The study utilised a quantitative research design to explore membership perceptions and experience of PSA service delivery to its entire membership. Self-administered questionnaires and interviews were used as data collection methods. The questionnaire gathered data on PSA effectiveness in terms of organising and service delivery to its members. Interviews with union leadership in Harare were held to gather information about how they conduct union business across all membership divides given their strategic positions in the union structures. The study sample was 323 PSA members and officials based in Harare who were randomly selected in their different workplaces.

IV CONCEPTUAL FRAMEWORK

The effectiveness of a union is measured by its ability to organize and the deliverables that benefit its membership. Delivery effectiveness is dependent on organizing capacity. As shown in the diagram below, union effectiveness depends on organizational effectiveness and delivery effectiveness. Union effectiveness leads to increase in membership.



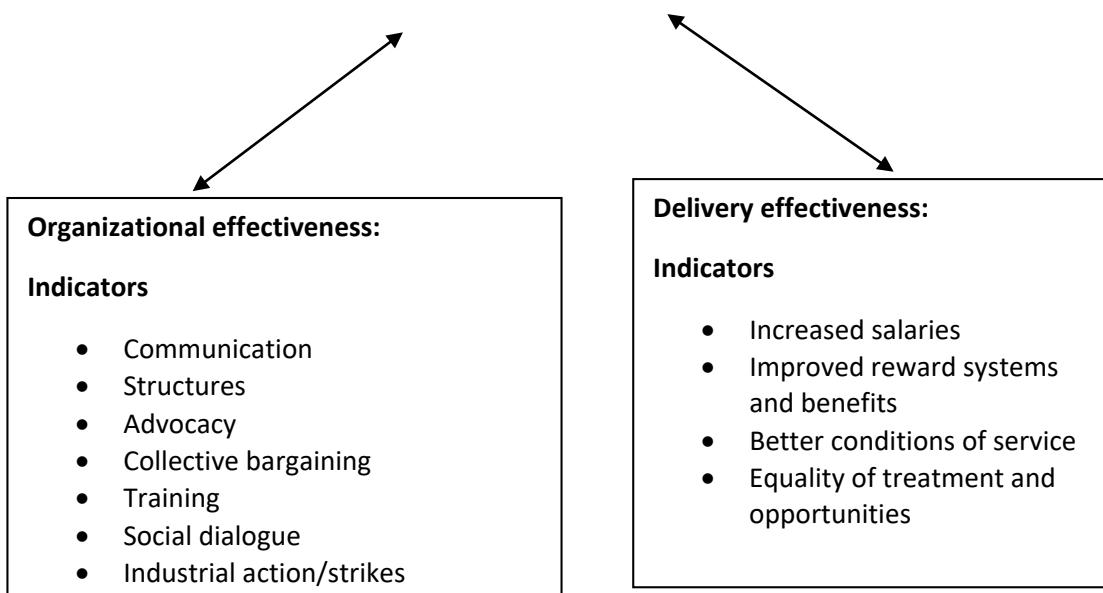


Figure 1: Conceptual Framework

V. FINDINGS

5.1 Membership Trend in the Public Service Association

The investigation revealed that PSA membership was declining. Figure 2 below shows a declining membership trend over a five-year period, signalling future uncertainty of the PSA. Membership sharply declined from 8290 in 2012 to 3996 in 2014, gradually declining to 3768 in 2016.

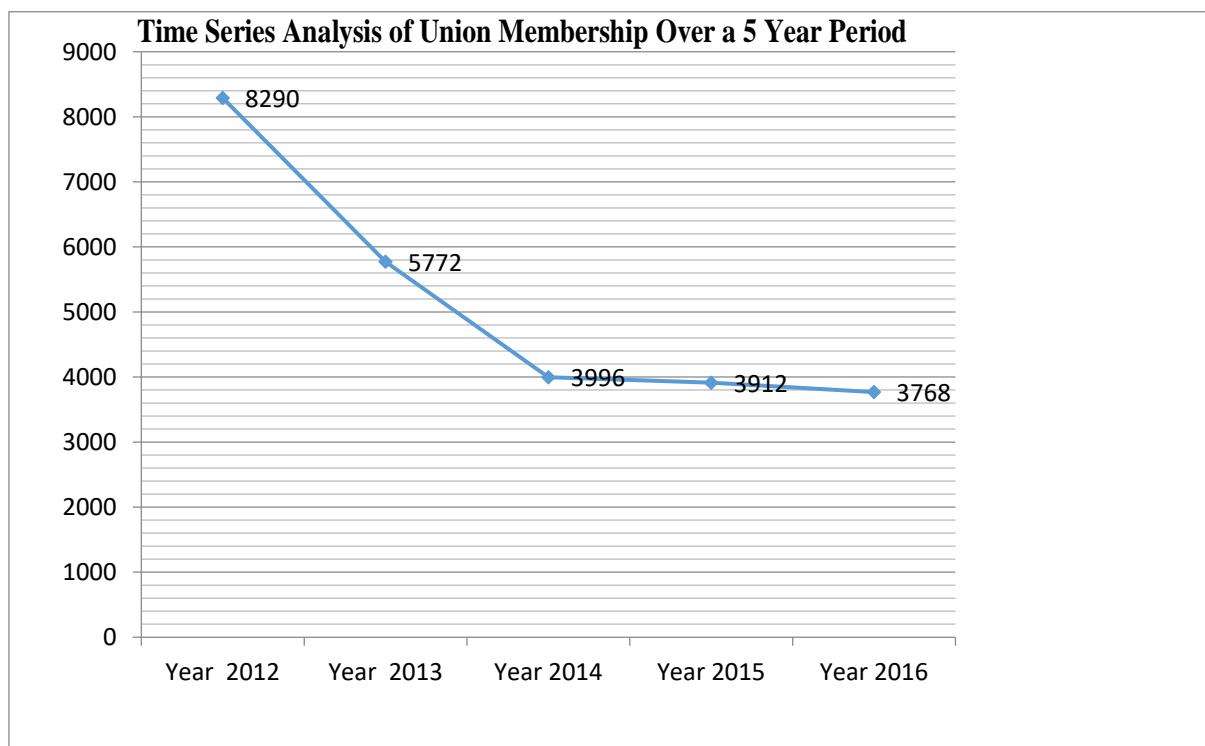


Figure 2: Trend Analysis of Declining PSA Membership

5.2 Length of Membership in PSA

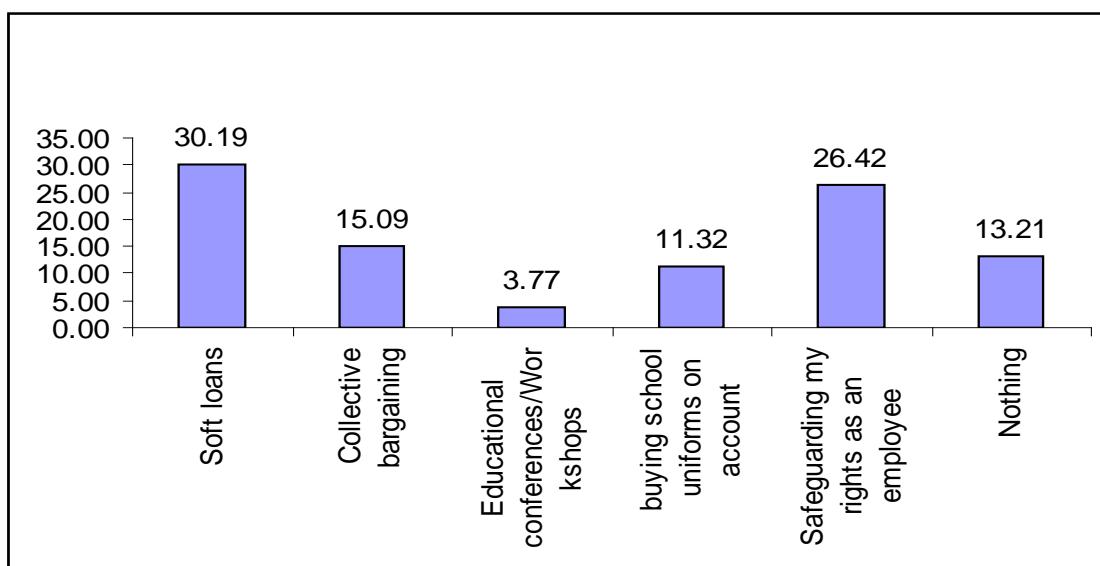
According to the survey results, about 45% of the civil servants had been members of PSA for 35 years, 25% had been members for 20-30 years and, 20% joined between 10-19 years ago, while 10% had been members for the past 1-9 years.

Table 1: Number of years as PSA member

Length of membership	SEX		Total
	MALE	FEMALE	
0-5 YEARS	29	28	53
6-11 YEARS	20	38	58
12-17 YEARS	26	22	48
18-23 YEARS	34	31	65
24-29 YEARS	22	32	54
30-35 YEARS	29	10	39
Total	166	151	317

5.3 Benefits received from public service association

The Public Service Association has strived to lure civil servants by providing packages of service that include soft loans to its members. The survey showed that about 30.19% of civil servants who are members of Public Service Association received soft loans, 26.42% said they benefited through safeguarding their rights as an employee, while 13.21 % said they received nothing.



civil servants by benefits received from PSA

Figure 3: Civil

5.4 Intention to Remain a Member

The survey revealed that about 54.1% wanted to terminate PSA membership. Only about 45.9% said they would remain as members. PSA members made comments in the questionnaire that the PSA should introduce more schemes for its members in order to attract new recruits.

Table 2: Intention to remain members of public service association

Intention To Remain A Member		Frequency	Percent
Valid	Yes	144	42.5
	No	170	50

	Total	317	92.5
Undecided		3	7.5
Total		317	100

5.4.1 Reasons for No Intention to Remain a Member

On why the civil servants wanted to resign from PSA membership, 42.9% indicated that they were not benefiting from the association. This was followed by 14.3 % who said that the organization had failed to represent workers' interests.

Table 3: Reasons for not intending to remain a member of Public Service Association

Reason for not Intending to Remain A Member (n=317)	Frequency	Percent	Valid Percent	Cumulative Percent
Poor organizational culture	22	9.5	9.5	9.5
It is not safeguarding my rights, subscriptions too high	31	4.8	4.8	14.3
Lack of transparency	11	4.8	4.8	19.0
Retiring on pension	12	4.8	4.8	23.8
No longer interested	22	4.8	4.8	28.6
Not benefiting	109	42.9	42.9	71.4
Only joined to get a loan for driving lessons	11	4.8	4.8	76.2
Organization is manipulated by the government	15	4.8	4.8	81.0
Organization not representing workers interests	70	14.3	14.3	95.2
There is no benefit	14	4.8	4.8	100.0
Total	317	100.0	100.0	

5.5 Perceptions of members on PSA Effectiveness

Overall, the Public Service Association's organizing effectiveness has been described as ineffective. The research established that 88.3% of respondents strongly disagreed that PSA shares information with its members, 68.4% strongly disagreed that PSA educates its members on labour rights and 66.5% indicated that it was difficult to contact PSA officials, 65% believed that the PSA leadership was incompetent, while 68.4% indicated there were no active and effective structures at workplaces. The research further revealed that 65.9% of respondents saw PSA as powerless to influence the employer's decisions, while 88.3% indicated that PSA local meetings were not well attended, as indicated in the table below.

Table 4: Overall response on PSA Effectiveness(n=317)

Degree of agreement / disagreement		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	2	.60	.006	.006
	Agree	13	4.1	.041	.047

	Disagree	121	38.17	38.17	38.21
	Strongly disagree	177	55.83	55.83	100.0
	Total	313	98.73	100.0	
Missing		4	1.26		
Total	317	100.0			

Table 5: PSA Organizational Effectiveness

Effectiveness scales (n=317)	SA %	A %	U %	D %	SD %
PSA share information with members	.025	.038	.031	.022	.883
PSA educate its members on labour rights	.031	.031	.094	.157	.684
There are difficulties in conducting PSA officials	.069	.056	.063	.142	.665
PSA has competent leadership	.066	.06	.094	.094	.650
PSA structures are active and effective at workplaces	.069	.056	.056	.132	.684
Powerfulness of PSA in influencing employer's decisions	.019	.038	.094	.189	.659
PSA Local meetings are well attended	.025	.037	.028	.025	.883

Key: Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D), Strongly Disagree (SD)

Table 6: Percentage distribution of respondents on local meetings attendance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	8	2.5	1.4	1.4
	Agree	12	3.7	29.6	31.0
	Disagree	8	2.5	35.2	66.2
	Strongly disagree	286	88.3	33.8	100.0
	Total	314	95.9	100.0	
Missing		3	4.1		
Total	317	100.0			

5.5.1 Delivery Effectiveness of Public Service Association:

On PSA delivery effectiveness, the survey revealed that 68.1% of the respondents strongly disagreed that the association was improving job security, health and safety and pay increase, while only 6.9% strongly agreed. On whether PSA was protecting and promoting the interests of its members against unfair treatment, 84.5% respondents strongly disagreed, while 65.6% strongly disagreed that PSA was effectively negotiating for better pay, benefits and better conditions of service, 63.4% strongly disagreed that the association improved reward systems, with 64.9% also strongly disagreeing that they were enjoying non-monetary benefits. On the improvement of decent work by PSA, 26.8% strongly agreed, 20.8% agreed, while 32.8% strongly disagreed and 12.6% disagreed, as indicated in Table 7.

Table 7: PSA Delivery effectiveness

Factor structure on PSA delivery effectiveness (n=317)	SA%	A%	U%	D%	SD%

PSA is improving job security, health &safety and pay increase	.069	.053	.066	.126	.681
PSA is protecting and promoting members' interests against unfair treatment	.037	.025	.031	.06	.845
PSA is effectively negotiating for better pay, benefits and conditions of service	.012	.044	.100	.186	.656
Improved reward systems by PSA	.069	.094	.063	.135	.634
Enjoying non-monetary benefits (housing, free motor vehicle imports) etc.	.069	.056	.100	.088	.649
Decent work has improved	.268	.208	.069	.126	.328

Key: Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D), Strongly Disagree (SD)

5.6 Concerns of PSA members

The research revealed that PSA members had serious concerns, which they felt needed to be addressed. These, as shown in Table 4.17, were: (i) wages and salaries; (ii) conditions of service; (iii) salary increments; (iv) gender rights; (v) legal framework and collective bargaining; (vi) high subscriptions; (vii) power of negotiators; and (viii) PSA capacity to negotiate.

5.6.1 Wages and Salaries

63.1% strongly disagreed that their wages and salaries were satisfactory, 21.7% disagreed while only 1.8% strongly agreed that the salaries and wages were satisfactory and 4.1% agreed. This implies that the majority of PSA members were generally not happy with the level of remuneration they are getting from their employer and wished their union would do more in negotiating for better salaries and wages.

5.6.2 Conditions of Service

On fairness of conditions of service, 30.2% strongly agreed that the conditions of service are fair, 20.8% agreed while 23.9 disagreed and 14.5% strongly disagreed. This meant that the majority generally accept the conditions of service as somewhat fair with a room for improvement.

5.6.3 Salary Increments

Since the last 12 months there has not been a salary increment as indicated by the survey results on table 4.17; at least 55.2% strongly disagreed and 41.6% disagreed to ever receiving a salary increment in the last twelve months.

Table 8: Concerns of membership (n=317)

Concerns of membership (n=317)	SA%	A%	U%	D %	SD%
Wages / salaries are satisfactory or in line with your job	.018	.041	.091	.217	.631
Conditions of service are fair	.302	.208	.104	.239	.145
Member's salary increased in the last 12 months	.012	.018	0	.416	.552
Gender rights being respected	.347	.302	.037	.157	.154

There is adequate legal framework for effective collective bargaining in the civil service	0	0	.110	.236	.652
There is social contract and an independent Collective Bargaining Council in the civil service	.015	.050	.066	.356	.511
Subscriptions not too high	.085	.142	.012	.318	.441
Government negotiators have power to implement agreements	.06	.148	.104	.315	.372
PSA have capacity to engage in effective collective bargaining processes	.069	.321	.037	.277	.293

Gender Rights

The survey indicated that gender rights were being respected as

34.7% strongly agreed, 30.2% agreed while only 1.54% strongly disagreed and 1.57% disagreed.

5.6.5 Legal framework and collective Bargaining

The inadequacy of collective bargaining legal framework, the lack of social contract and an independent collective bargaining council in the civil service were raised, 65.2% strongly disagreed that there was adequate legal framework for collective bargaining, while 51.1% strongly disagreed that there was social contract and an independent collective bargaining council and 36.5% disagreed.

5.6.6 Subscriptions too high

Out of all three hundred and seventeen respondents, 44.1% strongly disagreed, 31.8% disagreed that the subscriptions charged by PSA are not too high, 5% strongly agreed and 1.42% agreed that subscriptions were not too high, while 1.2% were undecided.

5.6.7 Power of Negotiators

37.2% strongly disagreed and 31.5 % disagreed that government negotiators have power to implement agreements arrived at negotiations.

5.6.8 PSA capacity to negotiate

Out of all respondents, 29.3% strongly disagreed, 27.7disagreed, while 32.1% agreed that PSA has the capacity to engage in collective bargaining. Only 6.9% strongly agreed while 3.7% were undecided.

Interview Responses:

Six selected union officials were interviewed about the general performance of the Public Service Association and how members perceived its effectiveness. There was a general consensus amongst officials who noted that the PSA has not been performing well and that there was persistent membership decline. There were three key factors that were identified as major causes of PSA's ineffectiveness, namely, (a) lack of a social contract with the employer (government), (b) lack of independent collective bargaining structure and, (c) the need for labour law reform given that the Public Service Act, which governs the civil servants does not provide for collective bargaining but mere consultations and that it did not recognize the right to strike.

5.7 Discussion

5.7.1 Deliverables

On deliverables such as increase in salaries, improvement of benefits, and equality of treatment and opportunities the majority of the respondents strongly felt that there was need for improvement. They felt that PSA was not adequately delivering in these areas yet they are critical areas which can negatively impact on union effectiveness, if they are not adequately addressed. As such, these areas should not be ignored if the union is to enhance its effectiveness and attract more members. Bearing in mind that the civil service does not provide cash loans for emergencies or to meet financial stress, respondents expected the PSA to provide cash loans and other credit facilities like agricultural inputs, building materials, and residential stands for its members through negotiating with the corporate world on their behalf. Improvement in the area of deliverables could ultimately halt the protracted decline in membership by making the union more appealing to current and potential members.

5.7.2 Organizational Effectiveness

Aspects of organizational effectiveness outlined in the conceptual model for this study proved to be critical for the overall effectiveness of the union. These include communication, appropriate structures, advocacy, collective bargaining, training, <http://dx.doi.org/10.29322/IJSRP.9.05.2019.p8974> www.ijsrp.org

social dialogue and industrial action. The respondents predominantly felt that these were crucial for the effectiveness of the union. The major expectation of civil servants was effective representation of their interests by the Public Service Association. The general membership was of the opinion that the key business of PSA was to represent members effectively. PSA was not representing its membership effectively. This could account for the precipitous decline in membership which had afflicted the union over the past few years. To address the ominous challenge of dwindling membership, the union needs to institute measures to enhance its organizational effectiveness. The research participants predominantly indicated that PSA should prioritize training and workshops for capacity building. This clearly indicates that training and workshops are key in educating memberships. It also provides a platform for members to meet and exchange experiences and new ideas, thereby ultimately enhancing the overall effectiveness of the union.

VI. CONCLUSIONS

The concerns and expectations of members exposed the association's weaknesses in service delivery which is key to union effectiveness. Unresolved concerns are as good as grievances that have not been attended to or virtually ignored. Once a response is delayed or not proffered, apathy creeps in, resulting in premature termination of membership and its decline.

Most of the concerns were bread and butter issues associated with the rationale for going to work and the conditions of near slavery and despondency were serious accurate indicators of union ineffectiveness. As the objectives of many unions at large are to protect and promote the interests of its members, (Burchielli, 2004), it appears PSA has missed on this one as evidenced by the respondents' wide concerns and expectations which pointed to the association's ineffectiveness in service delivery.

The objectives of this research have been met beyond expectations as most answers to the research questions are more useful and can help PSA to swim instead of sinking.

VII. RECOMMENDATIONS

An analysis of views from different respondents revealed that future viability of the Public Service Association will be better if they seek for a harmonized Labour Act, and the establishment of an independent Collective Bargaining Council in the Public Sector. Given the challenges, brought about by the economic hardship the country is facing, unity of purpose is the key to effective collective bargaining for decent work practices by the employer. Most of the trade union officials and the respondents gave varied and interesting recommendations for the future prosperity of the association. The following recommendations have been made:

7.9.1 Union Structures

The effectiveness of any organization lies with its structure. The PSA should restructure and establish structures at all levels in Districts and Provinces as well as workplaces. The leadership of these structures should be elected by the local membership and Annual General Meetings be held to renew the union leadership and review its strategic plan. The National leadership should also go for elections after all the lower structures have been put in place.

7.9.2 Collective Bargaining Council

There is an urgent need for an independent collective bargaining council (CBC) as provided for in the Zimbabwe Constitution. The CBC should be administered by an independent secretariat appointed and funded by the council. Both the workers union and the employer must be levied equally to finance the council. All resolutions made by the council must be binding on both parties and the council must have absolute power to execute agreements. At collective bargaining, issues of social contract and equality of treatment and opportunities are addressed and the outcome of the collective bargaining should translate to union effectiveness. It is therefore recommended that effort be made to push government to establish the Collective Bargaining Council as provided for in the constitution.

7.9.3 Merging of unions

It is important to note that the problems in the civil service need to be resolved by pooling resources together in order to benefit from an expanded skill base, more cash resources, utilize already good infrastructure developed by unions and ensure that viability of the trade unions remain achievable. This could be done through strategic alliance with other players in the trade unions industry and merging of unions so as to thwart competition. It is common knowledge that there is strength in unity and numbers; as such, it is recommended that unions may merge to form one strong union.

7.9.4 Politics of Patronage

Public Service Association must continue to be apolitical if it is to be effective and serve the interests of its members whose private affiliation to political parties is their secret which should be kept outside union business.

7.9.5 Union Representation

The findings of this research indicated that trade union representation is generally weak as evidenced by lack of effective structures, competences and unity of purpose by the union officials. It also appears that some union leaders are not elected on merit to match the quality of debates experienced in the negotiations process. It is therefore recommended that the secretariat of unions and its leadership be appointed/ elected on merit to meet the challenges associated with human resources issues and collective bargaining dictates.

7.9.6 Membership Management Schemes

The findings also revealed that Public Service Association is not providing enough service and benefits to its members despite high subscriptions charged to members. This has also resulted in massive membership termination. It is therefore recommended that there be intensive membership drive through advocacy, immediate response to membership needs, introduction of schemes that benefit members like soft loan facility, zero deposit purchase schemes, school fees, housing development schemes, training and educational schemes, income generating schemes and holiday travel schemes. Union leadership should enhance communication with their members by keeping them informed of any developments through emails, circulars, press statements, workshops and meetings. These can be funded by a revolving fund created from the members' subscriptions and contributions. There is also need for a downward review of subscriptions in line with low salaries being earned.

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Early diagnostic markers for neonatal sepsis – Haematological scoring system, C-Reactive protein and Procalcitonin

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Abstract- Background: Neonatal sepsis is associated with high mortality and morbidity rate, as the clinical manifestations are nonspecific. Therefore, the need arises for early diagnostic markers of neonatal sepsis like Haematological scoring system (HSS), C-Reactive protein (CRP), Procalcitonin (PCT).

Aim : To evaluate the role of diagnostic parameters – HSS, CRP and PCT in the early detection of neonatal sepsis.

Methods: 50 cases of neonatal sepsis were studied, HSS was calculated as per the 7 point Rodwell et al scoring system. PCT was calculated by the semi-quantitative kit.

Statistical analysis : The results were compared with each other (comparative study design), with the gold standard (blood culture). Specificity, sensitivity, PPV & NPV were calculated.

Result: Blood culture was Positive - 46 % cases , negative - 54% cases, most common isolate obtained Coagulase negative staphylococcus aureus (CONS) 47.3% cases, Staphylococcus aureus (34.78% cases). HSS obtained Sepsis very likely - 56% cases, Sepsis possible - 40% cases, Sepsis unlikely - 4% cases. CRP results obtained positive results - 60% cases, negative - 40% cases. PCT results were positive - 86% cases and negative - 14% cases.

Conclusion: Among the various screening tests, PCT has higher sensitivity of 91.3% as compared to CRP (73.9%), HSS (65.2%). Thus, PCT is a better marker for screening neonatal sepsis. However it is not very specific, can be raised in various other conditions.

Index Terms- Blood culture, HSS, Neonatal sepsis, PCT

I. INTRODUCTION

Neonatal sepsis is associated with high mortality and morbidity rate, as the clinical manifestations are nonspecific.¹ therefore, it is very essential to diagnose the sepsis in early phase and also it is equally important to rule out neonatal sepsis.² Therefore, the need arises for early diagnostic markers of neonatal sepsis like Haematological scoring system (HSS), C-Reactive protein (CRP) and Procalcitonin (PCT). An early diagnosis using a sensitive marker can reduce the mortality and improve the outcome. According to the National Neonatal Perinatal Database (NNPD) report 2002-2003, the incidence of neonatal septicemia in tertiary care institutions has been reported to be 14.5 per 1000 live births (2.3%) and contributes to 16% of all mortalities among the hospital born neonates. (National Neonatal Perinatal Database.

Report for the year 2002-03. National Neonatology Forum, India).³

Aim : To evaluate the role of diagnostic parameters – HSS, CRP and PCT in the early detection of neonatal sepsis.

Objective :

1. To evaluate the role of HSS, CRP and PCT in the early detection of neonatal sepsis.
2. To compare between HSS, CRP and PCT, as a better marker in the early detection of neonatal sepsis.
3. To derive the sensitivity and specificity of PCT as an early diagnostic marker.

II. MATERIALS AND METHODS

In the present study 50 cases of clinically suspicious cases of neonatal sepsis were studied.

Inclusion criteria : Clinically suspected cases of neonatal sepsis admitted in the neonatal intensive care (NICU) and neonates who developed signs and symptoms of sepsis while they were admitted in NICU.

Exclusion criteria : 1. Suspected cases of septicaemia, where antibiotics have already been administered, 2. Inborn errors of metabolism, 3. Congenital anomalies.

An approval from the ethical committee was obtained and ethical practices were observed during the study. Written valid consent was taken from the parents. A detailed clinical history and findings were recorded. The blood samples were collected and processed for HSS, CRP and PCT. Blood culture – 1 ml of blood was drawn aseptically and inoculated into blood culture bottles containing 10 ml of brain heart infusion broth.

HSS was calculated as per the 7 point Rodwell et al scoring system in the present study.⁴

SN	Criteria	Abnormality	Score
1	Total WBC count	$\leq 5,000/\mu\text{l}$	1
		$\geq 35,000/\mu\text{l}$	
		$\geq 30,000/\mu\text{l}$	
		$\geq 21,000/\mu\text{l}$	
2	Total PMN count	$\leq 1,800/\mu\text{l} \& \geq 5,400/\mu\text{l}$ (at birth)	1
		$\geq 5,400/\mu\text{l}$ (12-24 hours)	
		$\geq 5,400/\mu\text{l}$ (2 days onwards)	
		No mature PMN seen	

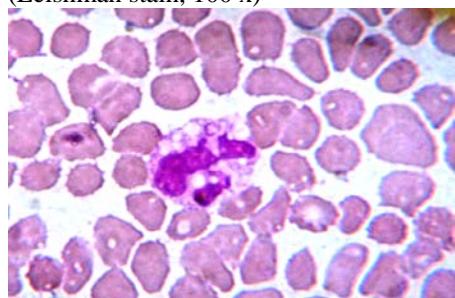
3	Immature PMN count (Picture 1)	<600/ μ l	0
		\geq 600/ μ l	1
4	I:T PMN ratio	\leq 0.3	0
		\geq 0.3	1
5	I:M PMN ratio	\leq 0.3	0
		\geq 0.3	1
6	Degenerative changes in PMN (Picture 1,2)	Toxic granules(picture 1) /cytoplasmic vacuoles (picture 2)/dohle bodies	1
7	Platelet count	\leq 1.5 lakh/ μ l	1

Abnormal total PMN count is assigned score of 2, instead of 1, if no mature polymorphs are seen on peripheral smear examination to compensate for low immature to mature ratio. Thus a score of 0 to 8 was obtained and interpreted as – score \leq 2 - Sepsis unlikely, 3-4 - Sepsis possible, \geq 5 - Sepsis very likely.⁴

Picture 1 – Peripheral smear showing band forms and toxic granules (Leishman stain, 100 x)

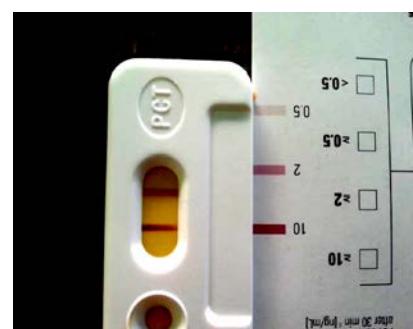


Picture 2 – Peripheral smear showing cytoplasmic vacuulations (Leishman stain, 100 x)



CRP was assessed using the rapid slide latex agglutination qualitative method (LAB-CARE DIAGNOSTICS (INDIA) PVT LTD). PCT was assessed using B.R.A.H.M.S PCT-Q KIT (Picture 3) manufactured by Thermo SCIENTIFIC, an immunochromatographic test for the semi-quantitative detection of PCT concentrations in serum/plasma. PCT level of <0.5 ng/ml - Sepsis not likely, \geq 0.5 ng/ml to <2ng/ml - Sepsis possible, \geq 2 ng/ml to 10 ng/ml - Sepsis likely and \geq 10 ng/ml - Sepsis very likely (Picture 3).

Picture 3 – Commercially available PCT – Q Kit : positive PCT (\geq 10 ng/ml)



Statistical analysis : The results were compared with each other and with the gold standard (blood culture). Specificity, sensitivity, PPV & NPV were then calculated.

III. RESULT

Blood culture was Positive in 46 % cases and negative in 54% cases. Blood culture most common isolate obtained Coagulase negative staphylococcus aureus (CONS) 47.3% cases and Staphylococcus aureus (34.78% cases) (Picture 4,5).

Picture 4 – MacConkey agar showing growth for Staphylococcus aureus



Picture 5 – Blood agar showing growth for Coagulase negative Staphylococcus aureus.



HSS obtained Sepsis very likely (56% cases), Sepsis possible (40% cases) and Sepsis unlikely (4% cases). CRP results obtained positive results in 60% cases and negative in 40% cases. PCT results were positive in 86% cases and negative in 14% cases.

Table 1 : Correlation of HSS with gold standard (blood culture)

HSS	Blood culture		Total
	Positive	Negative	
Positive	15	13	28
Negative	8	14	22
Total	23	27	50

Table 2 : Correlation of CRP with gold standard (blood culture)

CRP	Blood culture		Total
	Positive	Negative	
Positive	17	13	30
Negative	6	14	20
Total	23	27	50

Table 3 : Correlation of PCT with gold standard (blood culture)

PCT	Blood culture		Total
	Positive	Negative	
Positive	21	22	43
Negative	2	5	7
Total	23	27	50

Table 4 : Sensitivity, specificity, NPV and PPV of PCT, CRP and HSS.

Parameter	Sensitivity	Specificity	PPV	NPV
PCT	91.3%	18.5%	48.8%	71.4%
CRP	73.9%	51.9%	56.7%	70.0%
HSS	65.2%	51.9%	53.6%	63.3%

Among the various screening tests, PCT has a higher sensitivity of 91.3% as compared to CRP (73.9%) and HSS (65.2%). Thus, PCT is a better marker for screening neonatal sepsis. However it is not very specific and can be raised in various other conditions. 94% cases were healthy when discharged, 2% were discharged against medical advice and 4% died.

It was noted that neonatal risk factors associated with sepsis were low birth weight (<2.5 kg) (78% cases), preterm (<37 weeks of gestational age) (80% cases), lower socioeconomic status (82% cases) and born to multigravida mothers (72% cases). Early onset neonatal sepsis (presented within 7 days of birth) was seen in (78% cases). Respiratory distress syndrome was seen in 51.28% cases and Meconium aspiration syndrome in 20.51% cases. Maternal risk factors associated with neonatal sepsis were Anaemia during pregnancy (32.69% cases), Pregnancy induced hypertension (30.77% cases) and Premature rupture of membranes (26.92% cases).

IV. DISCUSSION

Blood culture is gold standard for definitive diagnosis of neonatal sepsis, but it has its own limitations.⁵ The yield of a positive blood culture ranges from 8-73%.⁶ A negative blood

culture does not exclude sepsis⁷ and about 26% of all neonatal sepsis could be due to anaerobes.⁸ Maternal antibiotics given in preterm deliveries may suppress the growth of bacteria in culture.¹

HSS is a simple cost, quick and effective tool in the early diagnosis of neonatal sepsis, but its sensitivity is unsatisfactory. Therefore it cannot provide a guideline to decisions regarding antibiotic therapy.^{9,10} It can be applied to even those neonates who have received antibiotic therapy. WBC varied widely across studies, with sensitivity & specificity ranging from 17% to 90% and 31% to 100%.¹¹ WBC maybe helpful in diagnosing sepsis, however normal WBC counts maybe observed in as many as 50% of culture proven sepsis cases, and neonates who are not affected may also have abnormally high WBC counts as a result of the stress of delivery.¹² 39 of 50 neonates presented with neutrophilia. Total neutrophil count was of limited value for the diagnosis of sepsis since the elevation is often late and inconsistent. Neonates with proven bacterial sepsis had normal neutrophil count, but the bands increased beyond the normal range.^{8,13} The associated band count and a leftward shift of the myeloid immaturity measurements may improve the diagnostic yield, but their subjective measurement is problematic.¹⁴ Neutrophilia itself is not a reliable or sensitive indicator of infection.⁸ Thrombocytopenia was frequently associated with sepsis and indicated poor prognosis.^{4,13} It is an important parameter in supporting the diagnosis of sepsis, although it appears to be a late finding and nonspecific.¹⁵ 21 cases of low platelet count were seen in the present study.

CRP is commonly used for detection of sepsis in neonates, but it is not useful as an early phase infection marker and it lacks specificity.¹⁶ Long duration between invasion by infectious agent and the rise in serum CRP concentrations.¹² CRP can be considered as a specific but late marker of neonatal infections.¹¹

PCT rapidly increases in 6 to 8 hours, and then a plateau in 12 to 48 hours. Plasma elimination is approx 25 to 30 hours.¹⁷ Therefore it has value in early detection of neonatal sepsis, and shows quick reduction in its level post antibiotic therapy.^{14,1,19} PCT is more sensitive than CRP, in the diagnosis of septicaemia, meningitis and UTI²⁹. PCT used together with CRP, a negative PCT test may help in “ruling out” while a raised CRP result helps in “ruling in”, the possibility of sepsis, particularly of the late onset type.¹⁴ The early response to appropriate antibiotic therapy can be evaluated by PCT in the septic neonates, but not by CRP. Late response to treatment can be evaluated by both CRP and PCT.²⁰ It is not the sole marker of neonatal sepsis, and is relatively expensive.

This study correlated with a study by Sucilathangam G in 2012 studied PCT and CRP in neonates admitted to NICU. They concluded that PCT was more sensitive than CRP in the detection of neonatal sepsis. A negative PCT test result may help to “rule out”, while a raised CRP result helps to “rule in”, the possibility of sepsis.²⁰ Monsef A and Eghbalian F in 2012 concluded that PCT has a high sensitivity, specificity, PPV and NPV for the diagnosis of neonatal sepsis.²¹ MAMDOUN M. Esmat in 2012 concluded that the serum levels of PCT is more reliable marker than the serum levels of CRP in the early diagnosis of neonatal sepsis and in the evaluation of the response of the disease to the antibiotic therapy.¹ H Altunhun in 2011 studied PCT, CRP and blood cultures of neonates admitted to NICU for neonatal sepsis and concluded that PCT measurement at birth may initially be

normal, a serial PCT measurement at 24 hours of age may be more helpful for an early diagnosis. During the first 24 hours of life PCT is a more sensitive marker of infection than CRP.²² Ibeh Isaiah Nnanna in 2011 concluded that PCT monitoring could be helpful in the early diagnosis of neonatal septicemic infection in the intensive care unit. Both absolute values and variations should be considered and evaluated in further studies.²³

A combination of 3 or all of 4 tests was highly specific 95%-100%.²⁴

Limitations in this study were -small sample size, lack of follow up repeat PCT levels and blood culture negative results, even in clinically proven sepsis, this reduced the sensitivity and specificity of CRP and PCT.

V. CONCLUSION

HSS and CRP are simple, quick and cost effective tool in the early diagnosis of neonatal sepsis, but its sensitivity in detection of neonatal sepsis is unsatisfactory.PCT had a higher sensitivity (91.3%) as compared to CRP & HSS.PCT is a better marker for screening neonatal sepsis. However is not very specific and can be raised in various other conditions.

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Ecocentrism for the Sustainable Conservation and Management of Elephants in Southern Africa.

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Abstract

Elephant population management in Southern Africa has been an issue of concern for over 50 years now and continues to be an issue as their rate of reproduction is exceeding the carrying capacity of the land and the resources available in the ecosystems for their survival. Ecocentrism is a philosophy that advocates for the respect of non-human nature in that decisions making about nature should not be human-centered (anthropocentric) or done just for the benefit of humans. The land ethic and deep ecology are also divisions of ecocentric ethics and they also put out views that make ecocentric based decisions more understandable. These are such as the inclusion of soil, water, plants, and geology into the community of our ecology, and also gives leeway to say, if humans are to use nature for their benefit, it should be for survival and not luxury. With many methods of elephant population management available, it is important for conservationists and wildlife management authorities to consider an ecocentric ethic stance as to the reasons why interference with the elephants would occur and the methods they would use to manage and control the population. This paper tries to show the necessity of elephant population management in Southern African countries, namely: Zimbabwe, Botswana, Namibia, and South Africa, in an ecocentric based manner, be it through culling, translocation or birth control. This paper reviews a number of published materials to make its arguments. It concludes that if elephant management is carried out following the concepts of ecocentrism, it will most certainly yield better results for the sustainability of our environment and the ecological community as a whole.

Key words: Anthropocentric, Ecocentric, ethics, Elephants, culling, conservation, management, ecosystem, ecology, environment, translocation, birth control.

1. Introduction

Environmental ethics have generally been classified into two main categories, the human centered (anthropocentric) ethics and the ecosystem centered (ecocentric) ethics. Anthropocentrism values life in many forms and ecosystems as according to the benefits that they provide to human beings, whilst ecocentric ethics find value in all of nature, despite their given value or preference by humans. [1]. Intrinsic value is given to all nature when talking about ecocentrism. Philosopher Holmes stated that nature and life on earth are inherently good, implying that nature has intrinsic value, regardless of the value humans may place on it. For us to successfully practice sustainable development in all aspects of our lives, each part of the ecosystem would have to satisfy these two goals of ecocentric ethics as given by Patrick Curry as stated below. [1]

- 1) *"It must be able to recognize the value, and therefore support the ethical defense, of the integrity of species and of eco-systemic places, as well as human and non-human organisms. So it is holistic, although not in the sense of excluding considerations of individual value."*
- 2) *"Within nature-as-value, it must (a) allow for conflicts between the interests of human and non-human nature; (b) allow purely human interests, on occasion, to lose. (It is hardly a level playing-field otherwise.)"*

The land ethic does not prevent alteration of 'resources', their management and the use of resources is not prohibited, however the right to continue existing is acknowledged; soils, waters, plants and animals are included in this community.[2] This is the best given illustration of how land ethics under ecocentrism should best be applied. For the best sustainability of our animals, geology and the natural resources (soil, water, plants) it is most appropriate to apply the land ethics concept, which we will base our argument for this paper on. The main emphasis is however, that whatever action is taken by humans should be separate from any anthropocentrism or human benefit but solely of intrinsic value of the ecosystem. Giving intrinsic value to our ecosystems is just as important as managing them and guaranteeing the availability of the resources in the present life and future generations to come.

In Southern Africa Elephants (*Loxodonta Africana*) populations exceed the carrying capacity of the ecosystems and pose a threat not only to the ecosystems but also to the whole community of the land ethic (soil, water, plants and animals). [3] In West Africa and some Southern African countries, elephant populations have been declining due to poaching for acquirement the elephant's task, however in most of Southern Africa, the populations are quite stable or in contrast increasing such as in South Africa. [4] Botswana still holds the most elephants, currently estimated at 131,626 although the numbers have slightly declined, whilst Zimbabwe is second, being home of approximately 82,630 elephants.[4] In the past decade these countries have seen a 10% or less drop in the elephant populations. [5] Elephants exert great influences on the structure and function of the African Savanna ecosystem because of their ability to uproot and consume entire plants and topple or otherwise alter the physical structure of the flora.[6]. Their size, browsing habits and even their reproduction and population growth rates are all issues of concern to the environmental protection and conservation authorities of especially Southern Africa. This being as the elephant populations in the region have long surpassed the carrying capacity of the breeding land available for them.[7] The current conservation status of African Elephants is that they are listed as vulnerable under the IUCN Red List, and as Endangered animals in the CITES Appendix I[8], apart from the populations in Botswana, Namibia, South Africa and Zimbabwe that are listed under CITES Appendix II [8]. In Zimbabwe and Botswana, African elephants are not included on the list of "specially protected animals" because their population is so large.[8]

It has been said that no species, other than man, can modify habitats as rapidly and extensively as an elephant [9] and without any action to control the breeding and reproduction rate for a species their breeding and browsing routines would be detrimental to the whole ecosystem affecting sympatric water sources, plants and animals too.[3] This paper therefore tries to assess methods of elephant populations control in Southern Africa basing from an ecocentric ethics stand point. The methods usually applied for elephant population control are culling, trade and birth control.[10] Conclusions will be drawn on how effective, necessary or ethically considerable these actions are for the sustainable development and management of our ecology, and ecosystem; all for their intrinsic value.

2. Background

Ecocentric Ethics

The subject of ecocentric ethics has been there for centuries now, although it keeps evolving and its definition is getting broader with more scholars having different or extended views on the concept. Ecocentrism goes far and above bio-centrism which focuses on the intrinsic value of all living things, as it takes account of environmental systems and their abiotic characteristics. The fauna and flora are also put into the context of the ecological balance with organisms. Zoo-centrism is another ethical point ecocentrism in-cooperates and it focuses on the value of animals and their well-being. Gray[11] pointed out that all life depends upon geology and geomorphology to sustain it, hence it is very necessary to consider it whenever ecocentric based decisions are being considered or being made.

The Land Ethic

Aldo Leopold wrote an essay in the book, *A sandy Country Almanac*, where he presented his vision of the land ethic, which he defined as the relationship between people and the land. He states that they were intertwined and their relationship had to be strengthened as care for people could not be separated from care for the land.[12]. With this concept of ethics, the community is not limited to humans only, but all the other parts of Earth such as soils, water plants, and animals. Leopold wrote that "we can only be ethical in relation to something we can see, understand, feel, love, or otherwise have faith in." [12]

Deep Ecology

There is an acknowledgment that making decisions that satisfy both ecocentrism and anthropocentrism is difficult and this is classified under the inelastic principles of ethics.[2] Anthropocentric based decisions have been observed to be detrimental to our environment, other animals as well as the human race itself. Conditions such as climate change now exist due to human-induced activities and are affecting the availability of resources and the survival of humans, other species and of fauna and flora too. The making of ecocentric based decisions tends to take time and is usually not easy to implement, especially in situations where the society has been reliant on the resources, either for primary use or secondarily as a source of finance.[13] Deep Ecologists' claim that justification is made upon people only when their intervention in natural wildlife is vital for human needs. i.e. For survival not for luxury.[13] The basic principles of deep ecology encircle anthropocentrism and ecocentrism through acknowledgment of intrinsic value in everything and allowing humans to benefit from the natural resources that are available to satisfy the vital needs. Consequences still have to be weighed before every decision is made, as some things may appear necessary or vital at a given time, however, they have non-reversible, detrimental effects to us and our ecosystems in the future.

Elephants (*Loxodonta Africana*)

Elephants are large herbivores that spend approximately 16 hours a day eating plants and vegetables. Their diet primarily consist of leaves, bark, fruits from trees and shrubs. [14] The African elephants are long lived and the largest land mammals on Earth with an average shoulder height that can grow up to 11feet, weighing 6 tonnes and 19-24 feet in length. [15]. Southern Africa has the largest population of the African elephant in the world. Botswana, South Africa, Zambia, and Zimbabwe, relatively have large elephant populations and show either increasing trends or mild and non-significant declines recently [4] Botswana is home to the largest elephant population with an estimated at 165 000km² of elephant range followed by Zimbabwe which has the second largest elephant population occupying approximately 82 000 km². [9] These habitats that can support only about half those populations. Zambia's elephant populations have seen an 11% decline over the past decade, mainly caused by poaching activities.[9, 16] This does not indicate successful conservation, but failure of the conservation authority to preserve natural values. These countries' natural long-term ecological productivity is destroyed, there is a posed danger on the environment, i.e. soil. Who then is responsible for the management of the intrinsically valued ecosystems and the whole land ethics community?

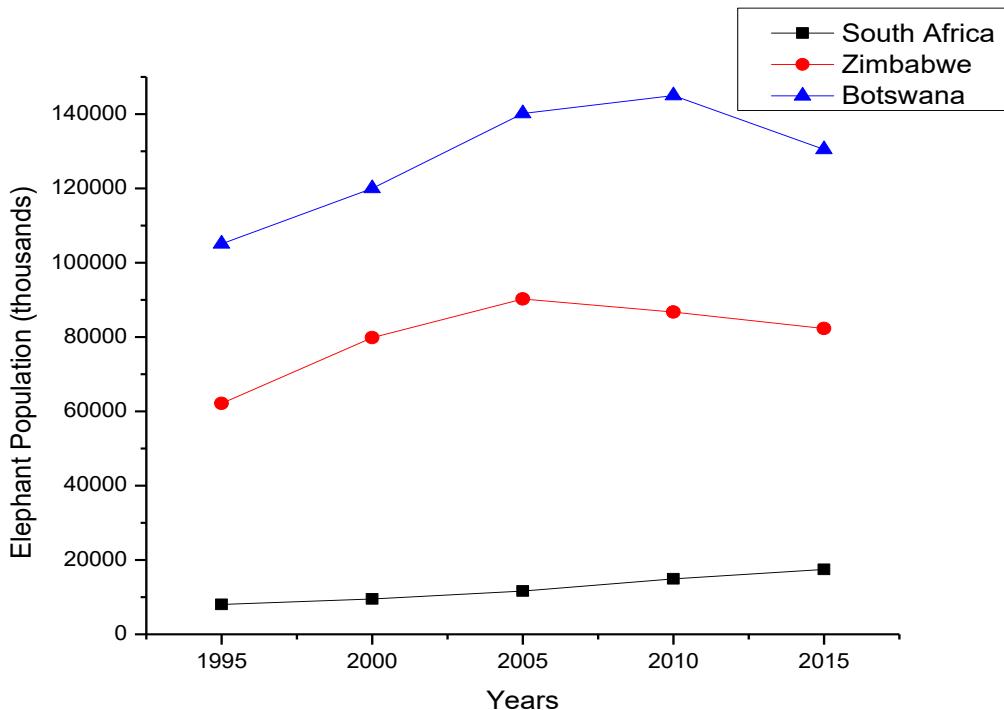


Fig 1. Elephant population trends in South Africa, Zimbabwe and Botswana from 1995 to 2015. Source:[5]

Elephant populations in Zimbabwe and Botswana were said to be at a sustainable capacity in the 1940s with a population density of one elephant per three square kilometers in Hwange and the adjacent Deka Safari Area, when the dispersal started. [9]. The original given carrying capacity for Elephants in Hwange and Deka Safari was between 3800 and 5000 before habitat changes. With alterations to their habitats through extension and human influence, the elephant populations grew exponentially.

Abundance and Overburden?

The Africa Elephants (*Loxodonta Africana*) exert prevailing effects on the structure and function of Africa's Savanna ecosystems. Elephants can uproot and consume entire plants or even break down and alter the physical structure of trees and plants. Their water needs are also quite high and hence need to reside in a good watered place.[14] In 2014 a fixed-wing aerial survey was carried out, of elephant populations in relation to rainfall in the Greater Mapungubwe Transfrontier Conservation Area (GMTFCA), Botswana, Zimbabwe and South Africa. It showed that elephant group size is correlated to rainfall. [17]. The elephants have been observed to move or to relocate to areas where water is abundant just as they did in 2014 when the rainfall in the other areas was as low as 434mm but the Limpopo had abundant water, causing overburden in the area. [17]. Climate change has led to droughts which have had an impact on the annual rainfall received in Southern Africa[17] and also contributed to the slow growth of vegetation and forest cover is one big issue of concern too. With insufficient resources to live on, the elephants would be subjected to harsh survival conditions and later death. It is then very imperative that ecocentric ethics are the base when decisions are being made about the sustainability of our environment and resources.

Elephants do not have absolute negative ecological impacts, in fact they have been shown to be of benefit to other animal species. The damaging of tree canopies, breaking of tree trunks and toppling of adult trees[14] increases local landscape is said to enhance food and shelter availability for co-occurring species.[18] Smaller herbivore mammals are said to benefit by having more access to high-canopy browse and maintaining open habitats that reduce predator threats.[14] The inter-dependency that exists within ecosystems serves as a major theme for science and environmental ethics and this has been observed and acknowledged that elephants do serve a significant role in the Savanna forest ecosystems, just as other species do too. Elephants have the ability to alter the canopy architecture and tree structure, soil structure and surface water resources structure.[19] As part of an ecosystem, this only becomes a problem when the negative effects on the environment are outweigh the positive effects on the ecosystem. This usually occurs when there is overburden of a specie in one area, such as the trends of Elephant populations are in Zimbabwe and Botswana.

According to Leopold

"A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise."[2]

The overburden of elephants in Southern Africa places a stress on the ecology as a whole and this then contradicts the preservation of the environment and the stable balance the biotic and abiotic community both need. It has been mentioned that the loss of perennial grass lands has led to the loss of grazing species such as the Roam, Sable, Tsessebe, whilst the increase in population of animals such as Impala and Kudu occurred due to the replacement of grasslands by thickets.[3] Such imbalances in the ecosystem are what need to be managed under the guidance of ecocentric ethics. Soil capping usually concurrently occurs with excessive numbers of elephants dwelling in one place reducing infiltration of rain water into the ground hence increasing runoff. All these processes lead to slower recovery of the ecosystems destroyed and naturally it is said that it can take up to hundreds of years to replenish the soil, grass and tree cover that can be degraded by excess elephants in one area.

3. Conservation and Management Methods

Elephant's size allows them to be not be preyed upon by other animals and this factor alone increases their life expectancy, which is then mostly determined by resource availability, which can lead to high localized elephant populations. [10] It is therefore very necessary to intervene in the management of elephants for curbing the populations. How then can the elephant numbers be controlled for sustainable resource distribution, use and a balanced ecosystem in an ecocentric manner? The topic of elephant population control has been a debatable matter among conservationists and wildlife agencies for many years now. Other activists and authors argue that there is no need for humans to try and control the high concentration of elephants in localized areas and that biodiversity is always in flux.[20]. However, some conservationists and ecologist have been agreement that for the ecosystem to remain balanced and the land ethic to be observed, humane control of the elephant populations is necessary. [10].

The most popular control measures that have been used in Southern Africa are culling and trans-location of the Elephants. Culling is when the elephants are killed to reduce their numbers and trans-location refers to the elephants being moved to a different breeding area or exporting them to other countries.[10] In the past decade there have been development and promotion of other control methods such as immunocontraception (PZP) vaccine in female animals, vasectomy in male elephants and immunocastration with GnRH.[10] These are going to be discussed in consideration of ecocentrism and a conclusion will be drawn on the seemingly most non-anthropocentric conservation and management method as it is reasonably difficult to separate the two, in a an economy driven world, however it is of vital importance.

3.1. Culling

Culling is defined as the killing or hunting of animals as a measure of population control.[9] In Zimbabwe between 1960 and 1988 a total of 44,500 elephants were shot all over the country as a culling action. Populations of elephants still grew from 32,700 to 51,097 head in spite of the culling that had been done. Zimbabwe's then Director of National Parks and Wildlife ordered more culls to ease the environment after realizing that the despite removing 4,000 elephants in three years, the population index had increased by 2,650head. [9].

The option to not cull would have resulted in detrimental destruction to the environmental resources and led to local extinction of some animals and plants too. With ecocentric ethics in mind, every species deserves just as much a chance to breed and continue to exist just as any other. It is therefore crucial to maintain species diversity and allow anime, fauna and flora every chance they can get at life by regulating the environments that they exist in. This action is in no way of intrinsic consideration, as humans do not solely benefit from regulating the ecosystem and maintaining a steady balance among the animals available and the necessary survival needs such as water, food and breeding surface area.

Arguments exist that elephants are highly emotional animals and that culling leaves the survived elephants emotionally scarred and also that it is not a humane manner to control the populations.[21] This being should be considered before the decision to cull is made. In the case of Zimbabwe and Botswana, it has been a matter of urgency of controlling already existing land overburdening elephant populations, which needs imperative action then that birth control cannot fix. [9]

3.2. Birth Control

The immunocontraception with porcine zona pellucida (PZP) vaccine for female elephants has been developed in the past decade to suppress of elephant populations by reducing reproduction rates. This is a non-hormonal vaccine that prevents the pregnancy of the elephants by stimulating antibodies against proteins that are necessary for fertilization. [22] It is said to not affect the hormonal balance of the female elephants, which is one aspect most animal activists and zoology ethics practitioners feared would be a problem. From the year 2000 success rates of the PZP vaccine have been studied and observed to be 95% efficient. The study and use of vaccines as a birth control methods is still being carried out, effectiveness, safety and long term effects being monitored and recorded. It has been shown that the vaccine's effects are reversible over a 16 year period, which is quite a long time to consider if there be need to reverse the vaccine's action.[23] It however has been observed to not cause any side effects on the histology and pathology behavior of the elephants.[22] The PZP vaccine has not been licensed by the Medicines Control Council to be used in Southern African as research on it is still being carried out. It is an elephant population management option most animal conservationists, are advocating for. It will take a few years before elephant scientists, veterinarians and environmental and ecosystem managers come to a feasible agreement on the use of vaccines as there still exist some lack of clarity on the function and utility of this method. [10]

The use of vaccines as a contraceptive method for elephants is a preventative measure which would be ecocentric in consideration and management of the carrying capacity of the land habitat available. For already existent, excessive numbers of elephants this form of management would not come in handy, hence Zimbabwe and Botswana in the past have resorted to culling and trans-allocation of the elephants, in-order to control the overburden that was happening and affecting the ecosystem as a whole.

3.3. Translocation

With excessive elephant populations existing in Southern Africa, trans-allocation and trading have been accepted as viable options that help alleviate the burden on the land and ecosystem. According to CITES [24] from 1990 to 2015, a total of 1666 elephants have been exported across the world, majority being for circus and zoo purposes or reintroduction into the ecosystem. Trans-locations can be across international borders or sometimes within the same country, just from area to another more suitable for these mammal animals. This method of elephant population control is ecocentric based, as the action helps by protecting both the wildlife and the environmental resources.[7]

In August 2017, Malawi carried out one of the largest trans-location of elephants of a total of 520 elephants from Liwonde National Park and Majete Wildlife Reserve in Malawi to Nkhotakota Wildlife Reserve. This was a local trans-location mainly done to relieve the pressure on the ecosystem from elephant surplus in Liwonde and Majete, as well as to add on to the elephant populations at Nkhotakota[25]. This "human-assisted migration" was needed so as to provide the best chance of a long-term and sustainable future for these elephants. These Reserves are managed by African Parks along with the Malawi Department of National Parks and Wildlife (DNPW) and had the elephants' security for the future as well as restoration of the ecological system at interest during the induced wildlife migration.

4. Acknowledgement of Intrinsic value existing in other Elephant management methods

Ecocentrism is not an 'anti-human' ethical argument neither does it argue that all life is equal. There is also no denying that a lot of homocentric (human centered) problems already exist that would push us to conserve our ecosystems and use the resources sustainably. Ecocentric ethics try to present the ecology as a system that is made up of individual species, that are inter-dependent and co-habitat together to build a functioning ecosystem. With that being said, the importance of each specie, be it fauna, flora, human or geological environment is to be recognized and each one allowed the chance of survival accordingly, not only because it would be of benefit or good use to the human beings. In elephant conservation and population controlling, some methods used have been argued to have been of intrinsic value, as the humans have some gain out of it. This could be through physical protection from the excess elephants after culling or economic gain from trading the elephants, or even by their physical presence which attracts tourists to visit the Reserve and Game ranges in Southern Africa.

Under the CITES Appendix II, Elephants in Zimbabwe, Botswana, Namibia and South Africa have been listed on the "Schedule of Animals with High Economic Value." [8] This means that dead or alive, elephants are of great economic value to these nations. Inasmuch we cannot utterly deny the benefits of elephants' existence to the human populations in the mentioned countries, it is vital to show that the well-being and protection of the elephants comes first, before the consideration of the economic benefit they may

have for the people. The trading of elephants calves in May 2016 from Zimbabwe to Dubai and China, for example was only done due to the fact that Zimbabwe's environment could not support the populations of elephants that were currently in the country. [26] Having too many elephants constricted in a breeding area tends to accelerate the rate of reproduction, which would not be ideal as the food resources and water would then be insufficient, leading to starvation and dehydration.[24] This goes on to show that the ecosystem's balance and survival of more than the elephant species is what is first considered when the trading of elephants is done and that the economic benefit is not the focal drive of the action.

The trade of elephant trunks has been a controversial issue because of their economic value and the need for elephant trunks has caused high poaching records in the region. Countries such as Kenya have taken a stand on the trade of elephant trunks for their ivory by burning the trunks. In April 2016 they burnt a stockpile of elephant trunks and rhino horns which were estimated to have been worth about 150 million. The Kenyan President Uhuru Kenyatta said they did this in solidarity to show that elephant trunks are worthless to them unless they are on their elephants.[27] The stand shows that the country elephants are kept and protected not for their intrinsic value and that ecocentric ethics are being considered for the breeding, protection and survival of these species. Such value given to our fauna, flora, geology and everything else in the ecosystem is what ecocentrism tries to achieve.

5. Conclusion: Why Ecocentrism is an essential solution

Ecocentrism recognizes humanity's duties towards nature, which is why we believe it should be central to solving most of our extraordinary environment issues, such as the issue presented in this paper of overabundance of elephants in an area where they exceed the carrying capacity by almost double, as in Southern Africa. The roles ecocentrism plays are described briefly below:

Ethically, ecocentrism allows the moral community to focus on other members of the ecosystem, other than the humans. Respect, care and concern is given to all life as well as other parts of the ecosystem such as land and geology. [2] Moral concern should be extended to all ecosphere, biotic and abiotic components. This respect and concern can be through the control of elephant population in Southern Africa's Savanna ecosystems, which are not equipped to support as many elephants as there currently are. Methods of population control are still carried out in a humane manner to still show that the elephants are important creatures as they are.

Ecologically, ecocentrism goes on to show the inter-dependency relationship that exist between humans and non-humans and how both are reliant on the ecosystem services nature provides. This can be applied to our management of elephant populations in that, without the trees, grass and adequate water resources, the elephants would not survive, whilst the toppling down trees by Elephants allows smaller species to access food too and by their simple existence, they are of economic value to the humans through tourism. Elephants play an important role in the dry Savanna climate influenced forest structure in maintaining the ecology balanced and regulated. It goes on to portray the importance of existence of each and every specie, not intrinsically but for their individual role in the ecosystem.[2] The geology, water bodies and flora are just as well important because without them there would be little to no life. Precaution should then be taken to make sure there is no specie facing extinction due to another being given higher value or preference in the ecosystem neither should our environment be destroyed because of poor management or failed regulation of the ecosystem.

In conclusion, elephant populations in Southern Africa, especially Zimbabwe and Botswana definitely need human management so as to maintain a well-balanced productive ecosystem. Ecocentric ethics should be at the core of the decisions made in order to achieve sustainability, and in this case for the methods of population management, the purpose of control. With all decisions made in humility and respect to all forms of life abiotic aspects too.

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Importance of Supranational Structures towards Transboundary Ecotourism Development: Case of Serengeti-Mara

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Abstract

In the East African Community (EAC) region, coordinating policies and regulations on tourism was geared towards increased coordination and pooling of resources towards tourism-related improvements in areas of improved road and air access, fewer visa restrictions, increased cross-border movement of people and goods, and more harmonization of national policies as well as on safety and security. This objective can only be achieved through creation of supranational structures with clear defined roles. In EAC region, the East African Tourism Wildlife Coordination Agency (EATWCA) is mandated with this task of marketing the region as a single tourism destination. A single tourist visa and a comprehensive roadmap for developing a brand strategy to promote East Africa as a single tourist destination is part and parcel of this strategy. Thus, transboundary tourism destinations such as Serengeti-Mara ecosystems are better managed by such supranational structures. Further, the East African Tourism and Wildlife Conservation Agency was created as an implementing agency for EAC tourism activities on conservation of tourism destinations like Serengeti-Mara. These agencies are limited to marketing and publicity which automatically limits its operations. Within it there is the East African Tourism Wildlife Conservation Association mandated to coordinate policy on conservation, but is yet to function. Thus, the inadequacy of supranational structures limits policy coordination in transboundary ecotourism destinations such as Serengeti-Mara. The study used questionnaire, interviews and focused group discussion to collect primary data while secondary data were collected using journals, documents, acts, legislations, sessional papers and conventions/protocols on tourism. Data were analyzed using descriptive statistics. The qualitative data were analysed by consolidating emerging themes from the key informant interviews and topic analysis. Quantitative data were analysed using descriptive statistics such as frequencies and percentages. Data were presented in form of tables, pie charts and narrations. The results indicate that although the East African Tourism Wildlife Coordination Agency (EATWC) and East African Tourism Wildlife Conservation Agency (EATWCA) are responsible agencies to coordinate policy on marketing at regional and international level and conservation, they do not capture other pillars of ecotourism. Consequently, policy coordination is majorly dependent on state agencies such as KWS, TWS/TANAPA or Narok County government (Kenyan side). The 1983 bilateral agreement between Kenya and Tanzania overrides regional policy agreement in areas of tourism. The bilateral agreement is statist in that it empowers state agencies/parastatals with function of tourism policy coordination. Therefore, the EAC tourism policy should be reviewed by creating supranational organizations to oversee policy coordination in shared ecosystem. These organizations would be supported by supra-national agencies at bilateral level that would specifically implement ecotourism development in shared ecosystems such as Serengeti Mara. With supranational agencies, it would be easier to coordinate policy by information exchange and sharing.

Key words: Tourism Policy Coordination, supranational agencies, ecosystems, bilateral, organizations and parastatals

Introduction

Article 115 of EAC regional tourism policy states that partner states undertake to develop a collective and co-ordinated approach to the promotion and marketing of quality tourism into and within the Community. Further, Article 116 directs Partner States to undertake to develop a collective and co-ordinated policy for the conservation and sustainable utilisation of wildlife and other tourist sites in the Community. To this end, marketing and promotion of East Africa as a single tourist destination is enabled via the East African Tourism and Wildlife Coordination Agency (EATWCA) at international tourism fairs. Secondly, the East African Tourism and Wildlife Conservation Agency was created as an implementing agency for EAC tourism activities, including the implementation of a 2007 ECA tourism marketing plan and strategy. Since Serengeti-Mara is a transboundary ecosystem in EAC region, the regional tourism policy applies to it. This is due to the fact that tourism activities or jurisdiction in one state affect the environmental and social systems in the other or East Africa region as a whole, and cross border communities have seamless cultural interactions (LVBC, 2010). However, there are policy challenges with regard to conservation and sustainable utilisation of wildlife and other tourist sites in Serengeti-Mara ecosystem as stipulated in EAC regional tourism policy. This due to lack of adequate institutional mechanisms; thus, this has been left to national entities to coordinate. For instance in Tanzania we have the Tanzania Wildlife Division (TWD); Tanzania National Parks (TANAPA) is responsible for the management of all wildlife, including those outside protected areas. Tanzania Wildlife Division (TWD) administers the Game Control Areas around Serengeti National Park. Serengeti National Park is administered by Tanzania National Parks (TANAPA). TANAPA is a government parastatal with the mandate to conserve and manage wildlife resources within protected areas for the present and for posterity. In Kenya, Kenya Wildlife Service (KWS) is a government parastatal with the mandate to conserve and manage Kenya's wildlife resources within and outside protected areas for the present and for posterity. Mara has been owned and managed by the Narok County government. Many NGOs operate in Serengeti-Mara ecosystem, among them African Wildlife Fund (AWF) and Wild Wildlife Fund (WWF) with conservation programs on both sides of the border (UNESCO, 2013). Thus, the international border dividing the Serengeti-Maasai Mara Ecosystem creates parallel zones of institutional rules, laws, practices or norms. These institutions are local, national, and therefore, operate at that level. These institutions lack capacity to operate at cross border level. This means that formal institutional policy coordination at cross border level is lacking.

Materials and Methods

The Serengeti-Mara region is found within the EAC region on which the regional tourism policy applies. The Serengeti-Mara Ecosystem is an area of some 25000 km spanning the border between Tanzania and Kenya (34-36 degrees East, 1-3 degrees, 30's). The Kenyan part of the ecosystem lies in the South-West of the Nakuru County, forming part of two sub-counties, Narok and Trans Mara. It comprises approximately 6000 km of which 25% represents Maasai Mara National Reserve and 75% unprotected land inhabited by Maasai and other agro-pastoral communities (Malt, 2003). The Maasai Mara National Reserve and adjoining group ranches in Kenya form the northern portion of the Serengeti-Mara ecosystem to which wild animals, especially wildebeest and zebra migrate annually. The wildebeest and zebra from Serengeti National Park migrate and stay in the Maasai Mara ecosystem between June and November (Omar, 2013). However, the ecosystem suffers from tourism policy coordination challenges that exist despite a regional tourism policy in place. This has led to mismanagement of the resources, increasing pressures exerted by a growing human population, increasing socioeconomic demands such as tourism activities, encroachment of human settlements, hostile neighbours with competing interests, and poaching (LVBC, 2010).

To gather data, there were 92 questionnaires which were administered to respondents in total. The researcher with the help of two research assistants administered structured questionnaires to gather information from 2 EAC agency directors, 2 Park Managers, 3 directors of state agencies (KWS, TANAPA and TWS), 3 directors of INGOs, 6 directors of NGOs, 70 managers of camps/eco-camps and lodges/Eco lodges; 3 heads of conservancies and 3 heads of wildlife management areas. Secondly, the researcher used interview schedule. The researcher and research assistants spent at least 5 days in each study site to conduct interviews. Both an in-depth formal and informal interviews were done. The formal interviews were structured since they involved a set of questions of predetermined questions. The interview schedule was used with EAC agency directors, Park Managers, directors of KWS, TANAPA and TWS, directors of INGOs and NGOs and tour operators. The research instruments were trial tested in Kilimanjaro Heartland between Kenya and Tanzania. These instruments were trial tested in a pilot survey was conducted in February 2018 using 30 respondents to validate them. The Focused Group Discussion focused attention on the given involvement of the local community in ecotourism activities. This method was used to probe various aspects of ecotourism activities that Community Based Natural Resource Management Groups engage in within dispersal areas of Serengeti Mara ecosystem. There were specific topics that were discussed by the groups. Members involved in this included heads of conservancies, wildlife management areas and existing community based natural resource management groups in these dispersal areas of the SMME. In total, there were 6 Focused Group Discussion groups comprising of 7 to 12 members in each group. This study relied on secondary data by examining books, reports, journal articles, online materials and newspaper materials and articles on aspects of ecotourism, bilateral agreement between Kenya and Tanzania, EAC Protocol on tourism and international protocols on tourism. The researcher sourced secondary data by analysis of publications such as journals on tourism, EAC tourism related legislations and government documents. These documents included Kenya tourism strategic master plan, Tanzania tourism strategic plan, bilateral and EAC regional tourism protocol/agreements.

Quantitative data were analyzed using descriptive statistics. Quantitative data consisted of measuring numerical values from which description such as frequencies and percentages were made. The data were first entered into the computer for analysis using statistical package for social sciences SPSS Version 12. This generated frequencies and percentages which were used to discuss the findings. Qualitative data basically involved themes and content analysis. The frequency with which an idea or word or description appears was to interpret the importance, attention or emphasis. Content analysis examined the intensity with which certain words had been used. A classification system was developed to record the information in interpreting results. The frequency with which a symbol or data appeared showed the measure of importance, attention or emphasis. The researcher presented data findings in form of frequency tables, pie charts, bar graphs and narratives. There were factors that affected the results of the study. One, the researcher was unable to gather information from some respondents who declined to participate or were unavailable for interviews. Also, there were geographical limitations that were experiences due to rough terrain in the wilderness, poor road network and bad weather. Lastly, there was language barrier in the rural areas. To overcome these shortcomings, the researcher engaged a tour guide to interpret and translate questions for the respondents. Further, research assistants from the area were engaged to assist in data collection. The researcher used four wheeled vehicle to overcome geographical limitations. In addition, the researcher utilized secondary materials from EAC Ministry, EAC agencies, Kenya Tourism Board and Tanzania Tourism Corporation and other institutions that had previously studied this ecosystems tourism status. On language barrier, the researcher engaged an interpreter to explain and interpret for the respondents.

Findings and Discussions

Tourism Policy Coordination and Organizational Structure with Regard to Ecotourism Development in Serengeti-Mara

The EAC tourism policy stipulates that the East African Tourism Wildlife Coordination Agency (EATWCA) is mandated with this task of marketing the region as a single tourism destination. Thus, marketing and promotion of East Africa as a single tourist destination are enabled via the East African Tourism and Wildlife Coordination Agency (EATWCA) at international tourism fairs (EAC, 1999). Thus, tourist awareness of tour products, a key aspect of ecotourism is conducted at international level. This strategy is inadequate and this agency operational mandate should be extended to regional and bilateral levels.

Article 116 further states that Partner States undertake to develop a collective and coordinated policy for the conservation and sustainable utilisation of wildlife and other tourist sites in the Community (EAC, 1999). To implement this mandate, the East African Tourism and Wildlife Conservation Agency was created as an implementing agency for EAC tourism activities. To this end, the East African Tourism Wildlife Conservation Association (EATWCA) Board functions as a preparation of operational procedures and guidelines on tourism in the region (EAC, 1999).

The EAC tourism treaty created the EATWCA that is responsible for policy coordination in shared ecosystems such as Serengeti Mara. However, this agency is limited to marketing and publicity which automatically limits its operations. Within it there is the East African Tourism Wildlife Conservation Association mandated to coordinate policy on conservation, but is yet to function. This means that there is lack of organizational structures to coordinate policy actions on environmental protection with focus on tourism activities, a key aspect of ecotourism in shared ecosystems, does not exist.

State driven environmental protection, however, is stipulated in the bilateral agreement which spells out that the contracting parties should take necessary steps with a view to promoting and intensifying the tourist exchange between them giving special attention to contacts made between their authorized tourist organizations and agencies (Republic of Kenya and Tanzania, 1983). Therefore national agencies and organizations are responsible for policy coordination actions in other ecotourism areas in SMME. These ecotourism aspects include tourism access and awareness of tour products; environmental protection; environmental education of both tourists and local people and local community benefit from tourism activities.

This makes information sharing and exchange difficult in the mentioned ecotourism aspects because it is solely done by state agencies. Findings indicate that Tanzania Wildlife Division (TWD), Tanzania Wildlife Services (TWS and (TANAPA) are some of state agencies responsible for the management of all wildlife, including those outside protected areas. TWD administers the Game Control Areas around Serengeti National Park while Serengeti National Park is administered by Tanzania National Parks (TANAPA). TANAPA is a government parastatal with the mandate to conserve and manage wildlife resources within protected areas for the present and for posterity (LVBC, 2010).

In Kenya, Kenya Wildlife Service (KWS) is a government parastatal with the mandate to conserve and manage Kenya's wildlife resources within and outside protected areas for the present and for posterity. Other organizations include Kenya Tourism Board (KTB), Ministry of Tourism, and other institutions that indirectly affect tourism activities such as Kenya Forest Services. But since the promulgation of the 2010 constitution, Mara National Reserve is under the Narok County government, yet another level of administration on Maasai Mara National Reserve. Even policy coordination at national level on the Kenyan side is disjointed since there is no joint body/committee to coordinate tourism activities.

In Serengeti, the tourism division, found within the Ministry of Natural Resources and Tourism (MNRT), is the main governmental body responsible for tourism within Tanzania. There are two main sections reporting to the Director: Travel and Facilitation, and

Hospitality and Development. Responsibilities of the Travel and Facilitation Section include industry and public relations that is concerned with licensing, policy /planning, tourism statistics and research (Kideghesho, 2008).

The wildlife division is responsibility for management and is split between the department and six parastatal which include Tanzania National Parks (TANAPA), Ngorongoro Conservation Area Authority (NCAA), College of African Wildlife Management (CAWM), Serengeti Wildlife Research Institute (SWRI), Tanzania Wildlife Company (TAWICO) and Tanzania Wildlife Authority (TAWA). The Wildlife Division is responsible for all wildlife management outside designated parks and conservation areas and also issues hunting concessions and licenses while SWRI conducts research in the whole country and TAWA is responsible for management of wildlife outside national parks (Kideghesho, 2008).

Thus, tourism policy coordination in SMME is affected by lack of a regional or bilateral organizational structure with capacity to enable information sharing and exchange in all key tourism areas. Even within respective countries, policy coordination with regard to many aspects of ecotourism is made difficult because of many state agencies that directly or indirectly affect tourism as a sector. Thus, coordination of policy should start at nation-state level and move to bilateral level and then at regional level.

This finding indicates that tourism policy coordination with regard to ecotourism in SMME is majorly facilitated by state agencies. These agencies are expected to facilitate exchange of information in aforementioned common interest ecotourism areas. These organizations are incapacitated and cannot purport to operate across the border. From the EAC agencies perspective, the EATWCA is limited in its mandate which leaves organizational policy coordination to ecotourism development in general.

This leads a number of obstacles where collaboration is needed for environmental protection and community development purposes in SMME. For example, joint policy coordination action on environmental protection along migratory corridors/routes and water routes on either side of SMME. This would promote conservation and management of shared wildlife or species populations in SMME. Further, there is a likelihood of complex problems such as cross border poaching, blocked migratory routes and human-wildlife conflicts that compromise protection of environment and wildlife along these corridors. These complex problems need interdependence among different actors in order to come up with joint policy actions to effectively solve them.

To find out specific organizational structures that coordinate tourism policy with regard to ecotourism in SMME, the researcher asked park managers, tourism officers in Ministries of EAC and Tourism, directors/managers of EAC tourism agencies, KWS, TANAPA, and TWS to identify the institutional organizations authorized to facilitate policy coordination in SMME. The total number of respondents was 10. Two questionnaires were not returned. Figure1 is a summary of findings:

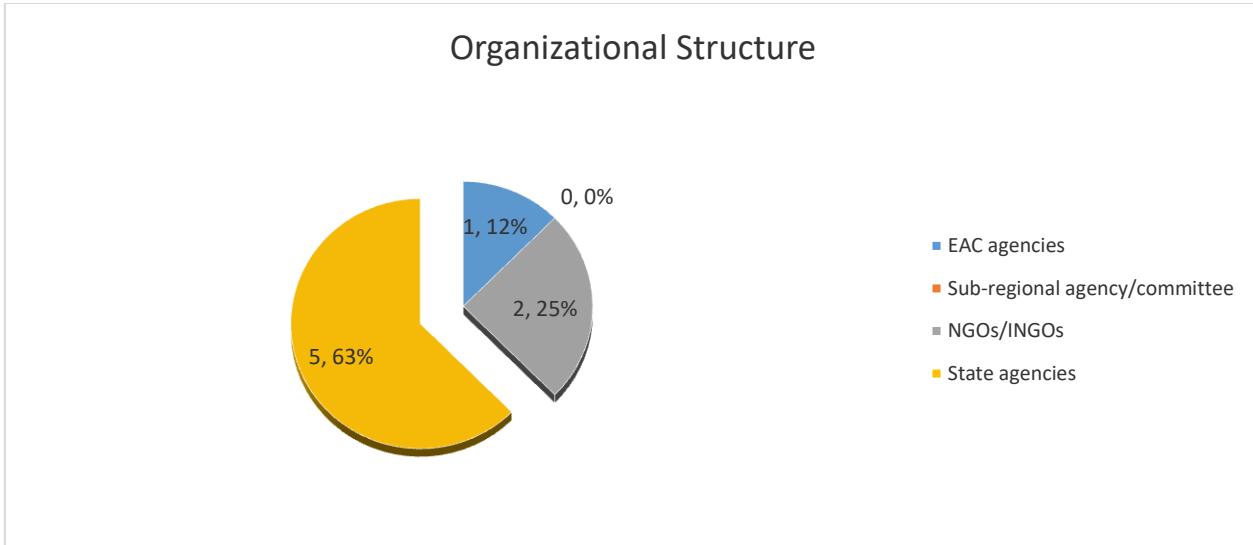


Figure 1: Organizational Structure

Source: Field Data, 2018

Figure 4.1 indicates that sixty-two and a half per cent (63 %) 5 of the respondents agreed that state agencies are institutional organizations that facilitate tourism policy coordination in SMME. Findings indicate that twenty-five per cent (25%) 2 of the respondents agreed that NGOs/INGOs do facilitate policy coordination while twelve and a half per cent (12%) 1 of the respondents agreed that EAC tourism agency is responsible for policy coordination. In an interview, a park manager was of this view:

Kenya and Tanzania are yet to jointly develop a tourism infrastructure plan to check on tourism facilities that are a threat to ecotourism while interlinked roads/airlines transport do not exist to promote tourism flow between Serengeti and Mara. The only tourism gate between the two adjacent parks was closed in 1977 (Interview held on 29th March, 2018 in MMNR).

This assertion indicates that tourism facilities such as lodges and camps are in a state of competition on both sides of the border and are controlled by respective states development policy. Because of competition between the two parks, there is a likelihood of overdevelopment of tourism facilities which goes against ecotourism aspect of environmental protection or effects of these tourism facilities. This finding concurs with Mayaka (2005) argument that tourism flow in the SMME is affected by lack of interlinked road and air network in EAC in general.

Other impediments relate to general tourism practices that differ as a result of many operators. Since areas nearby protected areas are established outside the direct control of respective national governments but by other stakeholders such as local governments, NGOs, local communities then cooperation need to be inclusive of them to achieve environmental and wildlife protection. For example, on the Mara side, the Narok County government is the main policy coordination actor in conjunction with national government agencies such as KWS and Ministry of Tourism while Serengeti side is majorly managed by national government agencies such as Tourism Wildlife Services, SENAPA and TANAPA and local authorities. The role of local authorities and county governments should be clearly defined to enhance cross border policy coordination. These levels of governments make it more difficult to coordinate policy actions in shared ecosystems.

For instance, there are many people involved on the Kenyan side due to devolved functioning of government structures in Kenya than in the Tanzanian side of SMME. Local community on Serengeti side of the border participate through local authorities. NGOs/INGOs

that operate across the SMME limit themselves to funding of projects across the border while tour operators and companies also affect operations in SMME. From this discussion, it is clear that the regional tourism policy captures key aspects of ecotourism and recognizes the importance of interdependence with regard to common regional interests and need to approach challenges that arise as a result of tourism activities. On the other hand, bilateral policy between Kenya and Tanzania limits interdependence which automatically makes it difficult to coordinate policy action in SMME. These supranational structural gaps both in regional and bilateral tourism policies arise from challenges that hinder crafting of a comprehensive regional tourism policy.

Conclusions

The main cause of little coordination is as a result of weak implementation mechanisms at regional or bilateral level to enforce policy coordination. Although the East African Tourism Wildlife Coordination Agency (EATWC) and East African Tourism Wildlife Conservation Agency (EATWCA) are responsible agencies to coordinate policy on marketing at regional and international level and conservation, they do not capture other pillars of ecotourism. Consequently, policy coordination is majorly dependent on state agencies such as KWS, TWS/TANAPA or Narok County government (Kenyan side). The 1983 bilateral agreement between Kenya and Tanzania overrides regional policy agreement in areas of tourism. The bilateral agreement is statist in that it empowers state agencies/parastatals with function of tourism policy coordination.

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Laser goniometer: smartphone goniometer with laser guidance for range of motion measurement in musculoskeletal medicine

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Abstract

Musculoskeletal disease is a common clinical problem, part of the physical examination of these body systems is the range of motion measurement of the joints. Current clinical tools for estimation of this parameters are visual estimation and the universal goniometer. With the advent of less expensive smartphones and widespread sensor availability, there was the development of a great number of apps that allowed the use of a smartphone as a goniometer. The purpose of this paper is to document research developments of creating a laser-aided goniometer with a smartphone, and suggests to create a business opportunity from this idea.

Index Terms- **MEMS:** Microelectromechanical Machines, **APC:** Automatic Power Control, **USA:** United States of America, **ROM:** Range Of Motion, **Ni-MH:** Nickel-Metal Hydride, **MCP:** Metacarpophalangeal, **PIP:** Proximal interphalangeal, **DIP:** Distal interphalangeal, **CMC:** Carpometacarpal, **IP:** Interphalangeal, **MTP:** Metatarsophalangeal, **ABS:** Acrylonitrile butadiene styrene, **CAD:** Computer Aided Design

1. INTRODUCTION

1.1 Background: Use of active and passive range of motion in musculoskeletal medicine.

In primary care clinical practice, the most common complaints are upper respiratory infections and gastrointestinal issues, followed by musculoskeletal problems.[1] There is a great variety of orthopedic and rehabilitation clinical problems in everyday practice. For example low back pain, neck pain, knee pain, hip pain, wrist pain, finger contractures, among others. [1] After a clinical interview and beginning a physical examination, the clinician seeing patients with orthopedic complaints eventually finds the need to measure the passive and active range of motion of a joint or body part. This clinical parameter is affected in different musculoskeletal diseases, for instance, increased wrist range of motion can indicate ligament hyperlaxity, and decreased or restricted passive range of motion can be found in patients with fractures, muscular spasms, muscle contractures, among other disease states.[2] An accurate assessment of the range of motion is also useful in patients who have a suspected diagnosis of scoliosis. [3]The main tool used to make a quantitative assessment of spine range of motion is the measuring tape or the inclinometer.[4] The goniometer can also be used for the evaluation of the range of motion of all the joint elements of the upper and lower extremities.

1.2 Currently used tools: plastic goniometers, inclinometers, halo goniometer, smartphone without case.

The most commonly used tool to measure the range of motion is the goniometer, and by 2019 in clinical practice most goniometers consist of plastic rulers. A goniometer is comprised of three elements. The first element is the axis, the second element is the stationary arm, and the third element is a moving arm. The moving arm of the goniometer is usually aligned to some anatomical landmark while the patient performs an anatomical motion so that the range of motion can be measured. In a sense, the goniometer is a special kind of protractor. The goniometer is used by a variety of health professionals that work with muscular-skeletal complaints, but many health professionals estimate range of motion measurements visually. Poulsen et al.[5] evaluated the reproducibility of goniometric measurements between experienced orthopedic surgeons and experienced chiropractors evaluating patients with hip osteoarthritis. The reproducibility was low between both groups of clinicians. Even though the subjects of Poulsen study were using conventional goniometers to evaluate the range of motion. Therefore a new kind of tool is needed for precise physical diagnosis of patients with orthopedic complaints.

1.3 Smartphone statistics and capabilities

By 2019 the United States of America has a population of more than 328 million persons, and the world has more than 7,500 million individuals.[6] Smartphone adoption and operating systems trends are different between the USA and the world. There are an estimated 257 million smartphone users in the USA in 2019 [7], which means that 67.3% of the population has access to a smartphone

and to the whole array of sensors that they include. The market share value is different in the USA vs the world. Apple iOS is among the most commonly used operative systems in the USA with 44.8% of smartphone owners using this operating system. The rest of the American market is divided between several smartphone companies that use the Android operative system. An estimated 53.4% of Americans smartphones are Android OS based in 2019. [7] In the rest of the world., by 2019 Android-based smartphones owned 75% of the smartphone market, and Apple iOS had a global 22.4% market share. [8]The remainder of the market share (less than 1%) is based on Nokia, and KaiOS. Modern day smartphones are surprisingly powerful computers most of them count with a great variety of sensors that can be explored for medical diagnostics. Among the most commonly installed sensors and circuits in smartphones are MEMS accelerometers [9], gyroscope, magnetometer, pedometer [10], proximity sensor, and thermoreceptors. Some smartphones even include pulse oximetry and heart rate sensors.

1.4 Health professionals

There is a large number of clinicians that see patients with musculoskeletal complaints. Therefore these professionals would benefit from a faster and more accurate way of measuring the range of motion. The third generation laser goniometer intends to position itself as a leading tool by providing smartphone assisted goniometric measurements with added laser guidance for improved alignment of the phones axis to anatomical landmarks. Among the health professionals that could benefit from a next-generation goniometer are: orthopedic surgeons, physical medicine and rehabilitation specialists, rheumatologists, sports medicine physicians, personal trainers, physical therapists, sports-aficionados, athletes, coaches, and healthy young men and women with interest in health and fitness. What I propose in this paper is for the creation of the first type of real multifunctional tool for health professionals. The world is filled with smartphones and sensors. And appropriate hardware adaptations and sensor capabilities will improve the smartphones capacities to become useful tools in the evaluation of disease.

2. METHODS

2.1 Circuit software simulation

An online circuit simulator that runs on Java [11] was used for building a simulation of the basic circuit for the second generation laser goniometer. In the following image one can see the following abbreviations: B = Battery, S1 = Switch 1, S2 = Switch 2, L1 = Laser 1, and L2 = Laser 2. For an image of the second generation laser goniometer circuit simulation, refer to Appendix A.

2.2 Circuit assembly

For the circuit assembly 4 AAA batteries were used. They were 1.2-volt Nickel-Metal hydride (Ni-MH) batteries. With an 1100 mAh lifetime per charge cycle. The batteries were feeding current to L1 and L2. These lasers are used for improved alignment of the phone with anatomical landmarks so that a proper measurement of range of motion can be used with this device. S1 and S2 are switch buttons that run from the negative cable of both lasers to the negative pole of the power cells B. The lasers used for the construction of the second generation laser goniometer prototype are the HLM1230 laser modules [12] They are 650 nm red laser modules with a power output of 5mW, a focusable acrylic lens, an APC driver for an input voltage of 3.5-4.5V direct current, an operating current of <25 mA. These are practical for the construction of further prototypes or marketable products because they are quite affordable at only 5-10 dollars per piece. These lasers are classified as IIIa lasers which means that retinal injuries can occur if the laser beam hits the retina for more than 2-3 minutes [13] However they are considered safe for medical devices. The lasers also come with a chrome brass heatsink and therefore do not need cooling equipment. For an image of the laser and the measurements refer to Appendix B.

2.3 Casing assemble

For the second generation laser goniometer a piece of polyvinyl chloride (PVC) tube was used for the housing of the electronics. The tube had an external diameter of 40 millimeters and an internal diameter of 36 millimeters. The length of the tube used was of 22 cm. With a top cap and a bottom cap. The top cap is also made of PVC and has the following dimensions: internal diameter of 36 mm, the external diameter of 42 mm, and length of 40 mm. The top cap houses the laser number 2 and it also has two attachment holes for two screws in the event that a voltage booster taser module is added. The bottom cap of the second generation laser goniometer houses a security switch intended to use for one of the lasers, or for a voltage booster taser module.

2.4 Software considerations

For the second generation laser goniometer a search was performed on the apple app store for any application that allowed for easy use of the phone accelerometers to use in the laser goniometer. I performed a 4 word search on the apple app store with the following terms: inclinometer, goniometer, level, and protractor. Seven apps were downloaded to the laser goniometer phone in order to investigate their accelerometer capabilities. The following apps were installed for study: Angle Pro, Protractor360, Goniometer, yROM Lite, Bubble Level, Orthophysical, and Angle. Of them the application called Angle was the most minimalistic and easy to use. However, it lacked any memory features that would allow for storing measurements. Furthermore, there was no access to the camera in the app. This restricts an augmented reality visualization of the angles that could be developed if new software was written specifically to merge the laser, accelerometer, and camera phone capabilities. For the remainder of the paper, clinical measurements of range of motion are made with the app Angle. One limitation of this app is that it does not estimate Azimuth or movements of the Z-axis in the phone. All of the apps installed lack the feature of integrating the feedback from the magnetometer with the accelerometer

to measure the movement of the phone in the Z-axis. Any marketable laser goniometer, therefore, would need to run its own iOS or Android app [14].

3. RESULTS

3.1 Second generation laser goniometer

The second generation laser goniometer has the capabilities to measure angles in three-dimensional space by using the smartphone accelerometer, magnetometer and the laser modules for improved alignment of the phone axes with clinical landmarks. One laser module Laser 1, projects a red cross because of the specially collimated lens. This laser, in particular, is aligned parallel to the Z-axis of the phone which allow for measurements on the X and Y axes. The second generation goniometer also has an additional laser module Laser 2 that projects a dot or a laser line. This module is aligned parallel to the Y axis of the phone so that measurements of the Z-axis or azimuth can be recorded. This device would be suitable for the goniometric evaluation of all the body joints. The joints of the body are basically divided into body groups: axial skeleton, upper extremity, and lower extremity. [17] Any clinical evaluation of the range of motion of a joint makes use of a goniometer. A goniometer is usually a plastic ruler and it consists of three parts: the first part is a goniometer axis, the axis should be aligned with a clinical landmark for correct measurement of range of motion. The second part is the stationary arm, and the third part or measuring part is the moving arm. The three elements of a goniometer previously described can be easily replicated with the sensor capabilities of any smartphone, provided the correct software is developed that allows for measurement of angle measurements in all three axes of the smartphone. For photos of this device refer to appendix C-F

For a clinical demonstration of the second generation, laser goniometer refer to appendixes G-J. Appendix G shows the clinical alignment necessary for measurement of the ulnar deviation of the left hand, the picture depicts the starting position and alignment of the laser goniometer to a clinical landmark, in this case, the space between the second and third metacarpals. Appendix H shows the measurement done on this hand with an estimated absolute value of the ulnar deviation of 37° degrees. Appendix I depicts the zero starting position for measurement of the left leg extension value, in this case, the laser cross is centered on the knee. Appendix J shows the ROM measurement of the knee as 66° degrees. The same principles depicted to measure these joints can be used to measure all of the joints in the body as discussed below.

3.2 First generation laser goniometer

The first generation laser goniometer was developed by the author while completing the social service in Monterrey, Mexico. I began the design of this device while working with children with cerebral palsy and needed an accurate way to measure the internal and

external rotation of the hip, so the risk of hip subluxation in these population could be estimated in this population [4], that expended most of their day using wheelchairs and sitting for prolonged periods of time. The first laser goniometer was only an iPhone 4 case that was 3D printed in ABS plastic and that had a special ring with a screw to attach a laser pointer. The device proved useful in my personal experience for seeing a great number of patients with hip issues. For a clinical demonstration of this device efficacy refer to Appendix K and L.

4. DISCUSSION

4.1 Spine measurement capabilities.

Neck pain and back pain are a common diagnosis in primary care practice. [1] As discussed previously visual assessment of the range of motion and conventional goniometric measurements have poor intra-observer and inter-observer reproducibility. However, there is evidence in the literature that the use of goniometer smartphone apps helps to improve the speed and accuracy of the range of motion measurements. Pourahmadi et al [18] reported improved intra-rater and inter-rater measurement reproducibility of range of motion measurement on patients who were evaluated with the goniometer app (Goniometer Pro), one of many goniometry apps for Android and iOS. This cross-sectional study demonstrated improved accuracy range of motion measurements on patients with non-specific neck pain. The study evaluated the 6 anatomical movements of the cervical spine: flexion, extension, right lateral flexion, left lateral flexion, right rotation, left rotation. Current methodologies for measuring thoracolumbar anatomical movements make use of a measuring tape that is positioned on anatomical landmarks to make an estimation of flexion, extension, right side flexion, left side flexion, right rotation, and left rotation. A next-generation goniometer would allow for faster and more accurate range of motion evaluations of the spine. Another cross-sectional study by Pouahmadi et al. [19] also demonstrated improved reproducibility and accuracy of range of motion measurement on the thoracolumbar spine with an iPhone goniometry app. Table 1 shows the

Table 1: Spine. The cervical and the thoracolumbar spine behave like joints with 3 degrees of freedom. Anatomical movements can be flexion, extension, left lateral flexion, right lateral flexion, right rotation and left rotation for both joint complexes.

Spine	Degrees of freedom (df)	Anatomical movements (am). $2(df) = (am)$	Number of joint complexes (jc)	Possible measurements (am)(jc)
Cervical	3	6	1	6
Thoracolumbar	3	6	1	6
				12

degrees of freedom of all the cervical and thoracolumbar joint complexes.

4.2 Analysis of upper extremity measurement capabilities.

The upper extremity is comprised of 10 joint complexes: shoulder, elbow, forearm, wrist, the metacarpophalangeal complex of fingers 2-5, proximal interphalangeal complex of fingers 2-5, the distal interphalangeal complex of fingers 2-5, carpometacarpal complex of finger 1, metacarpophalangeal complex of finger 1, and interphalangeal complex of finger 1. There are a variety of studies that demonstrate improved goniometric readings in the upper limb, most of them with smartphone devices. In the case of the shoulder Cornell et al. [20] shows improved inter-rater and inter-rater reproducibility of ROM measurements with the use of laser goniometer (Halo Goniometer), this study only looked at healthy patients. Keijzers et al. [21] studied the inter-observer and intra-observer reproducibility of elbow range of motion evaluation with universal goniometry, a smartphone goniometry application and a photo/movie application for ROM measurement. He found out that reliability was good only for the movie application. However a study made by Vauclair [22] reported different findings. According to this study visual estimation of ROM can be as good as smartphone goniometric evaluation, but only for some anatomical movements. This study reports that only visual estimations of forearm pronation/supination were as good as smartphone goniometric measurements. Vauclair found that smartphone measurements were better than visual estimation for flexion and extension of the elbow. Improved reproducibility, accuracy and speed are also reported for goniometric measurements done with smartphone apps for the remainder of joint complexes of the upper arm, for example, improved wrist ROM measurements can be done with smartphone apps. [23] [24] [25] The same principles outlined above can be extrapolated for better ROM measurements of other joint complexes like the fingers and the thumb. Table 2 shows the degrees of freedom, anatomical movements and total goniometric measurements that can be performed on the upper limb. A

Table 2: Upper extremity. Anatomical movements can be flexion, extension, internal rotation, external rotation, abduction, adduction.

Upper extremity per side	Degrees of freedom (df)	Anatomical movements (am). 2(df)=(am)	Number of joint complexes (jc)	Total Measurements (am)(jc)
Shoulder	3	6	1	6
Elbow	1	2	1	2
Forearm	1	2	1	2
Wrist	2	4	1	4
MCP	2	4	4	16
PIP	1	2	4	8
DIP	1	2	4	8
CMC	2	4	1	4
MCP of thumb	1	2	1	2
IP of thumb	1	2	1	2
				54

professionals that are frequently exposed to musculoskeletal complaints.

4.3 Analysis of lower extremity measurement capabilities.

Table 3 shows the degrees of freedom, anatomical movements and total goniometric measurements that can be performed on the lower limb. The previous principles from the spine and upper limb also apply to the lower limb. This structure is comprised of 9 conventional joint complexes with 2 special goniometric measurements that could also be improved by a next-generation goniometer. Hip measurement of ROM has low reproducibility in a great variety of conditions. A literature search reveals poor inter-rater and intra-rater reliability of hip ROM measurements in cerebral palsy, hip osteoarthritis, and femoral acetabular impingement.[4][5] [26] Knee evaluation with a smartphone goniometer is equally as good as the ones performed by experienced orthopedic surgeons using conventional goniometers, therefore it stands to reasons that improved alignment with laser diodes could improve the accuracy of goniometric measurements even further.[27] [28][29] Better goniometric measurements could also aid in the recovery of patients with issues of proprioception. [3]

Table 3: Lower extremity. Anatomical movements can be flexion, extension, internal rotation, external rotation, abduction, adduction. MTP of the first finger has only 3 anatomical movements: flexion, extension and abduction. Tibial torsion can be measured with a goniometer

Lower extremity per side	Degrees of freedom (df)	Anatomical movements (am). $2(df)=(am)$	Number of joint complexes (jc)	Total Measurements (am)*(jc)
Hip	3	6	1	6
Knee	1	2	1	2
Tibial torsion	N/A	N/A	N/A	N/A
Ankle	1	2	1	2
Subtalar	1	2	1	2
Midtarsal	1	2	1	2
MTP first toe	1.5	3	1	3
IP first toe	1	2	1	2
MTP fingers 2-5	1	2	4	8
PIP fingers 2-5	1	2	4	8
DIP fingers 2-5	1	2	4	8
				43

5. CONCLUSIONS

It is clear that there is a need for more precise orthopedic diagnostic instruments at affordable prices, with the advent of fast printing of circuit boards and the decreasing cost of using 3D printers. The possibility of creating an actual product is a daunting task. Ideally, a

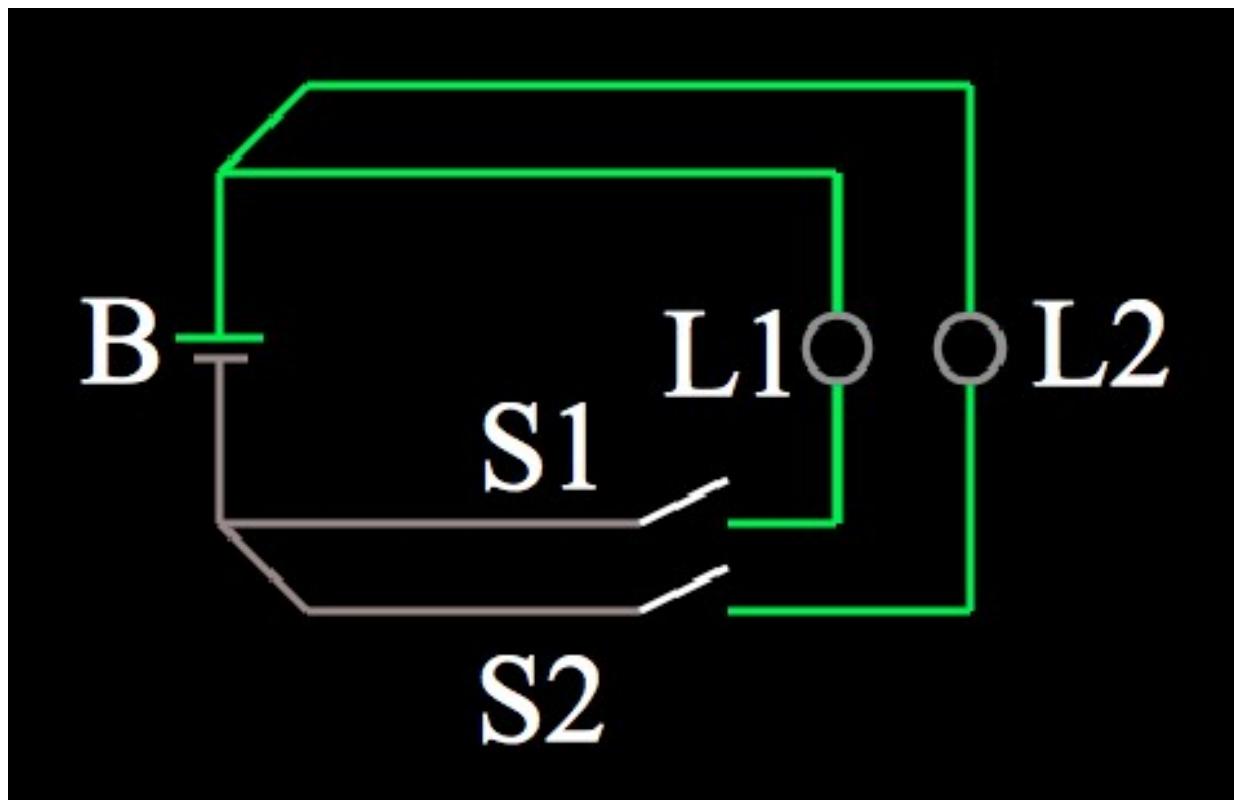
third generation laser goniometer would consist of an exterior smartphone case that could be added to any smartphone. The medical smartphone case could be 3D printed and would need to house 1 to 2 battery cells. An excellent ideal candidate for power cell is the 18650 lithium ion battery. The battery has a measurement of 18 mm in diameter at the base and top, and 65 mm of length as it is evident from its name. It also has a working voltage of 3.7-4.2 volts and an electrical charge capacity of between 1500-2500 mAh.[30] Therefore it could be compatible with any HLM1230 laser module.[15] [16] [12] Smartphone case material could be either polylactic acid or ABS [31]. 3D printer advancement and the development of new materials in the industry would allow for different smartphone case materials. Additional components that would need housing for the third-generation model are a TP4056 module or any other module that would allow for USB charging of the power cell and eventually the laser. [32] The TP4056 module is a constant-current/constant/voltage linear charger and it limits the current of the battery to 4.2 volts. Additional components include any cables and switches for turning on and off the third generation device. The next step is to get sufficient funding for creating the first 3D printed prototypes and study how the customers could interact with this product. The market for this kind of technology is obviously global thanks to the advancement of e-commerce by 2019.

6. ACKNOWLEDGMENTS

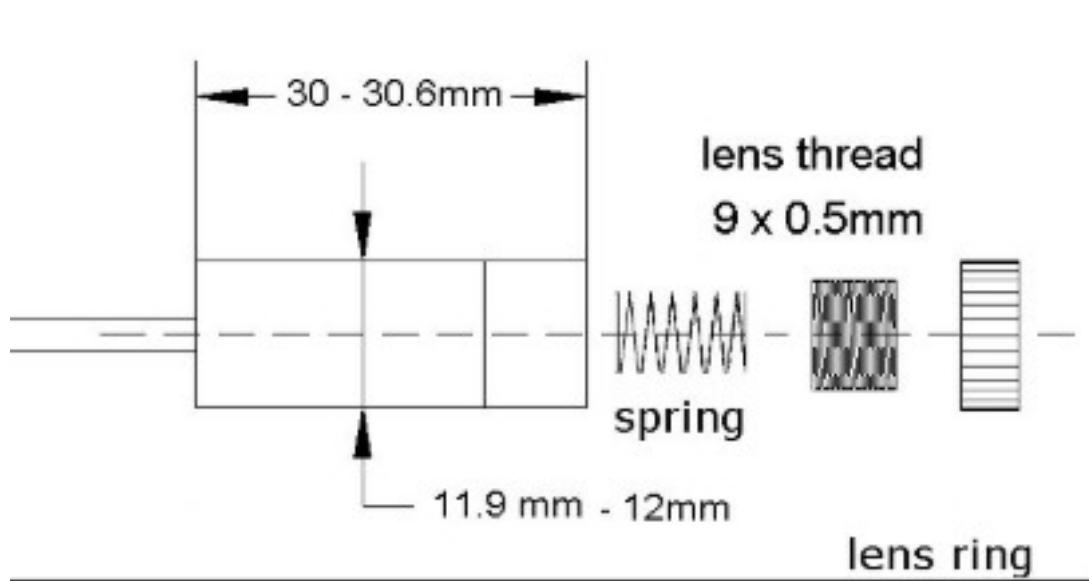
I am most appreciative to my mother and father for their support of my medical education. Thanks to my grandmother Elvia and my grandfather Frascuelo who always supported my education. As well as my aunt Nelly and my uncle Rafael for their support of my schooling. I also gratefully acknowledge all the assistance of the remainder of my family.

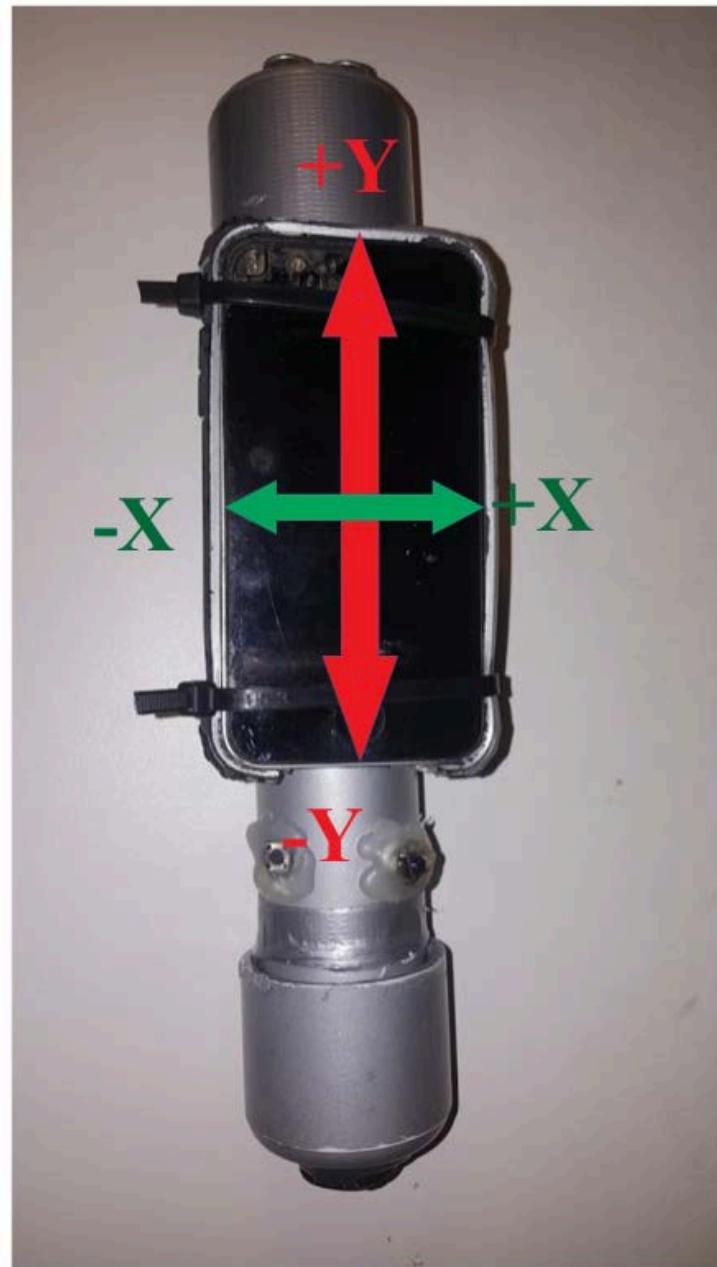
7. APPENDIXES

Appendix A: Circuit model simulation made on Java. B=Battery of 4.8V. L1 = Laser 1, L2 = Laser 2, S1 = Switch 1, S2 = Switch 2.



Appendix B : HLM1230 laser module components and measurement, this image is included in the user manual available online and listed in the references.





Appendix C: Second generation laser goniometer. iPhone 4s in image. Buttons are for controlling Laser 1 and Laser 2. The iPhone 4s in built MEMS accelerometer measures changes in position in the Y and X axis of the phone. Z-axis is orthogonal to the X and Y axes.

Appendix D: Lower cap removed to expose the 4 capacity battery holder for the 1.2 volt 4 AAA batteries powering the second generation goniometer



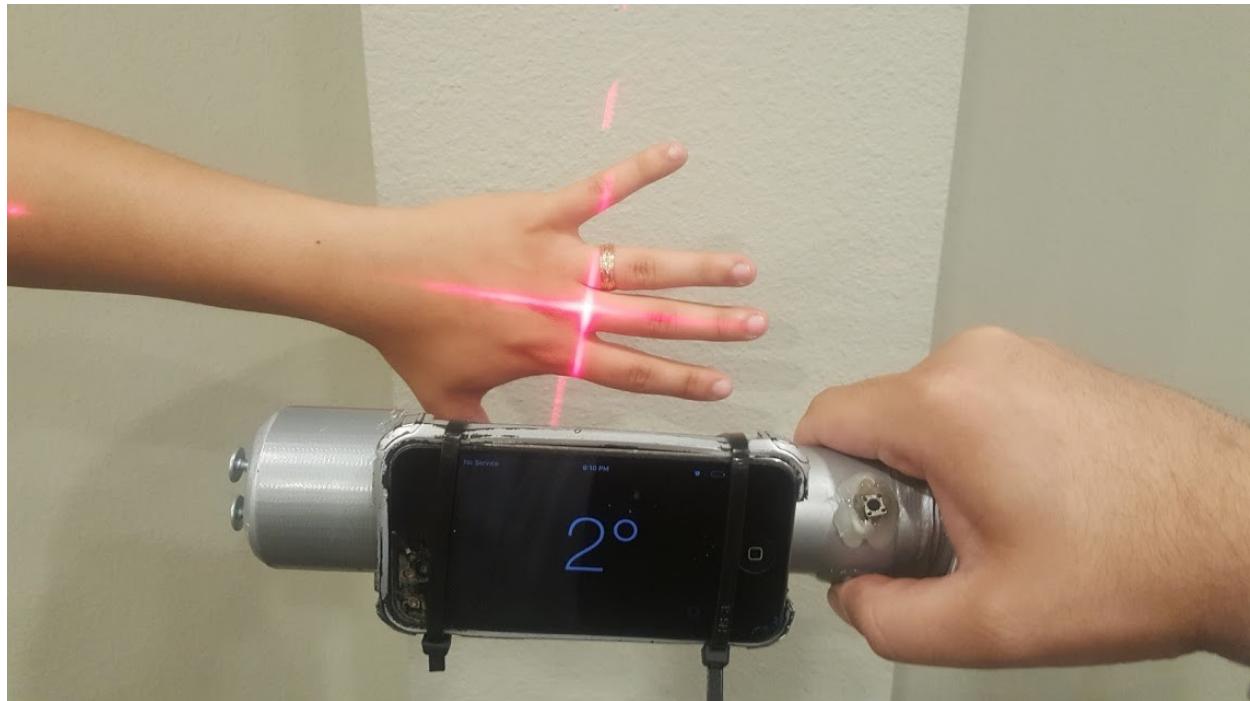
Appendix E: Laser module aligned parallel to Z-axis of the phone. This laser configuration allows for measurements of degrees on the X and Y axes.



Appendix F: Laser 2. This laser module is aligned parallel to the Y axis of the smartphone.



Appendix G: Ulnar deviation starting position 2° degrees. Laser cross is aligned to the space between the 2nd and 3rd metacarpals.



Appendix H: Ulnar deviation of -35° degrees. Zero starting position 2° degrees. Total arc of ulnar deviation = 37 degrees.



Appendix I: Left leg extension ROM measurement. Zero starting position. Laser cross aligned to center of the knee.



Appendix J: Left leg extension ROM measurement of 66° degrees. Laser is aligned to center of the knee.





Appendix K: First generation laser goniometer. ROM of left elbow 0°. Zero starting position. The first generation laser goniometer was a 3D printed ABS plastic case that held a green laser pointer in place.



Appendix L: First generation laser goniometer. ROM of left elbow flexion 87° degrees.

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The Effect of Addition of Arabic Gum to Amino Acid Profile and Fatty Acid Profile of Albumin Powder Cork Fisk (*Channa striata*)

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Abstract

Albumin is one of the most abundant proteins in plasma, accounting for around 50-60% of serum protein and 3% of the body's total protein. Albumin is a relatively small molecule with a molecular weight of approximately 66,500 Da, and consists of 585 amino acids which are arranged into three repetitive homologous domains and two subdomains. Cork fish albumin extract is usually consumed in liquid form and smells fishy so that not everyone likes it. For this reason, another alternative is needed, namely by processing using a drying method so that it produces albumin in powder form which is expected to be accepted by everyone. This study aims to determine the effect of the addition of Arabic gum on the type and amount of amino acids and fatty acids of cork fish albumin powder. The chemical composition of cork fish albumin powder was tested by proximate analysis. Amino acid content in cork fish albumin powder can be tested using HPLC (High Performance Liquid Chromatography), while the fatty acid content can be tested using GC-MS (Gas Chromatography Mass Spectrometer). Albumin powder in the treatment of addition of 100% maltodextrin and 0% Arabic gum was obtained albumin levels of 1,98%, protein 21,33%, water 6,06%. The highest amino acid content of glutamic acid is 0,40%, phenylalanine acid 0,40%, and lysine acid 0,36%, and the highest fatty acid content is Palmitic acid 23,46% and Oleic Acid 15,82%.

Keywords: Albumin powder, amino acids, fatty acids, maltodextrin, Arabic gum.

I. INTRODUCTION

Cork Fish (*Channa striata*) is an important freshwater consumption fish in many regions of Southeast Asia including India. This species has a vast natural distribution, stretching from Iran to the Middle East including India, China and Indonesia. In India and other Southeast Asian countries, Cork Fish (*Channa striata*) is an important component of freshwater fish catches and produces relatively high prices compared to carp (Sood et al., 2011). Cork fish albumin extract is usually consumed in liquid form and smells fishy so that not everyone likes it. For this reason, another alternative is needed, namely by processing using a drying method so that it produces albumin in powder form which is expected to be accepted by everyone. In the drying process, coating agents are needed, namely arabic gum. According to Rahmanto et al. (2014). The addition of arabic gum as a binder is expected to improve the quality and improve the shelf life of the final product. Gum arabic is a hydrocolloid that dissolves easily in water. Emulsifiers and thickeners of arabic gum are related to their protein content.

Amino acids are the main constituent components of proteins, and are divided into two groups, namely essential and non-essential amino acids. Essential amino acids cannot be produced in the body so they must be obtained in the form of food, while non-essential amino acids can be produced in the body (Elfita, 2014). Fatty acids according to Manduapessy (2017), are constituent components of fat, fatty acids consist of saturated fatty acids and unsaturated fatty acids. The ability of the human body to synthesize unsaturated fatty acids which have two or more double bonds is very limited, so these fatty acids must be obtained from food.

II. MATERIALS AND METHODS

2.1 Materials

This research material used consisted of raw materials for making albumin extract, ingredients for albumin powder making, and materials for chemical analysis. The raw material for making albumin extract, 500 grams of cork fish (*Channa striatus*) obtained from *Pasar Besar Malang* is still alive. The material for making albumin powder is albumin extract derived from extraction of cork fish and fillers in the form of maltodextrin and arabic gum.

In this study, the concentration of arabic gum is 50% (from cork fish) was used. 250 g of cork fish was extracted using a vacuum extractor at 70 ° C for 12.5 minutes. Furthermore, the albumin extract obtained was added by maltodextrin and arab gum according to each treatment. Then the cork albumin extract was dried using vacuum drying with a temperature of 49 ° C for ± 6 hours. The test parameters used in the main research were albumin, protein, water, ash, fat content, fatty acid profile and amino acid profile.

2.2 Albumin Analyze

Analysis of albumin levels was determined using the spectrophotometer method. A spectrophotometer is an instrument to measure the transmittance or absorbance of a sample as a function of wavelength, measurement of a series of samples at a single wavelength. In the spectrophotometric method, the sample absorbs electromagnetic radiation (transmitter), which at a wavelength of 550 nm can be seen. Determination of albumin levels can be done using the spectrophotometric method, namely: 2 cc samples or samples added with biuret reagents then heated at 37 ° C for 10 minutes. Cool then measured with electronic 20 and record the absorbance.

2.3 Protein Analyze

Analysis of protein levels can use spectrophotometric methods. The protein contained in a material can be known because of the arrangement of amino acids that bind to the peptide. The concentration of this protein can be known because of the color formed by Cu²⁺ ions from CuSO₄ in a NaOH alkaline atmosphere (Jubaidah et al., 2016).

2.4 Water Analyze

Analysis of water content according to Susanti and Putri (2014), samples were weighed as much as 2-5 grams in porcelain dishes that had known weight. The cup is put in the oven for 5 hours at a temperature of 100 - 105 ° C or until the weight is constant. The sample is then removed from the oven and put into the desiccator and immediately weighed after reaching room temperature. Re-enter the material into the oven until a constant weight is reached (the difference between 0.002 grams in a row). The weight loss is calculated as a percentage of water content and is calculated by the formula:

$$\text{Water (\%)} : \frac{\text{The weight of sample and cup before drying } p - \text{the weight of sample and cup after drying}}{\text{sample weight}} \times 100\%$$

2.5 Amino Acid Analyze

Analysis of amino acid profiles can be analyzed by using the HPLC method. According to Azka et al., (2015), to obtain amino acid content using the HPLC method, there are 4 steps that must be done. The first stage is the manufacture of protein hydrolysate, ie the sample is weighed as much as 0.1 g and destroyed. The destroyed sample was added with 10 ml of 6N HCL and heated in an oven with a temperature of 100 oC for 24 hours. The second stage is filtering the sample, where the sample is filtered and taken 30 µL and added 30 µL of the drying solution (mixture of methanol, picotiocyanate and triethylamine in a ratio of 4: 4: 3). The third stage is derivatization, namely derivatization solution (mixture of methanol, sodium acetate and triethylamine with a ratio of 3: 3: 4) as much as 30 µL. This is done so that the detector can easily detect compounds in the sample. After that dilution is carried out by adding 20 ml of 60% acetonitrile or buffer sodium acetate 1 M and left for 20 minutes. The fourth stage is injection into the HPLC, where 40 µL of the filter is taken to be injected into the HPLC. Calculation of amino acid concentrations contained in the material can be done by making standard chromatography using feed-ready amino acids that have experienced the same treatment as the sample.

2.6 Fatty Acid Analyze

In analyzing fatty acids according to Perkins (1975), it can be done by methylation. The first step is to weigh 1 ± 150 mg of the sample in the form of oil, then dissolve it in 2 ml of 0.5 N KOH in methanol. Then reflux for 5 minutes. Then 2 ml BF₃ methanol 15% refluxed for 5 minutes and added 4 ml heptan. Then reflux again for 2 minutes. Add 5 ml of anhydrous and Na₂SO₄ saturated NaCl solution sufficiently, after which it is cooled to room temperature. After cooling, the solution is put in a separate flask, shaken and left for a while so the heptan is separated. After that the solution is taken and put in a closed test tube to be injected into the GC.

III. RESULTS AND DISCUSSION

3.1 Albumin

The albumin content in albumin powder at the concentration of arabic gum fillers (50%) which is equal to 1.98%. The high and low level of cork albumin powder albumin is thought to be caused by the raw material of albumin powder itself, which is cork fish. The higher the albumin level in the raw material, the higher the albumin level of cork fish albumin powder (Setiawan, 2013). Suprayitno (2015) added, the protein content in cork fish is 25.2g / 100g of fresh cork fish and contains albumin of 62.24g / kg.

3.2 Protein

The protein content in albumin powder at the concentration of arabic gum fillers (50%) which amounted to 21.33%. The higher the concentration of addition of arabic gum fillers and the lower the concentration of maltodextrin affects the higher protein content of the final product. This is caused by different compositions between arabic gum and maltodextrin. Gum arabic contains glycoproteins. This protein in arabic gum contributes to the binding of extracts through noncovalent bonds between polypeptides. The addition of high maltodextrin does not affect the final protein content, this is because maltodextrin is a polysaccharide that does not contain protein which affects the binding ability of proteins (Kania et al., 2015).

3.3 Water

The water content in albumin powder at the concentration of arabic gum fillers (50%) which is 6.06%. The higher the concentration of arabic gum is added, the higher the water content of the cork fish albumin. Water content is influenced by molecular

weight, the greater the concentration of arabic gum used in solution, the micro-moisture content of encapsulants will also increase (Gardjito et al., 2006). The increase in water content was inversely proportional to the increase in levels of maltodextrin. This is because maltodextrin can increase the total solids of the dried material. So that the amount of evaporated water is less, consequently the increase in maltodextrin will reduce the water content. In addition, one of the properties of maltodextrin is being able to bind the free moisture content of a material resulting in the addition of more maltodextrins which can reduce the water content of the product (Yanuwar et al., 2007).

3.4 Amino Acid Composition

Table 1. Results of analysis of amino acid powder of cork fish albumin

No.	Asam Amino	Level (%)
1.	Aspartic Acid	0,36
2.	Glutamic Acid	0,40
3.	Serine	0,21
4.	Histidine	0,07
5.	Glycine	0,27
6.	Threonine	0,14
7.	Arginine	0,13
8.	Alanine	0,23
9.	Tyrosine	0,03
10.	Methionine	0,23
11.	Valine	0,08
12.	Phenylalanine	0,40
13.	I-leucine	0,20
14.	Leucine	0,08
15.	Lysine	0,36
	Total	3,19

Based on Table 1, the results of analysis of amino acid profiles of cork fish extract using the HPLC method can be read as many as 15 amino acids from 21 amino acids. It is known that the highest amino acids in cork albumin powder are glutamic acid, phenylalanine, aspartic acid, and lysine. The high and low amino acid content in a processed product can be caused by the parameters of processing, storage, fish species, and freshness of raw materials (Pratama, 2013). According to Yuniarti et al. (2013), high levels of glutamic acid in cork albumin powder because glutamic acid is a natural component in almost all foods containing proteins such as meat, fish, and milk

3.5 Fatty acid composition

Table 2. Results of Analysis of Fatty Acid Profile of Cork Fisk Albumin Powder

No.	Fatty Acid Type	Level (%)
1.	Caprilic acid, C8:0	0.09
2.	Capric acid, C10:0	0.05
3.	Lauric Acid, C12:0	0.35

4.	Tridecanoic Acid, C13:0	0.06
5.	Myristic Acid, C14:0	2.89
6.	Myristoleic Acid, C14:1	0.06
7.	Pentadecanoic Acid, C15:0	0.90
8.	Palmitic Acid, C16:0	23.46
9.	Palmitoleic Acid, C16:1	3.26
10.	Heptadecanoic Acid, C17:0	1.10
11.	Cis-10-Heptadecanoic Acid, C17:1	0.38
12.	Stearic Acid, C18:0	5.55
13.	Elaidic Acid, C18:1n9t	0.23
14.	Oleic Acid, C18:1n9c	15.82
15.	Linoleic Acid, C18:2n6c	0.63
16.	Arachidic Acid, C20:0	0.23
17.	γ -Linolenic Acid, C18:3n6	0.00
18.	Cis-11-Eicosenoic Acid, C20:1	0.15
19.	Linolenic Acid, C18:3n3	0.48
20.	Heneicosanoic Acid, C21:0	0.10
21.	Cis-11,14-Eicosadienoic Acid, C20:2	0.09
22.	Behenic Acid, C22:0	0.26
23.	Tricosanoic Acid, C23:0	0.06
24.	Cis-13,16-Docosadienoic Acid, C22:2	0.03
25.	Lignoceric Acid, C24:0	0.13
	Total	56.32

Based on Table 2, the results of the analysis of fatty acid profiles of cork albumin powder using the AOAC method can be read as many as 25 fatty acids. The highest fatty acid content in cork albumin powder is palmitic acid, and oleic acid. The high and low fatty acids in the product can be caused by these fatty acids which cannot stand the heat during the drying process (Liputo et al., 2013). According to Hastarini et al. (2012), high levels of palmitic acid and oleic acid in cork fish albumin powder because the two acids are the main components of fatty acid constituents in the oil produced by fish. The lowest fatty acid level in cork fish albumin powder is docosadienoic acid.

IV. CONCLUSION

Cork fish albumin powder can be used as a source of albumin because it contains 15 types of amino acids and 27 types of fatty acids. Of the types of amino acids and fatty acids present in cork albumin powder have an important role in the process of wound healing including the types of glutamate, arginine, and aspartate acids. As for the types of fatty acids that play a role in the wound healing process, EPA and DHA.

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Frequency of Hepatitis B and Hepatitis C in Blood Donors Visiting Blood Bank of Doctor's Trust Teaching Hospital Sargodha, Pakistan

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Abstract- BACKGROUND

A number of evaluations regarding frequency of HBV & HCV in general population have been carried out but only few focused blood donors visiting tertiary health care units. This study focuses upon gender distribution, age distribution and residential distribution (urban and rural) of Hepatitis B & C positive individuals, It also reflects most prevailing mode of transmission of these viruses among subjective individuals.

OBJECTIVES

To determine frequency of Hepatitis B & C in blood donors visiting blood bank of Doctor's Trust Teaching Hospital Sargodha.

METHODOLOGY

This is an observational cross-sectional study with prospective data, done through observation of blood screening test logs of 100 donors visiting blood bank of Doctor's Trust Teaching Hospital, Sargodha.

RESULTS

- Out of 90 male blood donors 33 are affected (HBV positive 8, HCV positive 25) while out of 10 female blood donors 6 are affected (HBV positive 2, HCV positive 4).
- 10% of affected individuals are less than 30 years of age while 29% are above 30 years of age.
- 10% of total subjective individuals have positive screening test for HBV.
- 29% of total subjective individuals have positive screening test for HCV.

CONCLUSIONS

Hepatitis C is more prevalent than hepatitis B in subjective population. Males are more affected than females by 5.5:1. Middle age group is more affected. Most common modes of transmission are needle pricking, dental and other surgical procedures.

Index Terms- Blood donors, Mode of transmission, Hepatitis B&C prevalence.

I. INTRODUCTION

Viral hepatitis is a serious public health problem affecting billions of people globally. Limited information is available on this issue in Doctor's Trust Teaching Hospital, Sargodha.

1: [This cross-sectional study was undertaken with the aim of determining the seroprevalence and risk factors of Hepatitis B virus (HBV) and hepatitis C virus (HCV) among blood donors <http://www.biomedcentral.com/1471-2458/13/50>].

2: [The World Health Organization (WHO) estimating that chronic hepatitis B & C affect over 500 million people world wide. The situation in Asia Pacific is particularly dire, with 74% of total hepatitis B population living in the region and 20% of Hepatitis C population living in South East Asia alone <http://www.who.int/csr/disease/hepatitis/Framework/en/index.html>].

3: [Data from the global Burden of Disease study 2010 (published in 2012) shows that's even with advances in treatment and the success of the hepatitis B vaccination program in many countries, the mortality rate of viral hepatitis in Asia pacific has risen from 695,000 deaths in 1990 to over one million deaths in 2010. The annual mortality rate associated with viral hepatitis is three times as high as HIV/AIDS and nine times as high as malaria in Asia pacific. <http://www.healthmetricsandevaluation.org/gbd>]

HEPATITIS B VIRUS

4 : [It is one of the most common viral infections in the world. The WHO estimates that two billion people have been infected with the hepatitis B virus and approximately 240 million people are living with chronic infections. The virus is highly infectious, around 50-100 times more infectious than HIV in cases of needle stick injury. Acute hepatitis B infections often go away within six months. However, if the infection becomes chronic, it may cause far more serious complications. The younger you are when you become infected, the more likely you are to develop chronic infection. Hepatitis B is transmitted through contact with the blood or other body fluids (i.e saliva, semen and vaginal fluid) of an infected person. It can be passed on from mother to child during childbirth. <http://www.worldhepatitisalliance.org/en/hepatitis-b.html>].

5 : [It is noted overall that 75% of patients with hepatitis B have liver cell cancer and cirrhosis. Healthy carriers then are also at risk.

Other risk factors may be duration of infection with Hepatitis B or co-infection with either Hepatitis D or Hepatitis C.
<http://www.hepatitiscentral.com/hcv/hbv/lcc.html>

HEPATITIS C VIRUS

6: [It is different from hepatitis B in that the body is generally unable to clear the virus itself, known as 'spontaneous clearance', and the infection therefore becomes chronic. 4 out of 5 people develop a chronic infection, which may cause cirrhosis and liver cancer after 15-30 years. There are approximately 150 million people chronically infected with hepatitis C worldwide. In 2000, the WHO estimated that between three and four million people are newly infected every year. Hepatitis C is mainly spread through blood-to-blood contact. In rare cases it can be transmitted through certain sexual practices and during childbirth.
<http://www.worldhepatitisalliance.org/en/hepatitis-c.html>.]

7: [Acute infection may occur with limited or no symptoms, or may include symptoms such as jaundice (yellowing of the skin and eyes), dark urine, extreme fatigue, nausea, vomiting and abdominal pain. <http://www.who.int/topics/hepatitis/en>]

8: [To dialogue hepatitis B the blood needs to be checked for the Hepatitis B surface antigen (HBsAg). The HBs antigen is a part of the virus and will usually appear in your blood six to twelve weeks after infection. For Hepatitis C, your doctor will first check for hepatitis C antibodies (anti-HCV). If the test is positive, it means virus is present now, or the virus had cleared out. Hepatitis C antibodies usually takes seven to nine weeks to appear in your blood after infection.

<http://www.worldhepatitisalliance.org/en/prevention>]

RISK FACTORS

9: [Risk needle use or accidental stick, blood transfusion, hemodialysis, organ transplant, getting tattooed, piercing, unsafe sex, kidney diseases and blood clotting disorders.
<http://www.webmd.com/hepatitis/hepb-guide/hepatitis-b-what-increases-your-risk>]

II. MATERIAL AND METHODOLOGY

Study design

Cross-sectional descriptive study

Study population

Blood donors visiting blood bank of Doctor's trust teaching hospital, Sargodha

Study Area

Blood bank, Doctor's trust teaching hospital Sargodha - Punjab Pakistan

Duration

3 weeks

Sample technique

Non-probability convenient sample

Inclusion criteria

Blood donors visiting blood bank of Doctor's trust teaching Hospital Sargodha - Punjab Pakistan

Exclusion criteria

Anyone who is not a blood donor in study area

Data collection procedure

Primary data has been used in this study. Data was collected through the blood bank laboratory screening logs.

Sample size

100 blood donors

OBJECTIVES:

- To determine the frequency of Hepatitis B & C in blood donors visiting blood bank Doctor's Trust Teaching Hospital, Sargodha - Punjab Pakistan.

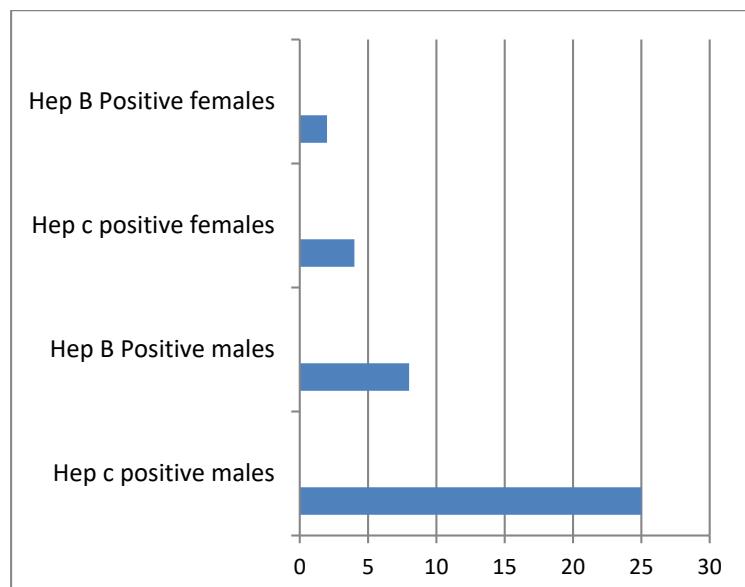
III. FINDINGS AND RESULTS

➤ Table 1

Frequency distribution of Hep B & C distribution among genders.

Types of virus	Affected Males	%age	Affected females	%age
Hep. B	8	8.9	2	20
Hep. C	25	27.8	4	40

N=100 (males=90, females=10)



(Table#1)

➤ **Table 2**
Frequency distribution of Hep. B & C among different age groups.

N=100

Age groups	No. of affected individuals	%age
Less than 30 yrs of age	10	10
Above 30 yrs of age	29	29

No. of unaffected individuals =61, %age =61%

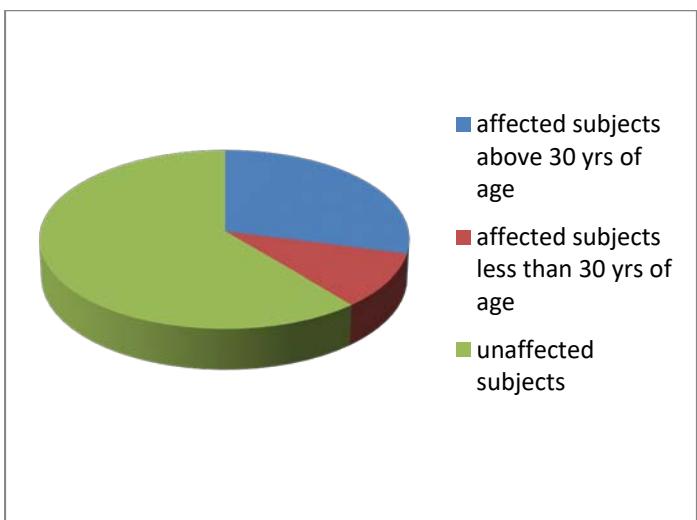
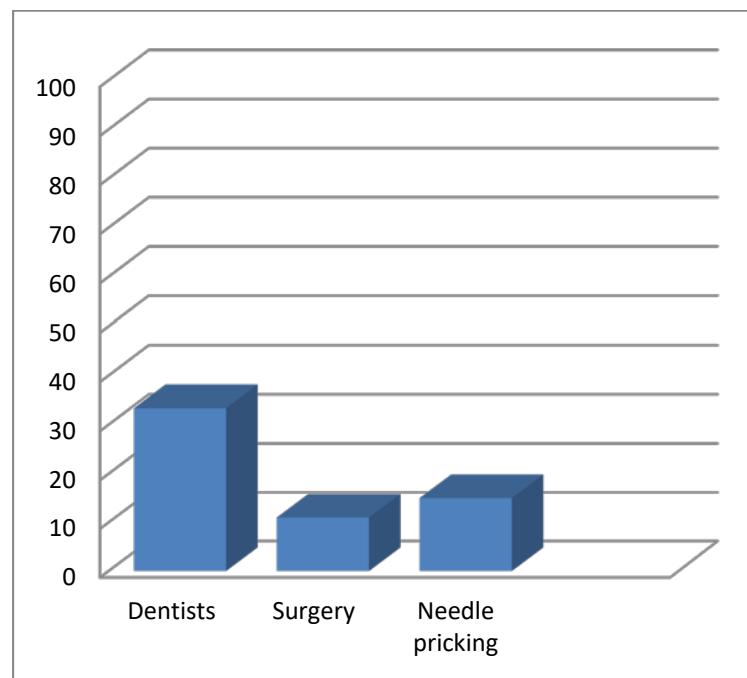


Table 3
Frequency distribution of modes of transmission of Hep. B & C among subjects.

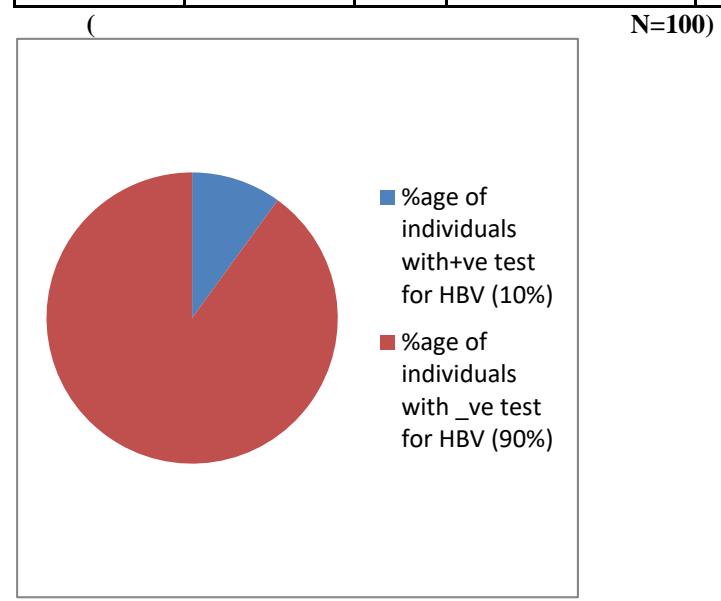
N=100, total no. of affected individuals =39

Modes of transmission	Frequency of affected individuals by the specific mode	%age
Dentist	13	33.34 %
Surgery	11	28.20 %
Needle pricking	15	38.46 %



➤ **Table 4**
Frequency distribution of subjective individuals with positive screening test for Hepatitis B virus.

Type of virus	No. of individuals with positive screening test	%age	No. of individuals with negative screening test	%age
HBV	10	10	90	90



➤ **Table 5**
Frequency distribution of subjective individuals with positive screening test for Hepatitis C.

N=100

Type of virus	No. of individuals with positive screening test	% age	No. of individuals with negative screening test	%age
HCV	29	29	71	71

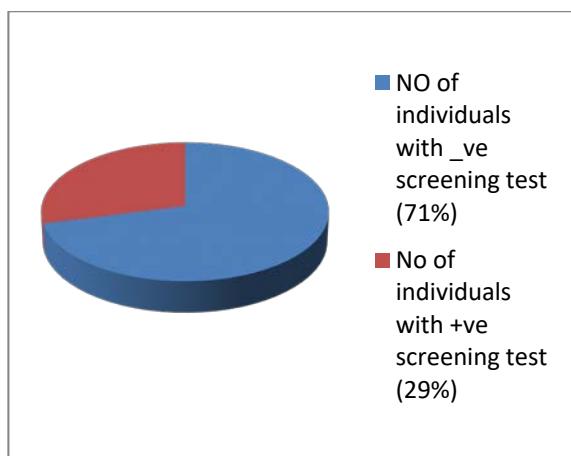


Table # 5

IV. DISCUSSION

Our study throws light on the current epidemiological status of viral hepatitis B and C infections among blood donors visiting Blood bank, Doctor's Trust Teaching Hospital Sargodha. This data shows that the prevalence of HBV is slightly lower than that of HCV in blood donors. The main transmission route in the blood donors is attributed to the nosocomial exposure to contaminated instruments, like dental, surgical instruments and needle pricking.

Even with a moderate prevalence, there may be a large reservoir of HCV and HBV infected persons in the region which indicates that many people are at risk of developing chronic liver disease related to viral hepatitis, added to the fact that antiviral therapy is not affordable by the vast majority of people in developing countries. Therefore, nosocomial risk prevention as well as health education among population are the main intervention that might help limiting the spread of these blood-borne infections.

Higher prevalence was observed in advanced age groups. First, anti-HCV and anti HBV screening among blood donors was not conducted throughout the region and the association of blood transfusion with HCV and HBV seropositivity should not be surprising, given that the blood product had not been previously

screened for HCV. Second, the higher prevalence of HCV in older people could be attributed to a longer exposure to risk factors for HCV transmission. Analyses by gender reveals that, the seroprevalence of hepatitis B and C among males is significantly higher than that found in females with no plausible explanation for the higher exposure to occupational HBV and HCV risk factors in men, or else females clear the HBV and HCV more efficiently as compared to males. Measurement of HBV seropositivity, has revealed that 10% of the 100 blood donors had HBV infection. The overall prevalence of HCV infection in the blood donors in our study is found to be 29%.

Pakistan has been placed by the WHO into the less prevalent zone for both hepatitis B and C; however, the exact number of persons infected is unknown for the reason that no large-scale epidemic data exist to assess the true HCV and HBV infection burden in Pakistan. Although a few studies have been carried out, they were affected by a selection bias because most studies are generally based on subjects from risk groups or blood donors with lacking information on children and senior citizens not generally included in as specialized groups.

V. CONCLUSIONS

From our study, following conclusions can be drawn,

- Hepatitis C is more prevalent than Hepatitis B in the population according to our study using a sample of 100 blood donors.
- Among gender distribution of Hepatitis, Males were more affected than females by 5.5 : 1
- According to age distribution of hepatitis, people more than 30 years of age were more affected (29 affected) than people under 30 years of age (10 affected) in a combined sample of 100 people taken for the study.
- The most common mode of transmission among these patients was needle pricking (15 people). Second to that was through dental procedures (13 people) and then through surgical procedures (11 people). None of the affected people were unaware of the mode of transmission.
- Patients of Hep. B diagnosed were 10 out of 100 people by the screening test at blood bank, Doctor's Trust Teaching hospital Sargodha - punjab Pakistan.
- Patients diagnosed of Hep. C were 29 among a sample of 100 people.

VI. RECOMMENDATIONS

- Regular screening camps should be planned by health centers for early diagnosis and prevention of prevailing hepatitis in our community.
- Health education about promotion of screening tests and its importance should be given at community level.
- People should be educated about care from needle pricks and sharing needles, that is the main cause for prevailing hepatitis in our community. Limited availability of information

was observed at the institute during research work.

- Blood screening tests before blood transfusions should be made necessary.
- For prevention from this disease, vaccination programs should be extended and promoted

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- [1] Mentioned above in paragraphs.

Immature Platelet Fraction (IPF) As a Screening Test to Identify the Cause for Thrombocytopenia

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Abstract

Thrombocytopenia is a common finding in haematology practice and most often requires many tests to identify the cause. The study was done to evaluate IPF as a screening test for thrombocytopenia, to evaluate IPF as a diagnostic test for thrombocytopenia with associated increased thrombopoietic activity and to evaluate the difference in the IPF according to the age and sex of patients. A peripheral blood sample was analyzed by the FBC analyzer and (IPF) obtained. SPSS 20 was used for the statistical analysis. A P-value ≤ 0.05 was considered statistically significant. The value of IPF percentage to diagnose thrombocytopenia with increased thrombopoietic activity was determined using the receiver operating characteristic (ROC) curve. **Results:** The mean IPF value in 62 patients with thrombocytopenia and without increased thrombopoietic activity was 5.6% (CI for 95%: 3.4–7.8.) The mean IPF value in those thrombocytopenic patients (38) with increased thrombopoietic activity was 14.4% (CI for 95%: 9.4–19.4). The P-value was 0.00. The IPF cut-off for a diagnosis of thrombocytopenia with increased thrombopoietic activity was 08% [sensitivity 100%, specificity 87%, positive predictive value (PPV) 82%, negative predictive value (NPV) 100. %]. No statistical significance was made in respect of age and sex of patients.

Conclusions: IPF value derived by the analyzer is a useful screening test to differentiate between thrombocytopenia with high or low thrombopoietic activity. An IPF percentage in excess of 08%, has a high sensitivity and good specificity for a diagnosis of thrombocytopenia with increased thrombopoietic activity.

Index terms. Thrombocytopenia, IPF, thrombopoietic activity

Introduction

Thrombocytopenia is a common finding in haematology practice and most often requires many tests to diagnose.

They can be broadly classified as:

1. Thrombocytopenia occurring due to peripheral destruction/consumption/pooling
2. Those occurring as a result of production failures.

Identifying the cause in clinical setup is very time consuming and delays the initiation of the management Example; Immune thrombocytopenia. In those with suspected peripheral destruction/consumption of platelets a bone marrow examination is not done due to the invasive nature of the investigation. It also cannot be done to follow up the patient. In this regard the immature platelet fraction(IPF) also described as reticulated platelets(RP) is a very rapid and simple test which can be utilized to differentiate the cause for thrombocytopenia as per the classifications stated above.

Objective:

To evaluate the significance of IPF as a screening test for thrombocytopenia

Specific Objectives:

1. To evaluate sensitivity and specificity of IPF as a diagnostic test for thrombocytopenia with increased thrombopoietic activity.
2. To establish any significance in the IPF according to the age and sex of patients.

Study Design

A prospective observational study in patients with thrombocytopenia

Setting

The haematology department at Sri Jayawardene pura General Hospital(SJGH)

Study period

From September 2018 till the required samples were obtained.

Methodology

Prospective observational study in thrombocytopenic patients was done. 100 patients with thrombocytopenia were selected randomly from the samples that were sent to the laboratory for routine full blood counts (FBC) A blood film was done to confirm thrombocytopenia. The sample was analyzed by the six - part automated analyzer and the (IPF) was obtained (one patient from the group with peripheral consumption was excluded due to incompatible result)

Patient group included,

- A. Patients with low platelets due to decreased production included infection, sepsis, chronic liver cell disease, early stage of dengue infection, bone marrow failure syndromes, Drugs causing bone marrow suppression
- B. Patients with low platelets due to immune destruction/consumption/pooling of platelets such as ITP
- C. Patients with low platelets due to non – immune destruction/consumption of platelets

Control group included 100 samples of patients with no thrombocytopenia. patients with normal or high platelet counts (these patients with the high platelet counts were selected to prove that the IPF is not affected by the platelet count)

Study tool

A data extraction sheet was used to enter the investigations with the results.

Statistical Analysis

IPF value was derived in all samples. Results were expressed as mean and 95% mean confidence interval (CI), unless differently indicated. Differences between groups were compared by means of the Student's t-test. A P-value equal or lesser than 0.05 was considered statistically significant. To determine the accuracy of the IPF value in discriminating thrombocytopenia with increased thrombopoietic activity from thrombocytopenia with normal or decreased thrombopoietic activity, a receiver operating characteristic (ROC) curve was used. The cutoff value of RP percentage with the best sensitivity and specificity to diagnose thrombocytopenia with increased thrombopoietic activity, was determined. SPSS 20 for Windows computer software was used for the statistical analysis.

Ethical consideration

Approval was obtained from ethical review committee of SJGH.

The samples were those sent for routine analysis. No additional cost to the patient nor additional samples were obtained.

Results

Table 1 - Control Group – IPF upper and lower values with the mean

	N	Minimum	Maximum	Mean	Std. Deviation
Q7_IPF	100	0.7	7.7	2.834	1.5677
Valid N (listwise)	100				

Table 11 - Cases – IPF upper and lower values with the mean

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Q7_IPF	99	0.9	29.3	8.882	5.5072
Valid N (listwise)	99				

Table 111 - The IPF value in the group with the production defect

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Q7_IPF	62	0.9	10.9	5.596	2.2388
Valid N (listwise)	62				

Table 1V - IPF of the group with peripheral destruction, consumption and pooling

	N	Minimum	Maximum	Mean	Std. Deviation
Q7_IPF	37	8.1	29.3	14.389	4.9292
Valid N (listwise)	37				

Table V – IPF was significant as a screening test with a P value of < 0.05

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	70.897 ^a	1	P value .000		
Continuity Correction ^b	67.427	1	.000		
Likelihood Ratio	88.741	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	70.181	1	.000		
N of Valid Cases ^b	99				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 16.82.

b. Computed only for a 2x2 table

Figure 1 - Female to male ratio was 1:1

Frequency of male and female in case group

Q2_sex

	Frequency	Percent %	Valid Percent	Cumulative Percent
male	51	51.5%	51.5	51.5
female	48	48.5%	48.5	100.0
Total	99	100.0	100.0	

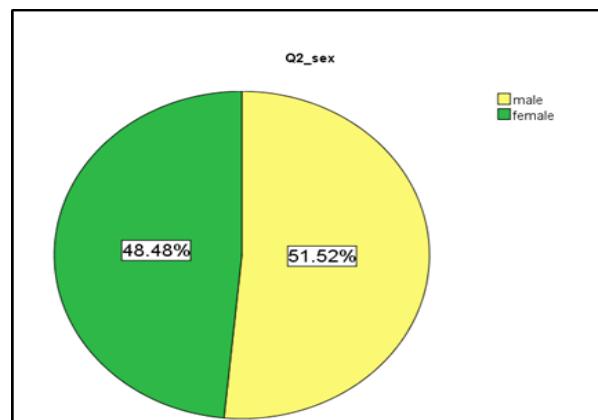


Table V1 - No statistical significance with age

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.006 ^a	1	P value 0.940		
Continuity Correction ^b	.000	1	1.000		
Likelihood Ratio	.006	1	.940		
Fisher's Exact Test				1.000	.552
Linear-by-Linear Association	.006	1	.941		
N of Valid Cases ^b	99				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 18.18.

b. Computed only for a 2x2 table

Table V11 - No statistical significance for the sex

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.776 ^a	1	P value 0.378		
Continuity Correction ^b	.461	1	.497		
Likelihood Ratio	.777	1	.378		
Fisher's Exact Test				.423	.249
Linear-by-Linear Association	.769	1	.381		
N of Valid Cases ^b	99				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 21.82.

b. Computed only for a 2x2 table

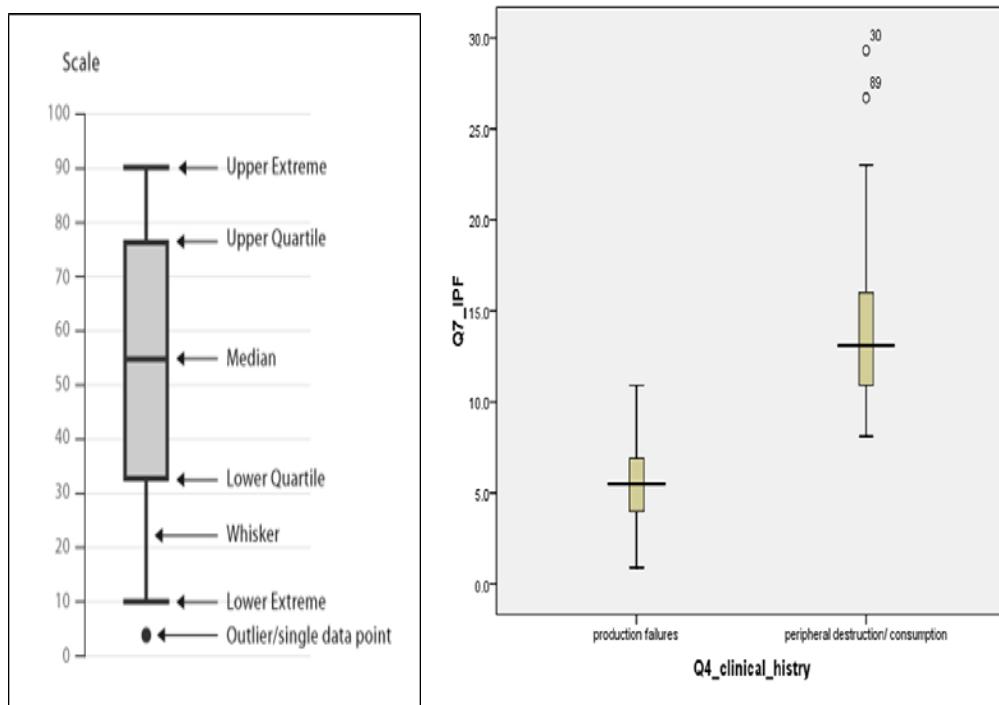


Figure 11 - Box chart depicting the IPF values in both case groups

The IPF value with the best sensitivity and specificity to diagnose thrombocytopenia with increased thrombopoietic activity was confirmed using the receiver operating characteristic (ROC) curve

Figure 111 - The ROC curve using 08% as the cut off IPF value

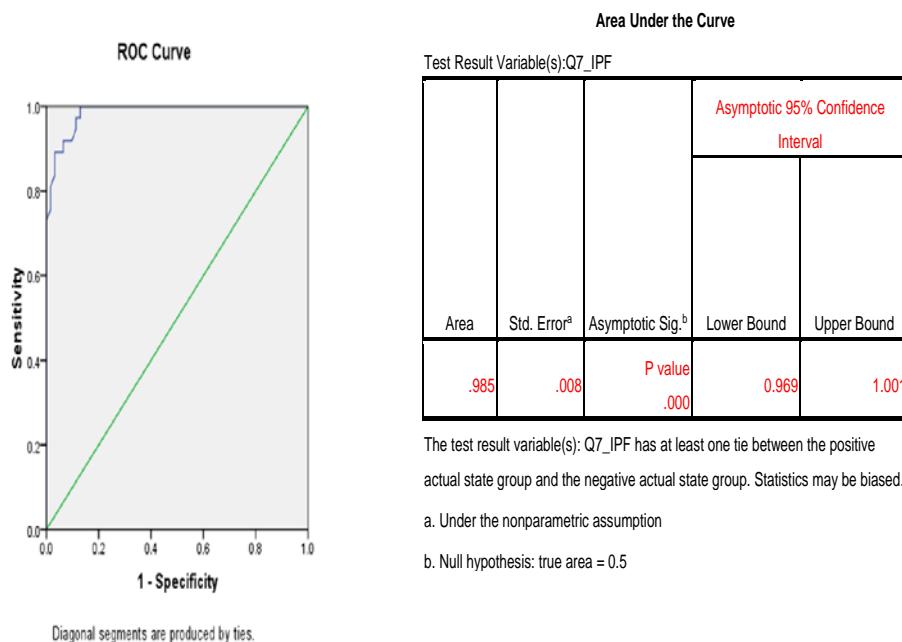


Table V111 - For the cut off value of IPF 8% - specificity, sensitivity, PPV and the NPV

		IPF_2gp7		Total
		IPF =<8	IPF > 8.0	
Q4_clinical_histry	production failures	Count	54	8
		% within Q4_clinical_histry	Specificity 87.1%	12.9% 100.0%
	peripheral destruction/ consumption	Count	0	37
		% within Q4_clinical_histry	.0%	Sensitivity 100.0% 100.0%
Total		Count	54	45
		% within Q4_clinical_histry	54.5%	45.5% 100.0%

Conclusion

IPF value derived by the analyzer is a useful screening test to differentiate between thrombocytopenia with high or low thrombopoietic activity. Our study concluded that an IPF percentage in excess of 08%, has a 100% sensitivity and negative predictive value for a diagnosis of thrombocytopenia with increased thrombopoietic activity.

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Effect of Human Resource Planning On the Performance of Kenya Power & Lighting Company Limited

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Abstract- This study focused on determining the effect of human resource planning on organizational performance. The objectives of the study were to establish the effect of Human Resource Planning on the performance of Kenya Power & Lighting Company. This study adopted a descriptive research design. The unit of analysis which is the study population consisted of the employees of Kenya Power & Lighting Company. The unit of observation which is the target population consisted of the 1,173 employees of the organization who work within Nairobi region and Central Office, while the sample size of the study was 128 respondents. Proportionate stratified sampling technique was used to determine the specific sample size of each strata of the study. Questionnaires were used to obtain primary data. Secondary data was obtained from published materials such as journals, audited accounts and annual reports. Data analysis was done through SPSS Version 24 and the analysed data was presented in form of tables and charts. The study found that human resource planning, positively and significantly influences organizational performance. Based on the findings above the study concluded that human resource planning has a positive and a significant effect on the performance of Kenya Power & Lighting Company. The study also concluded that elaborate leadership and succession plan influences a firm's organizational performance. The study concludes that firms should consider relevant skills when filling critical positions, firms should adopt effective human resource management strategies in order to improve on employee performance and overall firm performance and that organization should be objective while filling vacant positions as this may help in improving operation effectiveness and reduces losses.

Index Terms- Organizational Performance, Succession Planning, manpower forecasting

I. INTRODUCTION

According to McDonnell (2011), talent management is one of the most important factors in ensuring sustainable organizational success. The concept of talent management emerged in 1997 when McKinsey and Company created a phrase War for talents in order to describe the current business to be saturated by the shortage of talent and the struggle of organizations to attract and retain the human resources (McKinsey & Company, 2001). Talent management involves positioning the right people in the right jobs as explained by Devine (2008). This

ensures that the employees of the organization can maximize their talent for the maximum success of the organization.

Baheshtifar (2011) elaborates that the concept of talent management in organizations is a relatively new area and most organizations have prioritized it to ensure they acquire the right staff. This is because talent management has been linked to successful attraction, retention and development of employees (Buhler, 2008). The topic of talent management gained importance and attention in both the literature and in business practices. It has been claimed to be more important than organizational strategic success and talent management has gained top priority for organizations across the globe (Hartmann et al., 2010). In talent management the top management puts in place mechanisms to ensure the attraction, retention and the development of talents in the organization (D'Annunzio-Green, 2008).

Talent management is of essence because organizations are able to successfully attract and maintain necessary talent (Baheshtifar, 2011). Globalization of business, the need for profit maximization, and sustainable competitive advantage has galvanized organizations into developing human resource at the most valuable assets for enhanced performance (Klett, 2010). Globalization equally has thrust organization's into spaces previously unimaginable. For instance, it is possible for multinational organizations to operate from a global office, yet utilize cutting edge technology to manage multiple business locations in different continents (Campion, Fink, Ruggeberg, Carr, Phillips, & Odman, 2011). To enhance performance organizations, have to develop employee capabilities, as well as organizational competencies for sustainable competitive advantage (Kamotho, 2012).

According to Alemu, Yosef, Lemma, and Beyene (2011), stakeholders invest in business so that the can build wealth. It is the responsibility of management, and organizational leadership to ensure that structures within the organization do help in delivering this value for investors and stakeholders. To do this, organizations employ various strategies and tactics to ensure value generated, created, and delivered (Lucia & Lepsinger. 2009). On the other hand, some organizations have turned to technology as a way of enhancing organizational performance. Technologies like the Human Resources Information System (HRIS) has helped organizations collect, analyze, and decipher information in an accurate and timely manner, that enhances their competitive advantage (Kondalkar, 2008).

As a result managers who are potential users of the HR system can easily have access to data that enhances strategic

planning, tactical and operational decision making (Lucia & Lepsinger, 2009).

(Kent, 2010) Organizational performance, most often is highly dependent upon systems that develop employees as critical performance assets. Kent further contends that Human resource managers are constantly faced with numerous challenges of ensuring workplace equity, workforce diversity, while at the same time, juggling the ball of performance.

Kondalkar (2008) posits that rapid changes in technology, political upheavals, legal and business operation environment do pile pressure on HR managers to attract, hire, nurture and retain talented employee. Organizations cannot deliver tangible results, if they don't have mechanisms to sieve through globalized human capital, so as to attract the best and retain the best. Managers therefore feel the need to combine not only leadership skills form employees', but technical and interpersonal skills that make an employee thrive changing socio-political, economic and technological workplace (Alemu et al., 2011).

Klent (2010) argued that talented employees are a key source of innovation and competitive advantage to organization's improvement. Exploiting its potential and boosting its value to the organization involves a systemic process to determine the competencies that are fundamental to achieve enhanced job performance. In the early 1970s, David McClelland conducted a study in the USA to demonstrate how that talent management was more effective in determining successful employees for a specified job performance than traditional aptitude test. In his study, he argued that intelligence, or academic performance did not have any significant relationship with organizational performance (Alemu et al., 2011). Lucia and Lepsinger (2009) in citing McClelland study, further argued that talent management was more critical in enhancing performance than IQ tests of aptitudes offered by Human resource departments.

Today's global economy has created a more complex and dynamic environment in which most firms must learn to compete effectively to achieve sustainable growth. Workforces around the world have become larger, increasingly diverse, more educated, and more mobile (Briscoe, Schuler & Claus, 2009; Friedman, 2005). This global environment has not only changed the way business is conducted, it has also created the need for organizations to manage their workforces in a global context. As a consequence, the notion of a "global workforce" has received extensive discussion recently (Briscoe, Schuler & Claus, 2009; Collings, Scullion & Dowling, 2009; Scullion & Collings, 2006). One of the major topics of this discussion has been around talent management. Most of the research in the area of talent management so far has been premised on the idea of talent shortages, reflecting the robust economic conditions from 2000-2008 (Collings & Mellahi, 2009).

Global economic needs and financial circumstances in the recent past have forced several organizations across the world to downsize there operations and reduce wage bills. Despite the fact that too many competent job seekers are chasing the few available jobs, to sustain global competitive advantage; the employers have realized that they must manage workforces effectively. Therefore these organizations are compelled into observing the reality and challenges of global talent management and develop the capacities of their human resource management activities and ability (Collings & Mellahi, 2009).

In order to realize its dream of providing world class power that delights its customers, management has put in place policies aimed at attracting and retaining highly skilled personnel. Among the measures put in place is setting aside a budget for staff development. During the 2015/2016 financial year, the company set aside Ksh 500 million for staff training and development programs (GOK, 2015).

Other efforts that the company has made include conducting a job evaluation exercise in order to ensure staff are placed and remunerated appropriately in accordance with their relative worth. The company also reviewed its strategic plan in order to focus on its reviewed mandate in which the company focused more on tapping the available talents (HR Department, 2016). However, despite all these efforts, the Company has not been able to achieve its set performance targets and objectives. Information available from customer service Division (2016) indicates that the number of complaints on power reliability has been increasing from one month to the other.

The audited accounts for 2017/2018 financial year indicate a decline in profits by 40% compared to 2016/2017 financial year. Most studies conducted on talent management have not focused on local companies in Kenya. This study, therefore, sought to establish the effect of human resource planning on the performance of Kenya Power & Lighting Company. The objective of the study was to establish the effect of human resource planning on the performance of Kenya Power & Lighting Company

II. LITERATURE REVIEW

Several studies have shown the relationship between talent management and organizational performance, with generally positive results that indicate that talent management affects organizational performance (Boselie et al., 2005, Collins & Smith, 2006 Hailey et al., 2005). The reasons for the relationship between talent management and organizational performance have challenged the methodological rigor of these studies (Wall & Wood, 2005). Bae and Lawler (2000) conducted studies on two different talent management frameworks. It was the internal development framework and the acquisition framework. These frameworks correspond respectively to the high participation and management of traditional human resources or to the commitment and control of human resources systems.

Al-Hamadi (2007) noted that the main factors influencing talent management in Oman are religion (Islam), civil service law, foreign labor and social elites (Omanis trained abroad). They conclude by underlining the need for additional empirical studies on human resources issues in the Oman context. Aycan et al. (2007) studied the factors that influence the cultural orientation of Oman employees and their impact on talent management in organizations. They found moderate support for their hypotheses about the factors that determine cultural orientations. The relationship between cultural patterns and talent management practices has been strengthened.

In their study, Boxall and Purcell (2003) suggested that there was an "internal measure" between the practices, so that there was a synergistic effect greater than the sum of their individual parts. The approach is the emergency perspective, which suggests that talent management practices should be consistent with other aspects of the organization. The researchers

also examined the configuration viewpoint, suggesting that effective talent management practices consist of a set of coherent practices internally compatible with other organizational characteristics.

Guest *et al.* (2003) has argued that these perspectives are not necessarily in conflict and that they can simply operate at different levels. However, while best practices add value to the business, companies can gain additional benefits by ensuring that they are internally and externally consistent. Based on the universalistic perspective, it is reasonable to expect that high-participation human resource management practices are positively correlated with the subjective and quantitative measures of organizational performance (Michie & Shehan, 2001).

Yahya and Goh (2002) have highlighted the importance of human resources in implementing talent management for better performance and the fact that people's problems must change at the center of the scene to think about knowledge. Some authors, like Scarbrough and Carter, 2000 consider the best HRM practices; Robertson and Hammersley, in 2000, are the basic factors of success in managing talent. For Seviby and Simons (2002), the problem is that knowledge is not a discrete object and that the most precious knowledge is integrated into people and it is so difficult to transfer outside the immediate context that it becomes a great competitive advantage. Flood *et al.* (2001) argue that the most important element here includes the personal nature of tacit knowledge, which requires the disposition of the workers who own it, share it and communicate it. Therefore, an important point in this case is the idea that the success of any talent management initiative depends primarily on appropriately motivated and highly involved people who actively participate in the process (Roberson & Hammersly, 2000; Storey & Quintas, 2001).

Soliman and Spooner (2000) argued that talent management practices play an important role in facilitating the absorption, transfer, exchange and creation of employee knowledge. Similarly, Scarbrough (2003) identified that talent management practices, such as career planning, appear to influence the flow of knowledge that seeks to maximize the performance of the organization. Oltra (2005) notes that individual beings human beings are the creators and bearers of the final knowledge. Other academics such as Thite (2004) and Gloet (2006) who have conducted empirical studies have stressed that the main objective of talent management practices should be to improve the performance of the organization.

III. RESEARCH METHODOLOGY

The study adopted descriptive research design. Mugenda and Mugenda (2008) indicate that descriptive research designs are conducted in communities to establish the extent of a range of issues such as health, nutrition, education, crime etc. They argue that in descriptive designs, variables with greater dispersion indicate disparities within the community and provide important clues regarding the issues that the investigator should focus on. The target population for this study was 1,173 and which comprised of Managers, County Business Managers, Engineers and Officers as shown in appendix I. The study adopted stratified sampling technique due to heterogeneity of the population. According to Baird (2007), stratified sampling technique produces

estimates of overall population parameters with greater precision and ensures that a more representative sample is derived from a relatively heterogeneous population. Stratification aims to reduce standard error by providing some control over variance.

The study grouped the population into various strata according to Regions and categories of staff. The sample size of the population was derived from the Yamane formula. According to Stanley and Gregory (2001), at least 10% sample of the population is considered generally acceptable. The study, therefore, adopted a sample size of 11%. The sample size was therefore 128 respondents as shown in appendix II.

Primary data was collected through the use of structured questionnaires. Kothari (2008) observes that collecting data through the questionnaires saves time since it is possible to collect huge amount of information especially when the population of interest is large. Secondary data on the other hand was collected through published reports such as audited accounts, strategic plans and annual reports.

Questionnaires were randomly distributed to the target population. In order to obtain information from the respondents, the researcher sought to address the purpose of the study and allay any fears by assuring them that the information was to be strictly used for academic purposes only. With the help of three research assistants, the researcher administered the questionnaires in the selected regions. All questionnaires were accompanied by an introduction letter which explained the purpose of collecting the information.

The purpose of pilot testing is to establish the accuracy and appropriateness of the research design and instrumentation (Saunders, Lewis & Thornhill, 2009). Newing (2011) states that the importance of field piloting cannot be over emphasized, since you will always find that there are questions that people fail to understand or interpret in different ways. Cooper and Schindler (2006) concur that the purpose of pilot test is to detect weaknesses in design and implementation. Sekaran (2008) emphasizes that pilot test is necessary for testing the reliability and validity of instruments for a study. According to Mugenda and Mugenda (2003), a pretest should range from 1 to 10%. In this study, a pilot study was pretested on 13 respondents which represent 10% of the sample population.

Validity refers to whether a questionnaire is measuring what it purports to measure (Byrman & Cramer 1997). McMillan and Schumacher (2006) describe validity as the degree of congruence between the explanations of the phenomena and the realities of the world. The study will use both construct validity and content validity. For construct validity, the questionnaire was divided into several sections to ensure that each section assesses information for a specific objective and also ensure that the same closely ties to the conceptual framework of the study. To ensure content validity, the questionnaire was subjected to test -retest.

Reliability refers to the consistency, stability or dependability of the data. Whenever an investigator measures a variable, one wants to be sure that the measurement provides dependable and consistent results (Cooper & Schindler 2003). Reliability in research is influenced by the degree of error. As random error increases, reliability decreases (Mugenda & Mugenda 2001). Reliability was measured using Cronbach's alpha as a coefficient of internal consistency. Internal consistency measures the correlations between different items on the same test

or the same subscale on a larger test. The acceptable threshold for Cronbach's Alpha is 0.7 and above.

This involved interpretation of data collected from the respondents. Quantitative data was analyzed through the use of questionnaires. The statistical package for social sciences (SPSS) was used to analyze quantitative data. Multiple Linear Regression model was used to analyze the data as shown in equation I:

$$y = \beta_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + e$$

.....equation I

Where;

Y = Organizational performance

β_0 = Constant

x_1 = Human resource planning

x_2 = Competency development

x_3 = Career Planning

x_4 = Staff performance evaluation

e = error term

Quantitative data was therefore, be presented using statistical techniques such as tables, pie charts and bar graphs while qualitative data was presented descriptively.

IV. FINDINGS AND DISCUSSION

Out of the total 128 questionnaires that were administered to respondents, 128 were returned which confirms 100% response rate.

1.1 Reliability Test

Reliability analysis was done to evaluate survey constructs. Reliability analysis was evaluated using Cronbach's alpha. Sekaran and Bougie (2013) argued that coefficient greater than or equal to 0.7 is acceptable for basic research. Bagozzi (1994) explains that reliability can be seen from two sides: reliability (the extent of accuracy) and unreliability (the extent of inaccuracy). The average Cronbach's alpha was 0.8305 which indicates reliability i.e. $0.8305 > 0.700$ as shown in table 4.1:

Table 4.1: Reliability Results

Variables	Cronbach Alpha	Number Of Items	Conclusion
Human resource planning	0.821	8	Reliable
Organization Performance	0.840	7	Reliable

1.2 Validity Test

The test for construct validity for the study is the Kaiser-Meyer-Olkin (KMO) test for construct validity which according

to Field (2005), KMO Value/Degree of Common Variance of between 0.90 to 1.00 is "Marvelous", 0.80 to 0.89 is "Meritorious", 0.70 to 0.79 is "Middling" 0.60 to 0.69 is "Mediocre", 0.50 to 0.59 is "Miserable", 0.00 to 0.49 is "Don't Factor". Thus, a KMO coefficient of above 0.800 is "Marvelous" for the study and was evaluated as per Table 4.2:

Table 4.2: Factorability Test Results for Construct Validity

	Human resource development	Organizational Performance
Kaiser-Meyer-Olkin		
Measure of Sampling Adequacy.	0.712	0.756
Bartlett's Test of Sphericity	Approx. Chi-Square Sig.	154.648 195.381
		0.000 0.000

The values of the KMO Measure of Sampling Adequacy for all the variables were above 0.500. The significance of the KMO coefficient was evaluated using a Chi-Square test and a critical probability value (p-value) of 0.05. A Chi-Square coefficient ranging from 120.734 to 195.381 and a p-value of 0.000 imply that the coefficients were significant. The results further imply that there was a significant correlation between the parameters measuring aspects of talent management and performance of Kenya Power & Lighting Company

4.3 Descriptive Statistics

The first objective of the study was to establish the effect of Human Resource Planning on the performance of Kenya Power & Lighting Company. The respondents were asked to indicate their opinion to the statements provided. The findings are shown table 4.3:

Table 4.3: Descriptive Results for Human Resource Planning

	Strongly Agree	Disagree	Agr ee	Strongly Agree	Agree	Mean	Standard Deviation
The organization has a well elaborate succession plan in place	16.4 %	53.0%	25.0%	4.7	2.0%	2.2	0.8
The organization has an elaborate leadership plan in place	7.80 %	41.20%	43.00%	8.0	2.0%	2.5	0.7
The management supports succession planning initiatives	16.4 %	60.0%	60.0%	9.4	0.0%	2.4	0.9
There is objectivity in filling vacant position in the organization.	14.1 %	60.0%	50.0%	37.0	7.8	2.4	0.8
The organization has ideal number of employees across the business.	23.4 %	35.90%	30.50%	10.20%	2.0	2.3	0.9
The organization considers relevant skills when filling critical positions	11.7 %	29.70%	50.80%	7.8	2.0%	2.5	0.8
The organization adopts appropriate strategies in sourcing for talent for the business	10.2 %	44.50%	39.10%	6.2	2.0%	2.4	0.8
The organization conducts effective forecasting for its manpower needs	11.7 %	49.20%	35.20%	3.9	2.0%	2.3	0.7
Average					4	0.8	

The study findings showed that majority of the respondents who were 69.9% disagreed that the organization has a well elaborate succession plan in place. It was also found that majority of the respondents who were 51% agreed that the organization has an elaborate leadership plan in place. Furthermore, majority of the respondents who were 57% disagreed that the management supports succession planning initiatives. The results also revealed that majority of the respondents who were 54.7% disagreed that there is objectivity in filling vacant position in the organization. This finding is in line with that of Drucker (2007) who found that employees who can complete designed jobs help the organization achieve its core objectives and focuses on their core task that helps in improving the firm's performance. It was also found that majority of the respondents who were 59.3% disagreed that the organization has ideal number of employees across the business.

Majority of the respondents who were 58.60% agreed that the organization considers relevant skills when filling critical positions.

This finding is consistent with that of Ajay Kaushik (2014) which concluded that each company should have well-defined roles and a list of skills needed to effectively perform each role. In addition, it was found that majority of the respondents who were 54.70% disagreed that the organization adopts appropriate strategies in sourcing for talent for the business. The results also showed that 60.90% of the respondents disagreed that the organization conducts effective forecasting for its manpower needs.

On a four-point scale, the average mean of the responses was 2.4 which implies that majority of the respondents disagreed with most of the statements; however, the answers were varied as showed by a standard deviation of 0.8

4.4 Inferential Analysis

Inferential analysis was conducted to generate correlation results, model of fitness and analysis of the variance and regression coefficients.

4.4.1 Correlation Analysis

Correlation analysis was conducted to show the relationship between the independent and dependent variables as shown in Table 6.

Table 4.4: Correlation Analysis

	Organizational performance	HR planning	perf orman ce	HR plan ning
Pearson Correlatio n	1			
Sig. (2-tailed)				

1

** Correlation is significant at the 0.01 level (2-tailed).

The results showed that there was a positive and significant relationship between human resource planning and organizational performance ($r=0.510$, $p=0.000$).

4.5 Regression Analysis

Regression analysis was done to determine the influence of independent variables on the dependent variable as indicated in Table 4.5.

Table 4.5: Model Fitness

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.677 ^a	.458	.440	.34810

Human resource planning was found to be a satisfactory variable in explaining organizational performance. This was supported by coefficient of determination also known as the R square of 44.0%. This meant that Human resource planning explains 44.0% of the variations in the dependent variable which

was organizational performance. The results further meant that the model applied to link the relationship of the variable was satisfactory. Table 8 provided the results on the analysis of the variance (ANOVA).

Table 4.6: Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.583	4	3.146	25.959	.000 ^b
	Residual	14.905	123	.121		
	Total	27.487	127			

The results indicated that the overall model was statistically significant. Further, the results implied that the independent variable is a good predictor of organizational performance. This was supported by an F statistic of 25.959 and the reported p value (0.000) which was less than the conventional probability of 0.05 significance level.

V. CONCLUSION, RECOMMENDATION AND AREAS FOR FURTHER RESEARCH

section presents the study conclusions, recommendations and areas for further research.

1.3 Conclusion of the Study

Based on the findings above the study concluded that human resource planning has a positive and a significant effect on the performance of Kenya Power & Lighting Company. The study also concluded that elaborate leadership and succession plan influences a firm's organizational performance. It was also concluded that consideration of relevant skills when filling critical positions is crucial for a firm's growth and profitability.

5.2 Recommendation

The study recommended that, the Company design and implements more effective human resource planning strategies in order to improve on employee performance and overall corporate performance. The company should also implement more effective and business driven strategies while filling vacant positions as this will assist in improving operation effectiveness.

5.3 Areas for Further Research

In the regression analysis, R^2 showed explanatory power of 44% implying there must be other factors that influence performance at Kenya Power other than the aforementioned factors. Further studies should identify what could explain 56% of the variation in performance.

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Appendix 1: Target Population

Region/Cadre	Target Population
Central Office	
General Managers	12
Managers	43
County Business Managers	-
Engineers	186
Officer	516
Nairobi South	
General Managers	-
Managers	1
County Business Managers	2
Engineers	54
Officer	83
Nairobi West	
General Managers	0
Managers	1
County Business Managers	1
Engineers	50
Officer	97
Nairobi North	
General Managers	-
Managers	1
County Business Managers	0
Engineers	50
Officer	77
Total	1,173

Source (HR Department, KPLC 2018)

Appendix II: Sample Size Distribution

Region/Cadre	Sample size
Central Office	
General Managers	1
Managers	5
County Business Managers	-
Engineers	20
Officer	56
Nairobi South	
General Managers	-
Managers	1
County Business Managers	1
Engineers	5
Officer	9
Nairobi West	
General Managers	0
Managers	1
County Business Managers	1
Engineers	4
Officer	10
Nairobi North	
General Managers	-
Managers	-
County Business Managers	-
Engineers	5
Officer	9
Total	128

Correlates and Incidence of *P.falciparum* infection among HIV infected and HIV non- infected Children below 5 years in Kisumu County, Kenya; A Prospective cohort study.

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Abstract- Over 3 billion people across the world are at risk of malaria infection every year. This burden is compounded by the fact that approximately 2-3 million children live with human immunodeficiency virus (HIV) in sub-Saharan Africa. Malaria and HIV account for a significant amount of morbidity and mortality with an estimated 22.5 million people living with HIV. While Cotrimoxazole prevents opportunistic infections in HIV-infected persons, its effectiveness in preventing malaria varies especially in children. This study determined the correlates and incidence of *P. falciparum* infection among HIV positive and negative children < 5 years in Kisumu County. Data analysis was done using Stata version 14 statistical. Cumulative incidence of 17.42% was realised over three months follow up. Being a non-parametric test of difference between two groups of non-parametric data, Man-Whitney U test was conducted to assess the difference between malaria incidence in HIV POSITIVE and HIV negative. There was significant difference in incidence of *P. falciparum* among HIV infected compared to HIV non-infected children (*p*-value = 0.0030). symptoms presented; Fever RR 0.69 (95%CI: 0.22-2.16), headache RR 1.53 (95%CI: 0.12-19.08).Inability to retain oral medication RR 0.12: (95%CI: 0.01-1.92), number of persons per bednet use where two, RR 5.46 (95%CI: 0.46-64.58), three 2.14 (95%CI: 0.27-17.25) and > three 2.58 (95%CI: 0.27-24.87) were associated with the risk of malaria.

Index Terms- Correlates, Cotrimoxazole, HIV, cumulative Incidence, *P. falciparum*.

I. INTRODUCTION

Malaria is caused by infection with one or more of 5 species within the genus *Plasmodium*. The greatest burden of

disease and death is caused by *Plasmodium falciparum*. Every year over 3 billion people are at risk of malaria, and the disease burden is greatest in infants and young children[1]. While a novel strain of parasite, or other factors such as pregnancy or Human Immunodeficiency Virus (HIV) infection, can alter hard-won partial immunity. Malaria is known to increase viral replication and thus HIV disease progression [2]. Although not defined as an opportunistic disease [3],[4], a malarial episode may become more serious with HIV influence as reported by many studies [5] [6, 7]. The main objective of this study was to determine the correlates and incidence of *P. falciparum* in HIV-infected and uninfected children below 5 years in Kisumu city. WHO ranked malaria as the eighth-highest contributor to the global disease burden as reflected in disability-adjusted life years (DALYs), [8]. Malaria is the leading cause of morbidity and mortality among the children under the age of five years. Death and DALYS due to malaria could be more in high HIV prevalent areas such as Kisumu.

II. METHODOLOGY

Research design: The study adopted a prospective cohort design, used data collected from Kisumu County and Lumumba Sub-County hospitals in Kisumu County, Kenya. Male and female subjects below 5 years followed up for 3 months.

Sample size and sampling technique: A sample size of 132 was taken, samples were selected using purposive sampling technique and data was collected using structured questionnaire and case report forms.

Table 1 inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none"> i. A male or female child below 5 years seeking treatment from the Comprehensive Care Clinic (CCC) or Out Patient Department(OPD)/ Mother Child Health (MCH) departments. ii. Malaria Rapid Diagnostic Test (mRDT) negative on the screening date. iii. Willingness and ability the parent or guardian to comply with the study protocol for the duration of the study. iv. Subjects who are confirmed to be HIV infected for the exposed group. v. Subjects who are born of known HIV-negative mothers and are HIV non infected for the unexposed group. vi. Able to give consent and willing to participate in the study and follow up. 	<ul style="list-style-type: none"> i. LAR or parent unwilling or unable to participate in the study including the follow up period. ii. Malaria Rapid Diagnostic Test positive on the screening date. iii. Subjects who are on CTX and are HIV negative (HEI). iv. Subjects who are on any known malaria prophylaxis. v. Any other condition that may result in an unfavorable outcome should the potential subject participate in the study.

Data collection: The structured questionnaire consisted of 3 parts, part A, giving child level risk factors, part B, depicting the caretaker level risk factors and part C. Showing the house hold level risk factors

Data management and analysis : Data cleaning and validation was performed in order to achieve a clean dataset that was exported from excel of Access database where the original data was collected into a Stata version 14 for analysis .Analysis was conducted using Stata version 14 statistical software(9). Exploratory data techniques were done at the initial stage to uncover the structure of data and identify outliers or unusual entered values. The threshold for statistical significance was set at $p<0.05$. Study being longitudinal Risk Ratio (RR) was appropriate. A generalized estimating equations (GEE) model was customized for logistic regression with poison family to report RR with corresponding 95% CI were used to estimate the strength of association between the retained independent predictors of malaria. We fitted a Proportional Cox regression model to obtain the HR.

Ethical considerations: Written informed consent for the participation in the study was obtained from the Subject's parents or guardians or LAR. The purpose and the role of the study subject was explained clearly to the subjects in English, Kiswahili or dholuo before signing the consent form. Ethical approval was obtained from Independent Ethical Review Committee (ERC.1B/VOL.1/368) of Jaramogi Oginga Odinga Teaching and Referral Hospital (JOOTRH) and (JKUAT).

III. RESULTS

A total of 132 study participants (n=132) with equal distribution of HIV sero-status, HIV- (n=66) and HIV+ (n=66)

were recruited into the study. The mean age of males was 2.66 (± 1.08) years while the females were 2.91(± 1.10) years. The mean age of those who were HIV- was 2.57 (± 1.08) years while those who were HIV + were 3.01(± 0.95) years. Slightly higher number were females (n=67) than males (n=65). Majority of the subjects 106 (80.30%) were able to retain oral medication, while 23(17.42%) were unable whereas 3(2.27%) were sometimes able. Majority 128 (96.97%) of the subjects were being taken care of by their parents, 3 (2.27%) by house helps, only 1(0.76%) was being taken care of by a relative. Majority 108 (81.82%) of the care givers were married, while [18 (13.64%) were singles, whereas 9(3.79%) were either separated or divorced and only 1(0.76%) was widowed (Table 3). According to table 4. Majority of the participants [68(51.52%)] reported that 3 persons were sleeping under one LLIN, whereas [36(27.27%)] were sleeping 2 individuals under one LLIN, while [13(9.85%)] were sleeping more than 3 persons under the same LLIN (Table5)

Commutative incidence of malaria was 17.42%, (Table 2). The chi-square test of association between HIV status and Malaria outcome reported Pearson's chi-square p-value=0.003. In Table 6, Fever had RR=0.69 (95%CI;0.22-2.16), headache RR=1.53(95%CI;0.12-19.08), Retention of oral medicine RR=0.12(95%CI;0.01-1.92).For the number of persons sleeping under bednet ,two had RR=5.46(95%CI;0.46-64.58), three RR=2.14(95%CI;0.27-24.87) and >three RR=2.58 (95%CI:0.27-24.87).According to Table 7. Children who were taken care of by their parents either father or mother had HR=2.44(95%CI; 0.27-22.19) while those who presented with fever had HR=1.37(95%CI; 0.38-5.34) times of getting malaria infection, those who experienced headache were HR 4.27(95%CI; 0.30-5.04) times at risk of getting malaria.

Table 2 Table of Association

HIV Status	Malaria Status at the end of observation period		Total
	0pf/ul n (%)	>0pf/ul n (%)	
Negative	48 (72.73%)	18(27.27%)	66(100%)

Positive	61(92.42%)	5(7.58%)	66(100%)
Total	109(82.58%)	23(17.42%)	132(100%)

Table 3 Baseline Socio-Demographic and Child level factors

Variable		GENDER		HIV STATUS	
		Overall	Male (n=65)	Female (n=67)	HIV- (n=66)
n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Mean Age(Years)			2.66±1.08	2.91±1.10	2.57±1.18
Age Category:					3.01±0.95
[0-1]	5(3.79)	3(4.48)	2(3.08)	5(7.58)	0(0.00)
[1-2]	19(14.39)	9(13.43)	10(15.38)	12(18.18)	7(10.61)
[3-4]	36(27.27)	13(19.40)	23(35.38)	17(25.76)	19(28.79)
[4-5]	72(54.55)	42(62.69)	30(46.15)	32(48.48)	40(60.61)
Retain oral antimalarial Medicine					
Yes	106(80.3)	54(83.08)	52(77.61)	65(98.48)	41(62.12)
No	23(17.42)	11(16.92)	12(17.91)	1(1.52)	32(33.33)
Sometimes	4(3.03)	0(0.00)	4(5.97)	0(0.00)	4(6.07)
History of hospitalization					
No	79(59.85)	40(61.64)	39(58.21)	40(60.61)	39(59.09)
Yes	53(40.15)	25(38.46)	28(41.79)	26(39.39)	27(40.91)
History of fever					
Yes	53(40.15)	38(58.46)	41(61.19)	41(62.12)	38(57.58)
No	79(59.85)	27(41.54)	26(38.81)	25(37.88)	28(42.42)
Level of Hospital ^a					
Referral hospital	7(5.30)	2(3.08)	5(7.46)	3(4.55)	4(6.06)
County hospital	10(5.58)	6(9.23)	4(5.97)	2(3.03)	8(12.12)
Sub County Hospital	36(27.27)	19(29.23)	17(25.37)	20(30.30)	16(24.24)
Health Centre	9(6.82)	5(7.69)	4(5.97)	4(6.06)	5(7.58)
Never been admitted	70(53.03)	33(50.77)	37(55.22)	37(56.06)	33(50.00)
Symptoms Presented					
Abdominal Complications	1(0.76)	1(1.54)	0(0.00)	1(1.52)	0(0.00)
Chronic conditions	1(0.76)	1(1.54)	0(0.00)	0(0.00)	1(1.52)
Common Cold	3(2.27)	1(1.54)	2(2.99)	2(3.03)	1(1.52)
Fever	48(36.36)	27(41.54)	21(31.34)	24(36.36)	24(36.36)
Headache	5(3.79)	2(3.08)	3(4.48)	1(1.52)	4(6.06)
None	73(56.06)	33(50.77)	41(61.20)	38(57.58)	36(4.55)
Duration of Admission					
Never been admitted	71(53.79)	34(52.31)	37(55.22)	34(51.52)	37(56.06)
Less than 1 week	35(26.52)	18(27.69)	17(25.37)	20(30.30)	15(22.73)
Between 2-3 weeks	15(11.36)	7(10.77)	8(11.94)	5(7.58)	10(15.15)
1 month	9(6.82)	4(6.15)	5(7.46)	6(9.09)	3(4.55)
More than 1 month	2(1.52)	2(3.08)	0(0.00)	1(1.52)	1(1.52)
History of malaria infection					
Yes	60(45.45)	32(49.23)	28(41.79)	34(51.52)	60(45.45)
No					

Can't remember	1(0.76)	0(0.00)	1(1.49)	0(0.00)	1(0.76)
Source of antimalarial used					
Bought from chemist	17(12.88)	8(12.31)	9(13.43)	0(0.00)	17(25.76)
Bought from this hospital	10(7.58)	6(9.23)	4(5.97)	3(4.55)	7(10.61)
Given free from this hospital	60(45.45)	30(46.15)	30(44.78)	33(50.00)	27(40.91)
Never been given antimalarial	45(34.09)	21(32.31)	24(35.82)	30(45.45)	15(22.73)

^aLevel of the hospital that the child was admitted to when sick

Table 4 Descriptive analysis of Care giver level factors.

VARIABLES	Overall (n %)	GENDER		HIV STATUS	
		Male (n=65)	Female (n=67)	HIV- (n=66)	HIV+ (n=66)
Child Caretaker					
House help	3(2.27)	1(1.54)	2(2.99)	1(1.52)	2(3.03)
Mother/Father	128(96.97)	64(98.46)	64(95.52)	65(98.48)	63(95.45)
Relative	1(0.76)	0(0.00)	1(1.49)	0(0.00)	1(1.52)
Marital Status of caregiver					
Married	108(81.82)	51(78.46)	57(85.08)	59(89.39)	49(74.24)
Single	18(13.64)	10(15.38)	8(11.94)	6(9.09)	12(18.18)
Divorced/Separated	9(3.79)	2(2.99)	3(4.62)	1(1.52)	4(6.06)
Widowed	1(0.76)	0(0.00)	1(1.54)	0(0.00)	1(1.52)
Medication giver^b					
House help	3(2.27)	2(3.08)	1(1.49)	0(0.00)	3(4.55)
Mother/Father	127(96.21)	63(96.92)	64(95.52)	66(100.00)	61(92.42)
Relative	2(1.52)	0(0.00)	2(2.99)	0(0.00)	2(3.03)
Level of Education					
Never	7(5.30)	4(5.97)	3(4.62)	1(1.52)	6(9.09)
Pre-school	2(1.25)	0(0.00)	2(3.08)	0(0.00)	2(3.03)
Primary	34(25.76)	18(26.87)	16(24.62)	10(15.15)	24(36.36)
Secondary	34(25.76)	16(23.88)	18(27.69)	12(18.18)	22(33.33)
Tertiary	55(41.67)	29(43.28)	26(40.00)	43(65.15)	12(18.18)
Hospital Taker^c					
Mother	130(98.48)	64(98.46)	66(98.51)	2(3.03)	64(96.97)
Father	2(1.52)	1(1.54)	1(1.49)	0(0.00)	66(100.00)
Occupation of caregiver					
Employed	22(16.67)	11(16.92)	11(16.42)	10(15.15)	12(18.18)
None	39(29.55)	20(30.77)	19(28.36)	27(40.91)	12(18.18)
Self-employed	71(53.75)	34(52.31)	37(55.22)	29(43.94)	42(63.64)
Working Hours					
Day time 8am-5am	65(49.24)	30(46.15)	35(52.24)	42(63.64)	23(34.85)
Day time half day	34(25.76)	17(26.15)	17(25.37)	0(0.00)	34(51.52)
None	31(23.48)	18(27.69)	13(19.40)	24(36.36)	7(10.61)

Night time 6am	8pm-	1(0.76)	0(0.00)	1(1.49)	0(0.00)	1(1.52)
Night time night	half	1(0.76)	0(0.00)	1(1.49)	0(0.00)	1(1.52)

Medication giver^b –The person giving medication to the child if fell sick

Hospital Taker^c - The person who takes the child to the hospital when she/he is sick.

Table 5 Descriptive analysis of the Household-level factors

VARIABLES	Overall	GENDER		HIV STATUS	
		Male (n=65)	Female (n=67)	HIV- (n=66)	HIV+ (n=66)
		n (%)	n (%)	n (%)	n (%)
Residential area					
Rural area	22(16.67)	10(15.38)	12(17.91)	6(9.09)	16(24.24)
Urban area	109(82.57)	55(84.62)	54(80.60)	60(90.91)	49(74.24)
Other	1(0.76)	0(0.00)	1(1.94)	0(0.00)	1(1.52)
Bed nets available per house hold					
One	31(23.48)	16(24.62)	15(22.39)	21(31.82)	10(15.15)
More than one	85(64.39)	43(66.15)	42(62.59)	34(51.52)	51(77.27)
None	16(12.12)	6(9.23)	10(14.93)	11(16.67)	5(7.58)
Number of Persons per bednet					
Two	36(27.27)	18(27.69)	18(26.87)	5(7.58)	31(46.97)
Three	68(51.52)	35(53.85)	33(49.25)	39(59.09)	29(43.94)
More than three	13(9.85)	6(9.23)	7(10.45)	11(16.67)	2(3.03)
No bednet	15(11.36)	6(9.23)	9(13.43)	11(16.67)	4(6.06)
Availability of bed nets at the Resident					
Yes	38(28.79)	14(21.54)	24(35.82)	23(34.85)	15(22.73)
No	10(7.57)	5(7.69)	5(7.46)	3(4.55)	7(10.61)
Not sure	84(63.64)	46(70.77)	38(56.72)	40(60.61)	44(66.67)
Presence of waterlogs near residential					
Yes	44(33.33)	18(27.69)	26(38.81)	17(25.76)	27(40.91)
No	86(65.15)	46(70.77)	40(59.70)	49(74.24)	37(56.06)
Not sure	2(1.52)	1(1.54)	1(1.49)	0(0.00)	2(3.03)
Use of mosquito repellants					
Yes	65(49.24)	34(52.31)	31(46.27)	32(48.48)	33(50.00)
No	66(50.00)	30(46.15)	36(53.73)	34(51.52)	32(48.48)
Not sure	1(0.76)	1(1.54)	0(0.00)	0(0.00)	1(1.52)
Nature of Household					
Permanent with electricity	52(39.39)	26(40.00)	26(38.81)	31(46.97)	21(31.82)
Permanent without electricity	11(8.33)	5(7.69)	6(8.96)	1(1.52)	10(15.15)
Semi-permanent with electricity	56(42.42)	27(41.54)	29(43.28)	28(42.42)	28(42.42)
Semi-permanent without electricity	13(9.85)	7(10.77)	6(8.96)	6(9.09)	7(10.61)

Table 6 Calculations of Relative Risk of the selected risk factors

	HIV-	HIV+
Overall Risk Factors	Relative Risk (95% CI)	Relative Risk(95% CI)
Child Caretaker		
House help	Ref	Ref
Mother/Father	0.00(0)	2.31(0.33, 8.95)
Relative	N/A	4.60(0)
Symptoms Presented		
Abdominal complications	0.00(0)	N/A
Chronic conditions	N/A	0.00(0)
Common Cold	0.00(0)	0.00(0)
Fever	0.69(0.22, 2.16)	1.28(0.17, 9.62)
Headache	1.53(0.12, 19.08)	0.00(0)
Others	3.92(0.47, 32.40)	0.00(0)
None	Ref	Ref
Retain Oral Medicine		
No	Ref	Ref
Sometimes	N/A	0.00(0)
Yes	0.12(0.01, 1.92)	0.19(0.02, 1.89)
Number of Persons Sleeping under one bednet		
Two	5.46(0.46, 64.58)	5.35(0.36, 8.99)
Three	2.14(0.27, 17.25)	2.37(0.66, 25.36)
> three	2.58(0.27, 24.87)	5.13(0.53, 32.51)
None	Ref	Ref

NA (Not Available) statistics omitted due to collinearity

Table 7 .Cox proportional Hazard Ratios

	HIV-	HIV+
Overall Risk Factors	Hazard Ratios (95% CI)	Hazard Ratios (95% IC)
Child Caretaker		
House help	Ref	Ref
Mother/Father	2.44(0.27, 22.19)	1.00(0)
Relative	N/A	N/A
Symptoms Presented		
Abdominal complications	N/A	N/A
Chronic conditions	N/A	N/A
Common Cold	1.00(0)	N/A
Fever	1.37(0.38, 5.34)	0.00(0)
Headache	4.27(0.30, 5.04)	N/A
Others	7.94(0.65, 96.97)	N/A
None	Ref	Ref
Ability of the child to retain oral Medicine		
No	Ref	Ref
Sometimes	1.00(0)	N/A
Yes	1.00(0)	0.00(0)
Number of people Sleeping Under one bednet		
Two	0.32(0.02, 4.39)	1.00(0)

Three	0.24(0.02, 2.53)	N/A
More than three	0.20(0.01, 2.73)	1.00(0)
None	Ref	Ref

IV. DISCUSSION

Study done by (10)] found a prevalence of 17% of malaria in children under 5 years in endemic areas, our study realized cumulative incidence of 17.42%, with higher proportion of the subject who suffered malaria being HIV negative (22.27%) compared to HIV positive (7.58%). Our findings are in agreement with a cohort study of HIV-infected children in Kampala, Uganda to estimate the protective efficacy of trimethoprim-sulfamethoxazole (TMP/SMX) prophylaxis and ITNs on the incidence of malaria and concluded that combined use of TMP/SMX prophylaxis and insecticide-treated bed nets was associated with a dramatic reduction in malaria incidence among HIV-infected children (11)]. Current vigorous PMTC services, periodic HEI clinical checkups improves their wellbeing as opposed to the HIV negative counterparts.

Inability to retain oral antimalarial medication and *P. falciparum* infection outcome: It is essential to achieve effective antimalarial drug concentrations for a sufficient time to ensure high cure rates. According to WHO, Artemisinin-combination therapies (ACTs) currently represent first-line treatment of uncomplicated *P. falciparum* malaria and exhibit excellent efficacy and the potential to minimize development of drug resistance. According to Darren et al., in their study to determine the increased risk of early vomiting among infants and young children treated with Dihydroartemisinin-Piperaquine compared with AL for uncomplicated malaria, the ACTs appeared to be well-tolerated and with rare toxicities (12)],(13)],(14)],(15)]. Early vomiting has been shown to reduce the effectiveness of ACT antimalarial therapies because of reduced drug absorption. In our study, although majority 106(80.3%) of the study subjects were able to retain oral antimalarial, about 23 (17.42%) could not retain oral ACT. Those who were able Ability to retain oral medication were 0.12 times RR=0.12 (95%CI; 0.08-1.92) less likely to get malaria infection as compared to those who were able to retain oral medication. (16) examined the risk of early vomiting in a multivariate analysis found that risk of early vomiting was significantly higher in all participants less than 18 months of age.

Bed net use and *P. falciparum* infection : Long-lasting insecticidal nets (LLINs) are effective interventions for reducing the burden of malaria (17)]. According to President Malaria Initiative operation Plan FY 2018, LLINs are defined as one net per two people. In this study, although the results are not statistically significant, we realized that two people sleeping under one LLIN were 5.46 times [(RR=5.46; 95%CI; 0.46-64.58)], at risk of getting malaria infection than if they were three [RR=2.14:95%CI; 0.27-17.25] per bed net. The recommended ration of two persons per bed net could be effective for two adults while for children chances are that they could roll towards the bed net edge therefore exposing the child to mosquito bite. Previous studies show that large-scale, free net distribution campaigns can reduce inequities in household net ownership across socio-economic gradients (18)], ,(19)],(20)],(21)],(22)]. Socioeconomic

factors, such as household wealth and education, have also been identified as consistent and important predictors of mosquito net acquisition (19)],(17)],(23)].

Influence of Child Care takers factors on *P.falciparum*

:Study by (24)] suggested that knowledge is not sufficient enough to drive LLIN use and care seeking. In their study, caretakers recognized malaria mostly by chills (70.4%, 499/709), fever (45.7%, 324/709) and headache (39.8%, 282/709). Majority, 72.2% (512), of the caretakers knew that sleeping under LLIN could prevent malaria. Our study showed that the subjects who were being taken care of by their parents were 2.4 times [HR=2.44:95%CI; 0.27-22.19] at risk of developing malaria than their counterparts. Another study by (25)] in determining malaria-related knowledge, attitude and practices (KAP) among primary caregivers, a total of 90% of respondents reported mosquitoes and/or malaria as the cause of fever. Higher levels of education for the caregiver were associated with positive malaria-related KAP. Their independent predictors of malaria incidence, were also similar to the risk factors in our study.

Symptoms associated and *P.falciparum* infection : Study done in Kenyan (26)], concluded that fever is a sensitive indicator of clinical malaria in children <5 years,. Adding headache to fever as screening symptom increases sensitivity of detection at the cost of decreased specificity. Guidelines for treatment of malaria in Kenya says first symptoms of malaria are nonspecific and similar to those of a minor systemic viral illness(27).In this study 48(36.36%) experienced fever, 5 (3.79%) experienced headache, The study showed that those who had headache were 1.53 times [RR=1.53:95%CI; 0.12-19.08] more likely to have malaria compared to those who experienced fever [RR=0.69:95%CI; 0.12-1.92].

V. CONCLUSIONS

The study found cumulative incidence of malaria at 17.42%, with higher proportion (22.27%) of the subject who suffered *P.falciparum* being HIV negative compared to HIV positive (7.58%). There was a relatively weak inverse relationship (Cramer's V of -0.2596) between HIV status and malaria outcome consequently higher number of subjects reporting *P.falciparum* positive were HIV negative. Inability to retain oral antimalarial medication and presence of fever and headache were predisposing factors to malaria infection. Similarly the individual taking care of the child is also a source of risk to *P.falciparum* infection. Children who were taken care of by their parents were more prone to *P.falciparum* infection as compared to the other groups of child care taker. Lastly and the use of long lasting insecticide treated nets showed that the ratio of persons to one net directly affected infection with *P.falciparum*. Children should be maintained at the middle of the bed.

VI. RECOMMENDATIONS

We recommend that it is important ensure that a child retain oral antimalarial to enhance its absorption, we recommend that policies should be created to emphasise the Direct observe therapy (DOT) at the facility level with continuous health education. There is also need to promote and encourage and even follow up on availability and proper use of the LLINs as an intervention to *P. falciparum* control among the children under 5 years. The package of the use of the LLIN should include the recommended ratio of persons to one LLIN. Although it is existing in some facilities, there is still need to emphasize to the health care givers to consistently give health talks to the patient /child care takers during their visits to the health facilities and even through the use of media such as radio or television ensure the knowledge for taking care of the child is universal.

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Water Pricing Schemes for Water Saving Conscience

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Abstract- The Urban Water Service requires the adoption of a tariff system that recovers the costs of water resources and the establishment of individual national water-pricing policies that help to achieve sustainable water use. Also, water rates (tariffs) can be used as an auxiliary tool for consumption control, seeking efficiency and sustainable resource use. In this research, the study of Bolívar State (Venezuela) different regional, social, economic, political and climatic aspects is presented, analyzing the behavior of consumption of domestic water during the period September 2018 to March 2019, in order to check whether the current rates conform to the state of resources and the objectives of the Urban Water Service and Industry, and furthermore, develop the main objective of this investigation that is a Customized Sustainable Water Pricing Scheme, that includes financial criteria, economic criteria, and above all, environmental criteria, to create specific guidelines that can help to correspond the local contextual factors of water supply and demand. The main conclusion of this work is that Venezuela, invests in the water sector is very sporadic, reflecting the fluctuations in oil prices, also, water billing its subsidized by the government and cost recovery is not considered as a priority; the perception achieved through this study is worrisome because the system slightly covers the water service; altogether there has to be an urgent reformation of the water pricing schemes in order to make it industrial and environmentally sustainable. The critical conclusion and recommendation focus on the rearrangement of the current guidelines, by implementing new technologies, transparency in water measuring, transforming from a fixed rate to an Increasing Block Tarif, and including community reeducation.

Index Terms- water tariffs, water sustainability, water governance, Venezuela.

I. INTRODUCTION

Water is a necessity for human life and a prerequisite for people's wellbeing. Drinking, cooking sanitation and many more domestic as well as industrial processes depend on this resource. The access to clean water and sanitation is also reflected in Goal 6 of the Sustainable Development Goals set by the United Nations. However, many parts of the world face water scarcity. It is even expected that water will be the driver of future wars. This situation strongly calls for sustainable use of water. Including water conservation, ensuring safe and quality supply and justice allocation.⁽¹⁾

A commonly accepted tool for the management of water consumption in households is the implementation of different water pricing schemes. These base on the assumption that, according to their willingness to pay, consumers will respond to higher prices with a reduction of their consumption.

Setting the price for water goes beyond the rules of supply and demand. Water price policy includes more targets, which can be roughly summarized within three.⁽⁵⁾

1. Economic efficiency to ensure safe and quality supply of water and prevent wasting
2. Conservation of water to ensure the persistent availability of water resources
3. Justice allocation to guarantee the human right of access to clean water and fair sharing of its cost

To combine those targets in a water pricing scheme is a big challenge for policymakers. It requires sophisticated research taking into account environmental, social, economic, political and climatic aspects.

Water tariffs are applicable at different levels: they can be set either at the service provider level or by national (or local) governments. Tariffs can be categorized in consumer categories and classes, and they can be designed within a policy framework that addresses the needs of the poor.⁽⁹⁾ Policy makers need to decide which objectives have the highest priority, and where possible, use a range of instruments. Involvement of local communities in the tariff setting process is essential to identify the real, local needs, the costs of providing an excellent quality service, and the best ways to recover the costs incurred⁽²⁾.

It can be deduced, that countries with Fixed Charge Price Schemes have right now problems with reduced service levels which decrees the will to pay, low tariffs and inadequate income, low investment on infrastructure and human resources, infrastructure deterioration and loss of staff, there's no complete coverage of costs to improve the water standards.

On the other hand, we have countries the Two-Part Tarif Scheme; those countries have adequate water tariffs allow cost recovery, which is very important to assure well-functioning water and sanitation systems, affordable tariffs and improved collections, output based approached to management, interim funding for technical and human capacity. Moreover, those who have Increasing Block Tariff, we can say that they are in-between.⁽⁸⁾

In contrast with developed countries where the provision of drinking water to households is overwhelmingly achieved through utilities, access to drinking water in developing countries encompasses many forms. Other forms of provision include direct access to a water source (underground or surface); access to alternative sources of water, typically provided by the private sector (e.g., water tankers, water carts, kiosks, bottled water); and access to piped water through community taps or standpipes. In many countries, households have to rely on more than one of those sources of water. This is the case even for families connected to the public network because of limitations to the services provided by utility companies, which can take many forms depending on the local context: rationing of particular areas; low water pressure; periodic shortages; or leaks in the network⁽⁷⁾.

II. GENERAL OBJECTIVE AND KNOWLEDGE GAP

From the study of different regional, social, economic, political and climatic aspects, at Bolívar State, Venezuela; develop a Customized Sustainable Water Pricing Scheme, which will include financial criteria (cost recovery), economic criteria (efficiency pricing based on marginal cost) and above all, environmental criteria (incentives for water conservation); in order to create specific guidelines that can help to correspond the local contextual factors of water supply and demand.

Based on the water pricing theory and practice at home and abroad, the supply and demand balance analysis of the water quality and quantity should be analyzed and should combine with the relationships between water pricing and water saving. Through analysis and comparison of various water pricing methods, a flexible price system should be established to encourage water saving.

However, despite the considerable effort that has been made on the research of water pricing schemes. The following questions remain unclear and need to be clarified further:

Is there any 'right' water pricing policy and if there is, which one?

Which water pricing scheme is the most efficient? Which one is the most just? Which one is the most environmentally sustainable one?

Which one is the best compromise of all these?

What are the effects of different policies on water saving?

How to value different parameters that need to be considered when designing a water pricing scheme. (regional, social, economic, political and climatic aspects)

How to determine system parameters of different price schemes? (How to determine the lifeline threshold. How to determine excess consumption threshold? How to set prices in particular?)

III. RESEARCH DATA

The objective of this theoretical framework is to provide the concepts related to WPS in correspondence with the approach of the problem. In this way, an approach to the research background was made, then concepts of WPS and relationship with society were provided, the international and national organizations involved in the subject were mentioned, the impact of water pricing on saving and the regulatory aspects were discussed, and the main stakeholders in Venezuela were counted in. Likewise, some references are included about the national and international legal framework, agreements and laws concerning the problem.

As a selection from different prices schemes, we briefly present the most important regarding the research concern. These represent standard tariffs that have been used for a long time in many countries as well as models that have been recently implemented and are being tested⁽³⁾.

- Fixed charge FC: The bill does not depend on the quantity of water consumed.
- Uniform rate UR: All units (cubic meters) are priced at the same rate, independently of total consumption.
- Increasing block tariff IBT: The marginal rate increases with the block.

The criterion suggested by the American Water Works Association is to design and evaluate conservation pricing with effective communication of the price signal through consumer billing⁽⁴⁾. To influence water demand, conservation pricing must be understood by customers. Households should be able to estimate changes in their water bills because of increases in water usage. Many Florida utility companies describe their water rates on their websites and through newsletters to their customers. However, this information is often limited. For example, the survey of customers of sixteen Florida utilities, conducted by Whitcomb (2005), showed that 39 percent of respondents are not knowledgeable about water rate structures (i.e., number, size, and prices of the blocks). At the time of the survey, only five of the sixteen participating utilities printed their water rates on their bills, which partially explain this lack of customer knowledge⁽³⁾.

IV. GENERAL INFORMATION ABOUT THE RESEARCH ZONE

Venezuela is a Federal Republic located in the northernmost part of South America, northern hemisphere, in the middle of the intertropical zone, closer to the Equator than the Tropic of Cancer. It is relatively close to some of the centers of the economic and political decision of North America and with a geographical position of easy access by sea to markets in Central America, North America, Northwest Europe, and South America.⁽⁶⁾

Currently, the minimum salary in Venezuela is meager compared to other countries. Not to mention the inflation that the country's economy is suffering. With the current exchange rate of Bolívar, it is hard to compare the salary of a dollars, euros or yuan month base, however.

Unquestionably, the price of the dollar in Venezuela (official), is the value resulting from the DICOM exchange rate in the auctions. However, in the country, there is the price of the parallel dollar (unofficial market), which is traded between individuals and companies, given the shortage of foreign currency.⁽⁴⁾

The Bolívar state has an area of 240,528 km², which represents 26.24% of the national territory, limits to the North separated by the Orinoco with Delta Amacuro states, Monagas, Anzoátegui and Guárico; to the South with the Republic of Brazil and the State of Amazonas; to the East with the state Delta Amacuro and the Zone in Claim that separates us with the Republic of Guyana and to the West with the States of Apure and Amazonas. With a population Census 2011: 1,413,115⁽¹⁰⁾

The Potable Water and Sanitation Service (AP and S) in Venezuela have been framed in the public area and the entities or servers, of these network services, have been formed by State Owned Enterprises (EPE).

Table 1 relationship between water payments and water reception

Water reception	Average price (Bs/\$) month/unit	Average consumption per day	Average consumption per month	Total monthly bill
Residential (fixed rate)	29/0.009 month	900L	27,000L	29Bs / 0.009\$
Social Tariff (fixed rate)	11/0.003 month	450L	13,500L	11Bs / 0.003\$
Tankers	500/0.15 1m ³	230L	6,900L	3,500Bs / 1,05\$

The cost of production of domestic water m³ is 370 bolivars, therefore what they pay does not cover the production of the service, the fundamental basis of autonomy is in the adequate collection of the provision of services so that the company covers a reasonable percentage (higher than 70%) operating costs.

As we can deduct from table 1, rates do not cover the costs of the service, and this affects the high-water consumption per capita: 400 liters per day LPD average, while the International standard tends to 200 lpd.

V. FINDINGS

Below are the results obtained from the investigation, as well as its analysis. From the application and analysis of the survey, several points could be determined. In this way, a decoded information derived from the application of the instrument is presented. In principle, a detailed summary of the obtained answers organized by categories of analysis referred to the analysis of the categories.

- I. Household Information
- II. Opinion About Water Administration
- III. Environmental Commitment
- IV. Use of Water in the Household

Under them, a series of new sub-categories emerge from the analysis of the exposed summary, in conjunction with inferences generated by the most typical characteristics observed in the information collection process.

Category I: Household Information

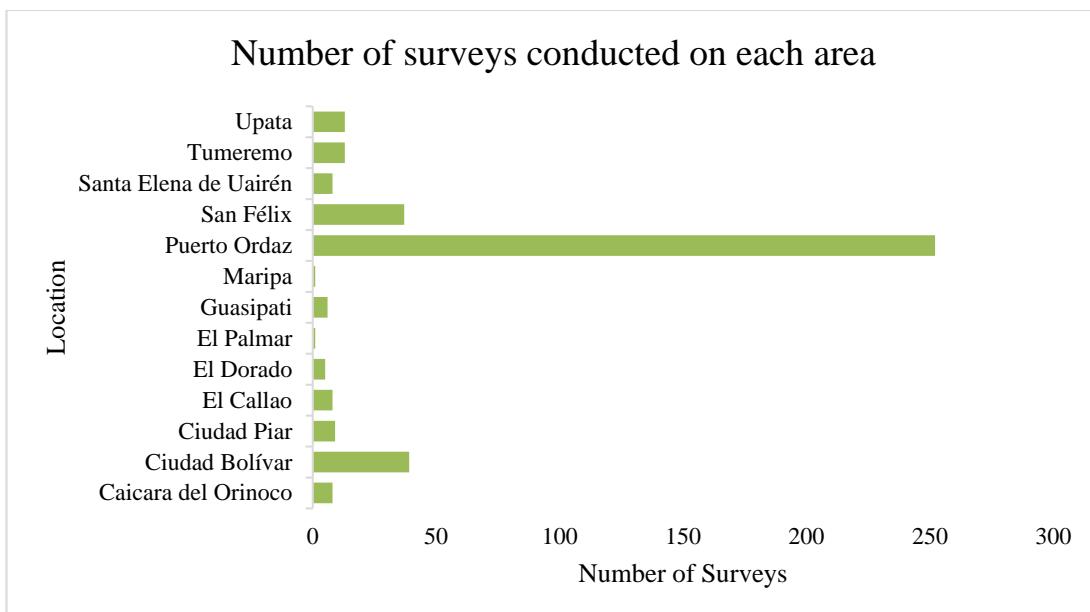


Figure 1 Number of surveys conducted on each area

We can observe that most of the sample taken was in the cities of Puerto Ordaz with 252 surveys (63%), San Felix with 37 (9.3%) and Ciudad Bolivar with 39 (9.8%), these cities are one of the most developed and planned cities in the state, thus this would mean that most of the survey results will have access to clean and direct water.

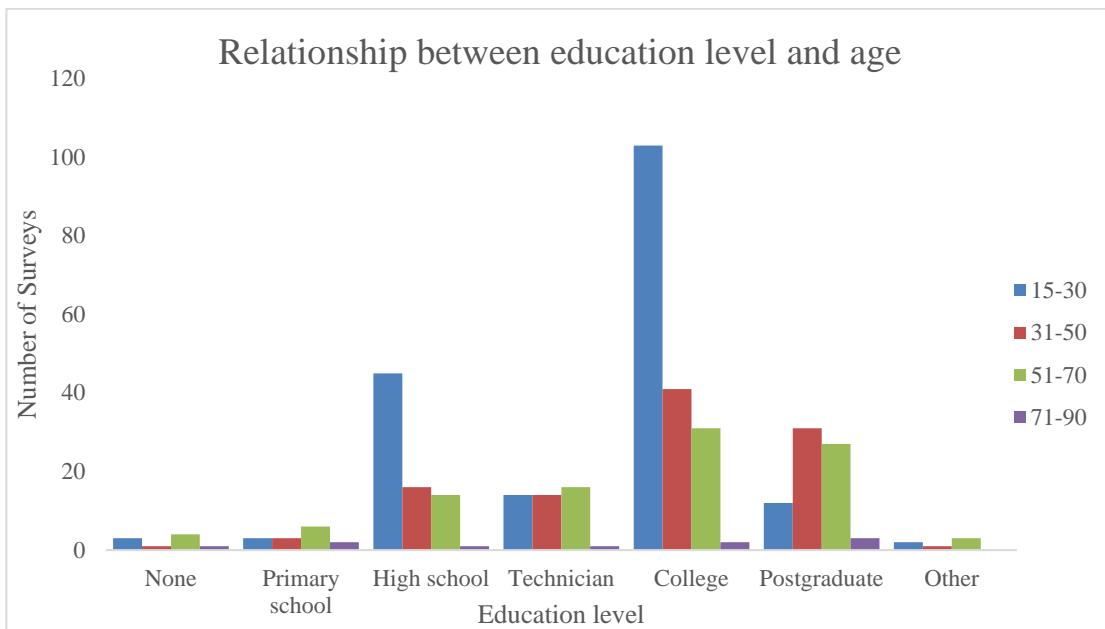


Figure 2 Relationship between education level and age

As we found the younger and middle-aged population was the most interviewed, from 15 to 30 years old, the surveys went up to 182 (45.5%), and the highest education level we can see is a college with 177 (44.25%) and followed by high school. This relation is directly linked to the previous sub-category since we can observe that most of the sample were literate, university and even reaching postgraduate level due to their closeness to the planned city standards, even regarding the age mainstream that was young between 15 and 30 years old. Among the “other” education levels we could find on a doctoral thesis, civil aviation.

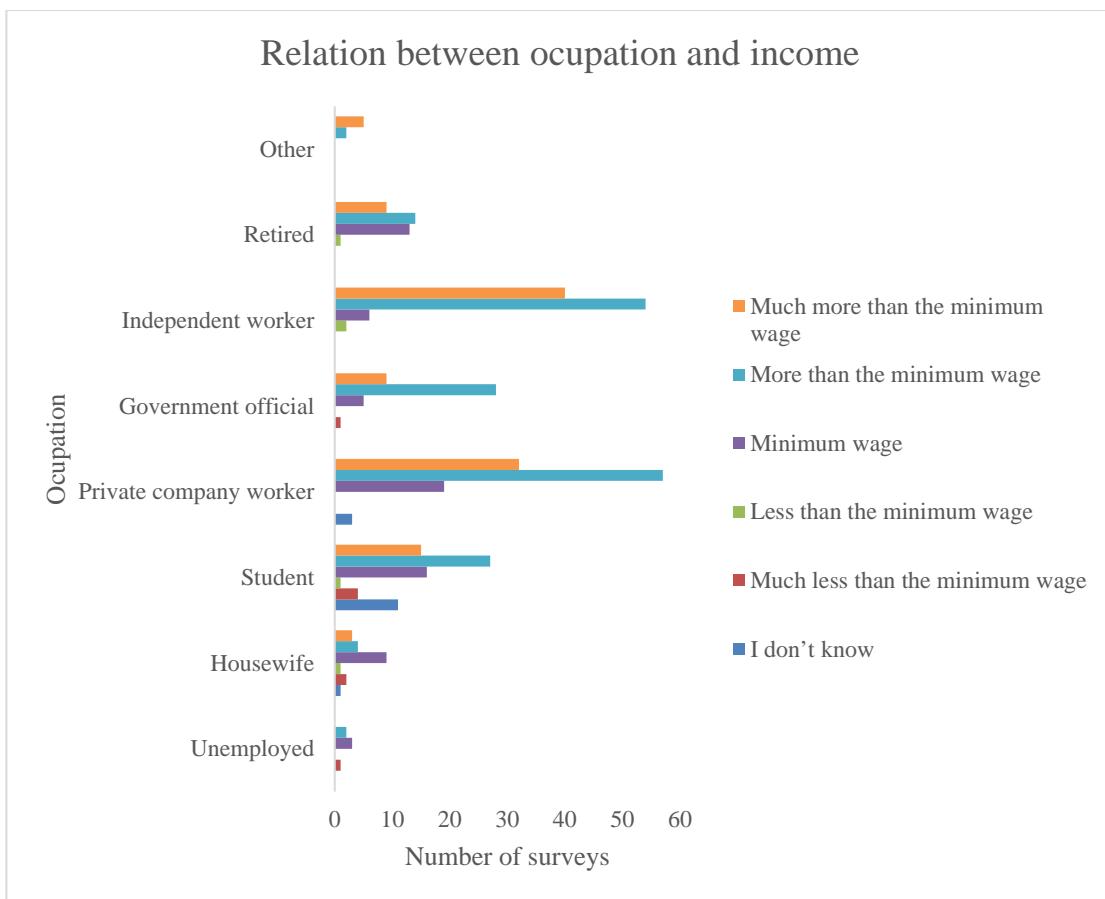


Figure 3 Relation between occupation and income

We can relate this time occupation, that has 111 (27,75%), with total income in the household that is more than minimum wage reaching 188 (47%) surveys, followed by more than minimum wage. This is one of the most essential items in the research due to its direct relationship with the pricing of water, and how is money spent in the household regarding this subject, most of the surveys were taken as a household compound so we can observe that as a compound the majority of the interviews work or study, just a small quantity is employed, however the vast majority has an income more superior than the minimum wage in the country of approximately 5.46\$, but this counts as the summation of all the salaries at home.

Category II: Opinion About Water Administration

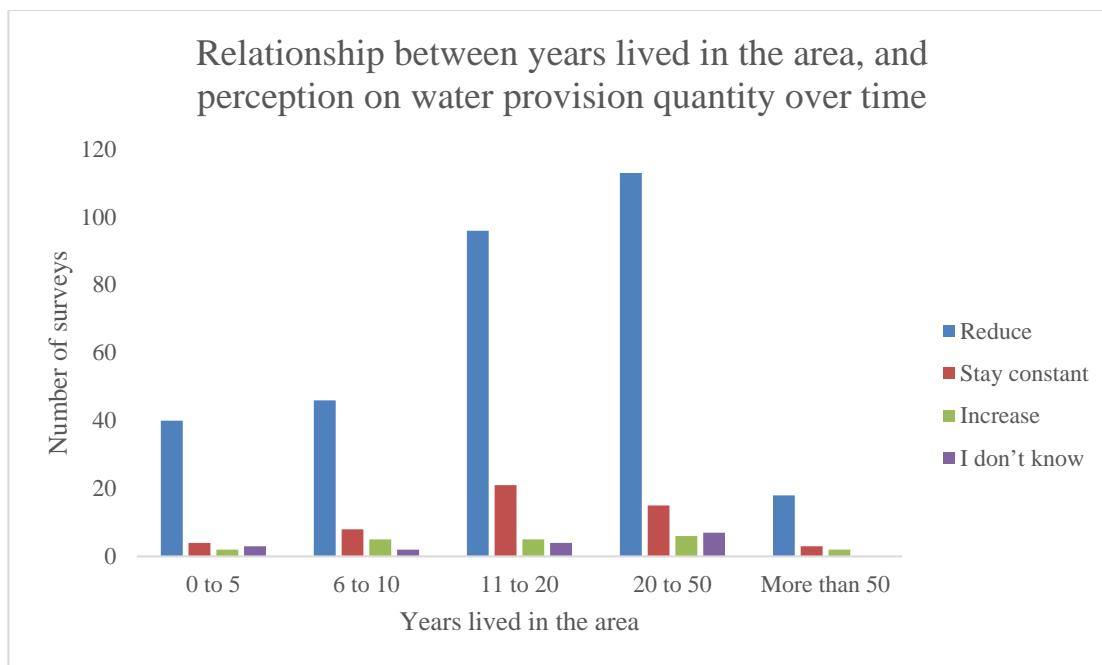


Figure 4 Relationship between years lived in the area, and perception on water provision quantity over time

Here we can observe the relationship between the years lived in the area that was mostly from 20 to 50 years with 141 (35,25%) surveys followed by 11 to 20 years, and the perception on water provision that was mostly tended to reduce with 313 (78,25%) surveys, followed by “remained”. This can explain how people that have lived fewer years in the do not know or do not consider that water provision has reduced, but on the other hand, regarding of the time lived in the area most of the people agree that the water provision has tended to reduce. This is a real problem because, on the concern of water billing, the population will mostly think it is not worth what they pay on the water billing, so, regarding this research, they will tend up to waste probably more water when the service it is active.

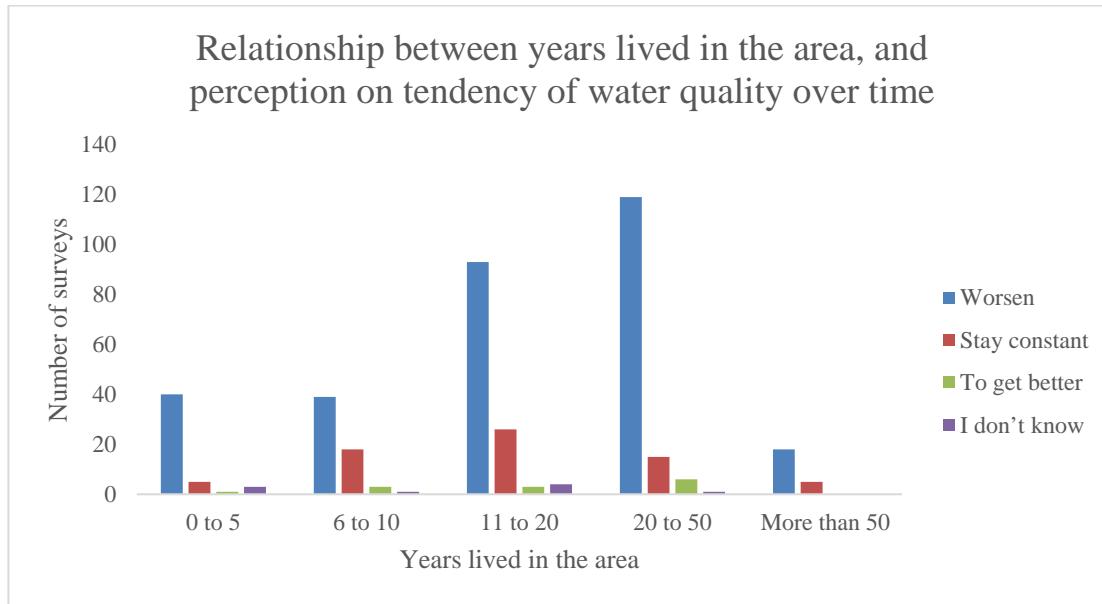


Figure 5 Relationship between years lived in the area, and perception on tendency of water quality over time

As the previous sub-category, we can see that most of the surveys had that the years lived in the area exceeded 11 years, also this time in relation with the quality of the water service the majority of the answers leaned to say that it has worsened with 309 (77,25%) disregarding the time lived in the area. Also, this remarks a problem in the community, not only for the water billing per se but also for the household health, if their health is compromised by the water quality, then the total household income will be depreciated, and at the end, it will end up trying not to pay over the billings.

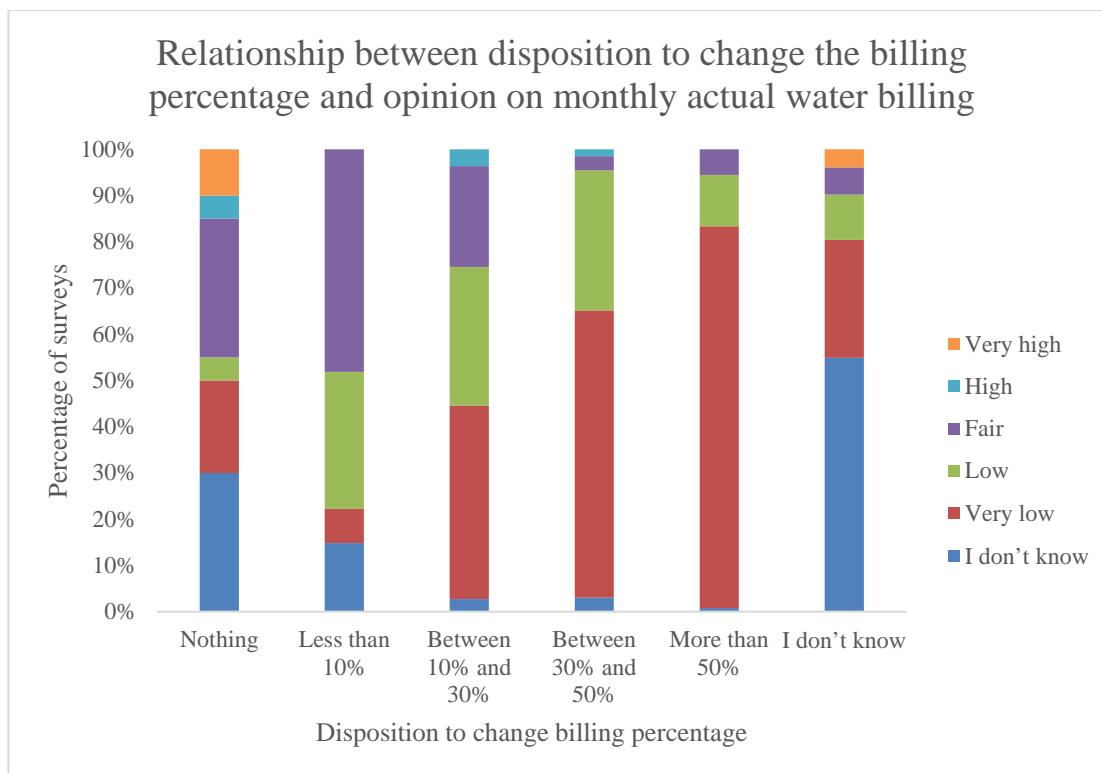


Figure 6 Relationship between disposition to change the billing percentage and opinion on monthly actual water billing

It could be assessed that population, in general, believe that the water billing is very low with 210 (52,5%) surveys, followed by the ones who also think it is "low"; this, related to the fact that also most of them believed that the water billing should increase in more than 50% with 126 (31,5%) surveys, we can deduct that the population might be considering that one, water quality and quantity depends on water billing, and this is the reason why they believe that by increasing the rates the water provision and quality will rise in conjunction, or two, they have an environmental consideration and know that water has to be highly billed so people can have consciousness of what they spend.

Category III: Environmental Commitment in the Household

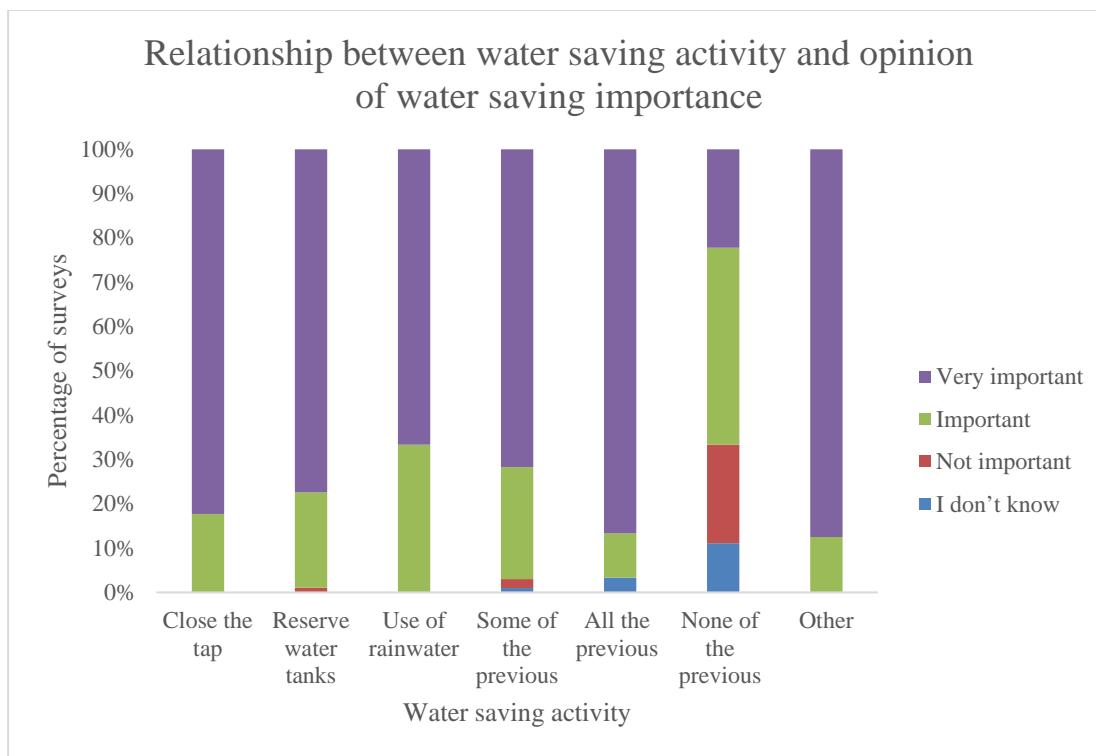


Figure 7 Relationship between water saving activity and opinion of water saving importance

Here we can observe an astonishing 310 (77,5%) surveys that believe that water saving it's imperative, this takes us to the linked category, thus, if the household considers that water saving its essential, even if they are not educated about it, it will be easier to introduce a new concept or practice a different water administration regarding water sustainability. So, the linked category is that most of the people, do the water saving consciousness or maybe for lack of water supply regularly close the tap with 158 (39,5%) in total, followed by the reserve of water tanks.

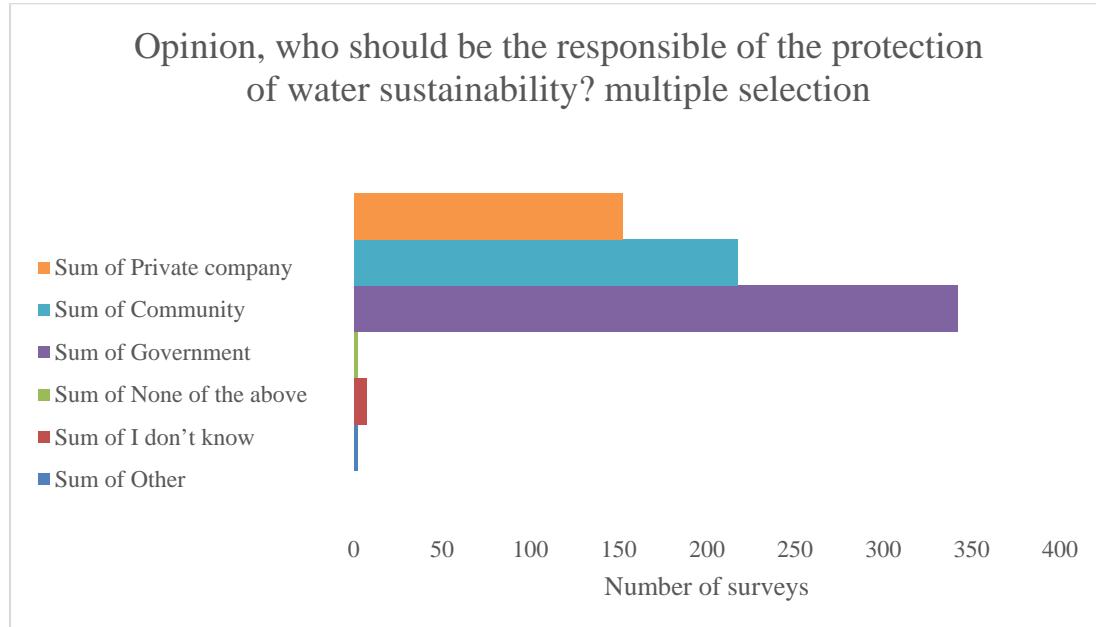


Figure 8 Opinion, who should be the responsible of the protection of water sustainability? multiple selection

Despite the meager participation on water saving programs, people still believe that the water sustainability issue should be a matter for a conjunctive work between Government, Community, and Private company, giving more weight of responsibility to the government with 342 (85,5%) surveys among the multiple-choice statistic. Between the "other" answers were, Hidrobolívar, Hidroguayana.

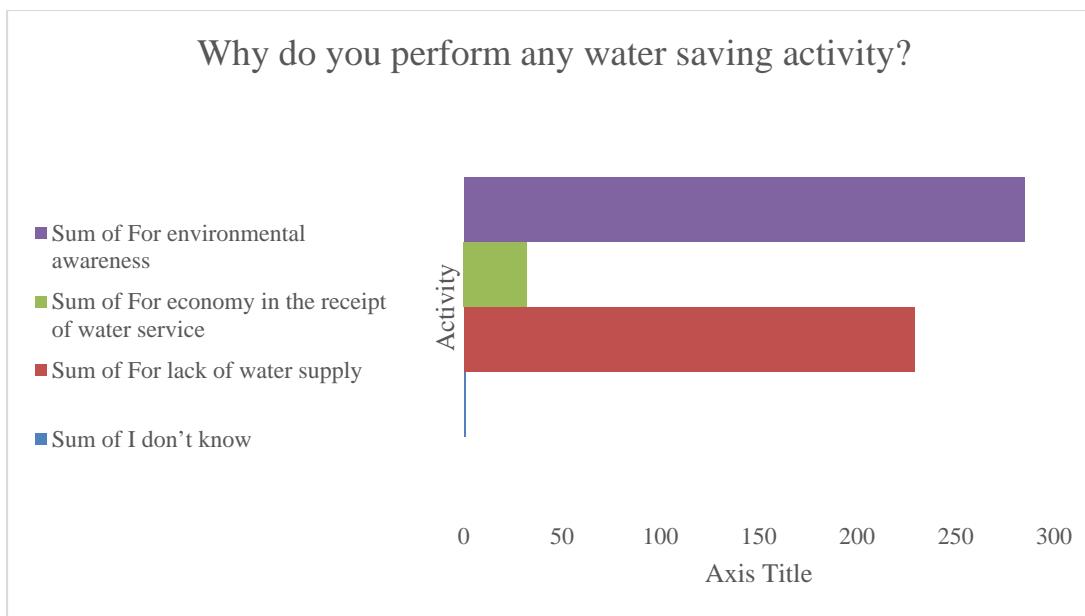


Figure 9 Why do you perform any water saving activity?

When asked about why do they perform water saving activities most of the people (in a multiple selection statistic) said that it is for environmental awareness, this could be true due the fact and intertwined of the previous answers that were mainly leaned to water saving, however we have to take into consideration that very carefully after this choice, they also considered that the lack of water supply is a primary factor for water so it can be deducted that despite there is a significant percentage of water sustainability consciences, there is still a problem of supply that directly affects peoples manage of water, and that, if in the direct future this problem is solved, people might stop saving water. Between “other” solutions where was, The bath rate downloads only necessary., I try to save water by taking a bath and doing the dishes, Repair of faults in the domestic system, Use pots that use less water, have washing machines that use less water, use water with awareness in day to day, Conscious use of water, Reuse water, Not have water, Rational use, the excess water from the washing machine is collected to be used to lower the toilet.

Category IV: Use of water in the household

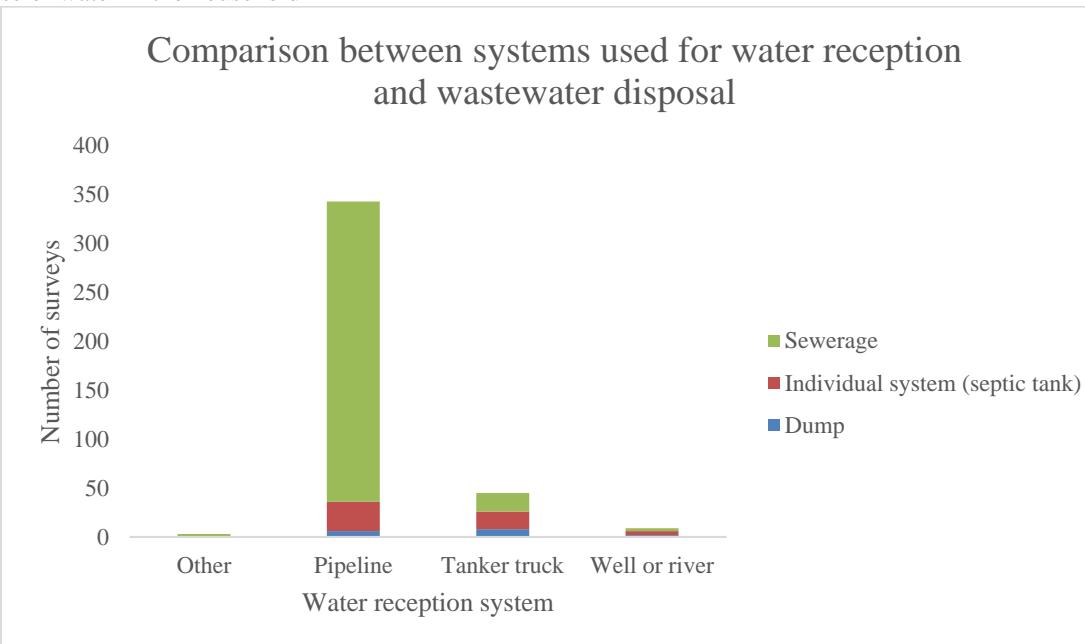


Figure 10 Comparison between systems used for water reception and wastewater disposal

As we pointed out in the first category (household) most of the people possess the direct pipeline water service to their houses 343 (85,75%) surveys and also the sewage system of disposal with 331 (82,75%), this is related to the fact that most of the surveys where in the city, however, there's still a large number of household that has the septic tank and tanker truck system, which sometimes is more

expensive to maintain than the direct one. Between “other” answers about water, receptions were, Buy a bottle, Water filters, Boiling water.

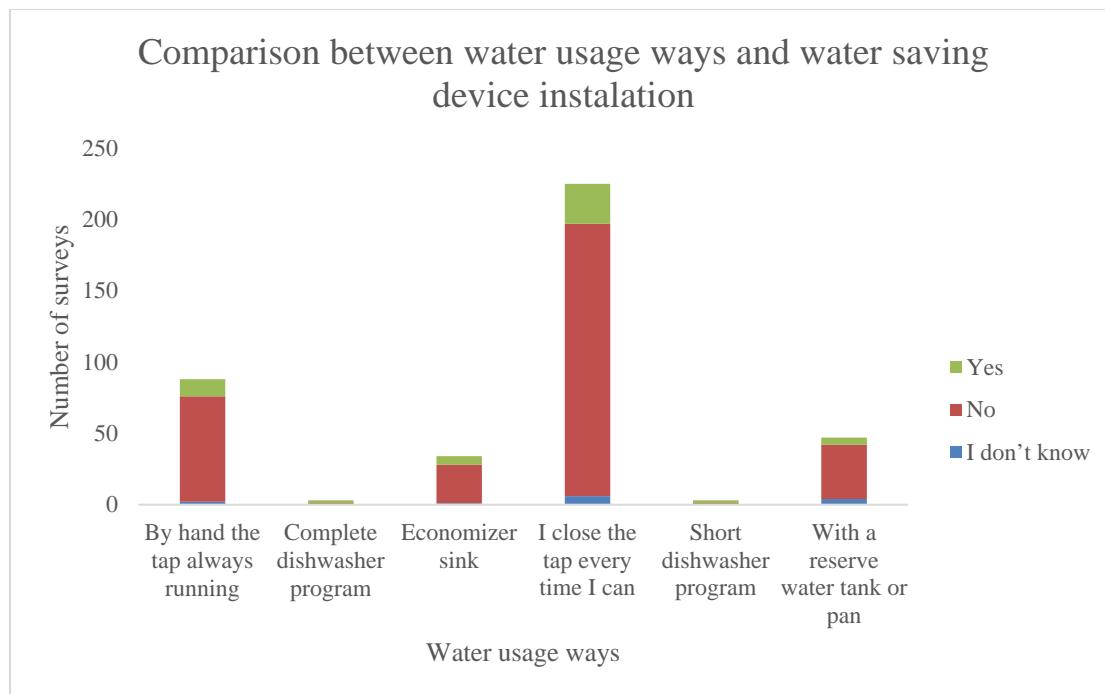


Figure 11 Comparison between water usage ways and water saving device instalation

In this case, we can see that most of the interviewees do not have a water saving device with up to 332 (83%), this is worrisome because it is directly linked to the disposition an individual or group has to invest part of their household income in a water saving strategy. At the same time we notice that most of the people, despite not having water saving systems, they apparently create their ways to save, like closing the water tap every time they get when they are washing, with up to 225 (56,25%) and other solutions like using a reserve water tank or pan.

VI. ANALYSIS

The respondents are people from Bolívar State, where the majority live in the metropolitan area, and smaller groups live in adjacent rural areas. However, they are all located in the area where the water is supplied by pipes of the city's hydraulic system. Likewise, the survey displays a large amount of working age population, in a 15 to 50 y/o range with a bachelor degree and active independently or in the private sector, suggesting that the housing market corresponds to recently build compounds or apartments, possibly acquired with own income as skilled workers or given by the previous generation, taking into account that 50% defined themselves as householders and another 50% as direct family members.

This salary range is above the minimum wage established by the Venezuelan Law and, even when it is one of the lowest among the continental region, it still allows respondents to have access to modern home appliances, e.g., water tanks, water ozonizers and other commodities.

Among the family group, the study reveals that most of its members work and that the income is distributed among itself. It is also important to mention that the surveyed families have been living in this location for many years, leading to a strong opinion on how the water supplied has improved or worsen along the years in their zone.

When the political opinion is consulted, results show a big part of the surveyed defined themselves as Moderate, but it is thought that this is to avoid political labels due to the nowadays polarized environment in the country. The survey was designed to identify political slants and its possible effect as well as to encourage solutions since the first could conceal facts on service performance over personal preferences.

About the price of the water supply service, a significant number of the ones polled consider that such price is too low in comparison to the investment needed to ensure the supply; but even though results indicate that most of the population consulted is not willing to pay for adjustments over 50% in their bills, this might be caused by the perception of not receiving an improvement in the service at a short-term period.

It is worth mentioning that none of the respondents seemed to have received proper material, studies, courses or lectures about sustainable water usage, indicating that the topic is absent in most of the levels of the educational system and the information of public management. There is a trend that shows how people interested in supporting sustainable initiatives is, but the methods to achieve this might not be clear for most, forcing vague answers such as “closing the tap,” without knowing other water saving mechanisms.

Even when the ones surveyed have heard about water saving ideas from public offices such as the City Halls, Ministries, and other departments, the majority thinks that the responsibility of a rational water use is directly related to public entities of the State, even though a considerable amount of people think the private sector also has an essential share of responsibility in the issue as well. When consulted which of the activities is thought to be necessary for the area water savings, the answers are heterogeneous, leading to the conclusion that there's no particular preference, but it does prove that the polled has particular knowledge of projects and plans implemented in the community and suggests that knows at least the basics of the presented options, knowing how to distinguish it from one another. This may prompt the main reason to apply such initiatives is due to environmental awareness, followed by the constant adaptation people has as a consequence of unreliable water supply or water scarcity.

Also, 90% confirmed that pipelines are the primary system used for water supply, and just a small percentage said water is provided by tanker trucks. This implies that even when there is a considerable amount of people living in rural areas, most of the population still enjoy proper aqueducts in the outskirts of both cities, yet people spend some time-saving water in tanks due to rationing, adapting their daily routine to the supply schedules in the less-favored areas. In the most impoverished zones, access to water is more limited, and its population pays more for the supply of tankers or water wells.

Most of the housing options have 1 to 2 bathrooms, and by collating this to the percentual graph of the number of family members versus the number of bathrooms, a correlation seems to be found. Accordingly, the relation of the number of family members and the times of toilet discharge shows an average of 6 to 8 times per person, meaning there is directly proportional interaction.

The frequency of showers taken per person per day shows a pattern of 6 to 10 weekly; the meaning is common to shower once a day. The periods used for the showers reveal a consistent 6 to 10 minutes among most of the ones polled.

Water usage for dental care averages typical dentist's recommendation of 3 times a day and even cases are taking more times a day than this, suggesting great importance to healthy habits in this group.

SUMMING UP

Water supply service must attend different factors: institutionalizing the supply companies, regain skilled personnel to manage them, proper infrastructure maintenance and adequate investment in equipment and the before mentioned aspects. The goal is to achieve a water supply service that fulfills the following features:

1. Continuity: an uninterrupted supply with minimal fluctuations.
2. Quality: water flow that satisfies national and international sanitary standards accordingly (industrial use, residential use).
3. Equitable: proper server for all the regions of the country, both urban and rural.

VII. CONCLUSION

The conclusions of the analysis can be summarized in three significant aspects, from the which also present the strategies that are considered appropriate for the overcoming the problems raised, as well as the policy instruments who can support such strategies, the type of investments needed, the activities that it is necessary to develop in the short and medium term, and finally the indicators that they are considered more appropriate to measure the results of the proposed actions:

The management of the resource

Although the country began many years ago actions, if they want to be advanced in natural resource management issues, due to various deterioration situations institutional and financial, these initiatives were left aside, and currently, the environmental management does not meet the primary objectives to preserve the principles of social equity, economic benefit, and environmental sustainability.

Adequate and timely availability of water

Venezuela is one of the countries with the highest availability of water resources in Latin America, but its abundance is relative, given the seasonality of it and the intensive occupation of the national territory in areas with less available water resources. This is compounded by the tendency to decrease availability as a result of intervention processes in the upper basins and the increasing contamination of bodies of water. If this process continues in the current trend, there will be a crisis of water availability in the short term in the regions with the highest urban-industrial occupation.

The infrastructure for the use and control of water resources

Despite having built a large amount of service infrastructure in previous decades, which allowed improving the conditions of public health, the exodus of peasants to the cities, coupled with the abandonment of maintenance programs, caused a collapse of services,

which has not yet been overcome. On the other hand, the fiscal crises that the country has suffered in recent years have consequently resulted in a significant lag of the investments necessary for the full use and control of water resources at the national level.

The proposal is implementing the following conceptual model by linking contextual conditions, implementation, system governance and components of water scheme functionality., call it a "Sustainable WPS."

The key elements for the development of this Guide should focus on:

1. Criteria to determine the potential beneficiaries (mainly income and valuing others): Government and subsidized water supply industries
2. Procedures (agile, efficient and straightforward) of individualized validation of the beneficiary: import of new technologies with the Venezuelan international relations and to cover at least 85% of the service.
3. Amount of aid (based on affordability conditions): transparency in water measuring and training personnel to deal with the considerable demand for monitoring and evaluation.
4. Methods of economic support (tariff structure, solidarity funds or others): utilize an INCREASING BLOCK TARIF that rewards water saving and connects population with quantity and scarcity
5. The setting of sustainable objectives and monitoring compliance: long term objectives are in order, also community reeducation and the gradual incursion of the water projects for local action.

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Climatic Injustice; Guyana's Case

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Abstract- Climate Change is a global issue affecting many nations worldwide. The main drivers of climate change are well known and continues to be pedaled by highly industrialized countries who reap the benefits of their economic activities. The impacts of climate change however are not limited spatially at its source. Nations like Guyana that contribute very little to the problem face harsh consequences of climate change. Guyana is a historically low emitter of greenhouse gases. Guyana's wide expanse of rainforest even compensates for some global emissions footprint yet Guyana is one of the most vulnerable countries. Guyana's coast is particularly susceptible. This is very unsettling as 90% of the country's population reside on this narrow strip of land. Despite having historically low emissions, this small nation will pay a big price should the efforts to constrain global temperatures below the 1.5°C as stipulated by the Paris Agreement. Potential consequences include flooding from coastal inundation and increased rainfall, crop failure due to changing weather patterns and worsening drought in some areas. The locational issue of the problem in Guyana's case is amplified by inadequate data or information and technical capacity for timely and effective adaptation planning and limited financial resources to confront these impacts head on. Recommendations for a more just reality include compensation by large polluters and payment for climate balancing services.

Index Terms- climate change, climate justice, global warming, Guyana

I. INTRODUCTION

Climate change is arguably one of the paramount predicaments of our generation. The difficulty doesn't apply only to the phenomenon but also in establishing a widely recognized definition. There are many definitions but two of the most popular are examined herein. Climate change as defined in the Intergovernmental Panel on Climate Change (IPCC) denotes a change in the state of the climate that can be recognized (for example using arithmetical tests) by changes in the mean and/or the variability of its properties. These changes would have to be evident for an extended period of time, usually decades or longer. The changes referred to can be observed in climate over time, whether due to natural variability or as a result of anthropogenic activities (IPCC, 2014). On the other hand, the United Nations Framework Convention on Climate Change (UNFCCC) defines climate changes as alterations in the composition of the global atmosphere that is attributed to anthropogenic activities, directly

or indirectly. The changes would need to have dire consequences on the natural climate variability over a comparable period of time (UNFCCC, 2011). Both definitions are similar in that they recognize the role of anthropogenic activities in the process and that the change must occur over a considerable time frame. They differ in that the former definition places more balanced blame on natural and human induced change while the latter pin points human activities as the main driver for the change.

Impacts of climate change are vast and varied. The Intergovernmental Panel on Climate Change (IPCC) published a special report on the impending impacts should global temperatures continue to rise. These range from species extinction, ecosystem collapse, habitat destruction, sea level rise and even widespread climate refugee crises induced by cities and parts of countries becoming uninhabitable (IPCC, 2018). After thorough consultation, recommendations were made to slow or reverse these consequences by limiting global warming to a change of no more than 1.5°C in order to avert adverse climate induced events (IPCC, 2018).

Climate injustice becomes very evident when the main contributing countries to the drivers of climate change are matched to the countries most vulnerable to the impacts. Climate injustice can be defined as the uneven contribution to and effects of climate change (Marcotullio, 2015). It is very frequently remarked that those countries that have contributed the least to the changing climate are affected the most. This sentiment is not only in reference to the developed as opposed to developing world divide, but remains true within and among sub-national units (Marcotullio, 2015).

Guyana is a small country classified as a Small Island Developing State (SID). Guyana, like many SIDs, is particularly vulnerable to impacts of climate change because of location, inadequate data or information and technical capacity for timely and effective adaptation planning and limited financial resources (UNFCCC, 2015). Guyana's coast is particularly vulnerable. The narrow strip of land is home to 90 % of the country's population and is the economic center for 75 % of the GDP. It would therefore serve as an incredible setback for the nation should the coast be impacted negatively.

In this paper, the climate injustices that Guyana is subjected to are discussed as physical, social and economic strictures. These are discussed following a thorough argument as to why the potential implications of climate change are unfair to Guyana.

The climatic injustices are examined in regards to the triple injustice of Climate change as outlined by UNESCO. These are that; climate change is hitting the poorest first, those affected did not cause it and are powerless to stop it and the polluters aren't paying (UNESCO, 2010).

A detailed discussion follows.

II. GUYANA'S VULNERABILITY TO IMPACTS OF CLIMATE CHANGE

Guyana's Initial National Communication to the UNFCCC (2002) reports climate model projections supposing a development path which results in a doubling of carbon dioxide concentrations by 2020-2040 and a tripling by 2080-2100 (OCC, 2018). Following these expectations, temperature is projected to increase by approximately 1.2°C above 1995 levels before the first half of this century. Further, higher increases in southern regions of Guyana and during the second arid season (August to October) are anticipated. Model prognoses of sea level rise for Guyana signpost a rise of about 40cm by the end of this century, or closer to 60cm if the effect of melt water from land ice is reflected (UNDP, 2019).

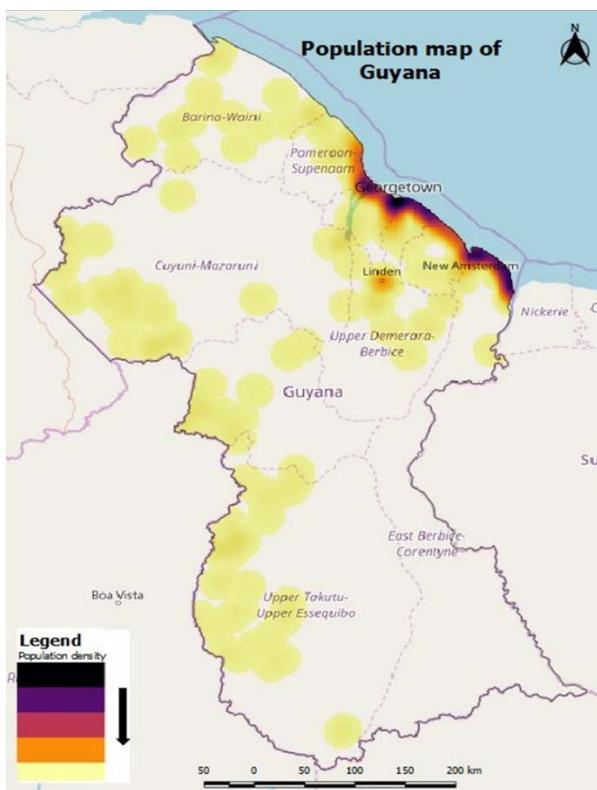


Figure 1: Population Density map of Guyana

90% of Guyana's population and 75% of the core economic activities concentrated on the low-lying coastal plain of Guyana. This makes the country particularly vulnerable to negative effects of climate change. These impacts have potential to adversely affect the economy, human livelihoods and ecosystems of the small tropical nation. Guyana at present writhes with high variability in rainfall, critical droughts sporadic with heavy precipitation and flooding. Floods from both precipitation and

inundation from the Atlantic Ocean. This manifestation may be aggravated by climate change (OCC, 2018).

A demand for fresh water resources is imminent due to increasing temperatures. This may be an issue as the evaporation rates will also increase thereby creating a deficit. Increasing sea level may escalate the force of storm surges thereby increasing risk of flooding along the populated and economically important coast. Salt water intrusion from sea level rise is also another area of concern. Domestic and industrial water supply channels may be adversely impacted. The predicted sea level rise coupled with extremes in rainfall events and storm surges and increased wave action will increase the level of flooding in Guyana significantly (OCC, 2018).

Guyana's population is anticipated to be extremely at risk from the antagonistic effects of climate change. The foreseen impacts are inclusive of recurrent flooding and sustained inundation of settlements, epidemic of water-borne diseases and amplified incidence of diseases in general. Further, possible contamination of potable water and reduced food supply are anticipated. This pose serious human health risks and can result in deaths. Climate change is also likely probable to result in flooding and inundation of valued agricultural land thereby attributing decreases in agricultural production owing to loss of land, heat stress, decreased soil moisture and an increased incidence of pests. In addition, increased soil erosion and loss of crops instigated by increased frequency of heavy rain and drought, and augmented heat stress in livestock caused by higher temperatures (UNFCC, 2002).

Guyana's economy is highly likely to be adversely impacted by falling production rates in the agricultural sector. The energy sector is also expected to be impacted by climate change, as higher temperatures upsurge electricity demand (predominantly for residential, commercial and industrial air conditioning). Guyana is predominantly susceptible to climate change because it is a poor developing country, with inadequate financial capacity to acclimatize to or alleviate the worst impacts of climate change. This is amplified by the significant role that agriculture, a part of the economy likely to be harshly affected by climate change, plays in Guyana's economic output (The Stern Review, 2007).

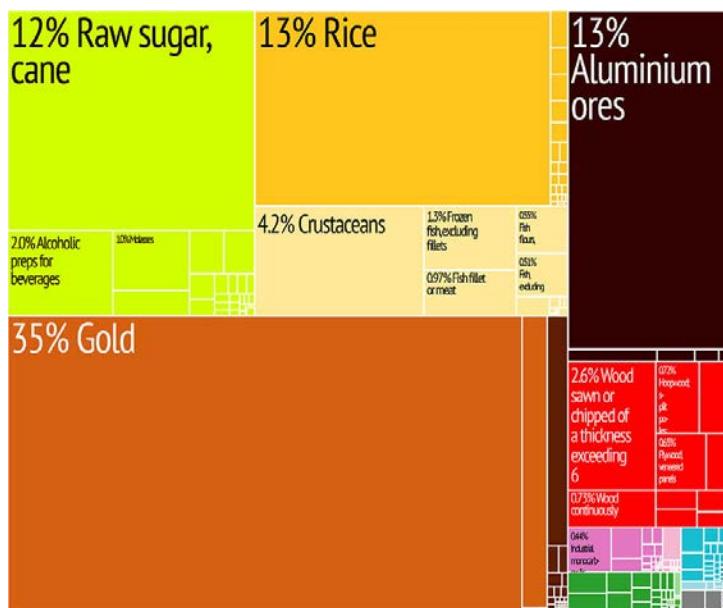


Figure 2: Economic Composition of Guyana

III.WHY IS CLIMATE CHANGE UNFAIR TO GUYANA?

UNESCO identified three main reasons climate change is disproportionately unfair. These will be discussed with specific focus on the Guyana case. Known as the triple injustice of climate change, they outline why efforts to tackle climate change need to be more just (UNESCO, 2009).

The first injustice is that climate change will hit the poorest nations first and the worst. This is particularly true in Guyana's case. Guyana is one of the poorest countries in the southern hemisphere. With a GDP of a mere 3.6 billion USD, the country is financially incapable financing the migratory actions necessary to avoid catastrophe (World Bank, 2010). Further, the already small economy faces the threat of decline as lands will become less and less cultivatable.

Secondly, those most affected did not cause it and are powerless to stop it. Guyana is a low emitter of greenhouse gases however it is a forced rider of the consequences of rising global temperatures. Rising temperatures indirectly cause sea level rise through melting of land ice. Guyana's low lying coast which is home to majority of its population face the hazard of flooding and displacement. Even if Guyana continues to pledge allegiance and fulfil those

Figure three illustrates the injustices discussed above. Image 'a' on top depicts climate equity for the year 2010 while image 'b' shows the same for 2050.

Countries with emissions in the highest quintile and vulnerability in the lowest quintile are shown in dark red (the climate free riders), and those countries with emissions in the lowest quintile and vulnerability in the highest quintile are shown in dark green (the climate forced riders) (Althor, 2016).

It can be observed that in both cases, Guyana (highlighted in the square black box) appears in a dark shade of green. This indicates that both in the past analyses and future predictions on climate

pledges to international climate agreements by keeping its vast rainforest standing, the country will still be powerless to avert the impending doom.

Third and finally, the large emitters are not paying for the consequences of their actions. This is a very important point as it highlights how unjust the situation really is. At the cost of ruining fragile ecosystems and economies the world over, some nations are making economic strides while emitting potent amounts of greenhouse gases into the atmosphere. It would seem fair that a portion of the economic prosperity be dedicated to aiding in mitigation and adaptation strategies for countries who are doing their part in aiding in the fight. Guyana is the second most densely forested country in the world. Keeping its forests standing is crucial to the global sequestration of carbon dioxide. Further, Guyana is also aiming to transition into a green state by 2025 by investing in renewable energy sources and sustainable practices.

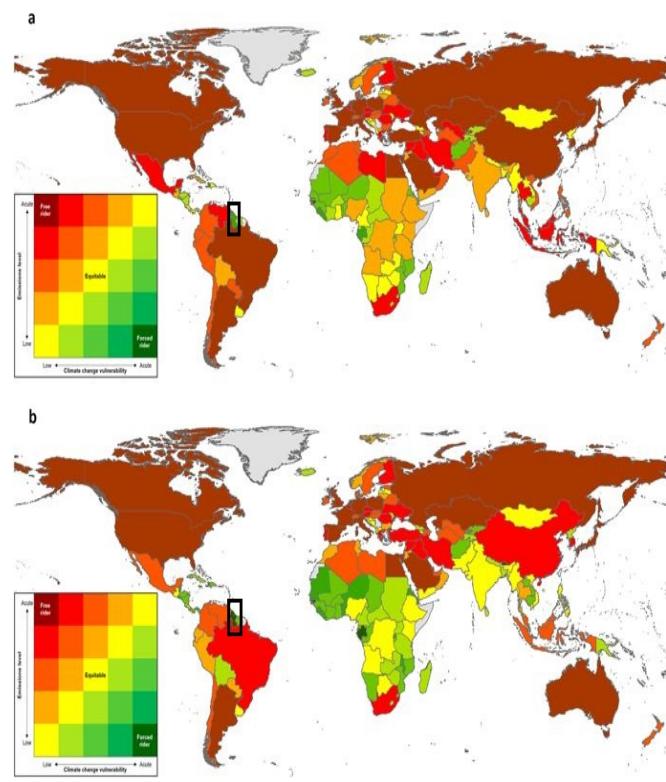


Figure 3: Climate Equity 2010 (a) and Climate Equity (2050) (Althor, 2016)

equity, Guyana has been a forced rider of the consequences. Simply put, the impacts of climate change borne by the nation are unjust considering its non-existent role in accelerating the phenomenon.

IV CONCLUSION

In an attempt to avert the impending disaster that climate change carriages to the world in general and developing countries in particular, a resolute international effort is required. That is inclusive of leadership and cooperation from developed and developing countries alike. Climate equity for small countries like Guyana cannot be achieved unless the injustices are recognized and a determined effort is made for necessary compensation.

Compensation in the form of financial support to aid mitigation and adaptation strategies, reduction of emissions and a global pollution/ emission tax are some of the way that climate injustices borne by Guyana can be addressed.

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The impacts of cultivating soil rapeseed (*Brassica napus L.*) as displacement plantation on soil fertility

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Abstract- To determine the impacts of cultivating soil rapeseed (*Brassica napus L.*) as displacement plantation on soil fertility, the field experiments were conducted. Cultivation of the rapeseed (*Brassica napus L.*) is 9.3-10.3 center/ha which has been increased by 2.7-3.0 center/ha compared to the previous ones after cultivating fallow and leguminous. The study found out after replanting the rapeseed afterwards fallow and corn, the hummus was increased by 0.10-0.51% from other alternatives. Therefore planting rapeseed after planting fallow- wheat-rapeseed-corn as alternations increases the intensity of soil fiber growth by 10.0-37.07% or 0.005-0.02 mg / per day. Yield of rapeseed grain and its biometric indicators: the rapeseed is compounded more by composite fertilizers (N26P18) for 30 kg / ha compared to control version and other dose alternatives.

Index Terms- alternation, rapeseed, soil fertility, biological activation

I. INTRODUCTION

Mongolia mostly produces as a crop of wheat, especially wheat each year. Crop cultivation in the structure of the crop system is 90%, which does not meet the qualitative characteristics of the product. 90% of the structure system in agriculture is cultivation of seeds. Rapeseed yield and mechanical harvesting efficiency have been widely affected by agronomic practices, among which, plant density and row spacing have played a vital role in obtaining higher yields⁴. Thus, it is important to determine the appropriate plant density and row spacing that optimize both the seed yield and mechanical harvesting efficiency. Numerous researchers have investigated the effects of plant density and row spacing on agronomic traits and the yield of rapeseed. Research to determine the optimal plant density in combination with row spacing for the maximum mechanized production of rapeseed has been inconclusive because the results vary depending on the location, cultivar, soil type and local climate. For example, It is economically beneficial because of the high demand for domestic and foreign markets. In addition, the rape changes the composition of grain crops and it is important for the improvement of soil fertility and the stabilization of crop yields. It is useful to start domesticate the production of the rapeseed technology in Mongolia. There are following benefits for domesticating rapeseed in Mongolia .Which are :

- Increase the amount of agricultural field for plantation

- Reduce the proportion of fallow areas
- Creating 60-80% profitable an intensive type of displacement

II. METHODOLOGY

The experience of the field trip is carried out in 2014-2017 for four years in the field of learning center "Nars Center" in Bornuur soum in Tuv province, Mongolia according to field method.

A 1st field experiment has 4 versions of 4 field rotations. The experiment plate width was 16,5 m and length was 40 m. Perimeter strip width was 1m, the separating strips between plates are 50 centimeters. Estimated area of the experiment plate is 10 square meters. The experiment was followed by the agro-technique which is used in Mongolia for the following sorts: Darkhan-74 soft wheat, Narlag bananas rice, Yubileiny rapeseed and Altaysky usatii peas.

A 2nd experiment was a monitoring and monitoring of compound fertilizer – has 5 versions which are unfertilized, N₂₆P₁₈ -20 kg/ha, N₂₆P₁₈ -30 kg/ha, N₂₆P₁₈ -40 kg/ha, N₂₆P₁₈ -50 kg/ha area active reactants. The experiment versions are placed in sequential order for 4 times of frequency. Estimated area of the experiment plate is 10 sq.m. The experiment was followed by the agro-technique which is used in Mongolia for the Yubileiny rapeseed sort of Ukraine. Perimeter strip width was 1m, the protecting strips between plates are 50 cm. Total size of the plate is 200 square meters.

III. STUDY RESULTS

The tabulate crop plants dominate in the crop rotation of our country. According to the researches done in Mongolia (by N. Altansukh, 1989, Ch. Damba, N. Nyamjav, 1978), the yield of wheat sort is mainly comprised of product stems per unit area, number of seeds of the single pappus and weight of 1000 seeds [2].

As stated in the results of the study (B.Ganbaatar, 2013), number of product stems is 219, number of seeds in the single pappus is 40.8 pieces, weight of 1000 seeds is 41.1 gr and seed yield was at 16.3 c/ha [2]. In contrast, our study shows that the height of the plant from Darkhan-74 sort wheat which was planted after fallow was 62-62.5 cm, products stems – 135 pieces, pappus seed number – 21.5 pieces, 1000 seed weight - 23.4-32.2 and the

seed yield was at 7.3-8.2 c/ha. The result is impacted by the lower precipitation rate and lack of moisture in the early phases of the research years.

Table 1
Harvest of tabulating crop plants, harvest structure indicators
(Tuv province, Bornuur 2014-2017)

Rotation	Turn	Plant height, cm	Product stem number, unit	Pappus seed number, unit	1000 seed weight, gr	Seed yield, t/ha
F-W-R-BRw	Wheat	62	136	23	32.2	7.3
	Bananas rice	68.9	176	42	13.8	6.5
F-W-P-R	Wheat	62.5	135	20	23.4	8.2
F-BNw-R-R	Bananas rice	67.3	199	43	13.8	8.8
F-R-W-W	Wheat	59.2	138	23	31.3	6.9
	Wheat	56.8	142	23	30.2	6.3

According to the study results, the highest seed yield is the wheat planted after the fallow which has yields of 7.3-8.2 c/ha. The rotation versions other than monitoring rotation have higher yields. The yield of bananas rice planted after the fallow is the highest which is at 8.8 c/ha and the ones planted after rapeseed are relatively low, showing yields of 6.5 c/ha. In addition, the yield of the wheat which was replanted after the rapeseed is 6.3-6.9 c/ha.

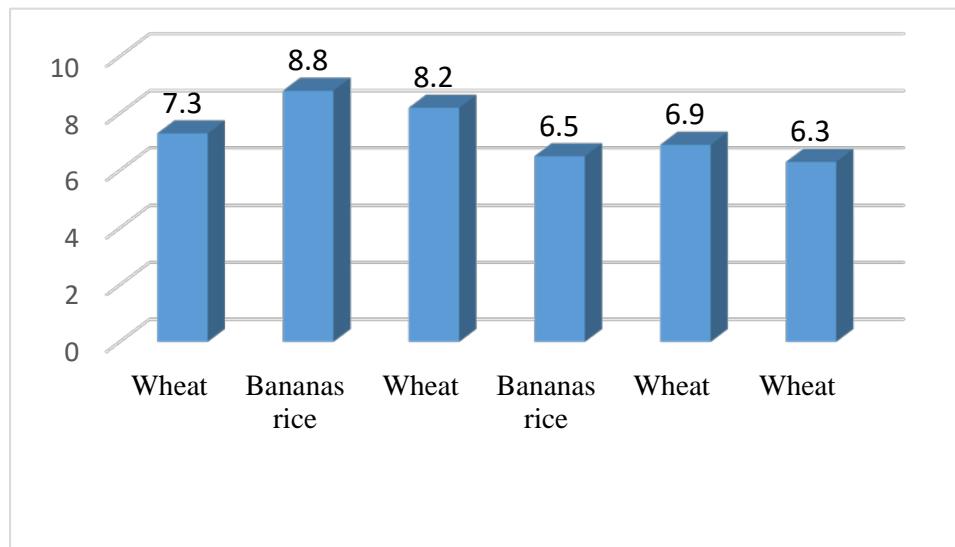


Diagram1. Seed yields of the crops of rotations c/ha, (2014-2017)

Recently, rapeseeds are introduced to our country's plant rotation and it accounts to around 20% of total farming lands. F.I.Safiallin (1990) determined that the product quality of the r rapeseed depends on the number of fascicule of one plant, number of seeds in the fascicule and 1000 seeds weight. [8]

Table 2
The harvest of rapeseed, harvest structure indicators
(Tuv province, Bornuur, “Nart” center, 2014-2017)

Rotation	Turn	Plant height, cm	Number of product branch, unit	In one plant		Number of fascicle seeds, unit	1000 seeds weight, gr	Seed yield, c/ha
				Number of fascicule, unit	Seed number, unit			
F-W-R- BRw	rapeseed	80.5	2.6	54	658	11	3	7.6
F-W-P-R	rapeseed	84.8	3	61	926	15	3.5	10.3
F-BRw-R-R	rapeseed	73.3	2.3	53	666	11	2.8	6.4
	rapeseed	73.2	2.5	56	634	11	2.8	6
F-R-W-W	rapeseed	80.1	3.2	58	874	12	3.4	9.3

The study results show that the yield of rapeseed planted after peas brought the highest amount of harvest which is 10.3 c/ha and is higher than other versions. The study also revealed that when the rapeseed absorbed the nitrogen in great amount, the yield increases. Like other leguminous plants, peas absorb nitrogen from the air and accumulates it in the soil and that positively impacts the rapeseed planted afterwards. Whereas, rapeseed planted after the fallow has yields of 9.3 c/ha and it was impacted by the fact that there has been certain amount of moist reserve in the early periods of harvest around May and June. The lowest amount of yields came from rapeseed planted after wheat and replanted rapeseed.

The height of Yubileiny sort plant in the fallow-wheat-peas- rapeseed rotation is 84.8 cm, number of product stems is 3, number of fascicles in one plant is 61, number of seeds is 926 and seed yield is 10.3 c/ha. Compared to monitoring and other rotation options, its plant height is 4.7-11.6 cm taller, number of fascicles in one plant is higher by 3-8 pieces, seed number is greater by 292 pieces, number of seeds in the fascicle is higher by 3-4 and seed yield is greater by 1.0-4.3 c/ha.

According to the studies conducted in Russia for Altaisky usatii sort peas, the plant height is 71.5 cm, number of beans is 15-17, seed number is 45, 1000 seed weights is 176-251 gr and our study for the above sort showed that plant height is 49.1 cm, number of beans in one plant is 15, seed number is 69, seed weight is 230 gr and the average yield amount is 4.4 c/ha.

Table 3 exhibits that peas harvest has been declining year by year, but that slightly impacts to the next plant. The low moist supply in the earlier periods of harvest growth in the recent years impacted a lot. But the rapeseed harvest is being increased in the fallow-wheat-peas- rapeseed rotation as compared to other rotations and it confirms that leguminous plant is a good antecedent for a plant.

In 2014, 2015 which are earlier years of the study, the climate has been normal and Altaisky usatii sort peas yield was

5.8-6.6 c/ha. And in exceptionally dry years of 2016, 2017, the yield of peas seed fell sharply and reached to 3.6-1.6 c/ha.

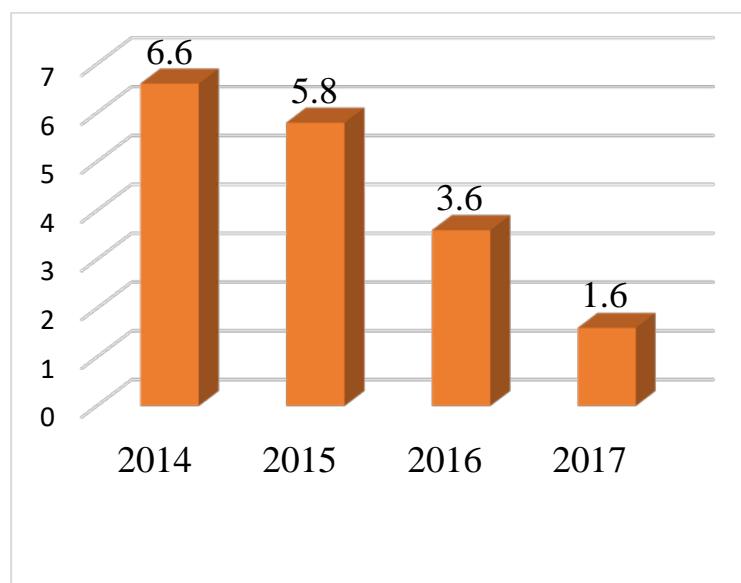


Table 2. Peas seed harvest, c/ha

The low moist supply in the study years has greatly affected the yield.

We determined the spread of rotation plants national system through using index method, calculating every 1 m² and 10 cm². In terms of total national statistics, the highest rapeseed is 2822.5 and lowest peas was 362.7 which is 7 times higher. The rapeseed roots were greater than wheat by 1525.8 and bananas rice by 2086.3. It shows that national system spread of rapeseed is relatively higher. The national spread of all the plants are spread most in the 0-30 cm of the soil. The national spread is being decreased in the soil depth. The fact that rapeseed turn spread is

higher than other turns reveals that rapeseed is the good antecedent of plants.

Table 3
 National spread %

Rotation	Turn	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
F-W-R-BR	Fallow	-	-	-	-	-	-	-	-	-
	Wheat	13.2	20.2	18.7	17.2	15.2	10.1	2.9	1.3	1.2
	rapeseed	16.6	22.7	19.5	15.2	13.5	9.6	2.7	0.2	-
	Banana rice	31.6	22.2	16.9	12.1	7.9	6.3	2.3	0.5	0.0
F-W-P-R	Fallow	-	-	-	-	-	-	-	-	-
	Wheat	12.6	12.8	15.5	16.8	17.2	18.7	5.3	0.7	0.3
	Pea	24.1	25.8	20.6	11.0	10.9	3.4	2.9	1.3	0.0
	Rapeseed	18.0	23.0	20.0	13.2	11.0	9.2	4.6	0.9	0.1
F-BR-R-R	fallow	-	-	-	-	-	-	-	-	-
	Bananas rice	28.1	17.2	14.5	14.3	11.0	8.6	4.1	2.1	0.1
	Rapeseed	18.0	24.0	20.0	16.0	12.0	8.5	1.2	0.1	0.2
	Rapeseed	19.0	23.0	19.5	13.6	11.1	7.5	4.3	1.9	0.1
F-R-W-W	Fallow	-	-	-	-	-	-	-	-	-
	rapeseed	17.3	22.8	18.7	15.0	10.8	10.4	4.6	0.3	0.1
	Wheat	15.0	22.4	18.9	15.0	14.1	12.4	2.1	0.1	-
	Wheat	14.0	23.0	17.6	16.4	13.6	11.8	3.2	0.4	-

If we take the national spread of F-W-R-BR rotation plants by percentage, the national spread of rapeseed and wheat are highest in the 10-20 cm, and bananas rice is more concentrated in 0-20 cm.

The national spread of wheat is decreased by 1.5-19%, rapeseed is decreased by 3.2-22.5% and bananas rice is decreased by 9.4-31.1% to the soil depth respectively. For the national spread of F-W-P-R rotation plant by percentage, national spread of wheat is seen the most in 20-30 cm and, rapeseed and peas are at highest in the 10-20 cm. In contrast, F-BR-R-R rotation national spread percentage shows that the spread of bananas rice is highest in 0-20 cm and 1st and 2nd year rapeseed are spread the most in the 10-20 cm which is almost same for these two years.

If we take the F-R-W-W rotation national spread by percentage, the rapeseed national spread is shown the most in the 0-20 cm, 1st and 2nd year wheat spread is the highest in 10-20 cm which is almost the same.

Among the factors that influence the formation of soil fertility, it was determined that organic substance has a strong role and significance (V.G.Mineev, 1978). The physical, chemical and biological conditions of the soil impressively depend on the amount of organic substance in the soil.

The source of soil organic substances is a plants root system, as determined by the researchers.

We defined the national system weigh by monolith method during plant harvest period of 2015-2016. For the plants involved in the experiment, system spread is 69.9-124.06 c/ha in the 0-30 cm of soil depth at 2 years average. And it matches the results of other researchers. In terms of national system weight, rapeseed weight is the highest at 124.0 c/ha and peas weight is the lowest at the 69.9 c/ha as detected by the study.

The study conducted in Buryat, Russia revealed that wheat has national mass of 17-40.5 c/ha in the 0-40 cm depth depending on its antecedent whereas the study conducted in Belarus in 2011 detected that rapeseed has national mass of 15.9 c/ha.

This result is relatively lower than our study results and we consider that it is caused by the fact that plant's national weight increases in the dry climate. Also, the study conducted in Buryat, Russia presents that 4 field rotation which is fallow-rye-bananas rice- rapeseed brought 2 times higher national mass than unrotated wheat and wheat banners (A.P.Batudaev, V.B.Bohiyev, A.K.Ulanov, 2004). It confirms our study results which show that the national system weight of rapeseed is higher.

According to the research conducted at the Agricultural Academy of Buryat, fallow-wheat-wheat rotation brought national mass of 18.9 c/ha, sunflower-wheat-wheat rotation brough 26.8 c/ha mass and sunflower-wheat-grass rotation resulted 3.9 c/ha mass (40). But our study claims that the more the national spread is, the more the national mass will be ($r=0.68$).

IV. CRITICAL ANALYSIS

The researchers studied the effects of rapeseed fertilizing technology in the soil fertility by Dr. B.Baatartsol, N.Bayarsukh (2008-2011) indicated that when using the full minerals ($N_{15}P_{20}K_{20}$) and biological fertilizers, humus, nitrate azote, mobile phosphorus and exchanging calcium are increased by 0.52%, 2.92 mg/kg, 0.6 mg/100 gr and 9.0 mg/100 gr respectively. Our study also indicated that version calculated by the 30 t/ha area active substance resulted the highest harvest which is 17.3 c/ha and in the 40, 50kg/ha active substance version, the harvest was decreased by 3.0-5.3 c/ha.

V. CONCLUSION

1. The study results show that wheat banner harvest in the fallow-wheat- rapeseed bananas rice rotation was 6.5 c/ha. It is 2.3 c/ha lower than the harvest after the fallow and it determines that the rapeseed influence the harvest of wheat banner.
2. When planting the rapeseed after the fallow and leguminous plants, it brought yields of 9.3-10.3 c/ha. Comparing to the other antecedents, the yield is increased by 2.7-3.0 c/ha. It shows that the seed plants are not a good antecedent for the rapeseed.
3. The fact that national spread of rapeseed is 61.0-62.0% in its replanted version after the peas and wheat banner reveals that rapeseed leave national residuals with a low dependency to its antecedents.
4. When replanting rapeseed after fallow-wheat banners, the amount of humus is increased by 0.10-0.51% as compared to other versions, and the version of planting rapeseed after wheat in fallow-wheat- rapeseed -wheat banner rotation shows the intensity of soil fiber breakdown is 10.0-37.07% which means it is increased by 0.005-0.02mg per day.
5. According to the agrochemical analysis made in the field soil where the rapeseed were planted, the hummus was decreased with the highest reduction in the version used compound fertilizer ($N_{26}P_{18}$) 40 kg/ha active substances.

When fertilized by the compound fertilizer ($N_{26}P_{18}$) 30 kg/ha active substance, the seed harvest and biometric indicators of rapeseeds are being increased more than the versions of monitoring and other doses. The correlational analysis determined that the seed harvest is directly related to the 1000 seeds weight, number of product stems, number of fascicles in one plant, number of seeds, number of seeds in the fascicle ($r= 0.70-1.0$).

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The Impact of Project Based Learning on the Critical Thinking Ability and Digital Literacy of fifth-graders in Gubeng 1 Elementary School, Surabaya

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Abstract. This study was to determine the effect of project-based learning on critical thinking skills and digital literacy of 5th grade students in social studies learning. This study uses an experiment with the design of "The Non Equivalent Pretest-Posttest Control Group Design". Based on the least significant difference further test shows that PjBL can affect 34% critical thinking skills and 28.9% digital literacy skills through project-based learning. Project-based learning influences students to use their critical thinking skills on the problems faced in relation to social studies material. Project-based learning forms students find solutions in solving problems by producing products. PjBL affects students' ability to find information, data, and content that is in accordance with the material at various sources on the internet independently. So that they can understand, process, and communicate effectively with others through various available media, and students are able to analyze, evaluate, and create information, data, content that is correct

Keywords: *Project-based Learning Model; Digital Literacy Skills; Critical Thinking skills*

Introduction

Does primary school with facilities that support learning using some internet-connected electronic media prove that students in the school understand how to use the media? Do students need to master the skills to use computers to find learning resources on the internet?

We often see digital technology in everyday life in recent years. Children are prepared for their future through the introduction, understanding and application of digital technology to the school, community and family environment. This refers to 21st century skills in which there is the ability to think critically, creativity, communication, cooperation, and information literacy and ICT.¹ In fact, the government has given orders to all levels of schools to master the six basic literacy, one of which is digital literacy. We interpret broadly digital literacy as a skill in using, understanding technology, and also understanding the principles and strategies of technology in achieving specific goals that have been determined by developing solutions that have been chosen.²³

Information in this era of globalization has experienced very rapid updates. Information develops continuously and can be accessed in various media. This information is found in print, electronic and online media in various forms. A complex and broad form of literacy is needed to deal with the complexity of the current information environment.⁴ In addition, skills-based skills need to be developed to coat literacy skills. Especially the skills to use electronic media devices online and offline. The technology always develops continuously so that it encourages changes in the form of literacy.⁵ One of them is digital literacy.

¹ Nasrullah, R. et.al., Materi Pendukung Literasi Digital, Kementerian Pendidikan dan Kebudayaan, Jakarta, 2017

² J. Voogt, N. Pareja Roblin, 21st Century Skills. Een Discussienota, Universiteit Twente, Hengelo, 2010.

³ L. Boswinkel, E. Schram, de toekomst telt, Report by Dutch National Centre of Curriculum development (SLO) and Ververs Foundation, 2011.

⁴ Bawden, David. "Information and digital literacies: a review of concepts." Journal of documentation 57.2 (2001): 218-259.

⁵ UNESCO. Education for All: Literacy for Life. 2005 Accessed at <http://www.uis.unesco.org/Library/Documents/gmr06-en.pdf>

Digital literacy as the ability to use, understand evaluation technology, and also to understand the technological principles and strategies needed to develop solutions and realize specific goals.⁶ Specific goals at the elementary school level are the learning objectives to be achieved.

The need to be able to participate in this modern world, every student needs to understand digital literacy. The mindset formed by the current generation is different from the previous generation, because currently access to digital technology is easier to master. Students need to master digital literacy skills. So that they can understand, process, and communicate effectively with others through various available media. In fact, awareness and critical thinking about various positive and negative impacts need to be developed, which students may face as a result of the use of technology.⁷ Students can use technology to access the internet network available at school. So that the activities carried out by the teacher provide stimuli for students to actively process the competencies needed in learning.

Although elementary school students are familiar with smartphone technology, it cannot provide a solution to their problems in processing information related to learning material. Using technology for online games and conversing on social media online, is their daily activity in utilizing technology.

Efforts to overcome these problems need to be done in classroom learning in forming students to be able to use information, data, and content on the internet in accordance with the objectives of classroom learning, namely through project-based learning. This learning is based on constructivist learning that focuses on developing projects to find knowledge.⁸ PjBL besides finding information also develops the ability to interact through groups in processing information. Students interact in solving real problems to obtain information when constructing students' understanding and competence.⁹ So that students as learners can play as active actors in learning activities, choose information to be learned, and construct meaning based on information.¹⁰

Based on the problems that occur related to internet use by children, this study was conducted to determine the effect of PjBL on the critical thinking skills and digital literacy of 5th graders in Gubeng 1 SDN Surabaya in relation to their active role in using the internet using the "DigComp 2.1" Digital Competency Framework . This is done to find out the literacy capabilities of data and information, communicate and collaborate, create digital content, secure internet, and solve problems in compiling sources of information obtained for certain purposes.¹¹

Identify, Research, and Collect Idea

This research is a quasi experiment with the design of "The Non Equivalent Pretest-Posttest Control Group Design. The population of this study was fifth grade students of SDN Gubeng 1 Surabaya Academic Year 2018-2019. Sampling was done with a simple random sampling technique, taken 2 classes, consisting of experimental and control classes. The experimental class (5th Grade C) consisted of 27 students who were treated with project-based learning, while the control class (5th Grade A) consisted of 28 students given conventional learning. The sample used was 55 students.

The independent variable of this study is project-based learning. The dependent variable of this study is critical thinking skills and digital literacy skills. The control variable in this study is the fifth grade Social Studies learning material in the second semester with basic competencies analyzing the role of the economy in an effort to improve people's lives in the social and cultural fields to strengthen national unity and unity.

⁶ Bekker, Tilde, et al. "Teaching children digital literacy through design-based learning with digital toolkits in schools." International Journal of Child-Computer Interaction 5 (2015): 29-38.

⁷ Nasrullah, R. et.al., Materi Pendukung Literasi Digital, Kementerian Pendidikan dan Kebudayaan, Jakarta, 2017, p. 4

⁸ Arcidiacono, Gabriele, et al. "Application of axiomatic design for project-based learning methodology." Procedia CIRP 53 (2016): 166-172.

⁹ Lilge, Frederic. "John Dewey, 1859–1959: Reflections on His Educational and Social Thought." The Educational Forum. Vol. 24. No. 3. Taylor & Francis Group, 1960.

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¹¹ Carretero, Stephanie, Riina Vuorikari, and Yves Punie. DigComp 2.1: The Digital Competence Framework for Citizens with eight proficiency levels and examples of use. No. JRC106281. Joint Research Centre (Seville site), 2017.

The research instrument used consisted of learning devices, the instrument for implementing PjBL learning to control the learning process was carried out by observation and for students given self-assessment questionnaires, tests critical thinking skills and digital literacy skills, and evaluated products as a result of the project.

The research data used covariant analysis (Anacova) statistical analysis and continued with the Least Significance Difference (LSD) difference test. Before the hypothesis test, a normality pre-test test was carried out using the Kolmogorof-Smirnov one-sample test, while the homogeneity test used Leven's Test of Equality of Error Variances which was assisted by SPSS 16 for Windows. Statistical tests were carried out at 0.5% significance level.

Results and Discussion

Based on the results of hypothesis testing shows there is the effect of project-based learning on critical thinking skills and digital literacy skills in 5th grade students of elementary school. The results of the calculation of statistical analysis of anacova briefly dependent variable on critical thinking are presented in table 1 below.

Table 1. Anacova Test Results Effect of PjBL on Critical Thinking Ability

Source	Type III Sum of Squares	df	Mean square	F	Sig.
Corrected Model	3432.895(a)	2	1716.448	33.059	.000
Intercept	7133.772	1	7133.772	137.396	.000
XCRITICAL	476.095	1	476.095	9.170	.004
CLASS	3206.892	1	3206.892	61.765	.000
Error	2699.905	52	51.921		
Total	325487.000	55			
Corrected Total	6132.800	54			

a R Squared=.560 (Adjusted R Square=.543)

In the PjBL variable, the calculated Fcount is 61.765 with a significance value of 0.000 (less than 0.05). Thus the null hypothesis which states there is no influence of PjBL on critical thinking skills is rejected and the research hypothesis is accepted, which means that there is an influence of PjBL on critical thinking skills. The results of further testing with LSD are listed in table 2.

Table 2. LSD Advanced Project Learning Test Against Critical Thinking Ability

Class	Critical Pretest	Critical Postest	Difference	The average value is corrected	Notation
1 = control	54.2	69.0	14.8	68.6	a
2 = project	51.7	83.7	32.0	84.0	B

From the data above the mean corrected critical thinking ability is different from the control class, namely the corrected average of the experimental class 84.0 and the control class of 68.6. The percentage of increase in conventional learning in the control class experienced an increase in critical thinking skills by 27.4%, while an increase in critical thinking skills in project learning in the experimental class was 61.8%. This means that based on the corrected mean ratio, the experimental class has critical thinking skills 34.4% higher than the control class. This, proves that project activities can affect critical thinking skills through perception and creative thinking in the

classroom.¹² Project-based learning also influences students' ability to understand lesson concepts with critical thinking skills rather than using conventional learning models.¹³

Anacova test results influence PjBL on digital literacy skills, on the learning variables in the project class obtained Fcount value of 52.116 with a significance value of 0.000 (less than 0.05), briefly can be seen in table 3 below.

Table 3. Anacova Test Results Effect of PjBL on Digital Literacy Capabilities

Source	Type III Sum of Squares	df	Mean square	F	Sig.
Corrected Model	2796.663(a)	2	1398.331	29.100	.000
Intercept	7370.155	1	7370.155	153.375	.000
XKRITIS	403.191	1	403.191	8.391	.006
KELAS	2504.361	1	2504.361	52.116	.000
Error	2498.764	52	48.053		
Total	329391.500	55			
Corrected Total	5295.427	54			

a R Squared= .560 (Adjusted R Square= .543)

Based on the data above the null hypothesis which states there is no influence PjBL on digital literacy abilities is rejected and the research hypothesis is accepted which means that there is an influence of PjBL on digital literacy capabilities. The results of further testing with LSD are presented in table 4 below.

Table 4. LSD Advanced Test Project Learning on digital literacy capabilities

Class	Digital Pretest	Digital Posttest	Difference	The average value is corrected	Notation
1 = control	52.27	70.29	18.02	70.13	A
2 = project	51.09	83.48	32.39	83.65	b

The results of this study indicate an increase in digital literacy skills, the average score of digital literacy abilities of students taught with project-based learning is 83.65. While the average score of students' digital literacy skills taught by conventional learning is 70.13. The experimental class has 28.9% higher cognitive abilities than the control class. These results prove that a project-based learning model that trains students to communicate and collaborate in solving problems influences students' information literacy abilities.¹⁴¹⁵

In the implementation of this learning the achievement of implementation appears at each stage of learning. In the planning phase, students work together with all group members starting from compiling proposals to making project

¹² Ku, Kelly YL, Venus SL Lee, and James W. Ellis. "Using artwork as problem context in generic critical thinking instruction: A strategy for thoughts." Thinking Skills and Creativity 25 (2017): 53-59. <http://dx.doi.org/doi:10.1016/j.tsc.2017.07.001>

¹³ Sastrika, Ida Ayu Kade, Wayan Sadia, and I. Wayan Muderawan. "Pengaruh Model Pembelajaran Berbasis Proyek Terhadap Pemahaman Konsep Kimia dan Keterampilan Berpikir Kritis." Jurnal Pendidikan dan Pembelajaran IPA Indonesia 3.1 (2013).

¹⁴ Chu, Samuel Kai Wah, S. K. Tse, and Ken Chow. "Using collaborative teaching and inquiry project-based learning to help primary school students develop information literacy and information skills." Library & Information Science Research 33.2 (2011): 132-143.

¹⁵ Han, Sunyoung, Robert M. Capraro, and Mary M. Capraro. "How science, technology, engineering, and mathematics project based learning affects high-need students in the US." Learning and Individual Differences 51 (2016): 157-166.

procedures, seeking information in various sources and making reports. Students' critical thinking is also very apparent at the implementation stage, including making project design until the final product is presented. The products they produce include posters, wall magazines, and kliping. From the projects they are working on they get direct learning experience especially in the creating stage. The ability to analyze and evaluate problems that exist around students is critically awakened can be seen in the results of the projects they make in the form of research reports.

Direct learning can improve students' digital literacy skills so that social studies learning that is considered difficult can be absorbed directly by the brain as important information that is not easily forgotten. While the ability to argue is seen at the processing stage which consists of presentation of project results and evaluation. At the presentation of each group, there was a sense of confidence in the results they got as if they were true researchers and shared information in the form of learning material about the superiority of the products of the area of origin..

Conclusion and Sugestion

This study shows that based on LSD's further test project based learning learning can influence students 'critical thinking skills to increase 34% and students' digital literacy abilities increase by 28.9% compared to learning provided without going through projects.

Project learning can be done on social studies materials which have been considered difficult by students, so that other research needs to be done from materials that are considered difficult on social studies subjects. Project learning requires a long time so that time management and preparation are needed enough for teachers to implement PjBL.

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Factors Affecting Savings And Internallending Communities in Informal Finance Groups On Pastoral Communities In Kenya, A Case Of West Pokot County

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Abstract- This study has explored the factors affecting savings and internal lending communities (SILC). The specific objectives were: financial viability, financial sustainability, financial acceptability and Information and Communication Technology. The literature review is in line with the variables under this study, the target population established was 440 covering Women groups, Youth groups, elder's council, youth association, livestock trader's cooperative society, Financial institutions and Government agencies in Kapenguria Division.

Index Terms- financial viability, financial sustainability, Information and Communication Technology and financial acceptability

I. INTRODUCTION

The history of Community Micro-Finance Schemes is ancient, dating back at least to 16th C, when Yoruba slaves carried out Merry-Go-Round activities to the Caribbean, as part of their institutional baggage - social capital (Donahue, 1999). Savings and Internal Lending Communities (SILCs) are a type of community-based Accumulating Savings and Credit Association (ASCA). SILCs build on an ASCA model developed by CARE in Niger (the "Mata Masu Dubara" or "Women on the Move" Project, often referred to as MMD), ASCAs themselves are improvements on traditional merry-go-rounds, or ROSCAs, that are prevalent in many communities around the world. While traditional ROSCAs provide their members with an extremely simple and transparent way to build useful lump sums, and as a result can form and spread without external assistance, they have their limitations (Copestake, Johnson & Wright, 2002).

Savings have been defined as the excess of income over consumption (Donahue, 1999). In the real sense, it is that part of after-tax income that is not spent; hence households have just two choices about what to do with their income after taxes -use it to consume or save it. Savings serve as invaluable reserves, as insurance against crisis factors such as illness, natural disaster, theft and other necessary human needs such as health, food, education and housing which can easily drive the poor into destitutions (Catholic Relief Services (CRS),2010). Like credit, saving helps households turn a sequence of small sums into useful lump sums. Households prefer to save rather than borrow because it has a low cost and gives them more control over their lives. Donahue (1999), observed that savings is a safer approach and one that is appropriate for all families

12as at times borrowing is a high risk decision for poor families especially those living in informal settlement areas (Anderson. & Baland, 2002). Poor people have multiple demands on their scant resources. As such, they normally save for specific time and purposes mainly in situations that motivate them to save more. Field surveys reveal that poor people prefer small regular contributions that are collected at their convenient time and placeto motivate saving discipline. At other time as it was observed, some features like "illiquidity or commitment savings" that hinder withdrawal also facilitate more savings (Donahue, 1999).Thomas (1995) asserted that in urban informal settlements, it is very difficult to protect savings from theft, inflation or the demands of everyday life. It is even more difficult to obtain credit or loan (Adinyira, Oteng-Seifah & Adjei-Kumi,2007). Faced with institution policies and services that are frequently hostile, inadequate or indifferent to their concerns, the urban poor have little choice but to valiantly deploy a range of coping strategies, chief among them being the use of their social networks to provide everything from credit, savings and physical security to information about housing, financing and employment opportunities (Creevey, & DAI, 2008).Informal financial markets heterogeneous, incorporating all financial transactions consummated outside the functional scope of formal financial regulations (Beijuka& Odele (2007).Informal financial participants include money lenders, Rotating Savings and Credit Associations(ROSCAs),mobile saving collectors, mutual assistance groups, landlords, neighbors, friends and family members (Creevey & DAI, 2008).Most informal finance groups in slums specialize 13in either lending or savings and they tend to be membership based. According to Ashley and Hussein (2008), most informal finance groups have been developed in response to the demand of a distinct clientele and each unit tends to serve a particular market niche.

Despite advances made by microfinance institutions in giving the poor access to credit, studies have estimated that 2.7 billion adults in the developing world remain unbanked (CGAP, 2009).In 2003, the World Bank reported that people living in slums are usually

financially excluded and therefore rely on informal financial tools for their finances (WB, 2003). The report also established that most of the households in Latin America and the Caribbean have no access to formal financial institutions. In a later report (2010), World Bank reported that 2.9 billion adults or half the world adult population is unbanked, and 2.7 billion of them or 90% are from low income and middle income countries.

1.2 Statement of the Problem

Promoting efficient, sustainable and widely accessible rural financial systems remains a major development challenge in Kenya (Kono & Takahashi (2010), With about 73% of the pokots population living in the rural areas and experiencing a high incidence of rural poverty, improved rural finance is crucial in achieving pro-poor growth and poverty reduction goals (Murphy, 2002). However, in most cases development of rural financial systems is hampered by the high cost of delivering the services to small, widely dispersed customers; as well as a difficult financial terrain - characterized by high covariant risks, missing markets for risk management instruments and lack of suitable collateral for credit access. Due to the remoteness and contextual hardships of Kapenguria such as lack of good infrastructure and harsh ecological conditions, penetration of formal financial services has been limited over years. Most pastoral communities tend to have a negative attitude towards monetary savings and focus on accumulating wealth in form of livestock.

Pokot community is no exception. This situation could be an indicator that significant gaps exist in finance and Investment pipeline among the pastoral Pokot community. Most likely, the lack of organized financial intermediation services together with a relatively rigid culture has slowed socio-economic development of the pokot. Although local development structures such as the Pastoral Community Development Associations (PCDAs) exist in Kapenguria, they tend to lack an organized system of financial intermediation that has ability to spur the desired socio-economic development in the locality (ILIDP SP 2012-2016). This reality presents the Pokot with an opportunity to select the "best-fit" financial services from a pool of prospective service providers from both formal sector (banks, cooperative societies, micro-finance institutions, etc) and informal sector (money lenders, "chama, pyramid schemes and accumulated savings and loan schemes - SILC). Pokots in Kapenguria reside in remote-rural locality hence a financial service is likely to be chosen or adopted if it addresses their unique situation. The researcher is not aware of any scientific investigations undertaken on the study topic. It is hoped that information generated through this study will help reduce existing knowledge gap on influence of SILC model in Informal Finance groups' selection of rural financial services on pastoral communities in Kenya by drawing experiences and lessons learnt in Kapenguria Division.

1.2.1 Objective of the Study:

The general objective of this study was to establish the factors affecting savings and internal lending communities on the Pastoral community in Kenya.

The specific objectives of this study were:

1. To examine how financial viability affects savings and internal lending on the Pastoral community in Kenya
2. To assess the effect of financial acceptability affects savings and internal lending on the Pastoral community in Kenya
3. To establish the extent to which Information and Communication Technology affects savings and internal lending on the Pastoral community in Kenya
4. To determine how financial sustainability affects savings and internal lending on the Pastoral community in Kenya

1.3 Theoretical Framework

The study was supported by different theories that give an in-depth explanation of influence of SILC in informal finance groups, (financial viability, social-cultural acceptability, information and communication technology and environmental sustainability. The theories rest on the fact that informal finance groups are increasingly being adopted in pastoral communities and rural areas, ([Rajan and Ramcharan, 2011](#),)

2.1.2 Banking Theories and Macroeconomics

The banking and macroeconomics theory was considered to be relevant on understanding how financial friction can determine the inefficiency supply of credit to pastoral communities in Kenya hence provides the theoretical background for this study. Woodford (2010) emphasizes the role of financial frictions in determining an inefficient supply of credit. In a world without financial frictions, savers lend to intermediaries at the same interest rate as that at which intermediaries lend to final borrowers. In the real world, however, the external finance premium is positive (and fluctuating), mainly due to intermediaries' limited ability to leverage their positions. Constraints on the intermediaries' equity accelerate the business cycle: intermediaries react to positive (negative) changes in net worth by intensifying (lessening) their 'supply of intermediation' (Woodford, 2010, p. 32). Financial markets are characterized by the existence of frictions and imperfections. Bernanke et al. (1999) and Eggertsson and Krugman (2012) concentrate on the analysis of the effects of changes in the borrowers' net worth; Woodford looks at the fluctuations of the lenders' net worth. In all cases, however, financial intermediation, if considered at all, is dealt with in very general terms, without providing any distinction between different intermediaries and, in particular, without paying much attention to commercial banks

2.1.2 The Cultural Theory

The cultural theory is relevant on understanding how culture of pastoral communities can influence savings and internal lending community in Kenya hence providing the theoretical background for this study. Cultural theories examine people within a culture and

try to understand or predict how or why they react a certain way towards credit, loan repayment. There are three main models of cultural studies research: production -based studies; text-based cultural studies; and studies of lived cultures. It may be more transformative to rethink each moment in light of the others; importing objects and methods usually developed in relation to one moment into the next ``Thompson et al. (1990) claim that their cultural theory is universal. They argue that distinctive sets of values, beliefs and habits (in nations, neighborhoods, tribes and races) are reducible to only a few cultural biases and preferences". Cultural theory is one of many approaches that have been used to cope with the subjectivity inherent in analyzing long term global change. The original aim of Cultural Theory was to create a typology of social forms that aligned with, Classificatory schemes developed by the upper-class social theorists like Emile Durkheim, Karl Marx, Max Weber and so on, and the new evidence collected in ethnographic studies (Verweij et al., 2006). Rather than trying to be complete, we want to provide the insight about the evolution of Cultural Theory. Large part of this report is derived from a comparison made by Thompson et al. (1990 part two) in which they try to show that despite the unconventional language of "grid" and "group", their typology refers to many of the same types of social relations.

2.1.3 Innovation Diffusion Theory

The Innovation Diffusion theory is considered to be relevant on understanding how technology can influence pastoral communities in Kenya on savings and lending hence provides the theoretical background for this study. The innovation diffusion theory (IDT) has remained one of the strong theories to predict the diffusion of innovations in a social system. Smartphone is one such product that falls in the category of innovation that changes with passage of time. Smartphones are becoming smarter by each day. The addition of new features in a way reinvents the use of this product. Instead of focusing on persuading individuals to change, it sees change as being primarily about the evolution or "reinvention" of products and behaviors so they become better fits for the needs of individuals and groups.

In diffusion of innovations, it is not people who change, but the innovations themselves (Les Robinson, 2009). The Innovation Diffusion Theory integrates other formal financial services with the informal financial services Compatibility: this is the extent to which adopting the innovation is compatible with what people do (Kaasinen, 2005). It is the degree to which an innovation is perceived as consistent with consumer needs, values and beliefs, previous ideas and past experiences. It helps give meaning to the new idea and regard it as more familiar (Francesco, 2012). The more compatible the innovation the better chances of adoption. E.g. a firm which wants to introduce a new line of operations will find it suitable to have a technology that doesn't much impact on the existing lines of operation. If the new line will disrupt the existing operational lines it may increase the cost involvement and the firm may scrap the deal. However one shall not blank out this possibility that too much compatibility can be sometimes a problem as the users may find it unworthy to try a new innovation or might not perceive it to be an innovation.

2.1.4 Growth Theory

The growth theory is considered to be relevant on understanding how environment can influence pastoral communities in Kenya on savings and lending hence provides the theoretical background for this study. Tackling global and local environmental issues simultaneously will require a global multi-stakeholder partnership (HLP, 2013), as well as partnerships at multiple levels of governance – from community and national levels up to international levels. A twin-track policy agenda of national and international action can help to achieve environmental sustainability in all countries, In July 2013, drawing on the work of the OECD2 and other international organizations, the G20's Development Working Group (DWG) hosted a dialogue with representatives from low-income developing countries on the lessons learned from their own experiences in designing and implementing inclusive green growth strategies and policies. Water, food and energy are closely interlinked. For example, options to increase water security – such as long-haul transfer and desalination – are often energy-intensive. At the same time, water is critical for meeting future energy demands without damaging the climate. The energy sector already accounts for an estimated 15% of the world's freshwater withdrawals, and this is projected to increase by 20% between 2010 and 2035 (IEA, 2012).

Water use for energy can reduce the availability of water and can also be polluting and damage freshwater ecosystems. Policies promoting biofuels as an alternative to fossil fuels have led to increased raw commodity prices and to pressure on land for growing food; in some cases this is affecting food prices for poor consumers in developing countries and undermining food security (King, 2013). OECD work on agricultural investment confirms that global agriculture is increasingly linked to energy markets (OECD and FAO, 2012). Higher oil prices are a fundamental factor behind high agricultural commodity price projections, as they increase oil-related costs of production, as well as demand for biofuels and agricultural feedstock. By 2021, global production of bioethanol and biodiesel is projected to almost double, with biofuels consuming a significant share of the global production of sugarcane (34%), vegetable oil (16%), and coarse grains (14%).

2.2 Conceptual Framework

This section presents the Conceptual Framework which shows the link between the study concepts and the three areas identified for investigation in the study. Figure 2.1 shows the relationship between variables identified in the problem statement and objectives.

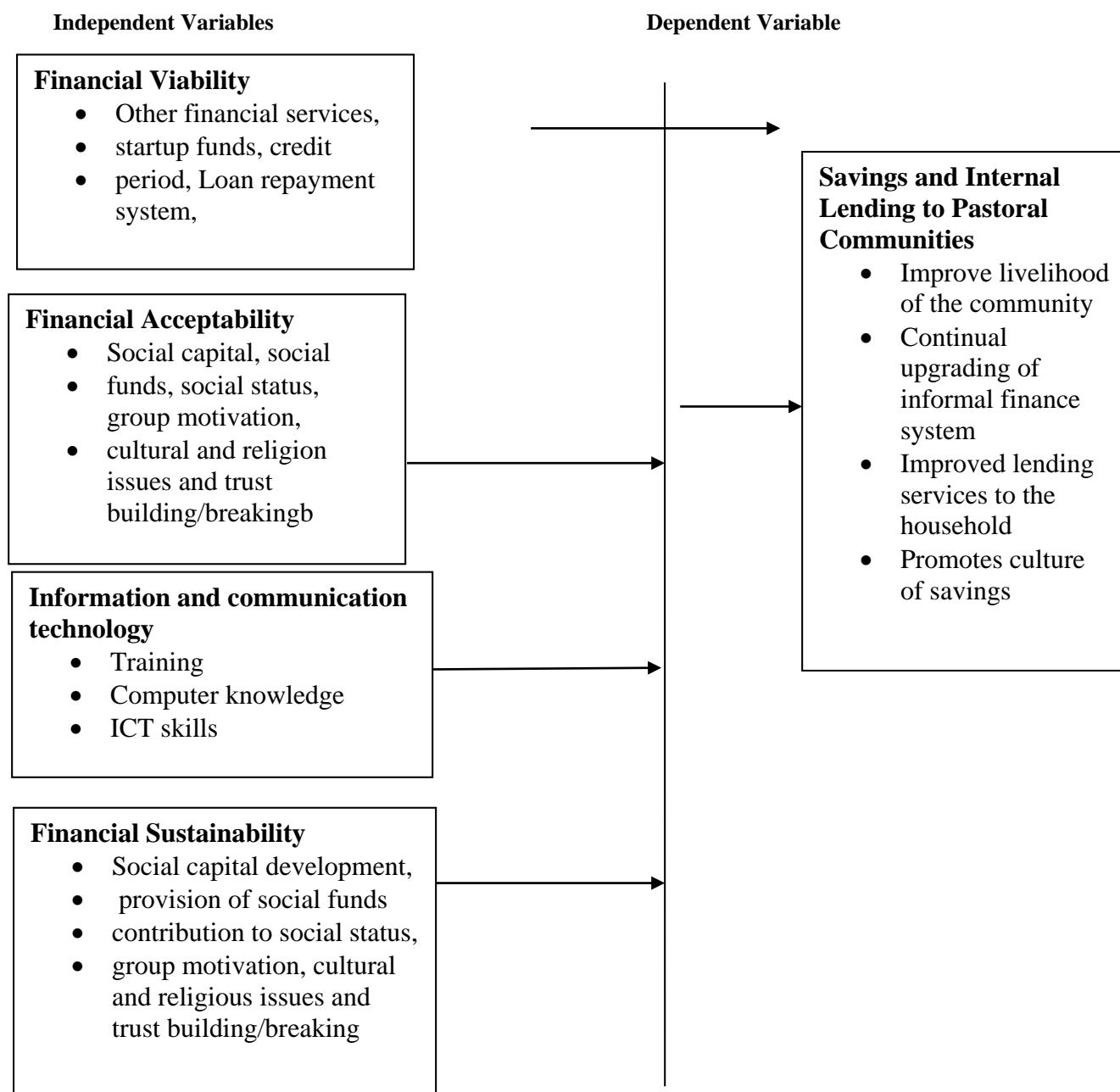


Figure 2.1 Conceptual Framework

2.1 Financial Viability

Skolas Vards (2014) defines financial viability as the ability to generate sufficient income to meet operating payments, debt commitments and, where applicable, to allow growth while maintaining service levels. Ardener and Burman (1995), define informal finance as contracts or agreements conducted without reference or recourse to the legal system to exchange cash in the present, for promises of cash in the future. SILCs are self-help organizations which mobilize their own resources mainly from members weekly savings, borrow to finance their MSEs, repay their loans and share growth using profits arising from credit to members and fines. While both informal finance and microfinance serve poor, unbanked people, informal finance derives from the grassroots, bottom-up demand of the poor for appropriate financial services, whereas microfinance derives from donor-driven, top-down supply. The common wisdom is that informal finance is a mine of lessons to inform the design of microfinance as elaborated by Ardener and Burman, 1995; Bouman 1995; Burkett. 1988; Caskey, 1994; Christen 1989; Graham 1992; Von Pischke 1992.

2.2.2 Financial acceptability

Despite the seemingly recent appeal of cultural concepts in financial research, it is gaining a large audience. The studies by Stulz and Williamson (2003) and by Grinblatt and Keloharju (2001), relating culture to investors' protection, and to stockholding, respectively, are now largely acknowledged by the financial community. Citing classical works by Greif, Lal, Landes, North, and even Max Weber – Stulz and Williamson (2003: 314, references therein)*** emphasize their general belief that culture is highly important for the effective study of financial phenomena. Ramirez and Tadesse (2007: 8) note the growing importance of references to "national culture indices", and Hofstede, in the financial and economic literatures. Some authors go even further. De Jong and Semenov (2002: 2) suggest that a specific "cultural view" should be developed, in part to compete with the law and finance approach, which has blossomed since La Porta, et al. (1997, 1998). Breuer and Quinten (2009)* suggest the establishment of "Cultural Finance" as an autonomous discipline. Simultaneously, "cultural biases" have been posited by academics of Behavioral Finance as early as 1999 (Shiller, 1999: 1), and those ideas are currently being more closely considered (Statman, 2007, 2008). Yet, in finance, neither any review, nor any consistent cultural framework, has been proposed to date.

2.2.3 Information and Communication Technology

Christensson, P. (2010, January 4) defines ICT as Information and Communication Technologies." ICT refers to technologies that provide access to information through telecommunications. It is similar to Information Technology (IT), but focuses primarily on communication technologies. This includes the Internet, wireless networks, cell phones, and other communication mediums. Which is very essential for pastoral community members in upgrading the system if saving and internal lending community. In the past few decades, information and communication technologies have provided society with a vast array of new communication capabilities. For example, people can communicate in real-time with others in different countries using technologies such as instant messaging, voice over IP (VoIP), and video-conferencing. Social networking websites like Facebook allow users from all over the world to remain in contact and communicate on a regular basis. Modern information and communication technologies have created a "global village," in which people can communicate with others across the world as if they were living next door. For this reason, ICT is often studied in the context of how modern communication technologies affect society.

2.2.4 Financial Sustainability

Financial sustainability is defined as responsible interaction with the financial to avoid depletion or degradation of natural resources and allow for long-term environmental quality. The practice of environmental sustainability helps to ensure that the needs of today's population are met without jeopardizing the ability of future generations to meet their needs. When we look at the natural environment, we see that it has a rather remarkable ability to rejuvenate itself and sustain its viability. For example, when a tree falls, it decomposes, adding nutrients to the soil. These nutrients help sustain suitable conditions so future saplings can grow. When nature is left alone, it has a tremendous ability to care for itself. However, when man enters the picture and uses many of the natural resources provided by the environment, things change. Human actions can deplete natural resources, and without the application of environmental sustainability methods, long-term viability can be compromised J.Morelli (2011)

2.2.5 Savings and Internal Lending to Pastoral Communities

Ardener and Burman (1995), define informal finance as contracts or agreements conducted without reference or recourse to the legal system to exchange cash in the present, for promises of cash in the future. SILCs are self-help organizations which mobilize their own resources mainly from members weekly savings, borrow to finance their MSEs, repay their loans and share growth using profits arising from credit to members and fines. While both informal finance and microfinance serve poor, unbanked people, informal finance derives from the grassroots, bottom-up demand of the poor for appropriate financial services, whereas microfinance derives from donor-driven, top-down supply. The common wisdom is that informal finance is a mine of lessons to inform the design of microfinance as elaborated by Ardener and Burman, 1995; Bouman 1995: Burkett. 1988; Caskey, 1994; Christen 1989; Graham 1992; Von Pischke 1992. Yoder, 1993 found out that MFIs in Kenya use diverse methods of microfinance molded from the Grameen Bank model. This model administers credit and savings. MFI's organize clients into groups for purpose of attaining economies of scale from the small scale transactions and instituting small group guarantee mechanism, credit appraisal is based on character assessment and trust of the group rather than viability of projects to be financed and collateral and the focus is on financing very small business and the poor (Khandker et al, 1995). Thus one can be denied credit if he/she does not belong to a group even if has ability to repay.

Study by Oketch (1993) on the demand and supply of MSE's finance in Kenya identified four methodologies mainly individuals credit, individual credit with technical assistance, group credit and group credit with technical assistance. The last two in my view are based on SILC concept hence major source of financing MSE's has roots in SILC spirit. According to Dondo (1994) organizations give credit in two ways, individuals or through groups. Dondo, Oketch, Yoder and Rukwaro studies are consistent on approaches used in Kenya to finance MSEs. Though the Kenyan situation is consistent. Gurgand (1994) did not identify any one single model for successful rural financial intermediation, rather a variety of operating models to improve savings mobility, provide credit and increase flexibility in service delivery were being used.

1.4 Research Methodology

Research Design

A research design is a plan and strategy of investigating a phenomenon and it seeks to obtain answers to various study questions (Kerlinger, 1973). The study adopted a sample survey design to help undertake descriptive research. Kothari (2004) defines a sample survey as a way of collecting data from a population with a view towards making statistical inferences about the population using the sample. The descriptive survey design was considered suitable for the study since it would help obtain data that describes characteristics of the study topic. Descriptive statistics discover and measure cause and effect relationships among variables (Cooper et al, 2003). It is expected that findings and conclusions made from the case study of Kapenguria, Pokot community will help generate facts and useful information on influence of SILC in Informal finance groups amongst the pastoralist communities in Kenya.

3.3 Target Population

Population is a group of knowledgeable people also known as universe (Hair et al., 2007). Cooper and Schindler (2003) define a population as the total collection of elements about which we wish to make inferences. In defining the most appropriate target population, a number of factors unique to Kapenguria division were considered. First, preliminary consultations with the political leadership of the Kapenguria Constituency revealed that it is the practice of the Pokot community to identify, plan and participate in local development projects under the pastoral community development associations (PCDAs). This approach to local development had proven to promote participation and inclusion of all the administrative locations in the Division. Second, it is the norm of the pokot people to speak to visitors (or strangers) through their institutions of local governance. Guided by these two factors and research objectives, it was deemed prudent to define the target population as the total number of PCDAs/ community-based groups/associations, councils, government agencies, faith-based and nongovernmental organizations operating in Kapenguria Division. The target population established to be 68 community-based institutions comprising of: 6 PCDAs covering 6 locations in the Division; 5 NGOs including ILIDP; 28 women groups; 18 youth groups; 1 women council; 1 elders council; 1 livestock trader's cooperative society; 1 youth association/network; 5 commercial banks and micro-finance institutions operating in West Pokot County; and 2 Government Agencies (Kapenguria CDF and Provincial Administration representative).

3.4. Sampling Frame

A sample is a set of information or data selected from a target population using predefined procedures (Field, 2005). Sampling is the process of selecting a number of individuals for a study in such a way that the individuals selected represent the large group from which they were selected (Mugenda & Mugenda, 1999). The study selected sample of 10% of (440) from the targeted population. The goal of stratified random sampling is to achieve desired representation from various subgroups in the population. This method was useful in this study because it is cheap, time-efficient, convenient, and accurate. In descriptive studies ten percent of the accessible population is enough sample size.

Sample and Sampling Techniques

Mugenda and Mugenda (1999) define a sample as a subject of a particular population. This study will use stratified random sampling techniques to select the respondents. Stratified random sampling techniques will be used to pick representative from each stratum; subjects will be selected in such a way that the existing subgroups in the population are more or less reproduced in the sample (Mugenda & Mugenda, 2003). The method produces accurate representations and there was no concern that any group was left out.

3.6 Research Instruments

Data collection was done through questionnaires. A questionnaire is a research instrument comprising a set of questions as well as prompts to gather data from respondents (Roger, 2008). Usually, questionnaires contain a series of questions to be answered in a certain format. They are advantageous to other methods of the survey because they are cheap and require little human effort in the process of administration (Krosnick, 2003). A both open-ended and closed-ended question was used during data collection. That was exploratory in nature to help respondents provide answers without forcing them to select from predetermined choices (Roger, 2008). Open-ended questionnaires were useful in collecting qualitative data. Closed-ended questionnaires, however, are limited to a set of explicit options where respondents select from (Krosnick, 2003). The explicit options were in the form of multiple choices, rankings, and classifications. Each question was not expected to provide unanticipated or unique answers, but rather, respondents were limited to a series of pre-selected options (Roger, 2008). The questionnaires were availed to the entire sample population both formally and informally. The Likert Scale of 1-3 was used in the closed-end questionnaires where the respondents were expected to choose among the following choices: , agree, unsure and disagree (Norman, 2010). It was also arranged in a logical manner such that the respondents had a clear understanding of the research from the general questions, independent variables, and dependent variable (Norman, 2010). The rating is "unipolar" in the sense that it compares one objective at a time rather than combining all the three sections.

3.7 Data Collection Procedures

Data refers to all the information a researcher gathers for study Kothari (2011). There are two types of data; primary and secondary data. According to Maryan (2012), the primary data are those collected for the first time and thus happens to be original in character. The secondary data are those documented by other scholarly writings after validating (Nandama, 2010). Secondary data would therefore refer to information from research articles, books casual interviews as well journals. Collection of primary data was done mainly using semi-structured questionnaires. The researcher was concerned with the opinion, perceptions views, feelings and attitudes. Bell (1993)

observes that such information is best collected through the use of interviews and questionnaires. A questionnaire was preferred because it was economical to administer and suited all levels of literacy in the sampled population. The secondary data was obtained from published sources (articles in journals), accessible government and micro-finance registries (sources), seminar and workshop power-point presentations accessible online, and programme records on situational analysis

3.8 Pilot Study

A pilot study (also referred to as pilot experiment or pilot project) is a small scale reconnaissance carried out to evaluate the feasibility, cost, time, and statistical variability of a sample size (Holborn, 2000). It aims at improving the research design package before the performance of the full-scale research. Also, it avoids money and time wastage on an insufficiently designed project (Teijlingen, 2001). The fact that the study was carried out on a section of the sample size improves its relevance as well as reliability. Determination of population samples for the pilot study is determined by resource availability in terms of finances. "A rule of thumb" proposes a maximum population of 10 % of the sample size (Teijlingen, 2001). Hence, 10% (9 respondents) of the sample size will be used for the pilot test.

3.8.1. Validity of the Research Instruments

The validity of an instrument is the degree in which an instrument performs its intended function. It is important in determining the efficiency of a system because it is nearly impossible to achieve an efficiency of 100%. The validity of the questionnaire will be determined using construct validity. Construct validity is a measure of the degree to which data obtained from an instrument meaningfully and accurately reflects or represents a theoretical concept (Mugenda & Mugenda, 2003).

3.8.2. Reliability of the Research Instruments

Reliability is defined as consistency of an instrument in its functions. It provides the degree of accuracy of an instrument. Cronbach's alpha (α) can be considered to be the anticipated correlation between a set of variables (Holborn, 2000) In order to improve the reliability of the tools, both the questionnaires and interview guides were standardized so that information collected could be sorted, entered and analyzed in a more consistent and accurate manner. The standardization also enhanced consistency in the questions being asked thereby eliminating bias and making information gathered more reliable. A formal reliability coefficient, Cronbach's Alpha Reliability Index was computed and reported for the scaled variables based upon the formula below:

$$= \frac{RK}{[1 + (K - 1)R]}$$

Where " k^M " is the number of items considered and "r" is the mean of the inter-item correlations: the size of alpha was determined by both the number of items in the scale and the mean inter-item correlations. Gkofge and Mallery (2003) provide the following rules of thumb:

> .9 - Excellent, _ > .8 - Good, _ > .7 - Acceptable, _ > .6 - Questionable, _ > .5 - Poor and < .5 - Unacceptable" (p. 231). For this study, a score of 0.7 and above was considered having acceptable reliability in measuring the domain under investigation. Training of the research assistants (RAs) helped to enhance objectivity and overall quality of the data collection process.

3.9. Data Analysis and Presentation

Sorting, coding and entry of field data will be done by a data analyst under quality supervision and technical guidance of the researcher. The Statistical Package for Social Science (SPSS) version 24 will be used to analysis data. The latest version incorporates the deployment and survey authority of numerical data using automated and batch scoring services (Field, 2005). The SPSS software is suitable for data analysis involving multiple regressions, Pearson correlations, and the Analysis of Variance (ANOVA). The resultant data presentation will be tabulated and presented using tables, bar graphs and pie charts.

Multiple regressions formula will be applied in this study to determine the relationship between the independent variables and one dependent variable. The formula for multiple regressions is expressed as follows: $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$, Where; Y = Influence of SILC in informal finance groups in pastoral communities,

β_0 =constant (coefficient of intercept),
 X_1 = Financial Viability

X_2 = Financial responsibility

X_3 = Information and Communication Technology;

X_4 = Financial sustainability;

ϵ =error term;

β_4 =regression coefficient of four variables.

An Analysis of Variance will be used to measure statistically the significance in predicting how dependent variables influence SILC for satisfaction. The test of significance is correlation coefficient, the R square as a measure of significance.

The coefficient is a standard measure of an assumed linear relationship between variables. A coefficient of value between (+ve) 0.5 and (-ve) 0.5 or higher indicates a strong relationship and by extension a significant variable in influencing the trend of the dependent variable.

1.4 Correlations of all Variables

Table 4. 1Model Correlations of all Variables

		<u>Financial viability</u>			<u>Responsibilty</u>	<u>ICT sustainability</u>	<u>Influence of SILC</u>
<u>Financial viability</u>	Pearson Correlation ¹						*
responsibility _z	Sig. (2-tailed)						
	N	98					
ICT		.112	1				
	Pearson Correlation						
	Sig. (2-tailed)	.266	.002				
	N	98	98	98			
Sustainability _z		.453	-.230	-.1451			
	Pearson Correlation						
	Sig. (2-tailed)	.231	.149	.367			
	N	98	98	98	98		
Influence of SILC		.382**	-.073	.226 -.135	1		
	Pearson Correlation						
	Sig. (2-tailed)	.000	.650	.156 .399			
	N	98	98	98	98		

**. Correlation is significant at the 0.01 level (2-tailed).

xx Correlation is significant at the 0.05 level (2-tailed).

From the findings, a positive correlation is seen between each variable and performance. The strongest correlation was established between financial sustainability and Influence of SILC ($r = 0.453$) and the weaker relationship found between Financial viability and Influence of SILC ($r = -0.112$). financial responsibility was found to be strongly and positively correlating with influence of SILC in informal groups correlation coefficient of 0.278 and 0.231 respectively. This is tandem with the findings of Camargo (2011), who observed that all the independent variables were found to have a statistically significant association with the dependent variable at over 0.05 level of confidence.

4.1 Regression Analysis

To establish the degree of influence of saving a and internal lending on pastoralists communities, 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. The regression model was as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon$$

saving a and internal lending on pastoralists communities = $\alpha + \beta_1$ (financial viability) + β_2 (financial responsibility) + β_3 (information and communication technology) + β_4 financial sustainability + 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.

4.1.1 Model Goodness of Fit

Regression analysis was used to establish the strengths of relationship between influence of SILC in informal finance groups in pastoral communities (dependent variable) and the predicting variables; financial viability, financial responsibility, information and communication technology and financial sustainability (independent variables). The results showed a correlation value (R) of 0.858 which depicts that there is a good linear dependence between the independent and dependent variables.

Table 4.2 Model Goodness of Fit

R	R ²	Adjusted R ²	Std. Error of the Estimate
0.871	0.781	0.796	0.056

a. Predictors: (Constants), financial viability, Financial responsibility, ICT, sustainability

b. Dependent Variable: influence of SILC in informal finance groups in pastoral communities

With an adjusted R-squared of 0.781, the model shows communication system, availability of net wort, training, 78.1% of the variations influence of SILC in informal finance groups in pastoral communities West Pokot County while 21.9% is explained by other indicators which are not inclusive in study or model. A measure of goodness of fit synopses the discrepancy between observed values and the values anticipated under the model in question (Capelli, 2010).

4.3 Analysis of Variance (ANOVA)

From the results in table 4.18 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 0.05 implies influence of SILC in informal finance groups in pastoral communities with financial viability, social cultural responsibility, information and communication technology, and environmental sustainability which is significant at 5 % level of significance. This is in line with the findings of Barney (2011), 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 Berkowitz (2012) who observed that analysis of variance statistics examines the differences between group means and their associated procedures.

Table 4.3 ANOVA

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	4.147	1	1.049	.514	.004
Residual	6.433	95	.495		
Total	10.580	96			

4.4 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 4.18 above reveal a positive relationship between inventory management practices on service delivery and all the independent variables. Taking the regression model:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon; \text{ where,}$$

Y= motivation of employees for job satisfaction;

α = Constant; $\beta_1 - \beta_4$ = Beta coefficients; X_1 = financial viability X_2 = financial responsibility; X_3 = information and communication technology; X_4 = financial sustainability 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 influence on the dependent variable.

Table 4.4 Regression Coefficient Results

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	-.183	.060		-1.143	.023
Financial viability	.723	.112	.838	5.471	.000
Financial responsibility	.149	.068	.162	2.471	.041
ICT	.344	.059	.587	4.386	.000
financial sustainability	.247	.115	.321	2.654	.017

Dependent Variable: influence of SILC in informal finance groups in pastoral communities

Constant: Reward, improve livelihood of the community, Continual upgrading of informal finance system, Improved lending services to the household, Promotes culture of savings

A unit change in inventory techniques would thus lead to a .723 influence of SILC in informal finance groups in pastoral communities ; while a unit change in training of would have an effect of .149 change in on inventory influences of SILC in informal finance groups in pastoral communities, also a unit change in ICT would have an influence of .344 change in on influence of SILC in informal finance groups in pastoral communities and finally a unit change in financial sustainability would have an effect of .247 change on influence of SILC in informal finance groups in pastoral communities. This implies that among other factors, inventory

techniques, training, lead time and information technology are significant determinants of influence of SILC in informal finance groups in pastoral communities.

4.5 Summary

In summary, key findings under this area of study included the following: Although most respondents disagreed on the illusion that West Pokot had enough financial institutions, they concurred with the fact that West Pokot was profitable for financial institutions; Loan repayment system, consumer protection policy, impact on the poor and support to community owned financial providers had influenced on saving and internal lending communities in informal groups on pastoral communities. The influence of credit period designed by financial institutions on the selection of financial services could not be justified since majority of respondents were unsure (scored it at 2).

The third objective was to establish how financial acceptability influences on saving and internal lending communities in informal groups on pastoral communities in West Pokot County. Majority of the respondents agreed that the following financial concerns influenced selection of financial services in the Division: Ability to build mutually supportive finance; provision of social funds for community health care, cultural rites of passage, education and training; contribution to social status like improving livestock keeping and building/breaking of trust amongst members.

The findings revealed that 97 % of the respondents agreed information and communication technology has a benefit on ensuring saving and lending is achieved. About the issue that the availability of network improves on saving and lending, the findings revealed that 100% of the respondents agreed with the statement. Majority of the respondents on the open-end question show that information and communication technology influences on saving and lending in that according to respondents they said ICT is important since it eases communication and all people can be reached hence having the information. According to the findings, the ability to provide a number of opportunities to improve financial sustainability of individual businesses had greatly influenced the choice of financial services in West Pokot. In addition, impact of a given financial service on the association level such as peer pressure, environmental education and training, symbolic and ethical environmental links as well as community coordinated implementation of the conservation and rural finance components had strong influence on its selection.

Influence of SILC in Informal Finance Groups in Pastoral Communities: The findings revealed that 100% of the all respondents agreed that saving and internal lending in pastoral communities in West Pokot if properly put in place it can; livelihood of the community, there should be continual upgrading of informal finance system, improved lending services to the household and the finance groups should promote the culture of savings. Majority of the respondents on the open-end question indicated that SILC in informal finance groups in pastoral communities was really influences how the community carries it activities.

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Organisational Resources as a Determinant of Project Implementation in Grass-root Support Non-Governmental Organisations in Kenya

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Abstract- The purpose of this research was to investigate if organizational resources are a determinant of project implementation. The Cross Sectional Survey research design was used for the research and the population consisted of all the employees of registered Grass-root Support Non-Governmental Organizations (GSNGOs). The GSNGOs were drawn from five sectors, namely: Education, Nutrition, Health, Agriculture and Micro-Finance.

Tool triangulation was used to enhance the quality of data collected and the questionnaire was the main data collection tool. An interview guide and an observation form were the other two tools used. Inferential and descriptive statistics were used to carry out data analysis. The descriptive analysis was presented through standard deviation, mean and percentages, whereas inferential analysis was presented through regression analysis and ANOVA. The study conclusion drawn was that organizational resources have a strong significant effect on project implementation. It is therefore recommended that organisations should protect their resources so that they are able to use them to their advantage.

Index Terms- Organisational Resources, Resource dependent, pooling resources, human resource, financial resources, innovative.

I. INTRODUCTION

GSNGOs in Kenya have been involved in insightful training programmes and workshops but are accused of not keenly implementing strategies and pooling resources in cases of proximity and common activities in a given area. This often results in duplication of projects and wastage of resources. In his study "An analysis of organizational learning process in donor agencies in Nairobi," Amulyoto (2004) observes that this has led to wastage of resources in organizations especially for long term plans. The need to recognize shortage of resources and to develop both the existing and expected new resources is critical in compelling leaders and managers to motivate and guide the organization towards effective strategic plan implementation. The study highlights two fundamental assets in GSNGOs; human resources and finances. None of the two variables is more vital than the other. However, the human resources and economic resources are continually ranked greater than the others. If employees are presented with high job security through motivation, empowerment, cutting-edge and reliable working structures and a free work environment to be innovative, they tend to protect enterprise assets and as a result work toward reaching long term goals as located in the strategic plans (Roberts, 2013).

The business enterprise with ample resources has the highest likelihood of attaining a greater retention of workers if all different variables are not a hindrance. It becomes very clear that for superb implementation of project strategic plans to take place, personnel require to be at their precise work stations for a sufficient period of time for implementation to take place. Job security, motivation and empowerment effectively work toward retaining personnel over a time which is sufficient for implementation of strategic plans to take place. Good training and enough resources in the organization are more likely to enable the achievement of a higher retention rate of staff.

II. METHOD

The study used the Cross Sectional Survey research design which collects data to make inferences about a population of interest at one point in time. It is described as snapshot of the populations about which they gather data and they may be repeated periodically. They can be conducted using any mode of data collection.

The target population of this study consisted of 500 employees of Grass-root Support NGOs based in Embu County. The sample was obtained from the Target Population using stratified sampling. The target population was stratified into five strata according to the type of projects they do, namely Education, Health, Microfinance, Agriculture and Nutrition. Simple random method was then used to obtain a 10 % sample of each stratum. A sample size of 50 GSNGO employees was therefore selected.

The sample size derived from stratification is denoted by $n = n_1 + n_2 + n_3 + n_4 + n_5$, where; n = sample size

n_1 = Education GSNGOs

n_2 = Nutrition GSNGOs

n_3 = Health GSNGOs

n_4 = Agriculture GSNGOs

n_5 = Micro-financeGS NGOs

Triangulation was used to obtain better quality of data. The data collection tools used were: a questionnaire (which was the main tool), an interview guide and an observation form. Data was analyzed using descriptive statistics and ANOVA.

Data Management and Statistical Analysis

Quantitative data collected were analyzed by descriptive statistics and presented through tables and in prose. This was attained through frequency distributions, means, percentages, and standard deviations, simple and cross tabulations. Qualitative data was coded into the different factors and sectors, and analysed through Content Analysis. The analysis utilized SPSS version 23 software to facilitate all computations and output for interpretation by the researcher. Descriptive analyses of the study was done and expressed through frequency tables, percentages, charts means and standard deviations. The researcher used a Likert scale ranging from 1 to 5 for analyzing items that were in nominal scale. Inferential statistics was used to test variable relationships in which regression analysis showed how the variables are related while correlation analysis indicated the degree of the effect of the independent variable on the dependent variable. For these tests, ANOVA, t-test and F-test were used. The Ordinary least squares regression analysis was done and interpreted to determine the influence that the independent variables had on the dependent variable; implementation of projects.

Statistical Model

The regression model used is presented in the equation below.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + e$$

Where:

Y is the dependent variable

β_0 is the constant term

β [1,...5] is the regression coefficient of the independent variable

X [1,...5] is the independent variable

e is the error term.

The study appreciates that there are other factors that may be affecting the implementation of projects in NGOS apart from the variables being investigated. These factors are represented by β_0 . The error term (e) represents "noise" or interference which denotes that there may be a non-linear relationship between the independent and dependent variable.

III. RESULTS

The research established that there was a strong effect ($R=.553$) of the predictor variable (organizational resources) on the dependent variable (Project Implementation). The adjusted R-Square value is .240. This means that the predictor factor (organizational resources) accounts for or explains 24% of the total variance in project implementation. The remaining 76% are explained by other variables which were not considered in this study.

Table 1: Model Summary for organizational resources and project implementation

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.553 ^a	.306	.240	.616

a. Predictors (Constant): Organisational Resources

b. Dependent Variable: Project Implementation in Grass root Support NGOs in Kenya

The results of Analysis of variance (ANOVA) for regression coefficients revealed that the significance of F statistics is 0.003 which is less than 0.05. This implies that there is a significant relationship between organizational resources and project implementation.

Table 2: ANOVA for organizational resources and project implementation

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.024	4	1.756	4.623	.003 ^a
	Residual	15.955	42	.380		
	Total	22.979	46			

From the findings of Coefficients in Table 3 below, $t=1.826$ imply that organization resources are adequate for project implementation by grass-root support non-governmental organizations in a significant way in Kenya. However, significance level being .075 which is more than 0.05 shows that the study was statistically insignificant. The findings on the extent that the human resources are accountable in the utilization of financial and material resources yielded $t=2.443$ implying that the factor influences project implementation significantly. Consequently, $p=.019$ shows that the effect is statistically significant.

The quality of human resources available for implementation of projects resulted in $t=.337$. This was, however, made statistically insignificant by $p=.738$.

Finally, the findings on the quality of material resources available for implementation of projects resulted in $t=1.444$ and was as well rendered insignificant with a p value of .156.

Table 3: Coefficients for Organisational resources

Model		Unstandardized Coefficients		Standardized Coefficients		t	Sig.
		B	Std. Error	Beta			
1	(Constant)	.561	.398			1.411	.166
	To what extent do you feel that your organisation's resources are adequate to implement projects within the planned time, quality and budget	.158	.087	.238	1.826	.075	
	To what extent do you think the human resources are accountable in the utilization of financial and material resources	.336	.137	.395	2.443	.019	
	What is your opinion on the quality of human resources available for implementation of projects	-.069	.203	-.064	-.337	.738	
	What is your opinion on the quality of material resources available for implementation of projects	.245	.169	.245	1.444	.156	

The findings of this study relates with research done by Koontz (2001) who concluded in his study on analysis of factors influencing projects in Kenya that the quality of project management, operating environment, worker motivation, communication, inadequate resources and organization of the project team as factors affect project implementation.

All other predictor variables were insignificant with $p>0.05$ except human resources' accountability in the utilization of financial and material resources during project implementation. Therefore, reject all alternative hypotheses except the significant alternative hypothesis in this predictor variable (human resources' accountability in the utilization of financial and material resources).

The regression equation from this output was:

$$Y=.561X_1+.158X_2+.336X_3-.069X_4-.245X_5$$

IV. SUMMARY

The research established that there was a strong effect of the predictor variable (organizational resources) on the dependent variable (Project Implementation). The study also found out that most of the grassroots support NGO's resources were adequate to implement projects within the planned time, quality and budget. The adjusted R-Square value showed that the predictor factor (organizational structure) accounts for or explains some of the total variance in project implementation. The results of Analysis of variance (ANOVA) for regression coefficients also showed that the significance of F statistics implies that there is a significant effect of organizational resources on project implementation. The findings of this study relate with Korten (1990) resource dependency theory argument that an organization is dependent on the environment for its resources and that those resources literally control the organization's planning.

V. CONCLUSION

The study concludes that organizational resources such as human, financial and capital among others are key to the growth of an organization and implementation of projects. Therefore, resources must be nurtured and protected. The organization depends on its resources to ensure successful achievement of it objectives, which is project implementation.

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Design Evolution from Small-Signal Amplifier to Small-Signal Tuned Amplifier including Analysis of their Bandwidth

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Abstract- Amplifiers are classified as untuned (wide band) amplifiers and tuned (narrow band) amplifiers based upon their bandwidth. Untuned amplifiers will provide the constant gain over a limited band of frequencies i.e., from lower to upper cut-off frequency. Tuned amplifiers will amplify signals of only fixed frequency of which is equal to the resonant frequency of the tuned circuit LC. In this paper, firstly, a basic small-signal (untuned) amplifier is designed as a swamped amplifier which is commonly used in electronic devices to use as a preamplifier. And then, its bandwidth (BW) is calculated estimably by subtracting lower cut-off frequency from upper cut-off frequency. After that, this amplifier design is converted into small-signal single tuned amplifier with center frequency 1M Hz and bandwidth of 20 kHz, to use as a radio frequency amplifier for a standard broadcast receiver by replacing a parallel tuned LC network in the collector circuit. In this paper, bandwidth of these two amplifiers is analyzed by Bode Plotter which shows the voltage gain (dB) versus frequency using Multisim 12.0. Finally, the difference of bandwidth between them is illustrated by simulation graph. It is observed that each design of amplifier amplifies signals within its rated ranges of frequencies (bandwidth).

Index Terms- swamped amplifier, single tuned amplifier, bandwidth, cut-off frequency, resonant frequency.

I. INTRODUCTION

Small signal voltage amplifiers are popular to amplify the small signal ac and they are configured mostly as common emitter BJT amplifiers. A swamped amplifier is also a common emitter amplifier in which some of the emitter resistor is unbypassed to get negative feedback for the stability of voltage gain [1]. This amplifier amplifies a wide band of frequencies equally well and does not permit the selection of a particular desired frequency and so it is called untuned amplifier. But sometimes, it is needed to design an amplifier that should select a desired frequency or narrow band of frequency for amplification and it is called tuned amplifier. Mostly, a tuned amplifier is designed to amplify the specified center frequency and is also called resonant frequency of this tuned circuit [3].

However, all amplifiers will amplify nicely any signal in their bandwidth. Bandwidth is the range of frequencies at which the voltage gain of the amplifier falls to 70.7% of the maximum gain. A frequency at which the voltage gain is 70.7% of its midrange value, expressed in dB as $A_{v(dB)} = 20 \log (0.707) = -3$ dB, is called cutoff frequency [1].

To convert the untuned amplifier into tuned amplifier, it is merely needed that the simple resistive load in the collector is replaced by a parallel tuned LC circuit whose impedance strongly depends upon the frequency. This paper is organized as follows. Section I is introduction about the tuned and untuned amplifiers. Design elaboration of swamped amplifier and single tuned amplifier including calculation of bandwidth are illustrated in section II. In section III, simulation results are expressed and conclusion for this work is presented in section IV.

II. DESIGN PROCEDURE AND CALCULATIONS

In this work, a swamped amplifier is designed according to the design protocol [2]. Firstly, design requirements are specified as the following:

Device is 2N3904 (npn);

$h_{fe} = 100$ (worst-case);

$|A_v| = 20$;

$R_L = 5k\Omega$;

$V_{CC} = 12$ V;

Lower cutoff frequency, $f_1 = 50$ Hz.

In design calculation, the value of resistors and capacitors are used for standard values and checking of voltage gain is also made. The circuit diagram of a swamped amplifier is shown in figure 1.

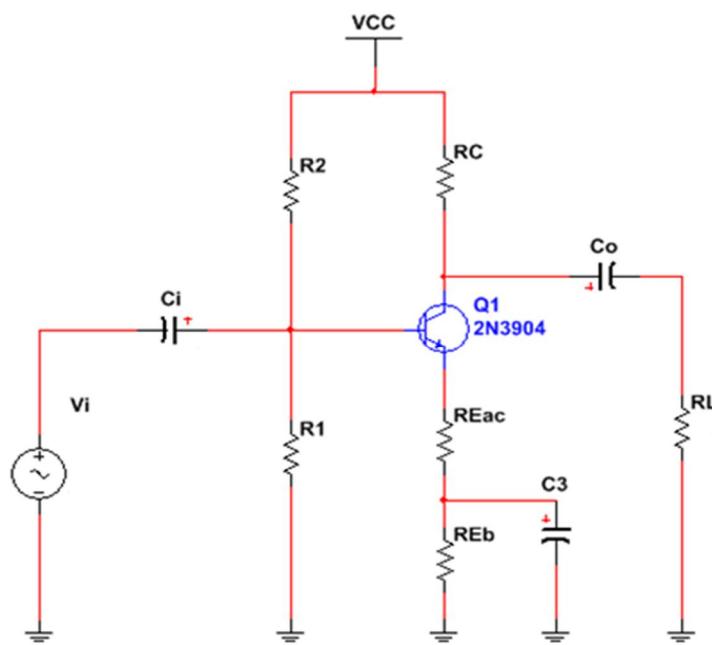


Figure 1: Schematic diagram of a swamped amplifier

A. Design Calculations for Swamped Amplifier

Let $R_C = R_L = 5.1\text{k}\Omega$ for maximum power transfer, [$R = R_C//R_L = 2.5\text{k}\Omega$]

$$I_{CQ} = \frac{V_{CC}(1+h_{fe})|A_v| + 0.06h_{fe}|A_v|}{2h_{fe}R + (R_C + R)(1+h_{fe})|A_v|} = \frac{24360}{15852000} = 1.5 \text{ mA} \quad (1)$$

From data sheet, at $I_{CQ} = 1.5 \text{ mA}$, $h_{ie} = 2.5\text{k}\Omega$, $h_{fe} = 130$.

$$R_{Eac} = \frac{h_{fe}R|I_{CQ}| - 0.03h_{fe}|A_v|}{(1+h_{fe})|A_v||I_{CQ}|} = 104.19 \approx 100\Omega \quad (2)$$

$$R_E = \frac{V_{CC} - R_C I_{CQ} - V_{CEQ}}{(1+1/h_{fe})I_{CQ}} = 233\Omega \quad (V_{CEQ} = 4.35 \approx 4V \text{ at } I_{CQ} = 1.5\text{mA}) \quad (3)$$

$$R_{Eb} = R_E - R_{Eac} = 233 - 100 = 133\Omega \approx 130\Omega$$

For simplicity, using the 10% stability rule, $R_B = 10\%$ ($h_{fe}R_E = 0.1$) ($h_{fe}R_E = 2.3 \text{ k}\Omega$) (4)

$$V_{BB} = R_E \left(1 + \frac{1}{h_{fe}}\right) I_{CQ} + V_{BEQ} + \frac{R_B I_{CQ}}{h_{fe}} = 1.08\text{V} \quad (5)$$

$$R_1 = \frac{R_B}{1 - \frac{V_{BB}}{V_{CC}}} = 2.5\text{k}\Omega \quad (6)$$

$$R_2 = \frac{R_B V_{CC}}{V_{BB}} = 26.28\text{k} \approx 27\text{k}\Omega \quad (7)$$

$$A_v = \frac{-R I_{CQ}}{0.03 + (1+1/h_{fe}) R_{Eac} I_{CQ}} = -20.66 \quad (\text{ok}) \quad (\text{checking } A_v) \quad (8)$$

$$R_i = R_1 \parallel R_2 \parallel (h_{ie} + (1 + h_{fe}) R_{Eac}) = 1.91\text{k}\Omega \quad (9)$$

$$R_0 = R_C = 5.1 \text{ k}\Omega \quad (10)$$

$$C_i = \frac{0.247}{R_i f_1} = \frac{0.247}{1.91k \times 50} = 2.5\mu \approx 2.2\mu\text{F} \quad (11)$$

$$C_o = \frac{0.247}{f_1(R_0 + R_i)} = \frac{0.247}{50 \times 10.1k} = 0.48\mu \approx 0.47\mu\text{F} \quad (12)$$

C_i and C_o are used for blocking dc and the values of these capacitance are used to set the -3dB low cutoff point at 50Hz.

For C_B , taking $10X_{CB} \leq R_E$, $C_B = 100\mu\text{F}$.

The design is complete.

B. Bandwidth Calculation

In this amplifier, $f_l \approx 50\text{Hz}$ and f_u can be calculated estimably by gain-bandwidth-product theorem using the value of f_T , transition frequency[2]. From data sheet, at high frequency, output capacitance (C_{bc}) = 4pF; input capacitance (C_{be}) = 8pF; $f_T = 300\text{ MHz}$ at $I_C = 10\text{mA}$ for 2N3904.

$$g_m = \frac{h_{fe}}{h_{ie}} = 0.052 \quad (13)$$

$$\text{Midband gain, } A_v = \frac{-h_{fe}}{h_{ie}} \times R = -130 \quad (14)$$

$$\text{Gain-reduction factor, GRF} = 1 + \left(\frac{R_E}{h_{ie}} \right) (1 + h_{fe}) = 13.2 \quad (15)$$

$$C = \frac{g_m}{2\pi f_T} = 177\text{pF} \quad (C = C_{bc} + C_{be} + C_d) \quad (16)$$

$$\text{At } I_C = 1.5\text{ mA}, C_d = 0.82 \quad C_{dmax} = 0.82 \quad (C - C_{bc} - C_{be}) = 135\text{pF} \quad (C_d \text{ is diffusion capacitance}) \quad (17)$$

$$C = 135\text{pF} + 12 = 147\text{ pF} \quad (18)$$

$$f_T = \frac{0.82(\frac{10m}{30m})}{2\pi(147P)} = 296\text{MHz} \quad (19)$$

$$\text{The first high frequency corner, } f_u \text{ is, } f_u = \frac{\text{GRF} \times f_T}{|A_v|} = \frac{13.2 \times 296M}{130} \approx 30\text{MHz} \quad (20)$$

$$\text{BW} = f_u - f_l = 30\text{MHz} - 50\text{Hz} \approx 29\text{ MHz} \text{ which is nearly } f_u. \quad (21)$$

C. Design converting from swamped amplifier to single tuned amplifier

In this work, an RF amplifier having 20 kHz bandwidth at 1.0MHz center frequency is chosen to design as single tuned amplifier using the above amplifier.

Choosing $L=10\text{ }\mu\text{H}$, the required design calculations are as follows:

Resonant frequency, $f_r = 1\text{ MHz}$;

$$f_r = \frac{1}{2\pi\sqrt{LC}} \text{ and so } C = 2.5\text{nF} \quad (22)$$

For bandwidth, BW= 20 kHz;

$$\text{Upper cutoff frequency, } f_u = f_r + 10\text{ kHz} = 1.01\text{ MHz} \quad (23)$$

$$\text{Lower cutoff frequency, } f_l = f_r - 10\text{kHz} = 0.99\text{ MHz} \quad (24)$$

III. SIMULATION RESULTS

Each designed amplifier is simulated using Multisim 12.0. Figure 2 shows the complete design of swamped amplifier with input signal 50mVpk at frequency 1kHz and figure 3 shows the graph of voltage gain versus frequency for this amplifier.

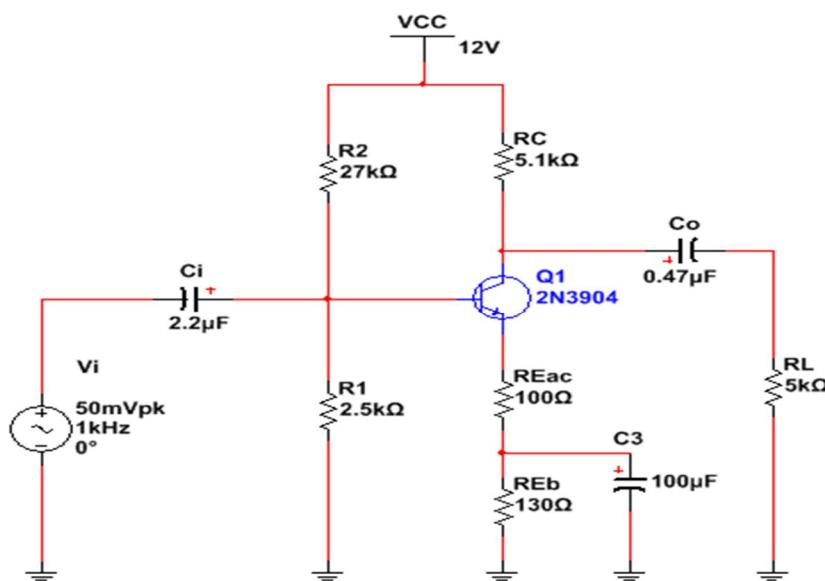


Figure: 2 Complete design of swamped amplifier

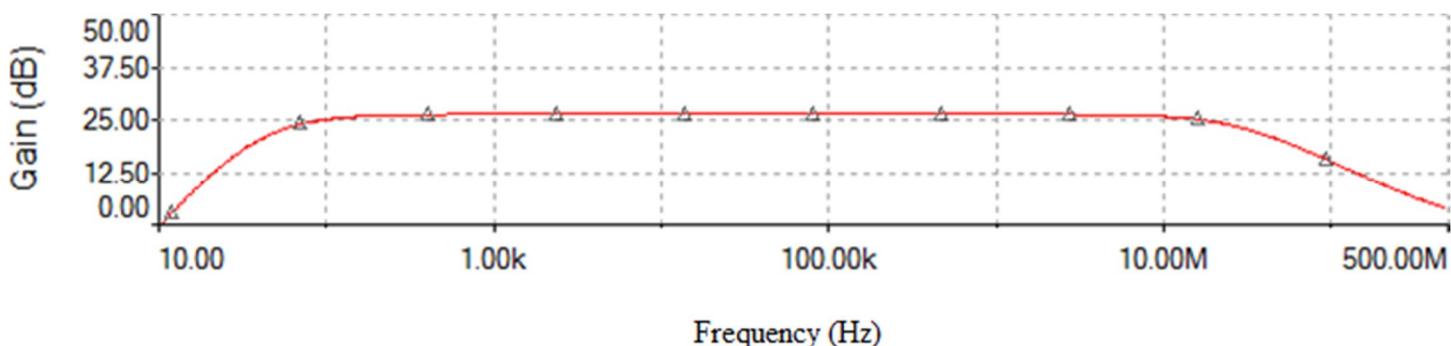


Figure: 3 Graph of voltage gain versus frequency of swamped amplifier

Also, a complete design of single tuned amplifier with input signal 50mVpk at frequency 1MHz is shown in figure 4 and the graph of voltage gain versus frequency for this amplifier is shown in figure 5.

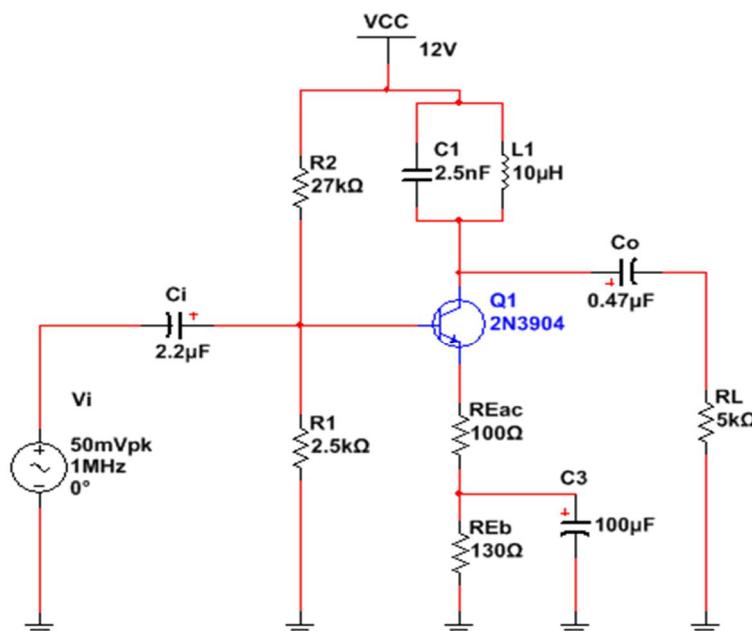


Figure 4: Complete design of single tuned amplifier

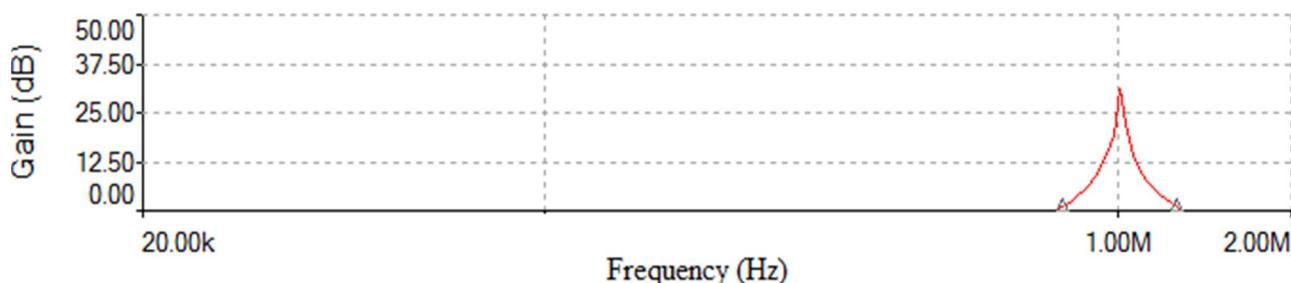


Figure 5: Graph of voltage gain versus frequency of single tuned amplifier

The comparison of bandwidth between these two amplifiers is shown in figure 6.

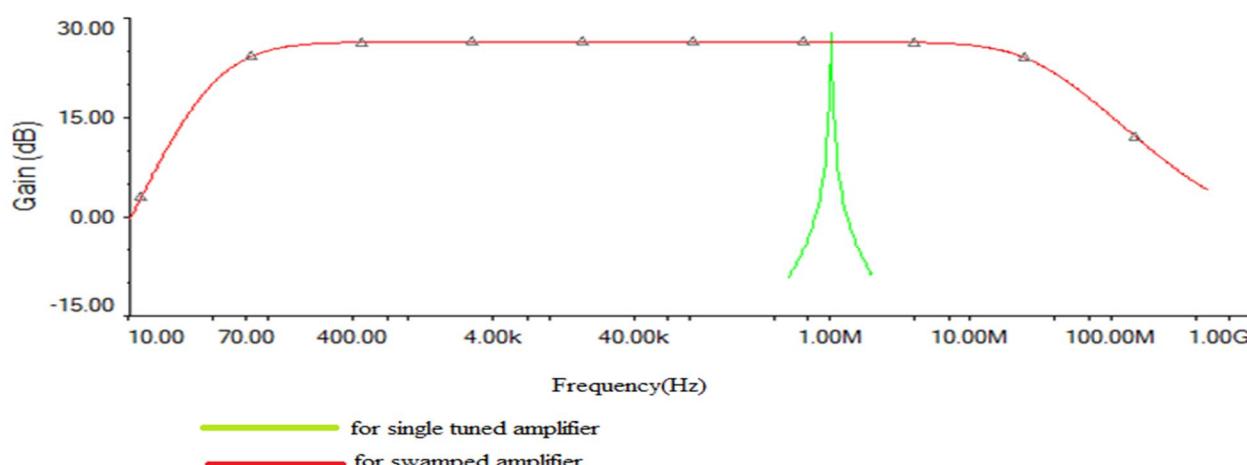


Figure 6: Comparison of bandwidth between these two amplifiers

Now, analysis of the value of bandwidth for these two amplifiers is started. As the voltage gain (dB) of swamped amplifier is 26.42dB, the value of voltage gain (dB) of this amplifier which falls to 70.7% of the maximum gain is nearly 23dB. Figure 7 shows the Bode plotters which indicate the value of lower and upper cut-off frequencies for the swamped amplifier.



Figure 7: Bode plotters indicating the value of lower and upper cut-off frequencies for the swamped amplifier

Similarity, for the single tuned amplifier, according to Bode result, midrange gain is approximately 30.921dB at center frequency at 1.003MHz. Figure 8 shows the Bode plotters which indicate the value of lower and upper cut-off frequencies for the single tuned amplifier.

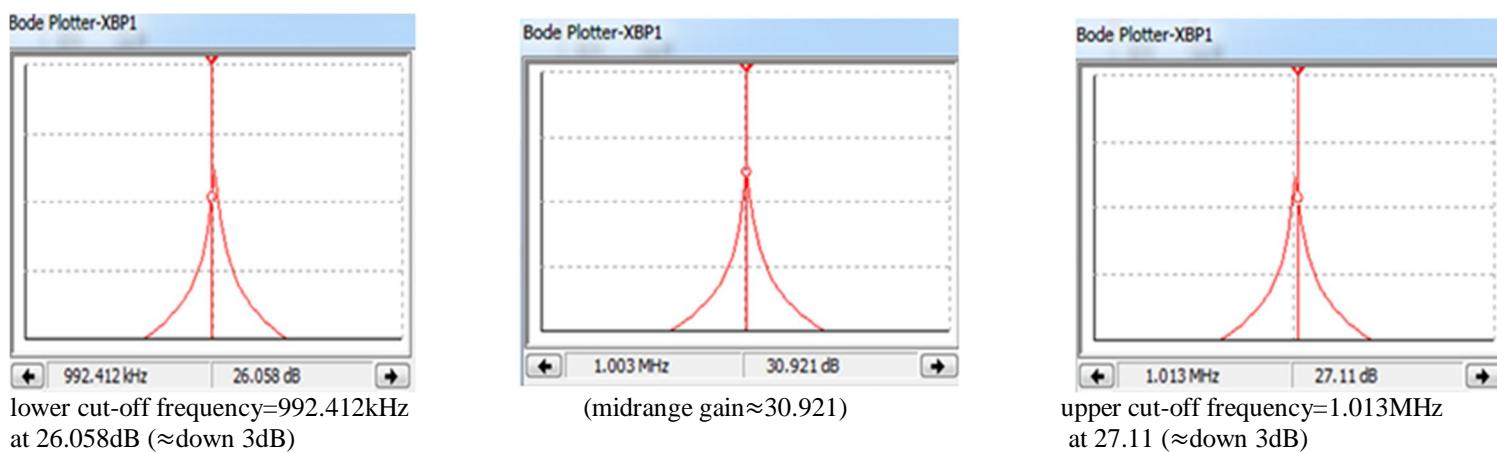


Figure 8: Bode plotters indicating the value of lower and upper cut-off frequencies for the single tuned amplifier

According to the above figure 7 and 8, table 1 is made to study the comparison of calculated (expected) values and simulated values for swamped amplifier and single tuned amplifier approximately.

Table 1: Comparison of calculated (expected) values and simulated values for swamped amplifier and single tuned amplifier

	Swamped amplifier			Single tuned amplifier	
	Calculated value (expected)	Simulated value		Calculated value (expected)	Simulated value
Upper cutoff frequency, f_u	30MHz	30.642MHz		1.01MHz	1.013MHz
Lower cutoff frequency, f_l	50Hz	57.735Hz		0.99MHz	992.412kHz
Bandwidth	29.999MHz	30.641MHz		20kHz	20.588kHz

IV. CONCLUSION

From the simulation results, the proposed design of swamped amplifier amplifies the input signals by the specified voltage gain in the wide ranges of frequencies. Its bandwidth is about 30MHz which is nearly equal to the upper cutoff frequency. Also, the single tuned amplifier amplifies only the signals at the specified center frequency, called resonant frequency 1MHz while discriminating all others. Moreover, according to the table 1, it can be observed that there is a little difference between calculated (expected) values and simulated values and so design evolution flow in this work is successful and convenient. But, for practical work, there is needed to concentrate about other facts such as temperature, power consume, the size of inductor, load and so on.

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Effectiveness of nesting technique on motor performance among low birth weight babies

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Abstract- Low birth weight babies have less motor skills compared with normal birth weight babies. Nesting technique is a nursing skill maintained babies in a comfortable position, facilities the monitoring of vital signs and enabled to have spontaneous motor performance to have normal neuromuscular and skeletal joint function. **Aim:** to assess the effectiveness of nesting technique on motor performance among low birth weight babies. **Method:** A quantitative approach with quasi experimental, pre-test- post-test non-equivalent control group design was used among 40 low birth weight babies (20 in experimental and 20 in control group). Non Probability consecutive sampling technique was used for selecting the samples. The data was collected by structured observational checklist to assess the motor performance of low birth weight babies. Following the pre-test, intervention was given to low birth weight babies in the experimental group, i.e., "nesting technique" for 8 hours continued for 4 days. The posttest was conducted at the end of 4th day for both the groups. **Results:** It was observed that in experimental group majority of subjects 15 (75%) had moderate motor performance before nesting technique whereas after nesting technique majority of subjects 15 (75%) had adequate motor performance. In control group majority of subjects 14 (70%) had moderate motor performance during pre-test whereas in post -test majority of subjects 16 (80%) had moderate motor performance. The analysis of unpaired t-test showed the table value of 9.20 which was significant at the level of p<0.05. **Conclusion:** It indicated that nesting technique had contributed in improving motor performance of low birth weight babies to experimental group showing statistically significant difference between post test scores of experimental and control group at the level of p<0.05.

Index Terms- Low birth weight babies, Motor performance, Nesting technique

I. INTRODUCTION

Low birth weight babies are the most vulnerable group to get adjusted to the new environment. Following birth, the first few months act as a transitory period during which the baby adjusts from the aquatic to the aerial environment. These babies have less sharp reflexes, diminished responses to visual and auditory stimuli and other neurological impairments such as attention deficit, difficulty adapting to their environment and reduced motor skills compared with normal birth weight babies.¹

During these first 28 days of life, the child is at highest risk of dying. It is thus crucial that appropriate feeding and care are

provided during this period, both to improve the child's chances of survival and to lay the foundations for a healthy life.¹

Newborn, or neonatal, deaths account for 45% of all deaths among children under 5. The majority of all neonatal deaths (75%) occurs during the first week of life, and between 25% to 45% occurs within the first 24 hours. The main causes of newborn deaths are prematurity and low-birth-weight, infections, asphyxia and birth trauma. These causes account for nearly 80% of deaths in this age group². So as per this statistic it shows that the neonatal mortality rates are increasing it is moreover related to the postural defects such as dolicocephaly, narrowing of head, kyphosis, scoliosis/lordosis etc.²

Due to birth injury, birth trauma, poor posture cause motor delay during child's life. Early motor delays are often a sign of neurological dysfunction. When a child has primarily motor delays, conditions such as cerebral palsy, ataxia, spinal bifida, spinal muscular atrophy and myopathy may be present. If there is no motor delay, a child does not have cerebral palsy. When a motor delay exists with delays in other developmental areas, the children have visual impairment or mental handicap. Hypotonia is the most common symptom of motor dysfunction in newborns and infants.³

The child's developmental assessment should include the quality of the pregnancy, including the onset and vitality of fetal movements and problems during labor and delivery. To manage the motor function of newborn babies, babies' posture should be maintained immediately for motor system development and therewith perhaps their health and development. The way in which baby is positioned throughout this time is very important and baby's posture dictates the level of his well-being.³

Neonatal posture requires a number of active postural control mechanisms that is, neuromotor functions which allow a living system to control its body posture at rest, during displacement and during active movements. Postural control is intimately linked to motor control: dynamic motor actions cannot be performed without first stabilizing body posture. This is true for voluntary as well for involuntary movements.⁴

Nesting and positioning is a nursing skill used in the developmental care of infants. This skill maintains infants in a comfortable position, facilitates the monitoring of stable vital signs, and enables spontaneous motor activity for normal neuromuscular and skeletal joint function.⁵

Nesting can be used as a facilitator to reduce the stress caused by aggressive procedures, such as suctioning. Some of the positive effects of nesting on the motor development of newborns include the improvement of coordinated and fine motor function

of different body parts and prolongation of curved body positioning similar to the fetal position.⁴

Objectives of the study

1. To assess the motor performance of low birth weight babies before nesting technique in experimental and control group.
2. To determine the effect of nesting technique on motor performance of low birth weight babies in experimental group.
3. To compare the motor performance in low birth weight babies in between experimental group with control group.
4. To find out the association between the pretest motor performance of low birth weight babies with their selected demographic variables in experimental and control group.

II. MATERIAL AND METHODS

The quasi experimental, pretest- posttest nonequivalent control group design was adopted to assess the effectiveness of nesting technique on motor performance among low birth weight babies in selected hospitals, Bengaluru. Study was conducted in NICU and post natal ward of Sagar Hospital and Sri Krishna

Sevashrama Hospital at Bengaluru. The sample size was 40 low birth weight babies. The samples were assigned in two group i.e. experimental and control group. In order to avoid contamination at a time, the investigators ensured the presence of babies either in experimental or control group. Each group consisted of 20 low birth weight babies (20 in experimental and 20 in control group). Babies with birth weight between than 1kg to 2.5 kg and both male and female low birth weight babies were included. Babies with congenital anomalies and transgender were excluded in the study. Non-probability consecutive sampling technique was used for selecting the samples. 30 structured observational checklist to assess the motor performance of low birth weight babies. Nesting technique was provided in experimental group for 8 hours per day continued for 4 days. The data analysis and interpretation was planned to include descriptive and inferential statistics. Data was analyzed with SPSS package (20.0 versions), α was set as 0.05. Paired “t” test was used to test the significant difference of pre and post-test motor performance in both experimental and control group. Unpaired “t” test was used to test the significant difference between the posttest motor performance in between experimental and control group. Chi-square test was used to find out the association between pre-test motor performances of low birth weight babies with their selected demographic variables.

III. RESULTS

Figure 1: Distribution of subjects in both the group according to gender

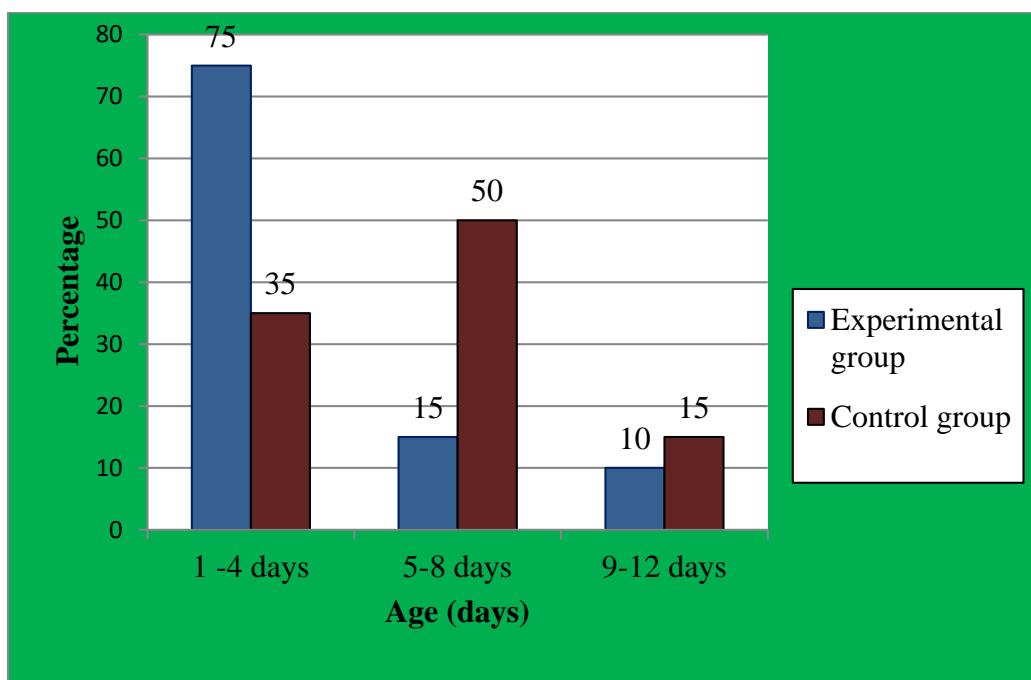
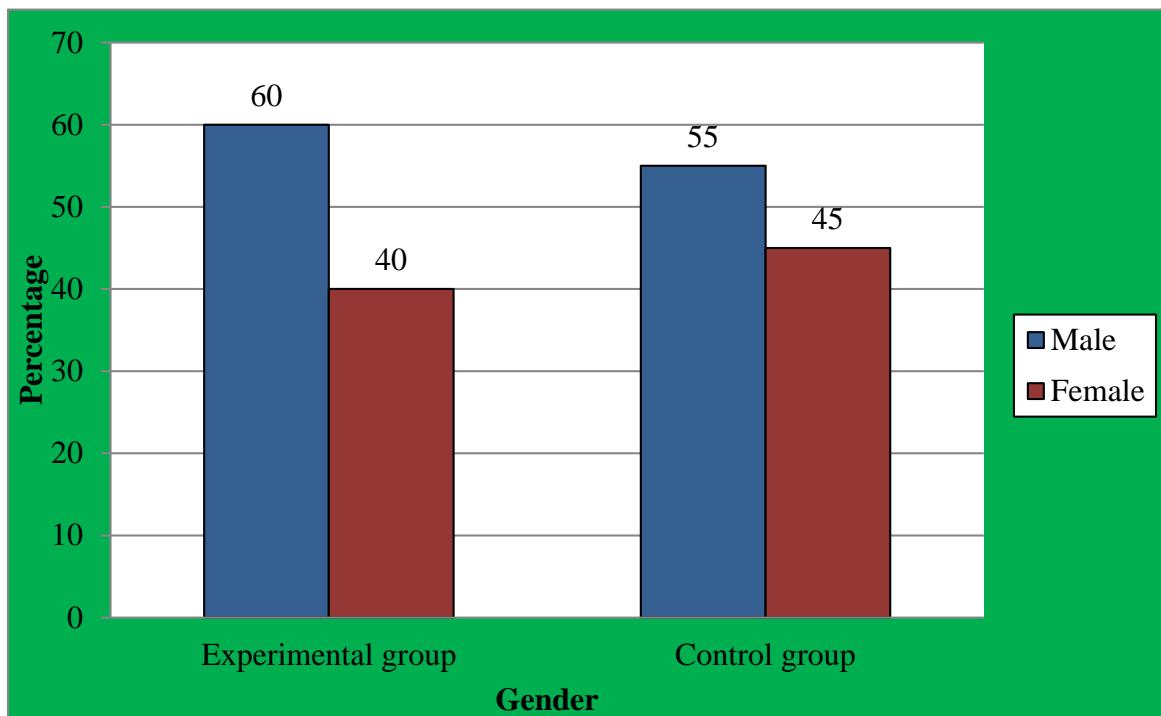


Figure 2: Distribution of subjects in both the group according to age groups (days)

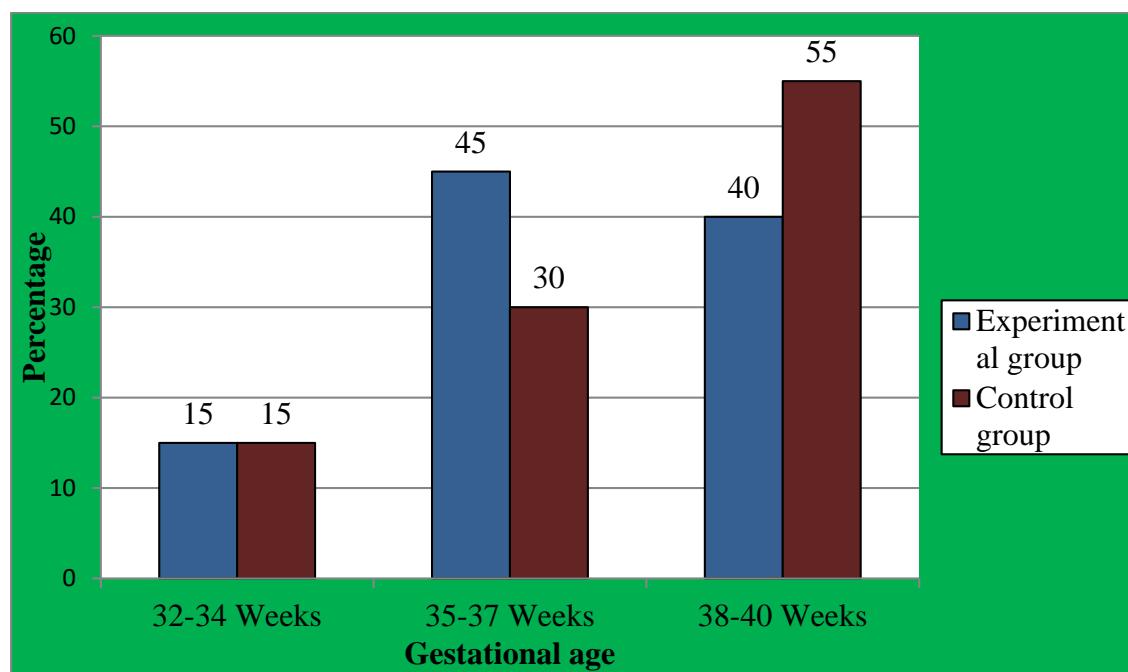


Figure 3: Distribution of subject in both the group according to gestational age

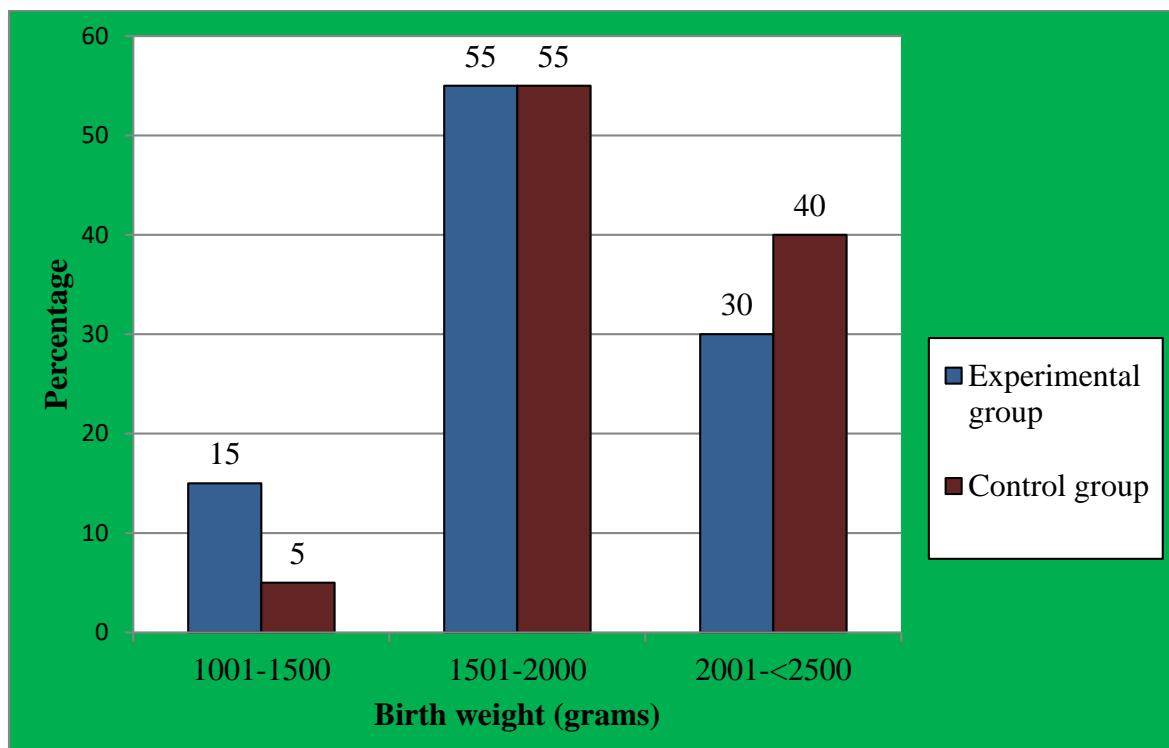


Figure 4: Distribution of subject in both the group according to birth weight (grams)

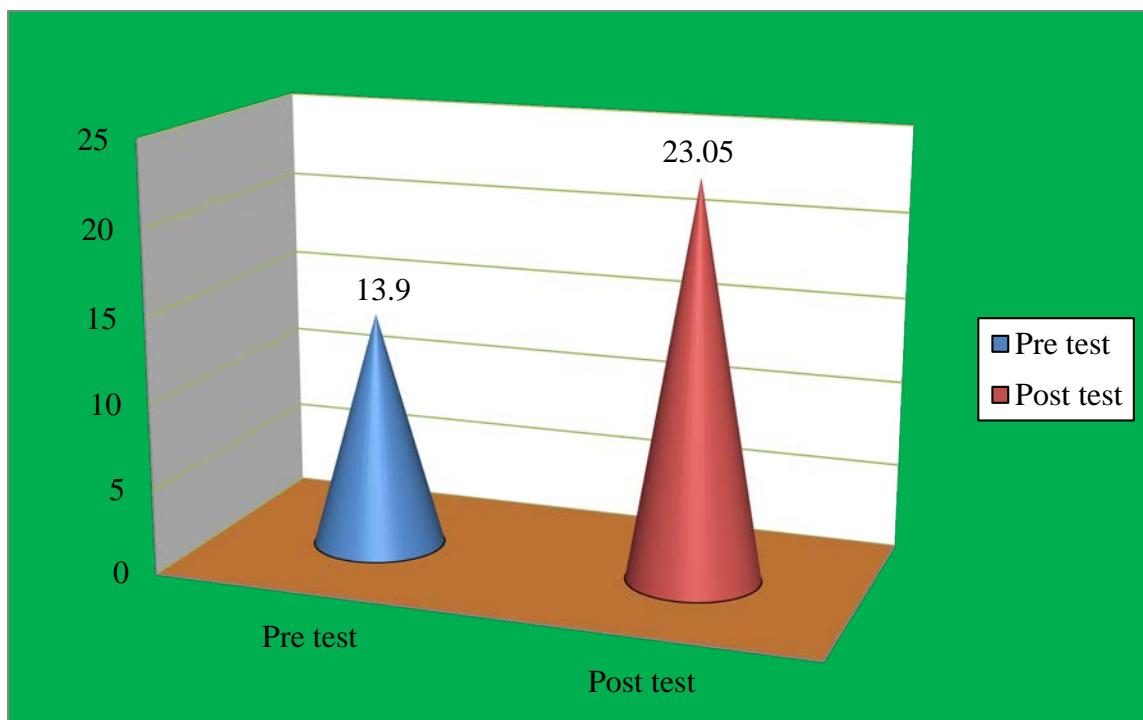


Figure 5: Comparison of mean score of the pre-test and post-test score of motor performance in experimental group.
Effectiveness of nesting technique on motor performance of subjects

Table 1: The Outcome of Paired t-test Analysis for Pre and Post -Test Motor Performance in Experimental Group.

S.No	Groups	Max. score	Mean difference	SD of difference	Mean difference percentage (%)	N=40	Paired t-test value	P-value
1.	Experimental Group	30	9.15	6.81	30.5		6.008 ^s	p<0.05
2.	Control Group	30	3.6	4.9	13.61		3.28 ^{NS}	p>0.05

Note: S-Significant at 5% level (i.e., p<0.05) and NS- Not significant at 5% level (i.e., p>0.05)

There was statistically significant difference between pre and posttest motor performance in experimental group at the level of p<0.05. But in control group there was no significant difference between pre and posttest motor performance. This showed that there was an improvement in motor performance due to nesting technique.

Comparison of motor performance in between experimental and control group

Table 2: The Outcome of Unpaired t-test Analysis Post –Test Motor Performance on Subjects in Between Experimental and Control Group.

S.No	Motor performance	Mean	SD	Unpaired value	t-test	N=40	P-value
1.	Experimental Group	23.05	4.49	9.20^s	p<0.05		
2.	Control group	16.5	5.64				

Note: S-Significant at 5% level (i.e., p<0.05) and NS- Not significant at 5% level (i.e., p>0.05)

The analysis of unpaired t-test showed the table value of 9.20 which was statistically significant at the level of p<0.05. It indicated that nesting technique had contributed in improving motor performance of low birth weight babies to experimental group showing statistically significant difference between post test scores of experimental and control group at level of p<0.05.

IV. DISCUSSION

Evaluate of motor performance of subjects in experimental and control group

The study demonstrated that majority of subjects 15 (75%) had moderate motor performance before nesting technique and 15 (75%) had adequate motor performance after nesting technique in experimental group. In control group majority of subjects 14 (70%) had moderate motor performance during pre –test and whereas in post –test majority of subjects 16 (80%) had moderate motor performance. The findings were consistent with study conducted by Prasanna K., Radhika M (2015) where the result revealed that the pretest mean score was 10.73 with SD 5.09 and the posttest mean score was 18.8 with SD 5.77 in experimental group. In control group the pretest mean score was 10.16 with SD 4.3 and the posttest mean score was 13.5 with SD 6.19 in control group.

Effectiveness of nesting technique on motor performance of subjects

The present study depicted that means difference was 9.15 with SD difference 6.81 and mean difference percentage was 30.5 %. The paired t-test value was 6.008 which was significant at the level of p<0.05 There was statistically significant difference between pre and posttest motor performance in experimental group at the level of p<0.05. This showed that there was an improvement in motor performance due to nesting technique. But in control group there was no significant difference between pre and posttest motor performance. So research hypothesis (H_1) was retained. The findings were consistent with study conducted by Poudlose R, Babu M., Rastogi S (2015) where the result demonstrated that mean difference was 4.59, SD difference 1.97 and paired t-test value was 12.64 at the level of p<0.05. Thus there was significant difference in motor performance of low birth

weight babies in the experimental group before and after administration of nesting technique.

Comparison of motor performance of subjects in between experimental and control group.

The present study indicated that overall mean score of motor performance in experimental group was 23.05 with SD 4.49 whereas in control group overall mean score was 16.50 with SD 5.64. The analysis of unpaired t-test showed the table value of 9.20 which was significant at the level of p<0.05. It indicated that nesting technique had contributed in improving motor performance of low birth weight babies to experimental group showing statistically significant difference between post test scores of experimental and control group at level of p<0.05. The findings were consistent with study conducted by Poudlose R, Babu M., Rastogi S (2015) where the result showed that in experimental group, the posttest score mean was 18.8 with SD of 5.77, whereas in control group the post test score mean was 13.5 with SD of 6.19. The calculated independent 't' test value was 3.5 which exceed the table value. Hence null hypothesis is rejected but research hypothesis is accepted. The study shows there is effectiveness of nesting on motor performance among low birth weight babies.

Association between the pre-test motor performance of subjects with the selected demographic variables in experimental group and control group

The present study showed that there was significant association between types of feed and motor performance in experimental group at the level of p<0.05. Whereas in control group there was a statistically significant association between gestational age, birth weight and types of feed and level of motor performance in control group at the level of p<0.05. Other demographic and clinical variables such as age (days), gender,

mode of delivery and order of children had no association with the level of motor performance in control group.

V. CONCLUSION

The finding of the study reveals that nesting technique had contributed in improving motor performance among low birth weight babies from experimental group significantly. It is an effectiveness intervention in promoting motor performance among low birth weight babies.

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Silver Nano-Particles from Diesel Particulate Matter: An Environmental Pollutant to a Potential Antimicrobial Agent and a Photocatalyst

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Abstract- The water soluble fraction (WSF) of diesel particulate matter (DPM), an environmental pollutant was used to synthesize silver nanoparticles (AgNPs). FTIR, fluorescence and UV-Vis data suggest that water soluble oxygenated PAHs in the WSF of DPM are capped to the surface of AgNPs providing the stability. The particle size, the size distribution, and the crystalline nature were confirmed by transmission electron microscopy (TEM) and X-ray diffraction (XRD) analysis. The particles are spherical in shape having an average size of 7.7 ± 1.5 nm. The antimicrobial activity of synthesized AgNPs was investigated using Agar well diffusion method and an enhanced activity was shown against the pathogens of *Candida albicans*, *Escherichia coli* and *Staphylococcus auerus*. A high level of photocatalytic activity for the degradation of rhodamine B and 2,4-dichlorophenoxyacetic acid (2,4-D), a common dye and a pesticide was exhibited by the AgNPs.

Keywords- Ag nanoparticles, Diesel particulate matter, Antimicrobial activity, Photocatalyst

I. INTRODUCTION

Diesel particulate matter (DPM) arising from diesel combustion has a number of undesirable environmental impacts on human health, climate, and ecology [1, 2]. Both stationary and mobile applications based on diesel combustion are heavily used throughout the world such as in electric power plants and automobile industry. Although, diesel particulate filters are installed in engines to reduce the emission of particulates to the environment, a large amount of DPM is discharged to the environment, especially during the regeneration process of the particulate filters [3]. Hence, the ability to utilize DPM for a potential application can be highly beneficial to the environment [4, 5].

DPM contains carbonaceous materials that includes unburned fuel molecules, partially burned fuel molecules, inorganic matter, and oxygenated PAHs adsorbed onto elemental carbon [6, 7]. Oxygen inside the internal combustion engine reacts with the hydrocarbons present in diesel fuel to produce a broad range of compounds that include aliphatic and aromatic aldehydes, mono- and poly- substituted benzene, and oxygenated PAHs [8-10]. The polarity of these organic compounds varies widely and some of which are water soluble [11, 12].

Among many types of metallic nanoparticles, AgNPs have shown a broad range of applications in medicine, renewable energies, and environmental remediation due to their unique optical, electrical, thermal and biological properties [13-17]. Controlling the physicochemical properties of AgNPs is a key aspect in developing technological applications which is heavily dependent on the method of synthesis, temperature, nature of the reducing and stabilizing agents. The chemical methods [14, 15, 18] hold several advantages over the other preparation methods, such as the simplicity in the procedure, and the consistency in the physicochemical properties. In chemical methods, the preparation of colloidal dispersion of AgNPs in water or in organic solvents is generally performed by chemical reduction. The use of naturally occurring reducing agents such as polysaccharides, plant extracts, or liquid mixtures of microorganisms has become popular in the synthesis of AgNPs due to the low cost and minor environmental impact [19-21]. Plant extracts, generally contain fairly large number of carbonyl and phenolic compounds that collectively provide a sufficient potential for the reduction of silver ions to metallic silver and the required stability for the AgNPs [22]. The aggregation of metallic silver atoms in to nano-sized, usually spherical particles are subsequently stabilized either by electrostatic or steric forces [23-25].

One of the most noticeable characteristics of AgNPs is its antimicrobial property. Silver is well known for its inhibitory effect on many microorganisms commonly present in medical and industrial processes [26]. Antimicrobial property of silver is greatly enhanced, if silver is transformed to a nanoparticle. This paper reports the antimicrobial potential of synthesized AgNPs against three common pathogens, *Candida albicans*, *Escherichia coli* and *Staphylococcus auerus*. Furthermore, the photocatalytic activity of AgNPs has gained a renewed interest in redox conversions of some organic compounds [27-30]. Silver nano particles give rise to SPR, which results from oscillating electrons of silver under the influence of visible light in the wavelength ranging

from 400 - 500 nm. This unique behaviour is limited to a few metals like Au, Ag, Cu, and Pt [27]. Exploiting this property is already seen in many applications that include surface-enhanced Raman spectroscopy, photocatalysis and in biosensors [31, 32]. We have successfully used the AgNPs synthesized from WSF of DPM for the photocatalytic degradation of an organic dye, rhodamine B and a pesticide, 2,4-D. In the present study, fluorescence quenching behavior of oxygenated PAHs and the surface plasmon resonance (SPR) peak intensities were analyzed as a function of WSF of DPM to Ag ion concentration to determine the capping action of the oxygenated PAHs in the formation of AgNPs. The idea of using DPM in the synthesis of AgNPs is novel and has not been previously attempted to our knowledge and we have proved the possibility of synthesizing AgNPs directly from the diesel engine exhaust.

II. MATERIALS AND METHODS

A. Preparation of the water extract of DPM

DPM was collected from diesel particulate filters located near the engines of passenger transport vehicles of a central depot in Colombo, Sri Lanka. A Soxhlet extraction method was used to obtain the water soluble fraction of DPM. A volume of 200 mL of double distilled, deionized water and 2.0 g of DPM were used for the extraction. The Soxhlet apparatus was adjusted to 8 cycles per hour and was run continuously for 8 hours.

B. Synthesis of AgNPs from DPM

Firstly, 8.0 mL of fresh water extract of DPM and 2.0 mL of 0.2 M KOH (Loba Chemie) were mixed to make the water extract basic. Then, 7.5 mL of the basified extract was gradually introduced to a boiling solution of 140 mL of 1.0 mM AgNO₃ (Park Scientific) under constant stirring within a period of 30 minutes. The solution was continually heated and stirred for another 30 minutes. The solution was cooled down prior to the use.

C. Synthesis of AgNPs from direct diesel engine exhaust (DEE)

A direct injection, light duty Toyota 2C diesel engine was run on the idle mode to produce continuous and uniform flow of exhaust fume. The exhaust pipe was directly connected to a three-neck round-bottom flask containing a volume of 200 mL of distilled water adjusted to pH 9 with KOH. The diesel engine exhaust was purged into the three-neck round-bottom flask for 30 minutes. Then, 5 mL of this solution was gradually added to a boiling solution of 100 mL of 1.0 mM AgNO₃ under constant stirring within a period of 30 minutes. The solution was allowed to cool prior to the use.

D. Characterization of AgNPs

The preliminary characterization of synthesized AgNPs was carried out using a Perkin Elmer Lambda 35 UV-Vis spectrometer. The morphology of AgNPs was assessed by the high resolution transmission electron microscopy (HR-TEM ZEISS Libra 200 Cs-TEM) at an accelerating voltage of 200 kV. The X-ray diffraction pattern of synthesized AgNPs were obtained using Ragaku Ultima-IV diffractometer. The Fourier Transform Infrared spectroscopy, FTIR (Thermo Scientific Nicolet iS10) spectra were recorded using KBr pellets. Powdered samples were obtained by centrifugation at 40,000 rpm (SORVALL RC M120GX) for ~20 minutes.

E. Fluorescence quenching of PAHs by AgNPs

Fluorescence spectra were obtained (Thermo Scientific Lumina) for a series of samples prepared by varying volume ratios (0:10 – 10:0) of 1.0 mM Ag⁺ : WSF of DPM (pH of 12). For all fluorescence measurements, the excitation wavelength was set at 350 nm and emission spectra were recorded in the wavelength range of 380 nm to 600 nm. UV-Vis spectra of each mixture were also recorded in order to detect AgNPs formation via the SPR peak. Crystals of NaCl were added and fluorescence intensity was re-measured at room temperature of the samples that showed a drop in the fluorescence intensity after the addition of silver ions into the WSF of DPM.

F. Microorganisms

Candida albicans (ATCC 10231), *Escherichia coli* (ATCC 25922) and *Staphylococcus aureus* (ATCC 25623) were obtained from the culture collection (Department of Microbiology, Faculty of Medical Sciences, University of Sri Jayewardenepura). *Candida albicans* was cultured in Sabouraud Dextrose Agar (HiMedia) and *Escherichia coli* and *Staphylococcus aureus* were cultured in nutrient agar (HiMedia) for 18 hours at 37 °C before each experiment.

G. Antimicrobial activity by agar well diffusion assay

Antimicrobial activity of the synthesized AgNPs was determined using the well diffusion method [33]. Overnight grown cultures of the test organisms were suspended in sterile physiological saline and the absorbance was adjusted to 0.5 McFarland standard. The standard bacteria suspension and *Candida* suspension were lawned on Mueller Hinton Agar (MHA, HiMedia, India) and SDA (HiMedia, India), respectively using the spread plate method. A sterile 9 mm cork borer was used to prepare wells and the bottoms of the wells were sealed with sterile molten agar. The wells were loaded with 200 µl of freshly prepared AgNPs solutions from both WSF of DPM and the direct DEE. The three control wells were loaded with 1mM AgNO₃, sterile distilled

water and the water extract of DPM. Plates were incubated at 37 °C for 24 hours. All experiments were done in triplicates. The average Zone of inhibition (ZOI) was calculated.

H. Photocatalytic study

The photocatalytic experiments using the synthesized AgNPs were carried out for an organic dye, rhodamine B (Loba Chemie) and a common pesticide, 2,4-D (Sigma-Aldrich). The test solutions containing 100.0 mL of distilled water and 100 μ L of AgNPs were mixed with either rhodamine B or 2,4-D until an optical absorbance of one at its maximum absorbance wavelength was reached. The samples were irradiated using a Philips Hg arc 250 W UV-Vis light source. The rate of photodegradation was studied by measuring the absorbance at 550 nm (for Rhodamine B), and 283 nm (for 2,4-D) of the test solutions by withdrawing samples at 0, 30, 60 and 90, 120, and 150 minutes illumination time intervals. Control experiments were also carried out with 100.0 mL of water and 50.0 mL of the analyte in the absence of AgNPs. The test solutions were kept under dark conditions for 30 minutes to equilibrate before irradiation.

III. RESULTS AND DISCUSSION

A. Nanoparticle characterization

The synthesised AgNPs produce a characteristic absorption in the UV-Vis spectrum (Figure 1b) around 400-500 nm region due to the surface Plasmon resonance (SPR). The appearance of a peak at 401 nm, with a FWHM (Full Width at Half Maximum) of 80 nm is a strong indication for the formation of AgNPs with smaller particle sizes. The WSF of DPM does not show any absorption features in the 400 nm region (Figure 1a).

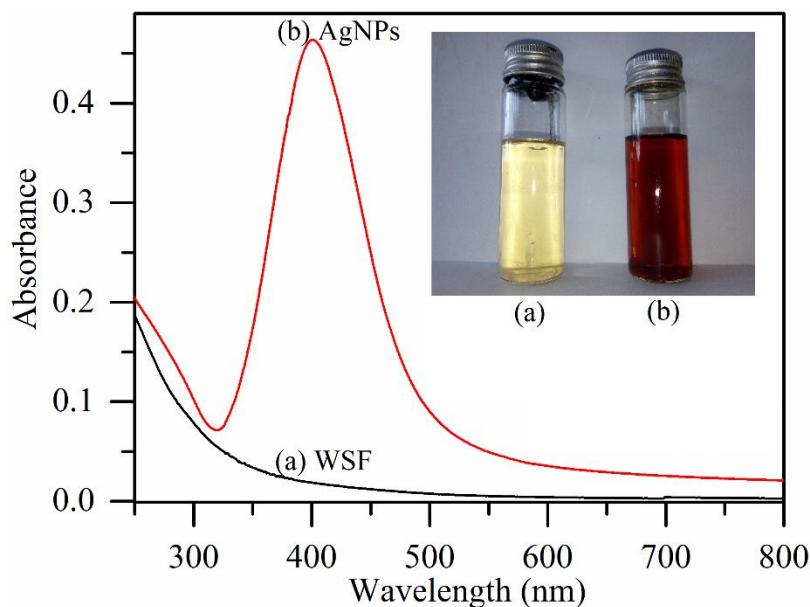


Figure 1: UV-Vis absorption spectra of (a) WSF of DPM and (b) synthesized AgNPs from WSF.

The surface morphology of the synthesized AgNPs was studied by TEM images. The TEM image (Figure 2.) indicates that AgNPs are spherical in shape and are fairly monodispersed. The inset of Figure 2 shows the particle size distribution of AgNPs derived from TEM data. The average diameter of the nanoparticles is 7.7 ± 1.5 nm, which is smaller than the average diameters of AgNPs synthesized from some reported plant extracts [21, 34]. Having a smaller particle size is advantageous to enhance the properties like photocatalytic and antimicrobial activities.

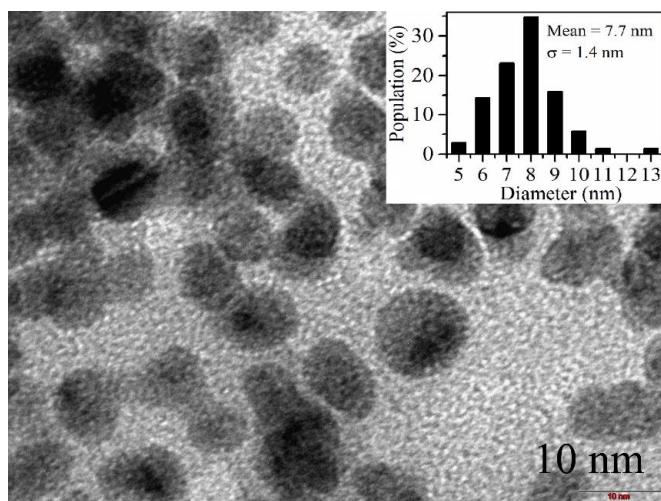


Figure 2: TEM image of synthesized AgNPs. Insert: Particle size distribution.

X-ray diffraction pattern recorded for the synthesized AgNPs (Figure 3) is matched with the peak distribution of metallic silver (Ag, JCPDS # 89-3722). The four peaks of pure silver observed at $2\theta = 38.09^\circ$, 44.30° , 64.43° and 77.42° in the diffractogram are indexed as (1 1 1), (2 0 0), (2 2 0), and (3 1 1), respectively. The crystal nature of synthesized AgNPs is particularly evident by the XRD data. The UV-Vis, TEM, and XRD data collectively provide a strong evidence for the formation of AgNPs from the molecules present in the WSF of DPM.

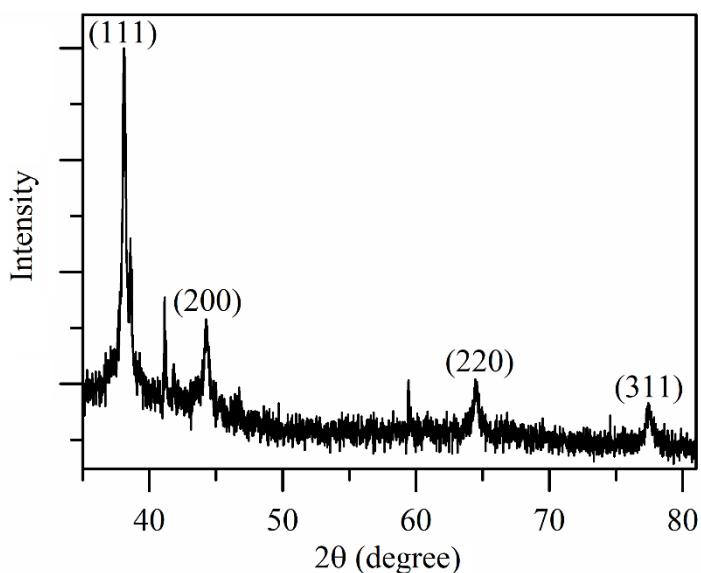


Figure 3: X-ray diffraction pattern of synthesized AgNPs.

The chemical nature of organic compounds present in the WSF of DPM plays a vital role in understanding the mechanism behind the formation of AgNPs. The FTIR spectra of DPM, WSF of DPM and the synthesized AgNPs are shown in Fig. 4. The FTIR spectrum of DPM (Figure 4a), clearly shows the vibration modes corresponding to the hydroxyl ($\sim 3442 \text{ cm}^{-1}$), and carbonyl ($\sim 1602 \text{ cm}^{-1}$ and 1718 cm^{-1}) groups. The appearance of a weak peak at 2921 cm^{-1} corresponds to the aliphatic C-H stretching vibration modes. Figure 4a is in strong agreement with the previously recorded FTIR spectrum of DPM [35]. As reported in previous investigations [8, 11], DPM contains a variety of compounds from oxygenated PAHs, mono and poly-substituted benzenes, to aliphatic aldehydes, and ketones corresponding to a broad range of polarities. According to Liang et al.[6], 20-percent of the total organic compounds in diesel soot corresponds to *n*-alkanoic and aromatic acids. The low pH (2.7) of the WSF of DPM, further indicates the presence of a significant amount of carboxylic acids in WSF of DPM. The FTIR spectrum of a freeze dried sample of WSF of DPM (Figure 4b) confirms the presence of organic compounds in the water extract of DPM. The peaks around 3400 cm^{-1} and 1718 cm^{-1} correspond to the presence of hydroxyl and carbonyl compounds. The presence of a broad peak at 3350 cm^{-1} and a sharp peak at 1636 cm^{-1} in the FTIR spectrum of AgNPs (Figure 4c) synthesized from WSF of DPM is a direct confirmation for the involvement of hydroxyl/oxo substituted organic compounds during the formation of AgNPs. Peaks at 1046 cm^{-1} can be assigned to $-\text{C}-\text{O}$ (ether linkages) [36] and the peak at 1402 cm^{-1} may be assigned to geminal methyls based on the previously published work [37]. The bands at 3350 cm^{-1} correspond to -OH stretching vibrations indicating the

presence of alcohol and/or phenol [38]. The studies based on aqueous extracts of plant materials to synthesize AgNPs have shown a strong connection between the presence of organic compounds with a minimum of two hydroxyl groups at *ortho* and *para* positions of a phenyl ring and a tendency to reduce and stabilize the silver ions to its metallic form [39]. Therefore, the hydroxyl compounds in the WSF of DPM as confirmed by the FTIR analysis play a similar role during the formation of AgNPs.

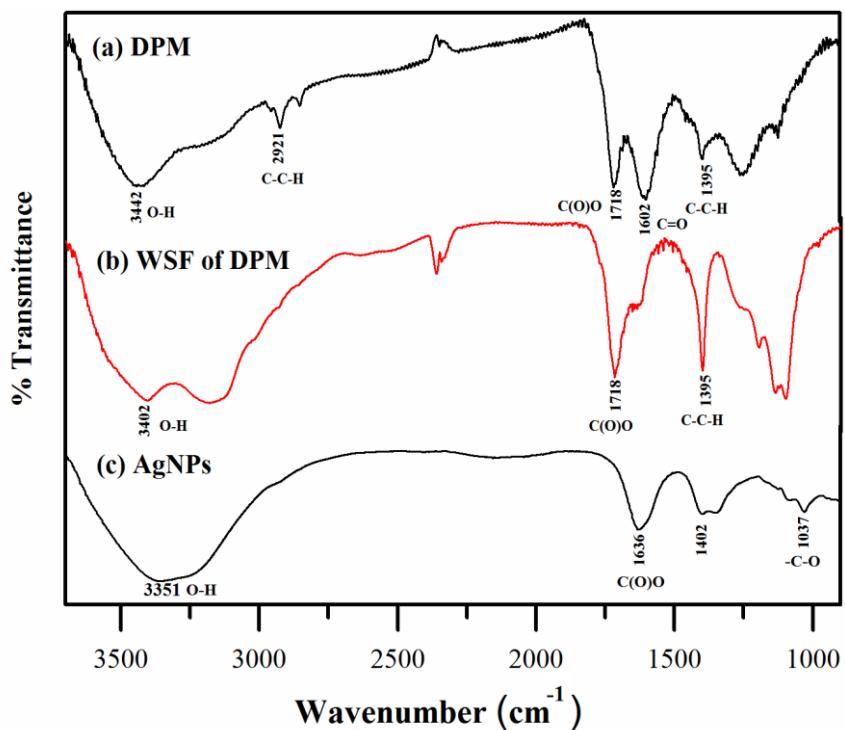


Figure 4: FTIR spectra of (a) DPM, (b) WSF of DPM and (c) synthesized AgNPs from WSF.

B. AgNPs from diesel engine exhaust fumes

The UV-Vis absorption spectrum of AgNPs synthesized directly from the diesel engine exhaust fumes (DEEF) is shown in Figure 5. The SPR peak is positioned at 409 nm and has a FWHM of 160 nm, which is broader than the FWHM of the SPR peak observed for the AgNPs synthesized from the WSF of DPM. It indicates a broader particle size distribution for the AgNPs synthesized from direct DEEF when compared with WSF of DPM. The inset in Figure 5 is the XRD pattern of the AgNPs synthesized from direct DEEF. The DEEF contains a large amount of volatile organic compounds in addition to diesel particulate matter [40]. Therefore, a wider range of reducing agents could be available to form the AgNPs during the synthesis than from the WSF of DPM. This confirms that the synthesis of AgNPs by DEEF is simple and faster than extracting WSF from DPM.

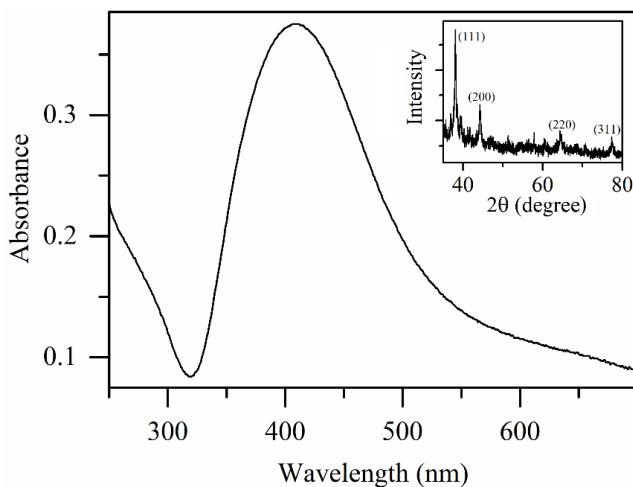


Figure 5: UV-Vis absorption spectrum of AgNPs synthesized directly from the DEEF. Inserted: X-ray diffraction pattern.

C. The role of oxygenated PAHs in the formation of AgNPs

The intense fluorescence signal observed at 420 nm for WSF of DPM allows to understand the capping action of water soluble PAHs. In this regard fluorescence quenching studies (*see* Figure 6a) were performed with the addition of varying volume ratios of Ag^+ to the WSF of DPM. A gradual decrease in the fluorescence signal was observed as a function of increasing Ag^+ concentration for the mixtures up to 0 % to 40%. A sudden drop in the fluorescence signal was observed after mixtures having >50% of Ag ions. UV-Vis absorption spectra were also recorded simultaneously for the same samples (*see* Figure 6c) and the appearance of SPR peak at 470 nm was evident at a ratio of 1:1 with a drop in the fluorescence intensity suggesting the surface capping of fluorophores present in the WSF to the AgNPs. In order to confirm that the observed drop in the fluorescence signal was not due to the dilution effect, a control experiment (*see* Figure 6b) replacing Ag^+ with water was also carried out.

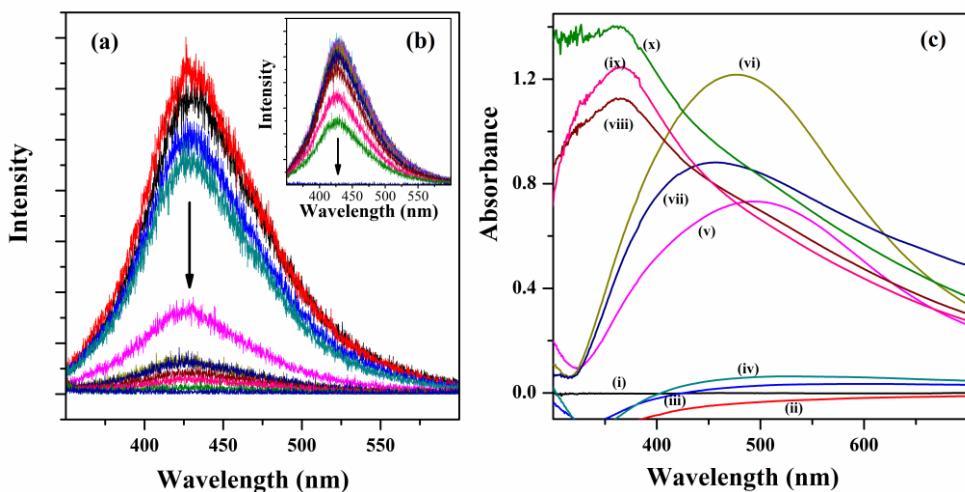


Figure 6: Fluorescence emission spectra for the mixtures containing different volume ratios (a) WSF and Ag^+ (10:0 to 0:10). (b) WSF and H_2O (10:0 to 0:10). (c) UV-Vis absorption spectra for the mixtures containing different volume ratios WSF and Ag^+ (10:0 to 0:10) represented by (i)-(x).

The relative fluorescence intensities (i.e. I/I_0 at max.) *vs.* ratios of Ag^+ to the WSF of DPM were plotted (Figure 7a). It shows a sharp drop after 40% of Ag^+ addition into the WSF of DPM, indicating the presence of an efficient fluorescence quenching process, occurring once AgNPs are formed. Whereas, addition of water, i.e. control experiment (*see* Figure 7b) suggests that the decrease in the fluorescence intensity is due to the dilution effect. The quenching of fluorescence of oxygenated PAHs by AgNPs may arise from the formation of a static complex via electrostatic interactions. A previous investigation[16] using fluorescing molecules as a local probe of the surface Plasmon field of metallic NPs, indicated that the quenching rate showed a strong correlation on the distance between the probe and the metal surface. A direct binding of the fluorescing probe to the metal surface resulted a complete quenching.

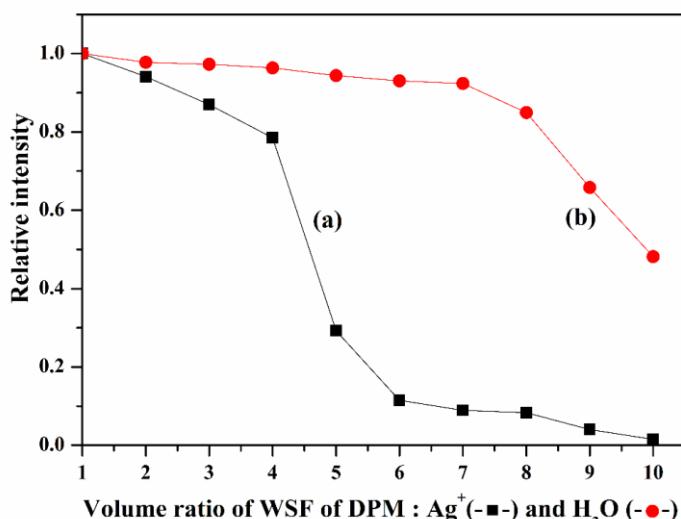


Figure 7: The variation of fluorescence emission intensity as a function of volume ratio between WSF of DPM and (a) Ag^+ (b) H_2O .

Figure 8(a) demonstrates the recovery of fluorescence signal from synthesized AgNPs samples by changing the ionic strength with the addition of NaCl. The formation of an electrostatic complex during the quenching process was further supported by the recovery of the fluorescence signal upon changing the ionic strength [41]. A sample of synthesized AgNPs displaying quenched fluorescence (Fig. 8a(i)) was mixed with a few NaCl crystals at room temperature to recover the signal as shown in Figure 8a(ii). Figure 8(b) shows the UV-Vis absorption spectra of the samples used to obtain the data in Figure 8a(i) and Figure 8a(ii). The sample with recovered fluorescence signal has no SPR peak (Figure 8b(ii)) indicating a dissociation of electrostatic complex/AgNPs to release oxygenated PAHs to fluoresce. Therefore, it can be concluded that oxygenated PAHs in WSF of DPM act as capping materials in the synthesis contributing to the stability of AgNPs.

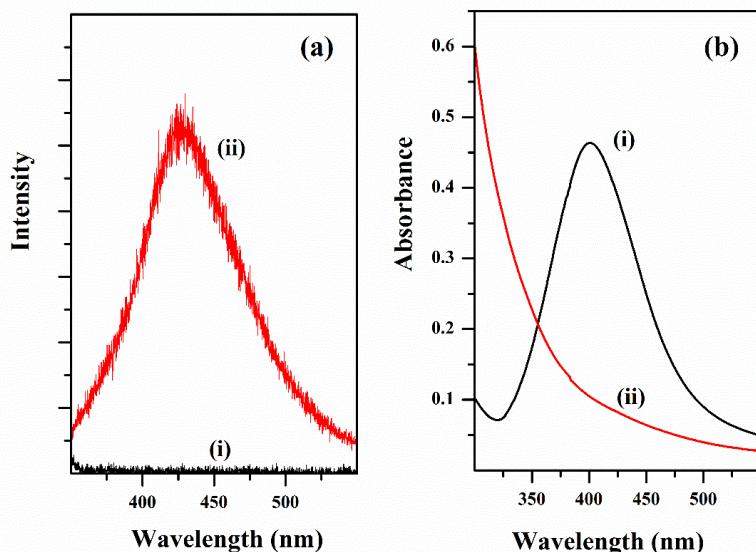


Figure 8: (a) The florescence emission spectra of (i) before (ii) after addition of NaCl. (b) UV-Vis absorption spectra of (i) before addition of NaCl. (ii) after addition of NaCl for the synthesized AgNPs from WSF.

D. Antimicrobial activity

The presence of a zone of inhibition (ZOI) for the two types of AgNPs synthesized through WSF of DPM and direct DEEF demonstrated antimicrobial activity against *C. albicans*, *E. coli* and *S. aureus* (see Table I). The antimicrobial activity of the AgNPs was compared with 1 mM AgNO₃ solution. Sterile distilled water and water extract of DPM were used as the negative control. All tested microorganisms exhibited comparable ZOIs to 1 mM AgNO₃, which is a well-known antimicrobial agent (Figure 9). AgNPs synthesized with the WSF of DPM exhibited a stronger antimicrobial activity compared to DEEF AgNPs (Figure 9 and Table I). The yeast *C. albicans* exhibited the strongest inhibition by both types of AgNPs compared to the bacteria *E. coli* and *S. aureus*. The water extract of DPM do not show any ZOI for all three microorganisms, indicating an insignificant level of antimicrobial activity. The results clearly indicate that AgNPs synthesized and stabilized with water soluble compounds present in the DPM is a potent antimicrobial agent against the investigated microbes.

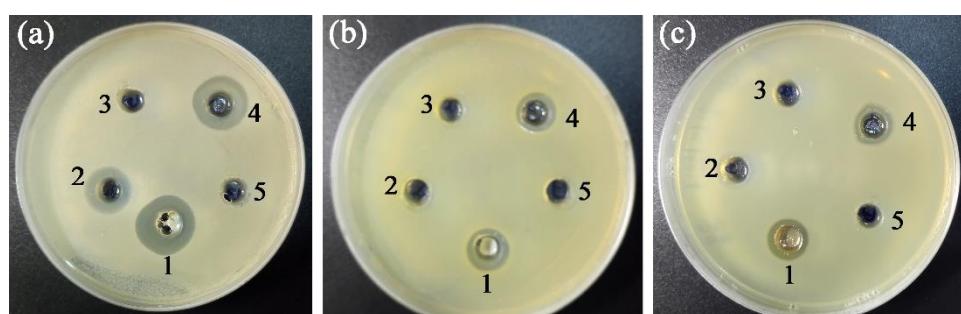


Figure 9: Antimicrobial activity determined using agar well diffusion method. Photograph of (a) *C. albicans*, (b) *E. coli* and (c) *S. aureus*. ZOI of 1, 2, 3, 4 and 5 are for AgNO₃, direct DEE-AgNPs, WSF of DPM, WSF-AgNPs and distilled water (DW), respectively.

Table I. Average zones of inhibition of the AgNPs against the three test organisms after incubation at 37 °C for 24 hrs. ZOI of 1, 2, 3, 4 and 5 are for AgNO₃, direct DEE-AgNPs, WSF of DPM, WSF-AgNPs and distilled water (DW), respectively.

Organism	ZOI (mm)				
	AgNO ₃	Direct DEE-AgNPs	WSF of DPM	WSF-AgNPs	DW
<i>Candida albicans</i>	1.8 ± 0.07	1.4 ± 0.07	-	1.6 ± 0.14	-
<i>Escherichia coli</i>	1.2 ± 0.07	1.0 ± 0.07	-	1.2 ± 0.12	-
<i>Staphylococcus aueru</i> s	1.2 ± 0.07	1.0 ± 0.07	-	1.1 ± 0.07	-

A high surface to volume ratio of smaller AgNPs results in higher antimicrobial potential. It has been reported that AgNPs bind to the surface of the cell membrane thereby disrupting its functions [42]. Silver ions released from the cell membrane contribute to the antimicrobial activity [43]. Further, the NPs penetrate the cell membrane and bind to intracellular organelles such as the mitochondria and nucleus leading to disruption of metabolic pathways and DNA replication [44]. The structure, thickness and composition of the cell wall are important factors affecting the antimicrobial activity. The Gram positive cell wall of *S. aureus* has greater cell wall thickness compared to Gram negative bacteria. Further the negatively charged cell wall peptidoglycan results in the Ag ions being stuck on to the cell wall preventing the penetration inside the cell and whereby Gram positive bacteria become more resilient to its action. In contrast, the thin cell wall of Gram negative bacteria containing Lipopolysaccharides which have a high negative charge promotes adhesion of AgNPs and its penetration within the cell [45]. Further the strong antimicrobial activity of AgNPs observed in this study against *Candida albicans* is suggested to be due to the NPs acting on yeast cells by disrupting the cell membrane and inhibiting the normal budding process due to its negative impact on membrane integrity [46].

3.5 Photocatalytic activity of synthesized AgNPs

The surface Plasmon induced photocatalytic activity of AgNPs prepared by the WSF of DPM was assessed using the photodegradation of an organic dye, rhodamine B, and a widely used pesticide 2,4-D (2,4-Dichlorophenoxyacetic acid). The photodegradation was measured by monitoring the absorbance at the maximum absorption wavelength, 560 nm for rhodamine B and 290 nm for 2,4-D. The degradation kinetics are shown in Figure 10a and 10b. The analyte samples exhibit a significant level of photodegradation in the presence of AgNPs.

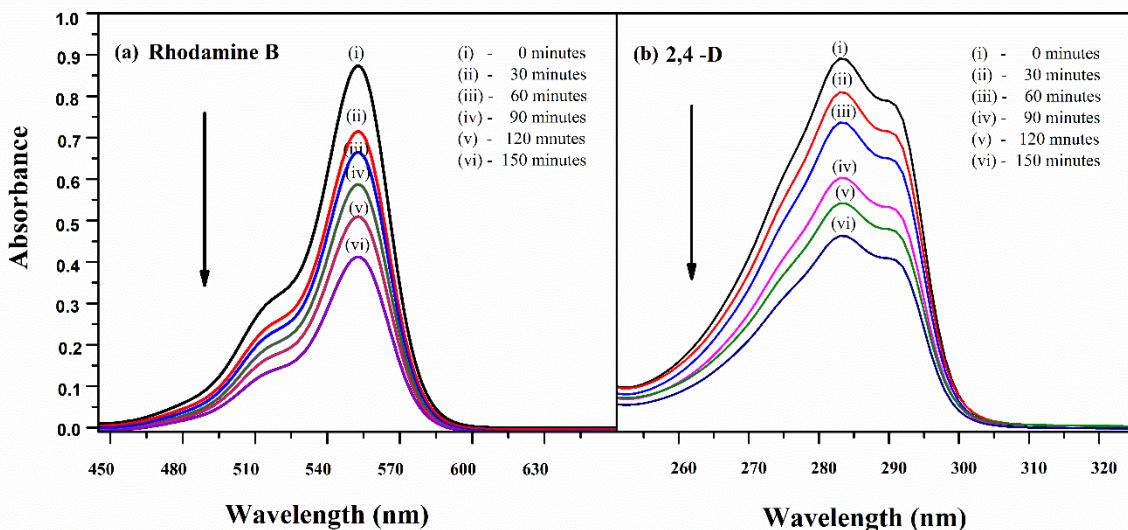
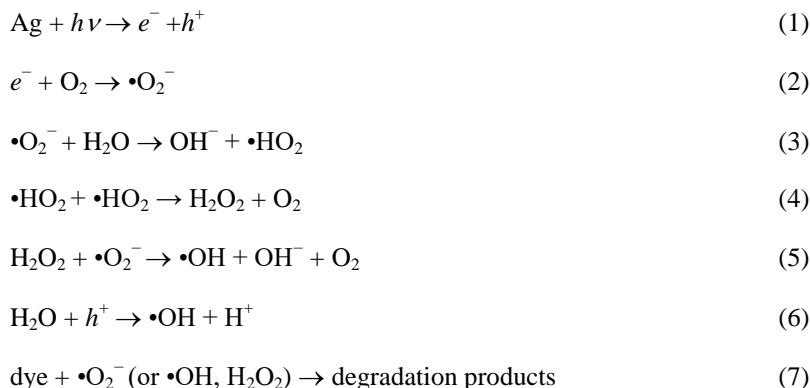


Figure 10: The photodegradation of (a) rhodamine B and (b) 2,4-dichlorophenoxyacetic acid in the presence of AgNPs as a function of irradiation time.

The drop of the analyte concentration after 150 minutes of exposure to the UV-Vis radiation was 41-percent for rhodamine B and 39-percent for 2,4-D, in the presence of the same catalytic load. The control experiments were also carried out in the absence of AgNPs for the samples and showed only about 3-percent of photodegradation within the same exposure time (not shown in the figure). The fast degradation of the analyte molecules under UV-Vis light irradiation in the presence of AgNPs suggests that the catalytic reaction is greatly accelerated by UV-Vis radiation. AgNPs absorb UV-Vis photons due to interband electron transitions and localized surface Plasmon resonance effect. The mechanism of the Plasmon-induced reaction can be represented in the following manner [47];



IV. CONCLUSIONS

The water soluble fraction (WSF) of DPM, a known environmental pollutant was utilized as a novel reducing agent for the synthesis of AgNPs. The method is simple when compared with the existing methods. TEM confirms that the synthesized AgNPs are spherical in shape with an average diameter of 7.7 nm. Further, the synthesis of AgNPs from diesel engine exhaust fumes (DEEF) is possible and the present study has revealed that the water soluble organic compounds formed during the internal combustion of diesel fuel can convert silver ions in to silver nano-clusters under basic conditions. The AgNPs synthesized either by WSF of DPM or the DEEF display the potential antimicrobial activity against *Candida albicans*, *Escherichia coli* and *Staphylococcus auerius*. The surface Plasmon induced photocatalytic activities were also observed for the organic dye, rhodamine B and a common pesticide 2,4-D.

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Knowledge of Nursing Students Toward old People

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Abstract- Aim: Because of variable demographics people plurality of present nursing students will work especially with old age after finishing their studying .It is understood that most nursing students have few knowledge and attention in working with adult people. There is an increasing want for encourage nurses to expand care for adult people as the goodness of care is affected by their knowledge. The study aimed to assess the knowledge of nursing students toward old people and determine its association with socio-demographic factors.

Methodology: interview questionnaire including: Section (1) demographic data of the students, age, Stage study, gender, marital status and residences. Section (2) comprised the" palmore's original Facts on Aging Quiz ". The sample consist of (79)Male, (12) Female were students in College of Nursing. Total number of student in College(100) respondents ,First-year (41), Second-year(23), Third-year(16),Fourth-year(20). Setting of data collection Faculty of Nursing_ University of Mosul, Iraq.

Results:-The study indicated knowledge of nursing students about old age moderate the mean score of correctly answer (M:52 ,SD:23.21)while the mean incorrect response rate was (48%,SD:21.73).

Recommendation:- The study recommended that an education program can be designed, constructed and implemented to the nursing student toward old people as well as further and nation-wide studies can be conducted on large sample size of students.

Index Terms- Knowledge, Nursing, Students, Older people.

I. INTRODUCTION

The population of the old age is a growing in all cities of the World. This is refer to be the plurality performance of humanity in the modern era⁽¹⁾. Globally, there are a rated 605 million people aged 60 years and over ⁽²⁾⁽³⁾ . One out of every ten persons is 60 years or over. By 2050, one out of five will be 60 years or older and by 2150, one out of three persons will be 60 years or elder. Moreover declared that old age is senility, that is, the oldest old (80 years or older) is the quickest increasing chunk shape 11 percent of the 60 years or older age group- and this is program to grow to 19 percent by 2050 ⁽²⁾. The number of centenarians is program to increase 15-lappet from approximately 145,000 in 1999 to 2.2 million by 2050. Although the population of the old age is growing in all cities of the world, until the early 80s, the demographic transmission was mostly observe as event of the developed cities ⁽²⁾ . Literature has however proven that the great plurality (two-thirds) of those over 60 years of age live in the developing world; and that the ratio is elevation stably and will reach nearly three-quarters by the 2030s .In 2011, the population in Iraq was 32.2 million; the expectation is that this population will reach 39 million in 2025, and 47.7 million in 2050. The number of old aged in Iraq was about (4.5%) elderly from total population in Iraq ⁽⁴⁾ . Also few publications and researches that focus on knowledge of elderly , there is no clear picture

about knowledge of old age situation in Mosul city as well as nursing student need to be aware of , knowledge and aging problems , all these factors motivate the researcher to conduct present study. Our aim was to discover the grad of the knowledge of nursing Students toward old people and to discover the organization between the demographic factors .So far, no literature is obtainable in our country on the knowledge of nursing Students toward old people in Iraq. and there is a paucity of studies on awareness, attitude and nurses and nursing students about the elderly.

Objectives of the study:

1. To assess Knowledge of Nursing Students Toward old People.
2. To determine the relationships between Knowledge of nursing students and socio-demographic characteristics of stage, age, gender, marital status and residence.

II. METHAOLOGY

Design of Study: A descriptive study design was adopted to fulfill the purpose of the present study for the period of Dec 1st 2017 throughout Feb 25th 2018 .

Setting of the Study: The study is conducted at the college of Nursing _ University of Mosul, Iraq.

Sample of the Study: A purposive non-probability sample of (79) Male, (12) Female were students in College of Nursing. Total number of student in College (100) respondents ,First-year (41), Second-year(23), Third-year(16),Fourth-year(20).

Study Instrument: A questionnaire is modification through review " palmore's original Facts on Aging Quiz ". The questionnaire is used as a tool of data collection which includes the following:

Part I: This part contains information about Socio- Demographic Characteristics which is consisted of (5) items which include Stage, Student age, Gender, Marital status and residence .

Part II: This part is composed comprised the" palmore's original Facts on Aging Quiz ". is composed of (25) items.

Statistical Data Analysis: The data of the present study are analyzed through the use of Statistical Package of Social Sciences (SPSS) version XVI.Descriptive Data Analysis include frequencies, percent and mean of score, Independent Sample T- test.

III. RESULTS

Table (1):-The demographical data of the Nursing student

Nursing students	Number (%)
Stage	
First-year	41(41%)
Second-year	23(23%)
Third-year	16(16%)
Fourth-year	20(20%)
Age	
18-21 Y	54(54%)
21-24 Y	29(29%)
24 or more Y	17(17%)
Gender	
Male	79(79%)
Female	21(21%)
Marital status	
Signal	76(76%)
Married	24(24%)
Residence	
Urban	91(91%)
Raral	9(9%)

Table 2: Percentage of Incorrect and Correct answers on each item (N=100).

Item	Correct	Incorrect
1. The plurality of old age –65-plus – are aged	60	40
2. The five senses (sight, hearing, taste, touch, smell) all inclined to weaken in old people.	91	9
3. The plurality of old age have no interest in, nor ability for, sexual relations.	30	70
4. Lung vital ability inclined to weaken with old people.	71	29
5. The plurality of old people feel forlorn most of the time.	36	64
6. Physical power inclined to weaken with old age.	88	12
7. At least one-tenth of the old age are living in long-stay institutions such as nursing homes, mental hospitals, and homes for the aged.	38	62
8. Senior drivers have fewer accidents per driver than those under age 65.	53	47
9. Old workers always cannot work as productively as young workers.	85	15
10. More than three-fourths of the aged are healthy enough to do their normal activities without help.	54	46
11. The plurality of old age are unable to adjust to change.	24	76
12. Old age always take long time to learn something new.	81	19
13. Depression is more recurrent among the old age than among young people.	46	54
14. Old age inclined to react slower than young people.	65	35
15. Generally, old age inclined to be beautiful much alike.	41	59
16. The plurality of old people say they are seldom plump.	40	60
17. The plurality of older people are socially isolated.	47	53
18. Old workers have fewer accidents than younger workers.	45	55
19. More than 20 percent of the people is now 65 and older.	30	70
20. The plurality of medical practitioners inclined to give low priority to the old age.	64	36
21. The plurality of old people have incomes under the poverty line, as defined by the U.S. federal government.	45	55
22. The plurality of old age are working or would like to have some type of work to do, inclusive homework and volunteer work.	65	35
23. Old age inclined to become more religious than other.	21	79
24. The plurality of old age say they are seldom disturb or annoyed.	51	49
25. The health and economic status of old age will be about the same or worse in the year 2010, compared with young people.	36	74

Mean right rate=52%; Mean error rate =48%

Table(3):-Independent sample test for nursing students knowledge toward older people according to demographic variable.

Demographic Variable	Mean	Std.deviation	t-value
Stage	2.2	1.07	1.27
Age	22.2	3.37	0.412
Sex	1.23	0.42	0.641
Marital status	1.66	0.47	1.38
Residence	1.9	0.3	0.189

These results indicated that there are not significant differences in nursing students knowledge toward older people according to age ,sex and residence .While there are significant differences in nursing

students knowledge toward older people according to stage of study and marital status variable at significant level (0.05).

IV. DISCUSSION

Statement correctly (M:52 ,SD:23.21) .the questionnaire item with the most correct responses was item 2:"five senses (vision hearing taste, touch and smell) all tend to decline in old age". Nearly all respondents responded correctly (91%).this was followed by item 6:"physical strength does not tend to decline in old age" (88%). The overall mean incorrect response rate was (48%,SD:21.73).Ten high error items are asterisked in table 2. These are items to which the error rates exceeded 50%.these error items illustrate the most frequent misconceptions among the sample nursing students. The most common six misconceptions about the elderly among Iraqi youngsters appear to be :(item 3) that the majority of the old people have no interest in sexual relation. (item 5),the majority of old age do not sense forlorn most of the time. (item 11),the majority of older persons are able to adapt to change.(item19) over 3 % of the Iraqi population are now 65 years & above ⁽⁵⁾ that the elderly inclined to be more religious as they age item 23 .(item 25) the health and economic case of old age (compared with younger people) in the year 2020 will propably be much higher than now . measures of health , income , occubation among older people are rising comparison with those of younger people . in other words , the cavity between older and youth people are on these dimensions will propably by substantially less. this reduction in gaps is largely due to improvements in health , income occupation & education among the younger cohrots now moving into the 65 & older category. In palmore's "original Facts on Aging Quiz" (1977)⁽⁶⁾ the correct answer to item 21 , "The majority at old people have income below the poverty level (as defined by the federal Government)" is false .However, the current situation in Iraqi seems to indicate that the elderly may indeed have incomes below the Iraqi poverty level. This is because human service administrators & policy makers in Iraq believe that the elderly are alway well cared for by families & so have not shown and serious interest in the issue of aging .The reality ,in contrast ,is that many families in Iraq do not have the resources to fully meet the needs of their elderly members. The current study is in agreement with the study that ⁽⁷⁾, the government has not realized that people senility will possibly be an especially serious matter considering they very sparse resources obtainable to buck up the old age. Rather emergency measures will need to be implemented as the need arise ⁽⁸⁾ .Special services for the aging in areas of income ,housing ,medical services ,care giving, & so on are lacking ,Also the national politics on the old adults is general on paper with no effect being made to implement it .The exclusive obtainable service that the government provides for the old adult is the pension scheme which is in gross disarry . In fact ,pension responsibilities have been almost totally abandoned in most states in the country as those newspaper headlines testify. ⁽⁹⁾⁽¹⁰⁾⁽¹¹⁾⁽¹²⁾ , however are only for those elderly who had been engaged in public service .therefor gender differences in the awarding of pension is significant because a large cohort of elderly woman today we're never in public service . Based on the foregoing , one may not be incorrect in dispute that the answer to item 21 in Iraq indeed true.

V. CONCLUSION

Depend on the returns of the present study, it was concluded that the participation fromstudents about Knowledge of nursing Students toward old people was half correct answer.

VI. RECOMENATION

The study recommended that an education program can be designed, constructed and implemented to the nursing student toward old people as well as further and nation-wide studies can be conducted on large sample size of students. Review and better in the study program might be needed to promote the knowledge of the iraq nursing students. And this study suggest that Mosul nursing students have to be best ready to do with primarily old age .

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Effect of Quality Products and Service Quality On Customer Satisfaction in Café City Palembang

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Abstract: Customer satisfaction is the level of one's feelings after someone compares the performance or results that are felt compared to what is expected. This study aims to analyze how much influence the product quality and service quality on customer satisfaction on Café in Palembang and the dominant influential variables. The number of samples used in this study were 100 respondents. The technique used in sampling this research is random sampling. The analysis technique that will be used in this study is multiple linear regression and hypothesis testing to obtain a comprehensive picture of the relationship between one variable with another variable. The results of the analysis in this study indicate that the variables of product quality and service quality have a positive and significant effect on customer satisfaction and there are 1 independent variable that has a positive and significant effect and dominant influence namely service quality on customer satisfaction at the Café in Palembang

Keywords: Product Quality, Service Quality, Customer Satisfaction

INTRODUCTION

In today's modern era, drinking coffee in a coffee shop (café) has become a lifestyle (community) in Indonesia. Not just drinking coffee, but at the café is also the goal of some groups to carry out certain activities, such as gathering, socializing, exchanging ideas, meeting clients, group learning for students, expanding networks and even becoming a place to conduct prospecting business between executives company.

Today's café is a profitable business, where many coffee lovers make coffee a mandatory necessity to fulfill as a lifestyle requirement, so that many cafes are made as one of the promising alternative business opportunities for business people. Business people move quickly in preparing strategies so they can please and build enthusiasm for customers. Creation of a comfortable atmosphere, attractive interior design, such as the design of chairs, tables, paint and provide an attractive and comfortable accent, a calm atmosphere, as well as Wi-Fi facilities (free hot spots), as well as live music that can be a special attraction for customers (Aditya, 2015: 107).

Café not only provides coffee, but also provides various kinds of unique food and beverage tastes and various facilities in it. Along with the times, coffee shops have many concepts, including as a place to enjoy a meal or dinner, there is also an automotive café that is a coffee shop that is provided for a community of automotive enthusiasts, to cyber cafes or coffee shops that provide online or internet networking facilities for consumers (Aditya, 2015: 108).

The many cafes that have sprung up have resulted in business owners thinking more creatively to create a different concept than the existing café, this is certainly to attract the attention of consumers. Some cafes in Palembang include: Serendipity Café, Rendezvous Cafe and Drink Café Bang Amin, Bingen Café, York Café, Colony Café, Mayor Board Game Café, Ombre Café, Kahoy Coffee Shop, Luthier Coffee, Plan B Café, Café Big Daddy, Equatore Rooftop Café, Gunz Café, EEGsperience Café, Pink House Café, Serendipity Café, Flowntage Café, Chicken Story Café, Cafe South Station, Equatore Rooftop Café, and other cafés

The cafes generally offer a variety of coffees, such as semendo coffee, milk coffee, cappuccino, and durian coffee. To accompany coffee, also provide a variety of affordable snacks, such as grilled squid, shrimp satay, sate satay, liver satay, chicken skin satay, shellfish satay, toast, grilled sausage and other snacks, and prepare facilities such as Wi-Fi Fi (free hot spot), TV for watching ball together and various games.

In this study, researchers will examine 4 cafés as samples, namely Café Bang Amin, Colony Café, Kahoy Coffee Shop, and Café Big Daddy. The following are the types of drinks and foods that are in demand in the cafes in Palembang which were sampled in this study, namely as follows:

Table 1. Types of Drinks and Foods that are in demand at Café-cafes in Palembang City that became Samples in this Research

Café Name	Drinks and Foods	Average Daily Order	
		ordinary day	Sundays and holidays
Café Bang Amin	Drinks: - coffee milk - Milk Tea - Pull Tea	160 Glasses 70 Glasses 90 Glasses	250 Glasses 150 Glasses 175 Glasses
	Foods: - Indomie - Sausage - Fried Rice	200 bowls 100 Sticks 150 plates	350 bowls 175 Sticks 250 Plates
Koloni Café	Drinks: - Ice Kalita - Ice Coffee Milk	100 Glasses 150 Glasses	200 Glasses 275 Glasses
Kahoy Coffee Shop	Drinks: - Ice Coffee Susuka - Ice Chocolate	150 Glasses 125 Glasses	250 Glasses 200 Glasses
Café Big Daddy	Drinks: - Coffee Vietnam Dripp Milk - Ice Cappuccino Food: - Banana Cheese	300 Glasses 175 Glasses 150 Servings	475 Glasses 325 Glasses 250 Servings

Source: Café Bang Amin, Koloni Café, Kahoy Coffee Shop, dan Café Big Daddy

Based on Table 1, it can be seen that at each café, there are types of drinks or food favored by customers, and the number of orders varies between one café and the other café. Like Café Bang Amin, the most dominant drinks are coffee milk and milk. This is the basis for researchers to conduct research related to product quality and service quality and its impact on customer satisfaction.

Based on the description above, the authors are interested in conducting research on "The Effect of Product Quality and Service Quality on Customer Satisfaction at the Café in Palembang City".

Formulation of The Problems

Based on the background of the problems described above, problems can be identified in this study, in the form of questions as follows:

- 1) How does the Product Quality influence Customer Satisfaction at the Café in Palembang?
- 2) What is the influence of Service Quality on Customer Satisfaction at Café in Palembang?
- 3) Which variable among the variables of Product Quality and Service Quality has the dominant influence on Customer Satisfaction at the Café in Palembang?

LITERATURE REVIEW

A. Customer Satisfaction

According to Kotler (2013: 242), customer satisfaction is the level of one's feelings after someone compares the performance or results that are felt compared to what is expected.

B. Product Quality

According to Kotler (2013: 201), product quality is the ability of a product to perform its functions, these capabilities include durability, reliability, accuracy produced, ease of operation and repair, and other attributes that are valuable to the product as a whole.

C. Service Quality

According to Kotler (2013: 241), service quality can be interpreted as an effort to fulfill the needs and desires of customers and the accuracy of their delivery in balancing customer expectations.

RESEARCH METHODS

This study intends to measure the relationship between research variables or causality. Causal research is useful for measuring the relationships between research variables or useful for analyzing and seeing the effect of independent variables (X) on the dependent variable (Y). The design of this study is as follows:

1. Variable X (Free Variable), namely Product Quality and Service Quality
2. Variable Y (Bound Variable), namely Customer Satisfaction

The type of sample used is random sampling. The sample used in this study were 100 respondents.

RESULTS AND DISCUSSION

A. Research Results

1. Analysis Results

Table 2. Validity Test Results

Indicator	<i>Product Moment Pearson's</i>	Sig.	α	Information
X1.1	0,365	0,000	<	0,05
X1.2	0,445	0,000	<	0,05
X1.3	0,571	0,000	<	0,05
X1.4	0,569	0,000	<	0,05
X1.5	0,619	0,000	<	0,05
X1.6	0,692	0,000	<	0,05
X1.7	0,643	0,000	<	0,05
X1.8	0,271	0,000	<	0,05
X1.9	0,609	0,000	<	0,05
X1.10	0,675	0,000	<	0,05
X2.1	0,527	0,000	<	0,05
X2.2	0,517	0,000	<	0,05
X2.3	0,608	0,000	<	0,05
X2.4	0,584	0,000	<	0,05
X2.5	0,579	0,000	<	0,05
X2.6	0,504	0,000	<	0,05
X2.7	0,223	0,000	<	0,05
X2.8	0,504	0,000	<	0,05
X2.9	0,575	0,000	<	0,05
X2.10	0,587	0,000	<	0,05
Y.1	0,526	0,000	<	0,05
Y.2	0,465	0,000	<	0,05
Y.3	0,258	0,000	<	0,05
Y.4	0,471	0,000	<	0,05
Y.5	0,421	0,000	<	0,05
Y.6	0,491	0,000	<	0,05
Y.7	0,492	0,000	<	0,05
Y.8	0,623	0,000	<	0,05
Y.9	0,693	0,000	<	0,05
Y.10	0,335	0,000	<	0,05

Data Source: Processed from the Questionnaire

Based on Table 2, it is known that each indicator (item) in each variable is Product Quality and Service Quality (Independent Variable) while Customer Satisfaction (Dependent Variable) has a Product Moment Pearson's value with a significance value of $0,000 < 0,05$, so the indicator (item) used in this research variable can be stated as appropriate or relevant and can be used as an item in data collection.

Table 3. Research Variable Instrument Reliability Test Results

Variable	Cronbach's Alpha	Cutt Off	N of Item	Information
Social Media (X1)	0,733	> 0,60	4	Reliable
Word of Mouth (X2)	0,714	> 0,60	4	Reliable
customer satisfaction (Y)	0,700	> 0,60	4	Reliable

Data Source: Processed from the Questionnaire

Based on the results of the instrument variable reliability test in Table 3 above, then the results of the Independent reliability test Product Quality Variables (X1), and Service Quality (X2) indicate that the data obtained is reliable because Cronbach's Alpha value is 0.733, 0.714 while the reliability test results Dependent Variable Customer Satisfaction (Y) shows that the data obtained is reliable because the value of Cronbach's Alpha is 0.700.

Table 4. Normality Test Results

Test of Normality	Kolmogrov-Smirnov		
	Sig.	Cutt Off	Infomation
Product Quality (X1)	0,112	>	0,05
Service Quality (X2)	0,124	>	0,05
Customer Satisfaction (Y)	0,137	>	0,05

Data Source: Processed from the Questionnaire

Based on Table 4, it can be seen that the probability value or significance for each variable is greater than 0.05, so that it can be stated that the data in this study are normally distributed.

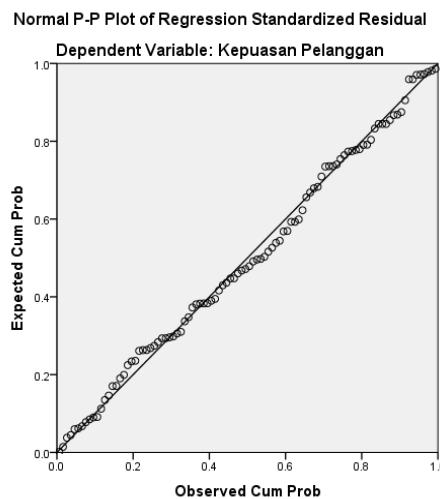


Figure 1. Normality Test Results

Based on Figure 1, shows that the data is normally distributed, because data spreads around the diagonal line and follows the direction of the diagonal line so that it can be stated that the regression model meets the assumptions of normality.

Table 5. Multicollinearity Test Results

Test of Multicollinearity	VIF	Cutt Off	Information
Service Quality (X1)	1.293	< 10	Multicollinearity does not occur

Product Quality (X2)	1.293	<	10	Multicollinearity does not occur
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Data Source: Processed from the Questionnaire

Based on the results from Table 5, it shows that there is no multicollinearity between independent variables because it shows a VIF value of less than 10.

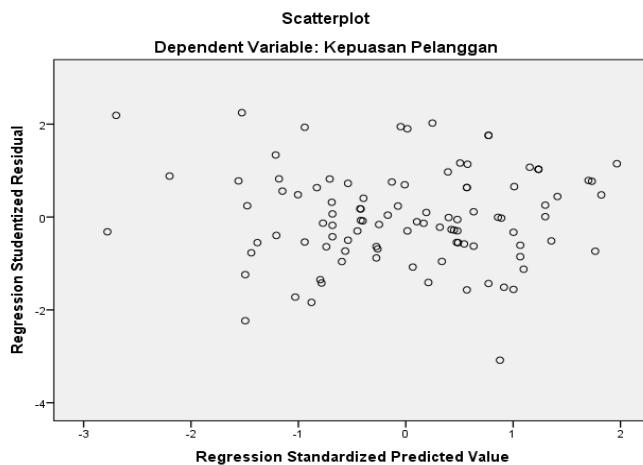


Figure 2. Heteroscedasticity Test Results

Based on Figure 2 above, it shows that there is no heteroscedasticity, because the spread of data forms a certain line or there is no clear pattern, and the points spread above and below the zero on the Y axis.

Table 6. ANOVA: Influence of Independent Variables (X) Together on Dependent Variables (Y)

ANOVA ^b						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	453.942	2	226.971	13.429	.000 ^a
	Residual	1639.448	97	16.902		
	Total	2093.390	99			

Unbound Variables: Product Quality and Service Quality
Bound Variables: Customer Satisfaction

Data Source: Processed from the Questionnaire

Based on the results in Table 6 above, it can be seen the results of testing simultaneously (F test) in the ANNOVA table obtained Fcount value of 13,429 greater than the F table value at the level of confidence 94%. To get results from F table can be calculated using the formula $F_{table} = F(k: n - k)$, then $F_{table} = 4: 100 - 4 = 96$, then it can be seen from the result table 3.09% ($F_{count} 13.429 > F_{table} 3.09$) and a significant probability value level $F = 0,000$ smaller than Alpha 0.05 (Sig. $F = 0,000 < \alpha 0,005$). So it can be seen from the table above, it can be concluded that the Product Quality variable (X1), and Service Quality (X2) together have a significant effect on Customer Satisfaction (Y).

Table 7. Regression Coefficient

Model	Coefficients			t	Sig.
	B	Unstandardized Coefficients	Standardized Coefficients		
1			Beta		
(Constant)	20.314	3.701		5,488	0,000
Product Quality	0,188	0,081	0,238	2,324	0,022
Service Quality	0,310	0,105	0,303	2,964	0,004

Bound Variables: Customer Satisfaction

Based on the results of the t-test analysis calculation in Table 7 above, it can be described as follows:

- 1) Product Quality Variable (X1), has a beta value of 0.188 with a significant value of 0.022 which is smaller than 0.05. This means that the Product Quality variable has a positive and significant effect on Customer Satisfaction of 0.188 units.
- 2) Service Quality Variable (X2), has a beta of 0.310 with a significance value of 0.004 which is smaller than 0.05. This means that the Service Quality variable has a positive and significant influence on Customer Satisfaction of 0.310 units

B. Discussion of Research Results

1. Effect of Product Quality on Customer Satisfaction

Product Quality has a positive and significant effect on Customer Satisfaction. From the results of the study obtained the coefficient for the Product Quality variable of 0.188 with a significant value of 0.022 where this value is significant at the 0.05 significance level because it is smaller than 0.05. Thus, that Product Quality has a positive and significant effect on Customer Satisfaction.

Good product quality will lead to customer satisfaction with the products sold. To foster customer satisfaction, Café owners in Palembang must sell and provide products that are of good quality. Good quality products will create a sense of satisfaction for customers in enjoying dishes from the Café.

The results of this study are in line with the research of Asghar et. al. (2011), Aziam et. al. (2017) and Surip et. al. (2017), which argues that product quality has a significant effect on customer satisfaction. But it is different from the results of research conducted by Erry et. al. (2017), who get the result that product quality does not have a significant effect on customer satisfaction.

2. Effect of Service Quality on Customer Satisfaction

Service Quality has a positive and significant effect on Customer Satisfaction. From the results of the study obtained coefficients for Service Quality variables of 0.310 with a significant value of 0.002 where this value is significant at the 0.05 significance level because it is smaller than 0.05. Thus, that Service Quality has a positive and significant effect on Customer Satisfaction.

The better quality of service provided will be the higher customer satisfaction. This shows that the quality services offered will directly attract customers to use the services offered by the Café. In this context, management capability is needed to improve service quality from various aspects related to the development of facilities provided. In other words, the leader cannot expect much on the effectiveness of the results of the implementation of the duties / jobs of the employee if the employee does not understand clearly what and how he / she carries out his / her duties / work.

Thus it can be concluded that the better the understanding of service quality, the purpose of customer satisfaction will be more effective. This is because the concept of understanding the quality is adjusted to the willingness of the customer, with an understanding of the customer and knowing what is being faced by the customer, the customer will be happy with the service provided.

The results of this study are in line with the research of Asghar et. al. (2011), Ehsan et. al. (2012), Adil (2013), Ngo and Nguyen (2016), Latif (2017), Rasmansyah (2017), and Aziam et. al. (2017) and Surip et. al. (2017), argues that service quality has a significant effect on customer satisfaction. But it is different from the research conducted by Ghalib (2014), Sri Rahayu (2015), and Erry et. al. (2017), who get the result that service quality does not have a significant effect on customer satisfaction.

CONCLUSIONS AND RECOMMENDATIONS

A. Conclusion

This research examines whether product quality and service quality can influence customer satisfaction. The test results using multiple linear regression analysis with two independent variables namely Product Quality and Service Quality and one dependent variable Customer Satisfaction indicates that:

1. Product Quality Variables have a positive and significant effect on Customer Satisfaction at the Café in Palembang
2. Service Quality Variables have a positive and significant effect on Customer Satisfaction at the Café in Palembang
3. Independent variables that have a positive and significant influence are variables of Product Quality and Service Quality on Customer Satisfaction. But there is one variable that has the dominant effect, namely the Service Quality variable that has a positive and significant effect on Café Customer Satisfaction in Palembang

B. Recommendations

Based on the results of the research, discussion, and conclusions above, some suggestions can be proposed to get better results as follows:

1. For Café Bang Amin, Colony Café, Kahoy Coffee Shop, and Café Big Daddy: Variable quality of service, employees must be given special training to serve customers such as: placing cups, order speed, hospitality, ability to make coffee, and calculating the amount order accurately. Product quality must also be considered, therefore the café must pay attention to product combinations, variants of drinks that use milk must be optimized, must have the characteristics of food and food, according to customer expectations, be attractive, and the products produced are different from other cafes.
2. For Further Researchers: For further researchers who are interested in researching this research, they should examine prices, product quality, brand images and so on and can expand samples to strengthen and produce good research.

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Work Engagement and Proactive Behavior: A Concept

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Abstract- This article discusses the concept of proactive behavior and work engagement and summarizes relevant research. On the basis of Broaden and Build Theory (Fredrickson, 2001), this study explores the role of work engagement in predicting proactive behavior. Despite the growing concern on the increasingly crucial aspects of proactive behavior, little is known on how work engagement can propose linkage to proactive behavior. In this article, I review sets of literature to propose possible linkage on such relationship. To offer explanatory device, this article review and discuss related theory and concepts to provide direction and sense of the possible linkage.

Index Terms- Proactive Behavior, Work Engagement, Broaden and Build, Positive emotions

I. INTRODUCTION

A popular maxim as once mentioned by George Bernard Shaw; there are three kinds of people in the world, “those who make things happen, those who watch what happens, and those who wonder what happened.” Those people who make things happen is said to be the ones who making additional efforts to accomplish things. Indeed particularly, in working life, all employees are expected to put forth greater efforts in achieving work-related goals, in other words by being proactive. The first kind of people as mentioned by Shaw can be recognized as a concept of proactive behavior; in which this concept explains an essential behavior in making things happened in the context of work performance. This concept as defined by Crant (2000) is “taking initiative in improving current circumstances or creating new ones; it involves challenging the status quo rather than passively adapting to present conditions.” As the definition characterized, proactive people are actively engaged, not passively waiting or observing.

To illustrate this behavior, using sales agents as an example, Crant (2000) noted that sales agents might engage in proactive behavior by proactively seeking feedback particularly on the sale closing techniques to improve their sale performance. Similarly, using students as an example; student persistent in understanding particular topic to eventually score higher grades would be relevant to portray how proactive behavior is exhibited. Labeling this as a positive behavior, proactive behavior does not only limit to task performance; but also can take form in extra-role behaviors. For example when employees responds on the opportunities present by changing or modifying their job scopes or switch to more preferred divisions of the business. From a sales industry perspective for instance, Mallin (2016) noted that proactive behavior is a desirable behavior required for salespersons. It is further noted that proactive behavior is a significant key driver to sales performance. Salespersons’ works require them to engage in proactive work, for instance making sales calls and doing research for the ‘ideal target prospect’; rather than trying to sell their product or service to everyone. Proactive sale people tend to show high sale performance level (Pitt et al., 2002). As suggested by these examples, it is noted that proactive behavior has been associated to affect positively performance and performance related outcomes, and that those who are working in a competitive industry, proactivity attributes to play the role effectively. All of these above examples are to illustrate that proactive behavior reflects work performance and how it partly can influence academic achievement. In either achievement situation, proactive people does not need to be told to act on something, but rather act on advance to alter the circumstances in which the individual might be in.

In a competitive business environment, during times of fast changes and dynamic environment (e.g. technology, regulation etc.) employees are often expected to meet company goals to better achieve competitive advantage (Mallin et al., 2014). In the work setting, employees are not merely passive puppets who would only follow orders; rather they actively participate and make decisions to play role effectively particularly in dynamic environment (Cameron & Lavine, 2006; Seligman & Csikszentmihalyi, 2000). With this in mind, proactive behavior exhibited by employees could be a strong weapon for the organization to be able to achieve competitive advantage. Being able to take initiative and think on own feet without being asked or told are considered desired behavior expected of individual employees. Moreover, individual employees are also presumed to be able to deal and resolve challenging and difficulties encountered in work. Such self-starting behavior can become an added value to the individuals themselves and demonstrates their capability in putting forth effort in pursuing work goals. However, despite a number factors of antecedents to proactive behavior have been identified by previous researchers, still not much is known about how such antecedents would influence proactive behavior; as well as theoretical lenses that enlighten the relationships (Shin & Kim, 2015).

Work engagement is suggested to be an important predictor for proactive behavior (Salanova & Schaufeli, 2008; Sonnentag, 2003). The current study intends to further discuss how work engagement influences proactive behavior through a motivational underpinning. More specifically, this study argues that employees' work engagement triggers proactive behavior at the workplace. Work engagement is a positive affective and "motivational state characterized by vigor, dedication, and absorption" (Schaufeli, Salanova, Gonzalez-Roma, & Bakker, 2002). This study proposes that work engagement is an important mechanism that promotes proactive work behavior. This study will contribute to work engagement literature generally by treating it as a predictor variable to proactive behavior. With regard to that, Broaden and Build Theory will be used to provide an explanation of such relationship.

II. LITERATURE REVIEW

PROACTIVE BEHAVIOUR

In the literature, proactive behavior has been studied in an array of areas, looking its relationship with different research streams. Dictionary defined proactive as "controlling a situation by making things happen or by preparing for possible future problems" (Merriam-Webster, 2003). In the literature, Bateman and Crant (1993) defined proactive behavior as a "dispositional construct that identifies differences among people in the extent to which they take action to influence their environments." Proactive behavior has personal and situational causes which directly modify environments (Bateman & Crant, 1993). According to Crant (2000, pg 436), proactive behavior is defined as "taking initiative in improving current circumstances or creating new ones; it involves challenging status quo rather than passively adapting to present conditions." Crant has argued four important constructs of proactive behavior; namely personal initiative, self-efficacy, proactive personality, and taking charge. These four constructs have the same behavioral domain and focus on efforts to promote effective functioning in the workplace. Such self-starting behaviors will lead changes for the individual employees and ultimately to business as well (Fritz & Sonnentag, 2009). Despite the conceptualization of proactive behavior, there is still confusion in the literature that confined proactive behavior in the contextual domain only (Parker, William & Turner, 2006). In regard to this, Crant (2000) further noted in his article saying that proactive behavior is partly in-role behavior to accomplish formal job requirement and extra-role behavior that would go far than what formal job requirements prescribed.

Labeling proactive as active work behavior, Frese and Fay (2001) identified proactivity as personal initiative; that is "self-starting work behavior that overcomes barriers to achieve a goal and permits individuals to deal with work challenges and difficulty more actively." In similar focus, Grant and Ashford (2008) refer proactive behavior as "anticipatory action that individuals take to impact themselves and/or their environments; in which it involves an active promotion of meaningful personal or environmental alteration". Drawing from these definitions, although they may vary, focus on central theme that proactive behavior comprises actions that requires acting in advance, peremptory, self-initiated behavior by individual to actually make a difference to a situation instead of reactively and passively waiting for something to happen. However, there is still lacking in research that examined proactive behavior, specifically in light of how such behavior can be developed in employees (Gitulescu, 2012).

WORK ENGAGEMENT

Work engagement is defined as "positive, fulfilling, work-related state of mind characterized by vigor, dedication, and absorption" (Schaufeli, Salanova et al., 2002, pg 74). This definition can enlighten how motivation is perceived as the drive within an individual that influences voluntary behavior, in term of its persistence, intensity and direction. Employees that are motivated are said to readily use a particular level of effort (intensity), for a certain amount of time (persistence), toward a particular goal (direction). Employees who are engaged are energetic and have a connection with the work activities they engaged in and able to deal with any related demands from the jobs (Schaufeli & Bakker, 2003). Table 1 below summarizes the work engagement conceptualization.

Work Engagement conceptualization	Descriptions
Vigor	Characterized by high levels of energy and mental resilience while working, the willingness to invest effort in one's work, and persistence even in the face of difficulties.
Dedication	Characterized by a sense of significance, enthusiasm, inspiration, pride, and challenge.
Absorption	Characterized by being fully concentrated and deeply engrossed in one's work, whereby time passes quickly and one has difficulties with detaching oneself from work.

Table 1: Work Engagement Conceptualization (Salanova & Schaufeli, 2008)

When employees are engaged, they are characterized by their willingness as well as readiness to deliver their personal energies expressed cognitively, physically, and emotionally; associated with satisfying the requirement of the work and also their discretionary work roles (Thomas, 2009). Likewise, an engaged employee has enthusiasm for the work and they fully involve in their work (Seijts & Crim, 2006). Rashid, Asad & Ashraf (2011) noted that another way for individual employees to be perceived as fully engaged in

work is how they will show it by devoting their more energy in time and energy. They further argue that if a corporation provides all the resources necessary for employees to conduct their jobs, the employees would really show some good performance and that will make themselves engaged in work. Lockwood (2007) stressed that organizations are increasingly involved in engaging and retaining its employees, referring to the fact that organizations are moving forward competing in boundaryless business world. With regard to this, organizations are reasonably looking for answers that help them understand and dealing with this rising issue. The highlighted concern is how the organizations can do to foster engagement among employees since the significance of it, is important to organizations (Gruman & Saks, 2011).

WORK ENGAGEMENT AND PROACTIVE BEHAVIOUR

Work engagement and proactive behavior are expected to be positively related. Sonnentag (2003) found positive affect between work engagement and proactive behavior. From the study, it was found that employees with high level of engagement take initiative on a daily basis. In similar vein, Salanova and Schaufeli (2008) conducted a study by using two samples, Spanish employees working in rapid technological changes and managers from Dutch Company. The study found that an increase in job resources would also increase work engagement, which then, affect positively to proactive behavior.

In addition, work engagement is seen as potential personal resources for proactive behavior. With the high level of vigor and feeling energized, it is said to activate proactive behavior (Parker et al., 2010), in which work engagement builds a resource that turns into proactive behavior. Engaged employees also place high value and care towards their work, and that lead them to exhibit more effort in their work (Schmitt, Den Hartog & Belschak, 2016). Since proactive behaviors involve change-oriented (Agarwal, Datta, Blake-Beard & Bhargava, 2012), it requires the employees to give focus and engross in their work through work engagement. Work engagement also incorporates positive emotions through the dimension of dedication. Positive emotions will expand people's cognitive and behavioral repertoire and lead their focus to behaviors that are future and changed-oriented (Bindl et al., 2012). Engaged employees are said to experience positive emotions at work, including interest, hope, pride and inspiration in their work (Schaufeli et al., 2006), it triggers proactive behavior which promotes effective functioning at work.

With the reasoning above, Broaden and Build Theory (Fredrickson, 2001) will be used to explain the relationship between work engagement and proactive behavior. Broaden and Build reflects how through positive perceptions of work actually expand the affective and cognitive processes that would advance self-application to the work role. It is also argued that positive emotions represent the most proximal factor of outward-oriented behavior. With the theoretical foundation in place, this study uses broaden and build theory as an underpinning theoretical lens to explain the relationship. In line with the broaden-and-build theory of positive emotions, it is argued that positive emotions (e.g. work engagement), have the ability to extend one's thought and action repertoires and building increased job resources. When engaged employees broaden their thoughts and actions, they will be better at adopting their job resources (Bakker & Demerouti, 2008). These job resources are crucial for showing effortful behaviors such as proactive behavior. Moreover, Fredrickson (2013) further explained that positive emotions are ideal when the environments or circumstances are valued and meaningful to the individual.

Although previous research have made an attempt to study the linkage between proactive behavior and work engagement and even found such linkage existed, not much is known on the capacity of work engagement in predicting proactive behavior at work. (Salanova & Schaufeli, 2008). Work engagement drives intrinsic motivation in which employees display perseverance in achieving goals along with exhibiting high level of vigor, dedication and absorption. Therefore, it can be expected that high engagement level would influence proactive behavior (Salanova & Schaufeli, 2008). It would make sense that individuals would wish to engage in work as a mean to behave proactively. This study intends to contribute to the ongoing debate of the relationships by showing that work engagement may potentially predict proactive behavior.

III. CONCLUSION

This research hopes to contribute to ongoing discussion about the potential of work engagement through motivational lenses in predicting proactive behavior. In accordance with Broaden and Build Theory (Fredrickson, 2001), through positive emotions, work engagement distinguished by high vigor, dedication and absorption would influence proactive behavior in the workplace. Positive emotions (through work engagement) are a lot more than just passive emotion and momentary experiences, but they produce the likelihood change of the individual behaviors by putting forth more effort (e.g., proactive behavior) (Armenta, Fritz & Lyubomirsky, 2017). The study helps to explore a mechanism of the link between work engagement and proactive behavior, furthering our understanding of such relationships. Further, in future it is hope that this study would reinforce the practical values that promote work engagement and proactive behavior at the workplace. Because environments that build work engagement are more likely to foster proactive work behavior, organizations should consider creating cultures that support such relationship.

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Dual Chambered Microbial Fuel Cell For Bioelectricity Generation From Environmental Samples

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Abstract- Microbial Fuel Cell(MFC) is an emerging technology which under anaerobic conditions, converts chemical energy in the organic substrates to electrical energy through catalytic reactions of microorganisms. This study is aimed to generate bioelectricity using a fabricated MFC with low cost anode and cathode materials without any toxic mediators. We devised MFC using Plain Graphite plates as electrodes. The cathodic electrolytes used were distilled water with NaCl whereas anodic compartments were inoculated with enriched bacterial culture. Anodic and Cathodic chambers were separated by a Proton Exchange Membrane. Current and Voltage measurements were recorded using a digital Multimeter. The performance of MFC was analysed using Polarization Curves. Maximum Power and Current densities obtained were $91.509.7\text{mW.cm}^{-2}$ and 46.88mA.cm^{-2} respectively. This experimental research was targeted to understand the capability of mediator-less dual chambered microbial fuel cell as electricity production unit.

Index Terms- Anaerobic conditions, Mediator-less MFC, Graphite plates, Electricity

I. INTRODUCTION

The International Energy Agency (IEA) in 2013 estimated World energy consumption as $1.575 \times 10^{17}\text{kWh}$ per year. Fossil fuels have supported the industrialization and economic growth of countries during the past century, but they cannot indefinitely sustain a global economy. The use of Fossil fuels leads to negative environmental impacts. Therefore, newer approaches like using fuel cells have emerged as a renewable energy sources that produces sufficient energy while at the same time reduces environmental damage. Among different kinds of fuel cells, Microbial Fuel Cells defined as devices which directly converts microbial metabolism into electricity have attracted researcher's attention (Allen, R.M. et al., 1993). The working principle of MFCs is based on the tenets of microbial physiology coupled with electrochemistry. MFCs are the major type of bio electrochemical systems which convert biomass spontaneously into electricity through the metabolic activity of the microorganisms. MFC technology has been found as a potential technology for electricity generation.

While the first observation of electrical current generated by bacteria is generally credited to Potter in 1911, after William Grove who built the first fuel cell in 1839, very few practical advances were achieved in this field even 55 years later (Lewis, K, 1966). The breakthrough in MFCs occurred in 1999 when it was recognized that mediators need not to be added. The essential physical components of the MFC are the anode, cathode and electrolyte. MFCs are typically designed as a two-chamber system (shown in Fig 1) with the bacteria in the anode chamber separated from cathode chamber by a polymeric Proton Exchange Membrane, which often separates the liquid in the two chambers while allowing protons to pass between the chambers. Microorganisms catalyze the oxidation of substrates releasing electrons and protons in the anode chamber. Electrons, collected on the anode, are transported to cathode by external circuit to create current and protons are transferred through the membrane internally, to sustain the current. Thus, due to dissimilar liquid solutions, a potential difference is produced between anode chamber and cathode chamber. Typically, the electrons and protons react with oxygen at the cathode, to form water. The defining characteristics of an MFC includes microbially catalyzed electron liberation at the anode and subsequent electron consumption at the cathode are sustainable. Principally, the output power depends on the rate of substrate degradation, the rate of electron transfer from the bacteria to the electrode, the circuit resistance and the proton mass transfer in the liquid. Since most microbial cells are electrochemically inactive, rapid electron transfer from a microorganism to an electrode needs an electron mediators like thionine, humic acid and many more. Thus, depending on the presence or absence of mediators, MFCs can be classified into two types. One type

generates electricity from the addition of artificial electron shuttles (mediators) to accomplish electron transfer to the electrode. The other type does not require these additions of exogenous chemicals and thus can be defined as mediator-less MFCs. Some anaerobic bacteria are even able to transfer electrons extracellularly to insoluble, solid-state electron acceptors such as electrodes (DiChristina et al., 2002).

Applications of MFCs:

The electricity produced by MFCs can be used for powering other technologies, such as biologically inspired robots, some remote devices. In addition, the voltage generated by MFCs can be used on microbial electrolysis cells (MECs). MFCs are especially suitable for powering small telemetry systems and wireless sensors that have only low power requirements to transmit signals such as temperature to receivers in remote locations (Ieropoulos et al., 2005). MFCs provide a renewable hydrogen source that can contribute to the overall hydrogen demand in a hydrogen economy. MFCs can potentially produce about 8–9 mol H₂/mol glucose compared to the typical 4 mol H₂/mol glucose achieved in conventional fermentation (Liu, H., et al., 2005). MFCs were considered to be used in treating sanitary waste, food processing wastewater, swine wastewater (Zhuwei Du, Haoran Li, 2007). MFC type of BOD sensor is used as a sensor for pollutant analysis and in situ process monitoring and control (Picioreanu. C, et al., 2007). Microbial communities in MFCs can function as tool for bioremediation (Jeffrey M. Morris and Song Jin., 2007). The main objective of the present study was to design an MFC which is capable of generating power simultaneously while employing low-cost materials without using toxic mediators. The fabricated MFC system (graphite electrode without any coating) was evaluated at ambient conditions using anaerobic mixed consortia and glucose as the sole source of electron. The current produced by an MFC is typically calculated in the laboratory by monitoring the voltage drop across the resistor using a multimeter.

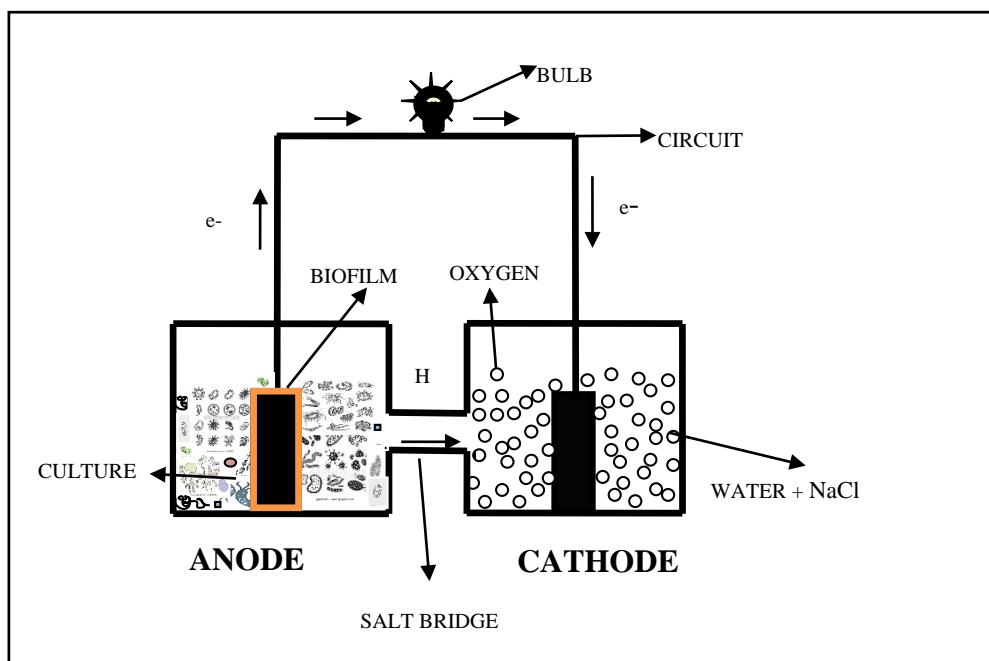


Fig 1: Schematic diagram of a typical two-chamber MFC

MATERIALS AND METHODS

Medium Composition and inoculum source-

Samples of coal were collected to isolate electrochemically active bacteria. The collected samples were inoculated in enrichment medium (Anaerobic media- Tryptone – 20gm/l, Dextrose – 10gm/l, Sodium Chloride – 5gm/l, Sodium thioglycolate – 2gm/l, Sodium formaldehyde sulfoxylate – 1gm/l, Methylene blue – 0.002gm/l, Final pH at 25°C – 7.2 ±2). This medium contains Sodium thioglycolate and Sodium formaldehyde sulfoxylate that provide adequate anaerobiosis which is indicated by methylene blue present in the medium, which gives blue colour to medium in the presence of oxygen. Dextrose provide essential nutrients while Sodium Chloride maintains Osmotic equilibrium. For biochemical characteristic analysis of isolated microorganisms, different media and reagents were used (Paul C. Schreckenberger, et al, 1974).

Cultivation-

One percent of the sample (which was diluted serially) was inoculated into autoclaved enrichment medium and incubated at 37°C without agitation under anaerobic conditions. The anaerobic conditions were maintained by applying a layer (approx. 2cm) of autoclaved oil over the surface of medium and sealed with parafilm wax. This ensures anaerobic conditions and therefore, allows the growth of only anaerobes. At the end of 72hr of incubation, the enriched cultures were analysed for bioelectricity generation.

MFC Fabrication and Operation:

The performance of MFC largely depends on the reactor design and electrode materials. Various forms of two cell compartment electrochemical cell may be devised to demonstrate microbial electricity generation and the one described here is one of them. The design criteria of dual chambered fuel cell are shown in Table 1. The electrons available through the metabolism of the electron donors by microorganisms are transferred to the anode of the fuel cell and then to the cathode through the circuit, where they reduce the oxidant, consuming protons available through the membrane from the anode (Allen, R.M., et al., 1993). Two chambers were selected in order to avoid mixing solutions of electron acceptors and electron donors and thus loss of electrons.

H – type two-chamber MFCs was constructed as described by Oh et al. Two polycarbonate bottles (1000ml) were linked with PVC pipe of 5cm length, which serves as salt bridge. The salt bridge was filled with boiled and cooled Sodium Chloride (15%) solution containing 5% agar. The salt bridge was fixed to the bottles with the aid of epoxy adhesive. The culture inoculum of bacterial strains was used as anolyte without any pre-treatment and distilled water with added NaCl was used as a catholyte in MFC setup. Plain graphite plates (5 – 4cm; 0.3mm thick; 45.4cm²surface area) were used as electrodes. The electrodes were positioned at a distance of 2cm on either side of the PEM. Circuit connections were set with the copper wires fixed into the drilled holes of the electrodes and sealed with epoxy resin to avoid corrosion of copper wires. The MFC was sterilized by thorough rinsing with Ethanol (70% v/v) and UV irradiated for 30min. The sterilized MFC chambers were filled with respective electrolytes and kept at room temperature for one day. Electricity generation was recorded using a multidigital meter for 21days.

Table 1: Design criteria of Dual chambered mediator-less Microbial Fuel Cell

REACTOR CONFIGURATION	DUAL CHAMBER
Anode chamber	suspended growth
Anode inoculum	Mixed anaerobic Consortia
Mediator-anode	Mediator less
Working volume of anode and cathode	500ml
Electrodes	Graphite plates
Surface area of electrodes	45.4cm ²
Membrane	PEM (salt bridge)
Operating temperature	Room temperature

Calculations:

Current density of MFC was calculated using formula:

$$i \text{ (mA.cm}^{-2}\text{)} = I/A$$

where, 'I' is the current measured (mA) and 'A' is the geometric surface area of anode (cm²).

The Power density of the MFC was calculated using formula:

$$P \text{ (mW.cm}^{-2}\text{)} = iV$$

where, 'i' is the current density and 'V' is the Voltage measured (mV).

RESULTS

Enrichment of anaerobic exoelectron generating bacteria has been reported earlier. A layer of biofilm is formed on the surface of the anodic graphite plate. This biofilm formation helps in transfer of exoelectrons to the graphite plate. The present study shows that the microbial inhabitant of environmental sample has electrogenic potential and they can manifest this potential if they are properly re-inoculated into their habitat. This leads to the production of bioelectricity in the fabricated MFC.

A total of seven distinct bacterial isolates were isolated from chosen environmental samples (coal) and their biochemical characteristic analysis (using tests like IMVIC, gelatine, nitrate reduction test, urease, catalase, oxidase, Esculin hydrolysis and Sugar fermentation) were carried out and the results are shown in Table 2. MFC constructed by using 1000ml PVC bottles and connected with 5cm long and 5cm diameter salt bridge was used to generate electricity by microbial cell suspension cultures. Power generation in mediator-less microbial fuel cell was investigated using a digital multimeter. The increase in production of electricity from MFC is shown in Table 3.

Table 2: Results of Biochemical characteristic analysis of isolated bacteria

Organism expected to be	Bacillus sps.	Acidothiobacillus sps.	Pseudomonas sps.	E. coli	Staphylococcus sps.	Clostridium sps.	Propionibacterium sps.
Tests For identification							
Gram's staining	Gram +ve	Gram -ve	Gram -ve	Gram -ve	Gram +ve	Gram +ve	Gram +ve
Shape	Rods	Rods	Rods	Rods	Cocci	Rods	Rods
Motility	Motile	Motile	Motile	Motile	Non-motile	Motile	Non-motile
Capsulated	-	-	+	+	+	-	-
Sporulation	+	-	-	-	-	+	-
Catalase	+	-	+	+	+	-	+
Oxidase	-	+	+	-	-	-	-
Urease	+	-	-	-	+	-	-
Indole	+	-	-	+	-	-	+
MR	+	-	-	+	+	+	-
VP	+	+	-	-	+	-	-
Citrate utilization	+	+	+	-	+	+	-
Nitrate reduction	-	+	-	+	+	-	-
Gelatin hydrolysis	+	-	+	-	+	+	-
Esculin hydrolysis	+	+	-	+	-	+	+
Starch hydrolysis	+	-	-	-	-	-	-
Sugar fermentation tests	G	+	+	-	+	+	+
	L	-	+	-	+	+	+
	M	-	+	-	-	+	-
	S	+	+	-	+	+	-

Where, G = Glucose, L = Lactose, M = Mannose, S = Sucrose.

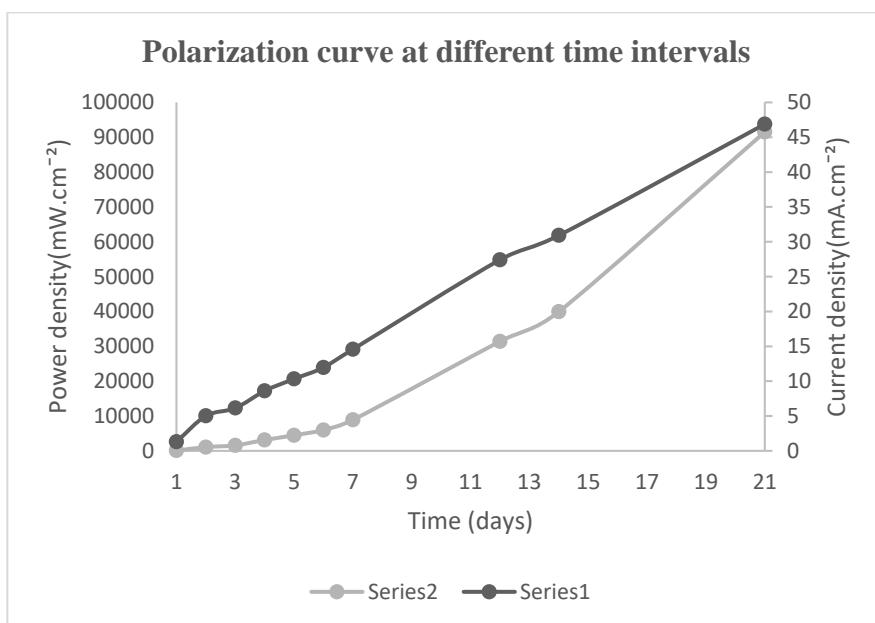
'+' indicates – the reaction is positive for the test and '-' indicates – the reaction is negative for the test.

Table 3: Measure of Voltage, Current, Current density and Power density for a period of 21days with graphite as electrode

S.No.	Day	Current measured in milliamperes(mA)	Voltage measured in millivolts(mV)	Current density(i) in mA.cm^{-2}	Power density(P) in mW.cm^{-2}
1	Day 1	59.7	55	1.31	72.05
2	Day 2	228.2	210	5.02	1054.2
3	Day 3	279.2	257	6.14	1577.9
4	Day 4	391.2	360	8.61	3101.7
5	Day 5	469	432	10.33	4462.5
6	Day 6	543	500	11.96	5980
7	Day 7	662	610	14.58	8893.8
8	Day 12	1245.3	1146	27.42	31423.3
9	Day 14	1403.9	1292	30.92	39948.6
10	Day 21	2128.7	1952	46.88	91509.7

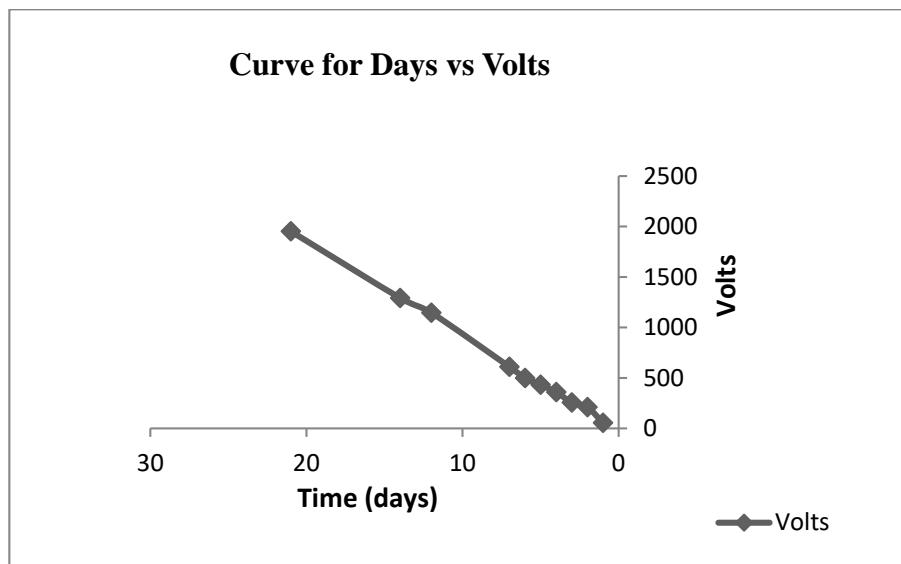
As shown in Fig.2 and Fig.3, there is an increase in Power production with increasing time period. This is due to the formation of bacterial biofilm on the graphite surface in anode chamber. About two days after the beginning of the MFC operation, the current and power densities increased. Probably, this period was required by the microorganisms to adapt to the culture medium, to begin to adhere to the graphite plate, and to produce the biofilm. The Power density was directly dependent on the biofilm development. The spreading property of biofilm is especially useful for MFC efficiency because it means that the number of electrons transferred to the anode is directly proportional to the anode's surface area given minimal loss of electrons due to close proximity between the biofilm and the anode (Kim BH, et al., 2003). The maximum Current density and Power density was 46.88mA.cm^{-2} and $91,509.7\text{mW.cm}^{-2}$.

Fig. 2: Polarization curve to show Power generation in MFC



Where, series 1 represents Current density and series 2 represents Power density

Fig.3: A curve showing an increase in volts in MFC



CONCLUSION

Microscopic, Morphological and Biochemical characteristic analysis revealed the presence of seven different microorganisms which include aerobes, anaerobes and facultative anaerobes. The results revealed the feasibility of bioelectricity generation using a fabricated MFC with low cost anode materials (non-coated plain graphite electrodes), without any toxic mediators. It can hence be stated that the potential electrogenic bacteria can be easily procured from environment and deployed in MFCs for an eco-friendly and economically viable method of electricity generation. Maximum Current and Power densities obtained using anaerobic consortia in this experiment were 46.88mA.cm^{-2} and $91,509.7\text{mW.cm}^{-2}$. Although MFCs are a promising technology for renewable energy production, they face several challenges, as well.

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The Effect of Natural Feeding Enrichment Using Beta Carotene on Stress Resistance and Survival Rate of Blue Swimming Crab (*Portunus pelagicus*) Larvae

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Abstract- One of the problems in blue swimming crab (*Portunus pelagicus*) hatchery is low survival rate of larvae, especially at the zoea and megalopa stages. This study aims to determine the optimum beta carotene dose on the survival rate of blue swimming crab larvae. The study was carried out at the crab hatchery in the Brackish Water Aquaculture Center (BPBAP), Galesong District, Takalar Regency, South Sulawesi. The crab larvae are maintained in a 40L plastic container filled with 24L of seawater (32ppt) salinity with density of 50 larvae/L. This experiment was designed with a completely randomized design (CRD) consisting of 4 (four) and 3 replications, and therefore, the experiment consisted of 12 experimental units. The treatment used different beta carotene doses in rotifer and artemia. The dosage used is 0ppm, 5ppm, 10ppm and 15ppm of beta carotene. The results of the variance analysis showed that the treatment had a very significant effect ($P < 0.01$) on the stress resistance and survival rate of blue swimming crab larvae. The highest level of stress resistance and survival rate was obtained at enrichment at a dose of 10 mg/L and the lowest at the dose 0 ppm of beta carotene.

Index Terms- *Portunus pelagicus*, beta carotene, rotifer, artemia, cumulative stress index, survival rate.

I. INTRODUCTION

The higher demand for crab meat (*Portunus pelagicus*) needs adequate and sustainable availability that can be met by intensive aquaculture. The development of crab aquaculture requires the availability of sufficient seeds to supply the demand of farmers. The presence of crab hatcheries is a solution for the supply of sufficient crab seeds. Production of crab seeds faces the problem of still low survival. The results of trials conducted by Prastyanti et al (2017) et al. resulted in survival rates of crab seeds to crab stadia ranging from 7.78-12.89%. The number of mortality of crab larvae in metamorphoses process due to feed quality and low-stress resistance (Suprayudi et al., 2006, Niklani A, 2013).

The critical phase of larval rearing is in the phase where the yolk of the larva runs out and begins to require exogenous nutrient intake (Watanabe and Kiron, 1994). According to Nikhlani (2013) larval deaths occur a lot when changing the feed phase from the egg yolk to the intake of nutrients from the

outside. This phase is a critical phase in the rearing of crab larvae, so all the supporting factors for the survival of crab larvae need to be considered, one of which is exogenous nutrition.

Efforts to increase crab survival, especially in the zoea stage, can be done by increasing the quality of natural feed through enrichment. Beta carotene is a hydrocarbon compound that is widely found in plants. Among the many important functions of beta carotene are related to provitamin A, which in turn affects embryonic development, properly growth, and vision. Beta carotene also shows anticancer and antioxidant properties (Berman et al., 2014). The antioxidant properties of beta-carotene can increase resistance to stressors during rearing.

Several studies on the use of beta carotene have been carried out. The use of carotenoid type astaxanthin and beta carotene as pigmentation in *Penaeus japonicus kuruma* shrimp has a positive influence on their survival (Chien and Jeng, 1992). The enrichment of rotifer with beta carotene for feed fish larvae of Japanese parrot fish (*Oplegnathus fasciatus*) results in higher survival in larvae compared to controls (Tachibana et al., 1997). The use of beta carotene enriched in rotifer supports the success of the Japanese parrot hatchery (*Oplegnathus fasciatus*) in the Nagasaki Municipal Fisheries Center where anti-infectives and beta-carotene antioxidants have a positive effect by producing larvae that are resistant to pathogenic viruses and bacteria (Tachibana et al., 1997).

One natural ingredient that has high beta carotene content is carrots (Marlyati, 2012). Some procedures are usually performed in extracting beta carotene, namely the operation of sorting and destruction of ingredients, suppressing juice, protein coagulation, sedimentation, centrifugation and extraction with organic solvents, filtration, dyeing, evaporation, and crystallization (Radomska and Harasym, 2018). According to Wingqvist (2012) extraction methods of beta carotene include traditional boiling, reflux, Soxhlet, and pressurized fluid extraction methods.

Until now, information about the use of beta carotene, especially those sourced from carrots to increase survival, the rate of metamorphosis and stress resistance in crab larvae is still limited.

II. METHOD

This research was carried out in the blue swimming crab hatchery unit of the Takalar Brackish Aquaculture Center, Indonesia, from October to February 2018. Extraction and analysis of beta carotene from carrots was conducted at the BPBAP Takalar Chemical Physics Test Laboratory using the Soxhlet method.

The animals tested are blue swimming crab larvae hatched in BPBAP Takalar hatchery. The larvae are stocked with a density of 50 head/L. 12 test containers tanks with a volume of 40L filled 24L of seawater (32ppt) salinity which had been treated for sterilization of sea water. The container is equipped with aeration to supply oxygen during the rearing.

The test feed used during the rearing of crab larvae is rotifer and artemia which has been enriched with beta carotene as a result of carrot extraction. Rotifer is obtained from the massive culture in the natural feed production unit of the Takalar Brackish Aquaculture Fisheries Center. Natural food types of artemia obtained from the results of hatching of commercially produced Inve artemia cysts, that has been enriched with beta carotene from carrots. The density of the rotifer is 500,000 ind/L and nauplius artemia is 300,000 ind/L, enrichment is carried out in containers with a capacity of 3L which are equipped with aeration for 6 hours. Carrot extraction is done by using a soxhlet tool (Wingqvist, 2012; Ismail, 2013). Analysis of beta-carotene using a spectrophotometer according to the method used by Takauechi et al. (1995) has been modified.

The parameters observed were stress resistance and survival rate. Stress resistance of crab larvae was tested by osmotic shock namely crab larvae were put into 0 ppt saline water. Cumulative stress index (CSI) is calculated by modifying the formula used by Ress et al (1994). with the following formula:

$$CSI = D_5 + D_{10} + \dots + D_{60}$$

Description:

CSI = Cumulative stress index

D_5, D_{10}, D_{60} = Number of stressed larvae at a certain time (minutes)

The survival rate is calculated using the following:

$$S = \frac{N_t}{N_0} \times 100$$

Description:

S = survival rate (%)

NO = Number of crab larvae at the beginning of the study

Nt = Number of crab larvae at the end of the study

The data obtained will be analyzed using variance analysis (ANOVA) and will be continued with W-Tukey's further test (Steel and Torrie, 1993). As supporting data during rearing, water quality measurements are carried out for several water quality parameters including temperature, salinity, dissolved oxygen, pH and ammonia.

III. RESULTS AND DISCUSSION

Results

The average content of beta-carotene rotifer, artemia and crab larvae are presented in Table 1.

Table 1. The average content of beta-carotene in rotifers, artemia, and crab larvae

Dosage of beta-carotene (ppm)	Average content rotifer (ppm) ± SD	Average content artemia (ppm) ± SD	Average content Crab larvae (ppm) ± SD
0	0.643 ± 0.13 ^c	2.307 ± 0.18 ^c	0.423 ± 0.11 ^c
5	3.271 ± 0.28 ^b	5.261 ± 0.10 ^b	2.267 ± 0.16 ^b
10	7.239 ± 0.29 ^a	9.217 ± 0.19 ^a	4.797 ± 0.27 ^a
15	4.488 ± 0.21 ^b	7.385 ± 0.50 ^b	3.259 ± 0.21 ^b

Description: Numbers followed by different letters in the average column show significantly different based on the Tukey test

Table 2. Average of cumulative stress index (CSI)

Dosage of beta-carotene (ppm)	cumulative stress index) ± SD
0	117.33 ± 1.15 ^a
5	117.00 ± 1.0 ^a
10	112.33 ± 0.58 ^b
15	113.33 ± 0.58 ^b

Description: Numbers followed by different letters in the average column show significantly different based on the Tukey test

Table 3. Average of survival rate of crab larvae

Dosage of beta-carotene (ppm)	Average of survival rate of crab larvae (ppm) ± SD
0	42.78 ± 1.03 ^c
5	51.58 ± 10.56 ^b
10	59.36 ± 4.79 ^a
15	56.72 ± 5.00 ^b

Description: Numbers followed by different letters in the average column show significantly different based on the Tukey test

IV. DISCUSSION

Discussion

The enrichment of rotifer with beta-carotene has an impact on the increase in beta-carotene content in rotifers. The results of the analysis of variance showed a very significant effect ($p < 0.01$). W-Tukey's further test results showed that each treatment showed significant differences compared to controls or rotifers without the addition of beta-carotene. ($p < 0.05$). The highest beta-carotene content in rotifers is the dose of 10 ppm which is 7,239 ppm. These results showed a significant increase in beta-carotene content compared to rotifer with a dose of 0 ppm (control) with a beta-carotene content 0.643 ppm.

The results of variance analysis showed that different doses had a very significant effect on the content of beta-carotene in artemia, rotifers and crab larvae. In the W-Tukey further test

the value of the beta-carotene content between treatments in artemia nauplius, rotifer and crab was significantly different ($p < 0.05$). The highest beta-carotene content was obtained at a dose of 10 ppm.

Low content of beta-carotene in rotifers and artemia at a dose of 0 ppm is due to the absence of beta-carotene in the culture medium. The content of beta-carotene in rotifers in the enrichment of 0 ppm beta-carotene originates from the intake of chlorella containing beta-carotene (Kristiyaningrum, et al. 2013).

The results of the analysis showed that the content of beta-carotene in the body of crab larvae increased after being given natural feed enriched with beta-carotene during the study. The highest beta-carotene content was obtained in crab larvae with the treatment of natural feed enriched with beta-carotene at a dose of 10 ppm which is equal to 4,988 ppm. The greater beta-carotene content compared to other treatments is supported by natural feed intake that has been enriched at optimal doses during rearing. The lowest beta-carotene content in the treatment dose of 0 ppm beta-carotene because there is no enrichment of beta-carotene in the natural feed.

Cumulative stress index testing (CSI) was conducted to determine the resistance of crab larvae to drastic changes of conditions in environmental. One cause of stress (stressor) is a change in salinity. Analysis of the variety of blue swimming crab larvae showed a significant difference between the crab larvae who received natural feed intake and beta-carotene enrichment compared to controls. Stress resistance is indicated by the low-stress response shown by larvae after receiving a stressor. According to Bendich (1993), the potential of carotenoid (beta-carotene) can improve immune function by increasing the modulation of macrophages and lymphocyte activation. In addition, beta carotene plays a role in cooling antioxidants and singlet oxygen, pro-vitamin A activity and increasing regulation of DNA expression. The existence of stress will have a negative influence on the physiological balance of crab larvae which will accelerate the flow of energy. The 0 ppt salinity stress given to the test animals gave a difference in rearing media concentration and body fluid concentration which resulted in blue swimming crab larvae conducting osmoregulation to maintain body fluid concentration as a result of diffusion and osmose (Ernawati, 2017).

The results of variance analysis showed that the provision of natural feed enriched with beta carotene with various doses had a very significant effect on the survival of crab larvae ($P < 0.01$). W-Tukey's advanced test showed significant differences between treatments ($P < 0.05$).

The highest survival obtained at a dose of 10 ppm is associated with a higher level of stress resistance compared to other treatments. Stress resistance in larvae will reduce mortality rates in larvae caused by changes in environmental conditions. describe stress resistance of crab larvae to changes in the environment.

V. CONCLUSION

Rotifer and nauplius of artemia enriched with beta-carotene as natural feed for blue swimming crab larvae can increase the content of beta-carotene in natural feed and blue swimming crab larvae. A dose of 10 ppm beta carotene gave the

best cumulative stress index results with a value of 112.33 and the highest survival of the crab larvae was 59.36%.

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Prebiotic Applications From The Types Of Nuts In Feeding To The Flash Rate And Specific Growth Of The Milkfish (*Chanos chanos Forskal, 1775*)

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ABSTRACT

The purpose of this study was to analyze the survival and specific growth of milkfish after being given various prebiotics from the types of beans in the feed. Spread with a density of 15 birds/aquarium with a size of 50 x 45 x 45 cm filled with water with 15-20ppt salinity. Fish are kept for 60 days and fed 5% body weight/day. The study was designed in a completely randomized design with 5 prebiotic treatments from legumes, soybeans, peanuts, green beans, kidney beans, and controls. The results showed that various prebiotics in a feed from legumes was significantly ($p < 0.05$) on survival and specific growth (% / day). The highest synthesis was produced in red bean prebiotics (77.78 ± 3.85), but not different from peanut prebiotic types (73.33 ± 6.66), controls (66.67 ± 0.00), and peanuts green (60.00 ± 11.54), but significantly different from soybean prebiotics (51.11 ± 13.87). The same results were shown at specific growth rates (% / day), the highest in red bean prebiotics (12.94 ± 3.19) and significantly different ($p < 0.05$) in the other treatments. So it can be concluded that the best type of prebiotic beans is red beans.

Keywords: *legumes, prebiotics, probiotics, milkfish, survival, growth, milkfish*

PRELIMINARY

One solution that can be offered to optimize the role of the digestive tract microflora as a producer of exogenous enzymes with prebiotic administration. Prebiotics act as a feed supplement which is in the feed or intentionally added to the feed can play a role in maintaining the balance of the microflora population and can be a growth promoter or activate several strains of beneficial bacteria found in the digestive tract of fish (Mazurkiewicz et al. 2008).

In the digestive tract of milkfish, there is many microflora where the microflora is a collection of microorganisms found in the digestive tract of organisms. In Aslamyah's study (2012) stated that there were microflora in the digestive tract of milkfish, namely 4 amylolytic microbial isolates (Moraxella sp., Aeromonas hydrophila, Citrobacter sp., And Carnobacterium sp.), 3 anaerobic amylolytic microbes (Staphylococcus sp. Flavobacterium sp. , and Vibrio sp.), 5 types of aerobic proteolytic microbes (Streptococcus sp., Bacillus sp., Micrococcus sp., Pseudomonas sp., and Proteus sp.), 2 types of anaerobic proteolytic microbes (Vibrio alginolytic and types not identified), 2 types of aerobic lipolytic microbes (Planococcus sp., And Plesiomonas sp.) And 2 types of anaerobic lipolytic microbes (Kurthia sp. And Serratia sp.). Microflora is able to utilize fibers in a feed that are not digested by the organism's intestine, so as to optimize the digestibility of feed in the digestive tract. Microflora in the form of probiotic bacteria that need nutrients in population development (Pelezar and Shan, 1988).

Microflora grows optimally supported by the availability of nutritional sources known as Prebiotics. Prebiotics are short chain sugar molecules, which contain fructose. Prebiotics are fibers that cannot be digested by the body and are food for probiotics. to optimize the bacterial population by providing prebiotics, according to Widowati and Misigiyarta (2003) that beans contain oligosaccharides not digested but beneficial for probiotic bacteria.

Types of beans that contain oligosaccharides are green beans, soybeans, and peanuts, so it is hoped that as a prebiotic can increase the bacterial population. Therefore, the synergy between probiotics and prebiotics will be more profitable, where the combined balance of probiotics and prebiotics will support the continuity and growth of beneficial bacteria in the digestive tract. The addition of prebiotics into the feed used by digestive bacteria causes an increase in enzyme activity in the digestive tract which

can increase digestibility (Murni, 2004). Good digestibility will optimize the utilization of feed consumed so that it is expected to improve the quality of feed so that it is expected to increase growth and survival in milkfish life.

MATERIALS AND METHODS

This research was carried out in the Mini Hatchery Unit of the Department of Fisheries, Faculty of Marine and Fisheries, Hasanuddin University, Makassar, using 15 glass aquariums measuring 50 x 45 x 45 cm filled with brackish water with 15-20 ppt and test fish with stocking densities of 15 tails/container. As a treatment, prebiotics is given from the type of beans in the feed with compositions such as Table 1, which is prebiotic feed from legumes including soybeans, peanuts, green beans, kidney beans and without nuts (controls).

Table 1. Feed formulations used during the study

raw material	Percentage of treatment				
	Soybeans	Peanuts	Green beans	Red beans	Control
Fish flour	35	32	43	42	45
Soybean flour	30	0	0	0	0
Peanut flour	0	30	0	0	0
Green bean flour	0	0	30	0	0
Red bean flour	0	0	0	30	0
Coconut meal flour	20	23	12	13	40
Wheat flour	10	10	10	10	10
Fish oil	3	3	3	3	3
Vitamins & Minerals *	2	2	2	2	2
total	100	100	100	100	100

Description: *) Composition of vitamins & mineral mix. Every 10 kg contains Vitamin A 12,000,000 IU; Vitamin D 2,000,000 IU; Vitamin E 8,000 IU; Vitamin K 2,000 mg; Vitamin B1 2,000 mg; Vitamin B2 5,000; Vitamin B6 500 mg; Vitamin B12 12,000 µg; 25,000 mg ascorbic acid; Calcium-D-Phantothenate 6,000 mg; Niacin 40,000 mg; Cholin Chloride 10,000 mg; Methionine 30,000 mg; Lysine 30,000 mg; Manganese 120,000 mg; Iron 20,000 mg; Iodine 200 mg; 100,000 mg Zinc; Cobalt 200,000 mg; Copper 4,000 mg; Santoquin (antioxidant) 10,000 mg; Zinc bacitracin 21,000 mg.

Each treatment consisted of three replications and was designed in the complete random form (Gasperz, 1991). Prebiotic administration by mixing evenly with feed raw materials, then printed using a feed printing machine, then dried until ready to be given to test animals. Feeding is done three times a day at 7:00 a.m., 12:00 p.m., and 17:00 p.m. with the percentage of feeding 5% of the body weight of the test fish per day.

The variables observed, the specific growth rates with the formula Hardjamulia et al (1986), are compatible with Widyanti (2009). In addition, observations were also made on water quality variables including temperature, salinity, dissolved oxygen, and pH, to determine the feasibility of habitat for the life of the test fish. A sampling of growth is carried out every 10 days using a Camry scale accuracy of 0.01 g is survival calculated at the end of the study. The data obtained were analyzed for variance and followed by the W-Tukey test.

RESULTS AND DISCUSSION

Growth

The results of the variance analysis showed that the treatment of various types of beans in feed significantly ($p < 0.05$) on the growth of milkfish. W-Tuckey's further test of the treatment of various types of beans in feed on the growth of milkfish showed in Table 2 that the growth of milkfish in the administration of prebiotic feed from Red bean species gave the best growth results of $12.937 \pm .3.19\%$.

Table 2. Average growth of milkfish during maintenance.

Various Prebiotics in Feed	Parameter ± Std
	Growth
Soybeans	9,830±.2,69ab
Peanuts	5,743±1,78a
Green beans	6,960±.3,07ab
Red beans	12,937±.3,19b

Control

 $6,273 \pm 2,37ab$

Description: Different superscript letters in the same column show significantly different results ($P < 0.05$).

The results showed that the highest growth rate was obtained from the feed treatment containing red beans. The high growth rate of milkfish in the treatment of feeding containing red beans is thought to be due to the high crude fiber contained in red beans. Given that crude fiber is not digested in the intestine, it is not concerned with the formation of energy. However, fiber is metabolized by bacteria that are and through the digestive tract.

Rough fiber is a part of plants that cannot be absorbed by the body and does not have nutrients, but fiber has a function that is not replaced by other substances in triggering physiological and metabolic events that can protect the health of the digestive tract. In the context of fiber, Fructose oligosaccharide (FOS), Galakto-Oligo-Sakarida (GOS), or Inulin can simultaneously increase the population of positive bacteria. Fructose oligosaccharide (FOS) is one of the dietary fiber that can be obtained from food derived from legumes which is a substance that not only improves intestinal microflora through bacterial growth but also has a positive impact on the element of host health (Kusharto, 2006).

According to Anggraeni and Nurlita (2013) that fish growth is closely related to the availability of protein in feed, because protein is an energy source for milkfish and protein is also a nutrient that is very needed by milkfish for growth, that the amount of protein will greatly affect the growth of milkfish. In Sumpeno's (2010) study, referenced by Yeni et al. (2014), explaining fish growth is influenced by two factors, namely internal factors which include genetic traits and physiological conditions of fish and external factors related to food and the environment. According to Sudarmen (1988) the speed of growth depends on the amount of feed consumed, water quality and other factors such as heredity, age, endurance and the ability of the fish to utilize feed, Furthermore Boyd and Koppler, (1990) added that the amount of feed given is very important because if too little will result in slow fish growth and competition for feed will occur which results in variations in the size of the fish produced. Conversely, if too much feed will cause environmental pollution and inefficient.

Synthesis

The results of the variance analysis showed that the treatment of various types of beans in the feed had a significant effect ($p < 0.05$) on the survival of milkfish. The W-Tuckey test shows in Table 3 that survival values in feed containing red beans differ from those containing soybeans but are similar to feed containing peanuts, green beans, and controls.

Table 3. The average survival of milkfish during maintenance.

Various Prebiotics in Feed	Parameter ± Std
	Synthesis
Soybeans	51,113 ± 13,87a
Peanuts	73,333 ± 6,66ab
Green beans	60,003 ± 11,54ab
Red beans	77,777 ± 3,85b
Control	66,670 ± 0,00ab

Description: Different superscript letters in the same column show significantly different results ($P < 0.05$).

The survival rate of milkfish produced in this study ranged from 51.11 to 77.78%. This shows that the percentage of the survival rate of milkfish in all treatments during the study experienced mortality or death, but the provision of feed with the content of red beans in the feed gave the highest survival rate of 77.78%. The high yield on feed containing red beans in this study is thought to be due to the nutrient content in the feed given in the form of protein, carbohydrates, and energy according to the needs of milkfish. Thus, the need for energy can be fulfilled so that fish can maintain their survival rate.

In addition to the availability of artificial food and the fulfillment of nutrients for fish, the addition of feedstock types of beans into artificial feed is thought to cause the survival of milkfish to be high besides the survival of milkfish between treatments shows a significant effect, because the feed percentage is 5% from biomass/day is the ideal size so that fish do not experience shortages of feed or excess feed, even by feeding four times a day allowing milkfish not scrambling for food so as not to cause cannibalism which can reduce the value of fish survival.

According to Yurisman and Heltonika (2010), in Yeni et al., (2014), factors that can influence the high and low life velocity of an organism are biotic and abiotic factors. Biotic factors include competitors, population density, age and ability of organisms with the environment while abiotic factors such as temperature, dissolved oxygen, pH. According to Reksono et al., (2012), that water quality also influences the survival and growth rates of cultivated aquatic organisms, and is supported by the statement of Serdiati et al., (2011), that fish survival is caused by many factors, one of which is a solid fish stock that is too high.

CONCLUSIONS

The administration of prebiotics from the type of legumes into feed in treatment D gave the best growth results, namely $12.94 \pm 3.19\%$. The results showed that the highest growth rate was obtained from the feed treatment containing red beans. while at survival shows that survival values in feed containing red beans are different from feed containing soybeans but the same as feed containing peanuts, green beans, and controls. the percentage of milkfish survival rate in all treatments during the study experienced mortality, but the feeding of red bean in feed gave the highest survival results. So that it can be concluded that the use of prebiotics from the recommended type of red beans is applied to milkfish feed formulations.

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A Novel Approach Using Convolutional Neural Network to Reconstruct Image resolution

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Abstract- Extensively, image super-resolution (SR) poses a challenge across all fields of interest as its problem is considered inherent in its acquisition due to several reasons. Hence, many algorithms have been proposed to suppress this inherent challenges. As a contribution to help see through this inherency, we modelled a Randomized Convolutional Neural Network for Image Super-Resolution (RCNNSR) which simply learns an end-to-end mapping existing between the low-resolution (LR) and the high-resolution (HR) and this reconstructed high-resolution image is kindred as possible with the corresponding ground truth high-resolution image. In image super-resolution, signal recovery is very necessary in order to get further information. Hence our tested images were totally exploit using the randomized leaky-rectified linear unit in order to compensate for information that lies in the negative region and therefore handling problem associated with over compression. To ensure fast convergence and also prevent large oscillation, the Nesterov's Accelerated gradient is used to improve convergence speed of the loss function. The algorithm is compared to other existing techniques and our proposed method averagely suppresses the other algorithms.

Keywords: Convolutional Neural Network Rectified Linear Unit, Deep Learning, Image Super-Resolution.

1. Introduction

Human security as well as the acquisition of detailed information of a person has made the image super-resolution (SR) reconstruction, especially in this 21st century a very active research field. Presently, this area of research strives to conquer the inherent limitations in devices that detect and convey information that constitutes an image or video. Smartphones and digital cameras are classical devices amongst the many that exhibit such inherency. Hence, this aids to make better use of the rapid growth of high-resolution (HR) display as it tends to ease accessing information in a form of image or video, ultimately for security reasons and other fantasies [1]. Image super-resolution could be thought of as a way of producing a high resolution (HR) image from one or multiple low resolution (LR) images through a well-structured (software technique) or written algorithm in any platform which can overcome the inherent limitations of low-cost imaging sensors. For its importance, such technology is applicable in medical imaging (x-ray radiography, etc.), surveillance (for monitoring human activities and events of a particular environment) and so on [2]. The basic reconstruction constraint of super-resolution is that the restored image, after applying the same generative model, should re-establish the observed low-resolution image. Mostly, this assumption is not realized simply because image super-resolution (SR) is usually an ill-posed inverse problem due to the insufficient number of low-resolution images, ill-conditioned registrations, unknown fuzzy operators, etc. Hence, these make the solution of the reconstruction constraint not unique. These ill-conditions create irregularities in the super-resolution (SR) image reconstruction. These setbacks are regularized into a well-posed problem by the integration of prior knowledge [1]. There are many approach to resolving these inverse problems but Bayesian super-resolution reconstruction method is usually utilized because of its robustness and flexibility in modeling noise [3].

Classification of Image Super-Resolution

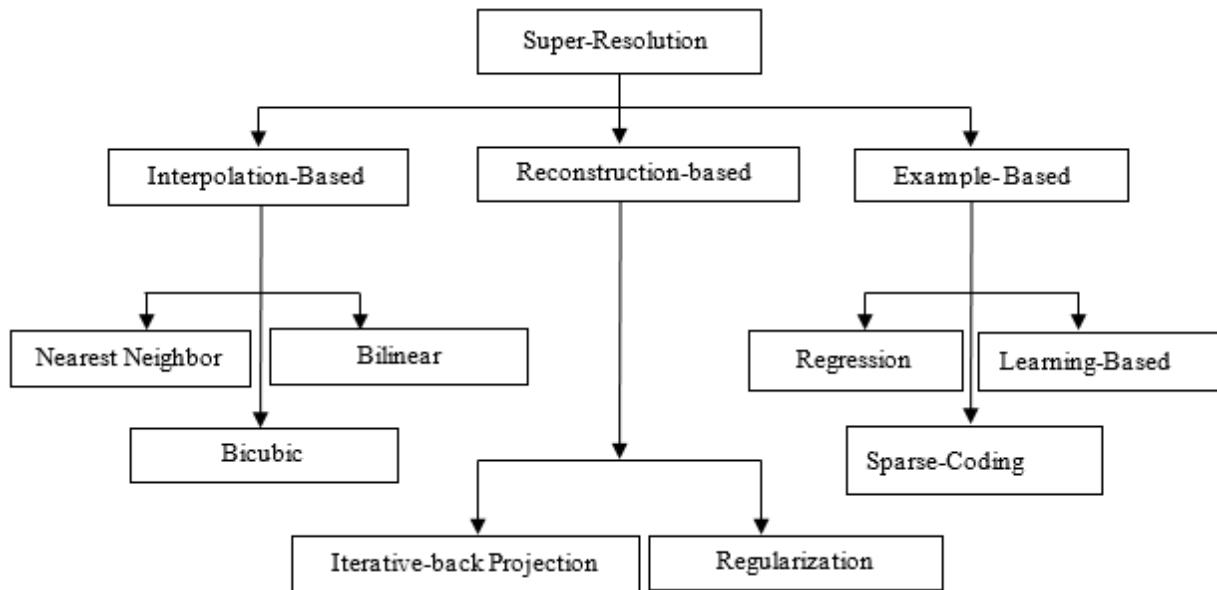


Figure 1: Flowchart of Super Resolution techniques.

Over the past years, researches concerning super-resolution (SR) have been made which had led to several proposed algorithms but the criteria upon which these algorithms are carried out can be grouped as shown above.

Interpolation Based Method: interpolation establishes a high-resolution image by calculating missing pixels' values and this approach can be implemented using traditional algorithms like nearest neighbor (NN), bilinear and bicubic interpolation. However, these interpolation-based methods commonly produce too smooth images as the magnification increase [4]. The most useful technique amongst the interpolation-based methods is the bicubic interpolation. It sharpens the edges and enhances the resolution of the image, but the disadvantage is that it produces ring- artifacts. To preserve and correct these artifacts, certain parameters (like local covariance coefficients) can be explored or algorithms (such as soft cuts algorithm) can be employed to check the regularization of the interpolation activities [5].

Reconstruction Based Method is divided into two (2) disciplines. These are; Iterative Back Projection Method (IBM) and the Regularization Method (RM).

Iterative Back Projection Method (IBM): It focuses on the blurriness of the image and the observed low resolution (LR) image in calculating the error difference of the HR image. This is usually done by back-projecting. For precision and accuracy, this procedure is repeated for a number of iterations to make the error insignificant [3].

Regularization Method (RM): The reason behind regularization algorithm is because SR reconstruction is an inverse and ill-posed problem. This is due to factors like unknown blurring operators, etc. Hence, various regularization methods such as Bayesian super-resolution reconstruction, total variation, sparsity and so on are the solutions to the ill-posed nature. This technique is to incorporate some prior knowledge about the desired HR image to constrain the solution space. The main advantage is that this method preserves edges and subdues artifacts in the resulting images [6].

Example-Based Method: The goal of this approach is to estimate the HR image using a dictionary corresponding patch. Here, the patch is constructed by either internal similarities or external training images. Since the micro-structural entities contained in the dictionary can be viewed as the image patches, it shows that the link between the HR image and LR image patches is established by the dictionary [5], [3]. Under the example-based method, one can adopt the technique of learning-based, sparse coding method or regression-based method.

Learning-Based Method: Basically, the estimation of the HR patches is from dictionary learning. Here, for every LR patch corresponds to a number of patches in the dictionary which is used in estimating the nearest neighbors. Afterward, the combination of the HR patches produces the HR image [3].

Sparse Coding Method: It employs two coupled dictionaries (D). Thus D_h for HR patches and D_l for LR patches. Coupling of these dictionaries enforce the sparse representation of the HR patches to equal the LR patches. The priority is training two coupled dictionaries for HR and LR image patches so that the sparse representation of the LR can be suitable for recovering the corresponding HR patches [5].

Regression-based method: the relationship existing between the LR and HR patches are studied by a regression function and the training sets are not learned from assumptions but rather the similarities within the LR and HR patches (thus, the correspondence of the LR and HR training sets). Now based on these training sets, the HR patches are obtained using the regression function by first minimizing the regularized cost function [3].

In this paper, we proposed a Randomized Convolutional Neural Network for Image Super-Resolution (RCNNNSR) to reconstruct a high-resolution image from a low-resolution image and this reconstructed high-resolution image is kindred as possible with the corresponding ground truth high-resolution image.

The rest of the paper is arranged as follows: Section 2 of the paper is the literature review. Section 3 deals with the methodology which discusses convolutional neural network for image super-resolution and the techniques involved in each phase. It also explains the proposed method of the paper and the algorithm including the training. Section 4 elaborates on the experiment and the evaluations of the results by first describing the experimental parameters, the setups, our results and figure compared to other state-of-the-art. Section 5 of the paper is the last part which summarizes the study and concludes it.

2. Literature Review

Deep Learning

Deep learning is a derivative of machine learning of which its method is based on exploiting many layers of linear and nonlinear processes (in classification or in pattern analysis feature extraction and transformation) [7]. The architecture of deep learning comprises some inter-connected layers that are programmed in a way that the output of each layer is connected to the next layer's input. These transformation units make extraction of data (input or features) very simple. The convolutional neural networks (CNN) form the general deep learning architecture and the primary transformation unit of CNN during estimation is the convolution filters contained in the CNN's layers. The connectivity of these equally-sized layers permit the network to learn sets of features with different properties. Since the general sequence is the output been the input of the next layer and so forth, the hierarchy system in deep learning makes the learning of higher-level features at the last layers. Minimization of the error between the network output and the ground-truth output is basically learned through optimization models and these form the weight of the filters. One of the reasons making convolutional networks prominent in computer vision is its ability to exploit and also capture stationary characteristics and learn vital features in natural images [8].

As mentioned above, CNN is a deep learning technique or algorithm that has the ability to train many layer networks. The architecture of CNN is a multiplex structure but also very flexible with fewer parameters. Because the interconnection between the input, the hidden layers and the output layer that are incorporated in the network through shared weight, sparse coding, and other coding properties, it decreases the complexity regarding feature learning and training of data sets [9], [10]. Dong et al [11] proposed a deep learning technique from a deep convolutional network to estimate the high resolution of a single image. The mapping of the algorithm serves as a deep convolutional neural network which straightforwardly learns the end-to-end mapping between the low resolution and the high-resolution images. Also, expatiate how sparse coding-based method can be viewed as a deep convolutional neural network. The structure of the CNN used by Dong et al is lightweight which aid to speed up the estimation time. It can also simultaneously deal with three color channels to enhance both restoration and reconstruction quality. Cui et al [12] proposed an auto-encoder network and a model that upscale low-resolution images through deep network cascade (DNC). The DNC is not an end-to-end mapping between the low and the high-resolution images since each layer of the cascade requires independent optimization of the self-similarity search process and the auto-encoder [13]. The technique utilizes the non-local self-similarity in each layer to exploit the patches of the input image through the enhancement of the high frequency. The collaborative local auto-encoder (CLA) receive the enhanced image patches as input, which it then subdues the jaggy nature and enhance the overlapping capability of the patches before entering the next layer for the reconstruction of its super resolution.

Deep learning is a newly discovered method of machine learning and its popularity has made it the pivot or the spot amongst the research areas of neural network, artificial intelligence, graphical modeling, optimization, pattern recognition and signal processing due to the usage of large data sizes for training and current advances in machine learning and signals or information processing research. Since deep learning is applicable to different research fields, the methods of convolutional neural network have shown greater impact and perform very well in several applications related to computer vision by endowing the computer to visualize, identify, analyze, process and understand images in the same manner as humans and also produce suitable output [7].

3. Method

The reconstruction of a single image super-resolution in deep convolutional neural network follows a preprocessing measure before subjected to the training phase. The formulation of the process starts with interpolation. Let Y represents the low-resolution image and X be the ground truth high-resolution image. Here, the method of bicubic interpolation is used to resize the low-resolution image Y to attain the same size as X and the interpolated image Y now functions as the input of the fully-connected network. This allows the training stage to transform Y to the high-resolution image by learning the shared weight of different filters in the layers. Error minimization in the network related to the output and the original high-resolution image is also ensured. The main aim is to recover from the bicubic reconstructed image Y , an image $F(Y)$ closer to the ground truth high-resolution image X via a mapping function F which is characterized by both linear and non-linear relationships. The training phase comprises three systematic operations: the patch extraction and representation, the non-linear mapping and the reconstruction phase where the output is aggregated.

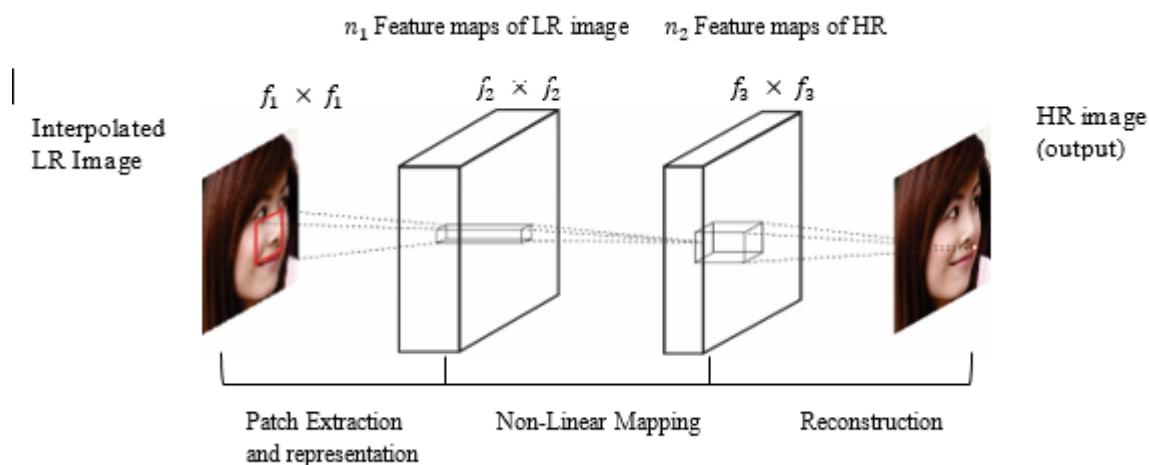


Figure 2: Illustration of a convolutional neural network

Feature Extraction and Representation Phase: This is the primary layer of the network which is also called the feature extractor layer. It is a phase that immediately accepts the interpolated image Y as input and operates on its features. In most image restoration techniques [14] patches are extracted and represented in a set of pre-trained manner such as Discrete Cosine Transform (DCT), Discrete Wavelet Transform (DWT) and Principal Component Analysis (PCA). These are Fourier related transforms that handle signals in their frequency domain and projecting images in their Eigen-space respectively. These pre-trainings form the basis of the feature extraction in the convolutional network where patches from the bicubic reconstructed image Y are extracted and each patch is represented or mapped into a high-dimensional vector. Here, the number of feature maps contained in the high-dimensional vectors equals the vectors dimension. The feature extraction and its representation into high-dimension space is purely linear convolution since we exclude the application of the rectified linear unit (ReLU) from the first layer operation and fully introduce it in the second layer to make the operation nonlinear. This implies the convolution of the image by a set of filters can be compared to the pre-trained bases such as DWT, DCT etc. in image restoration. The optimization of the network is based on the above mentioned bases. In the formulation, we defined the operation F_1 , between the interpolated image Y and the first convolution layer, mathematically as:

Where W_1 denotes filters (weight). Also equals n_1 -filters of size $c \times f_1 \times f_1$. C represents the number of channels in the image Y. f_1 is the size of the spatial filter, n_1 denotes the filter number and B_1 stands for the biases of the filters and also the n_1 -dimensional vector where each element in the vector is connected to a filter. Therefore, the output of the extraction phase comprises the n_1 -feature maps.

Nonlinear Mapping Phase: The first layer operation deals with the extraction of n_1 -dimensional features for each patch which now serve as the input of the second layer for mapping. For successful convolutional computation, each of these n_1 -dimensional vectors extracted from the first layer is mapped into an n_2 -dimensional space. The output $F_2(Y)$ for the second layer is expressed as:

Where W_2 is n_2 -filters of size $n_1 \times f_2 \times f_2$. B_2 represents the biases of size n_2 -dimension. The output of each n_2 -dimensional vector represents the high-resolution patches that will be utilized in the reconstruction phase. The function of this layer is to increasingly reduce the spatial size of the representation. This reduces the computational complexities because the number of parameters is decreased. Thereby, controlling over fitting.

Reconstruction Phase: Traditionally, image super-resolution reconstruction is achieved by aggregating the overlapping high-resolution patches to generate the final high-resolution image. This aggregation can be viewed as a pre-trained defined filter on a set of feature maps under the network. For this reason, the last convolutional layer for obtaining the final high-resolution image $F(Y)$ is given by:

W_3 represents c -filters of size $n_2 \times f_3 \times f_3$ which is also a linear filter. Also the size of B_3 is a c -dimensional vector. In the reconstruction phase, the filters play a specific role depending on the domain of the image. The filters behave as an averaging filter in the case where the high-resolution is in the image domain and can be reshaped and represented in a patch form. Otherwise in the case where the high-resolution patches are in other domain such as coefficients (in terms of other bases) the averaging is purely done by the W_3 by firstly projecting the coefficients into the image domain.

Rectified Linear Unit (ReLU)

The rectified linear Unit (ReLU) function is an activation or ramp function which is proposed by Hahn Loesser et al. In Artificial Neural Network, the rectified linear function is also an activation function which defines and simplifies the positive part of an outcome. It suppresses the effectiveness of other rectifiers such as logistic sigmoid, the hyperbolic tangent, and so on due to its efficiency in biological and other application fields. Let the rectified linear function be a ramp function ($R(x): \mathbb{R} \rightarrow \mathbb{R}_0^+$). Analytically, it can be written in various forms. Let consider it as a system. This implies the system equation can be expressed as:

And as a maximum function:

Where x_i is the input image, a_i is the coefficient governing the slope of the negative part and i shows the variations in different channels that the nonlinear activation operates on. Based on the value or the characteristics of a_i , rectified linear function assumes either: ReLU (rectified linear unit), PReLU (Parametric- ReLU), LReLU (Leaky- ReLU) or RReLU (Randomized Leaky-ReLU) and these variations are the unique properties of the rectified linear function.

Now, if $a_i = 0$, it implies the ReL-function becomes ReLU and can be expressed as:

If a_i = learnable parameter, then the function becomes PReLU, with the equation:

When $a_i = 0.01$ (small and fixed value), it is now an LReLU, with the support equation:

And finally, when a_{ij} is a random number sampled from a uniform distribution where $U(l, u)$ i.e. $a_{ji} \sim U(l, u)$; $l < u$ and $l, u \in [0; 1]$ [15].

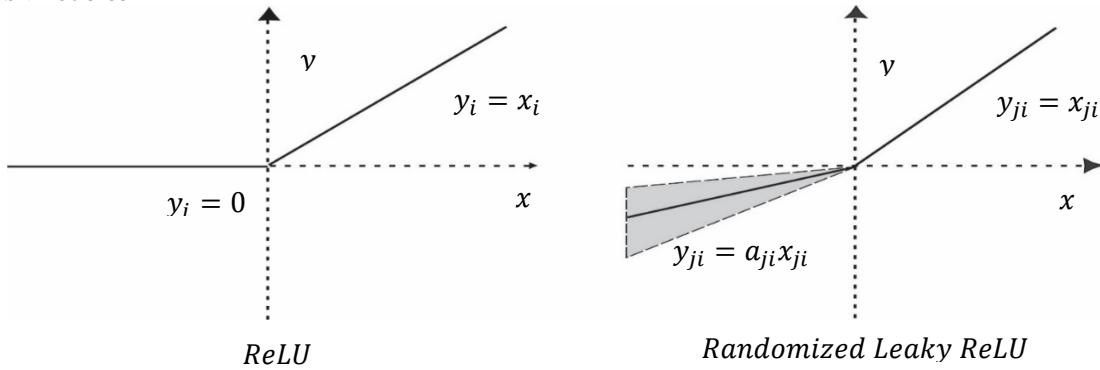


Figure 3: A characteristic graph between ReLU and RReLU

For RReLU, a_{ji} is a random variable which is sampled in a given range and remains fixed in testing. From equation (5), the maximum function applied to the convolutional neural network (CNN) takes the form $f(x) = \max(a_i, x_i)$, where $f(x_i)$ represents the final image associated with each layer's operation $F_i(x)$, $a_i = 0$ and $x_i = Wx + B$

Hence, the general activation function in CNN is expressed as:

Equation (9) is a perfect example of ReLU since $a_i = 0$ and most of the algorithms related to CNN employ such activation function to structure the network but considering *Fig.3*, it shows that all the information is based or concentrated in only the quadrant $x > 0$ whilst other information in other quadrants are squashed to zero. Therefore, avoiding such a limitation and seeking to recover more information as possible, we employed the randomized leaky rectified linear unit (RReLU) as it extends to the lower quadrant $x < 0$ as in *Fig.3* [16].

Hence from equation (5), the RReLU convolutional neural network system can be formulated as:

Where a assumes the same conditions as a uniform distribution. Combining equation (9) and (10), the final RReLU formulae can be generalized as:

Now equation (11) is integrated into the weights (filter response) of the various layers of the network with the same parametric properties during the formulation process. The new equations of the extraction and representation phase, the nonlinear mapping phase and the reconstruction phase are as follow respectively:

ReLU normally paralyzes or deactivates the neuron by putting it to zero when a negative value arises but the RReLU allows some small negative values. However, for consistency and comparison we maintained the procedure proposed by Srivastava et al [17] in training, as in the method of dropout by aggregating all a_{ij} and setting it to $\frac{l+u}{2}$ in the testing phase to obtain a deterministic result.

Also maintained the sampling parameters constant as suggested by Kaggle National Data Science Bowl (NDSB) competition that due to the randomized nature of the RReLU, it could reduce over fitting by sampling a_{ij} from U(3, 8). This implies $a = \frac{11}{2}$.

Training

The training phase requires an end-to-end mapping function F for estimating the network parameters. Let the network parameter $\theta = \{W_1, W_2, W_3, B_1, B_2, B_3\}$ where W_i and B_i are the weights and the biases of the various layers respectively. For better performance, the Mean Squared Error (MSE) is used as the loss function since it favors a high peak-to-signal- noise ratio (PSNR).

Let $\{X_i\}$ be a set of high-resolution images and $\{Y_i\}$ be its associated low-resolution images. hence the loss function can be expressed as:

where $F(Y; \theta)$ is the reconstructed image, X represents the ground truth high-resolution images and n is the number of training samples. The MSE is an important function mostly used for quantitatively evaluating image restoration qualities as its value is very significant in assessing the quality of image resolutions. There are many loss functions for training both traditional methods and CNN but if the loss function is flexible and derivable, the network can adapt to its parameters as compared to the challenges other methods would exhibit [13]. Although the framework is in the direction of favoring the PSNR, it also favors other image restoration metrics such as the structural similarity index measure (SSIM), Weighted Peak-To-Signal Noise Ratio (WPSNR), Mean Structural Similarity Index Measure (MSSIM) and so on. The minimization of the loss function by the various gradient descents by updating the weight W of the network is one of the integral part of evaluating how good or adaptive an algorithm is, and its simulation power (executing faster within a shorter time). In most cases or classically, training a neural network is minimizing the loss function by backpropagation, which is a specific gradient descent method for the neural network but recently, stochastic gradient descent (SGD) which is used for approximating the precise gradient when dealing with a large dataset is developed [18]. The SGD is an optimization technique or algorithm for modeling the parameters of the network in an iterative manner. The first iteration is to adjust the parameters a bit, and successively is to keep adjusting the parameters until it reaches a point that will enhance the performance of the network [19].

Consider an update on the weight matrices using the iterative equation:

$\mu \in [0,1]$, if $\mu = 0.9$ and $\nabla L(W_i^l) = \frac{\partial L}{\partial W_i^l}$, it implies

The SGD algorithm updates the weight W_{i+1} of the network through classical momentum (CM) by the linear combination of the previous update Δ_i and the derivative $\nabla L(W_i^l)$ or $\frac{\partial L}{\partial W_i^l}$. The momentum $\mu \in [0,1]$ is the weight of the previous update and mostly chosen to be 0.9. Δ_{i+1} represents the value for estimating the weight at $i+1$, l is the layers and since it follows the SRCNN architecture, it implies $l \in \{1,2,3\}$ and i is the iterations. Although SGD converges faster, it does not involve storing the overall training data in memory. It is flexible when adding new data in an online setting. SGD is used for analyzing loss functions in their convex form [20]. In deep learning, this loss function is non-convex to the parameters of the network, therefore, there is no assurance that it can estimate the global minimum, although it gives a good solution to deep learning networks. Hence we used the techniques of Nesterov's Accelerated Gradient (NAG) [44] to update the weights of the network.

Let the NAG formulae be:

Comparing SGD and NAG, the difference is in the derivative part. When updating, the SGD updates the weights through the linear combination of the previous update and the derivative whilst NAG updates the weights by firstly executing a partial update on W_i^l . Estimate $W_i^l + \mu\Delta_i$ which when considering equation (19) is W_{i+1}^l . This enables the Nesterov's Accelerated Gradient to respond better in regenerating Δ in a faster manner and in the situation where μ is higher, it becomes more stable than classical momentum. In the case where the optimization path of the classical momentum shows large oscillations in the direction vertical to its high-curvature, NAG has the ability to prevent these oscillations completely. This property makes it much efficient in decelerating during multiple iterations and also very tolerant to large values of μ compared to CM [17]. Now on each layer, the weights of the filters are determined by randomly drawing from a Gaussian distribution with zero-mean, a standard deviation of 0.001 and zero (0) biases. The learning rate of the first two layers and that of the last layer are 10^{-4} and 10^{-5} respectively. In the training phase, instead of patches, sub-images (samples considered as small images) were used and therefore it does not require any later processing such as averaging. Hence, the preparation of the ground truth images $\{X_1\}$ is set as $f_{sub} \times f_{sub} \times C$ pixel sub-images that are cropped randomly from the trained images. For the LR samples $\{Y_i\}$, the sub-images were blurred using Gaussian Kernel and sub-sampling the blurred image by an up-scaling factor using bicubic interpolation. Now to prevent border effects in the training phase, padding is excluded in all the convolutional layers enabling the network to create smaller output $[(f_{sub} - f_1 - f_2 - f_3 + 3)^3 \times C]$, and the evaluation of the MSE loss function is solely based on the difference between the central pixels X_i and the network output.

Algorithm

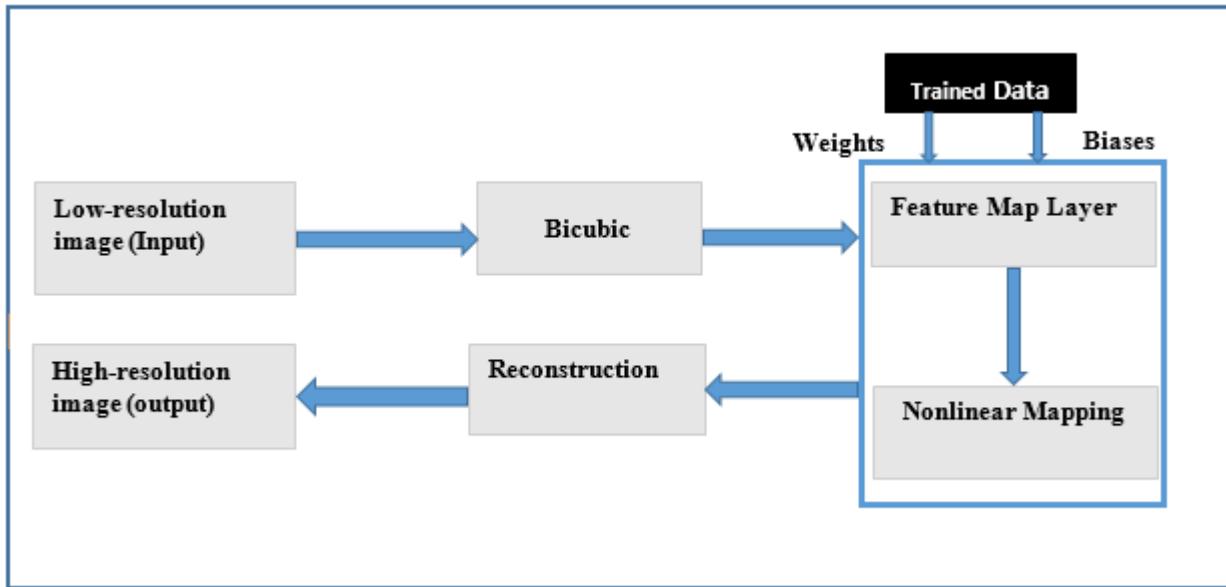


Figure 4: Proposed Method Workflow

Ground truth high-resolution image X

Input: Low-resolution (LR) image Y

Interpolate the LR image Y to the same size as X

The feature extraction and representation phase (convolution):

$$F_1(Y) = \max(0, W_1 * Y + B_1) + \frac{\min(0, W_1 * Y + B_1)}{a}$$

The nonlinear mapping phases

$$F_2(Y) = \max(0, W_2 * F_1(Y) + B_2) + \frac{\min(0, W_2 * F_1(Y) + B_2)}{a}$$

Image reconstruction phase (convolution):

$$F(Y) = W_3 * F_2(Y) + B_3$$

Output: High-resolution (HR) image same as X .

4. Experiment

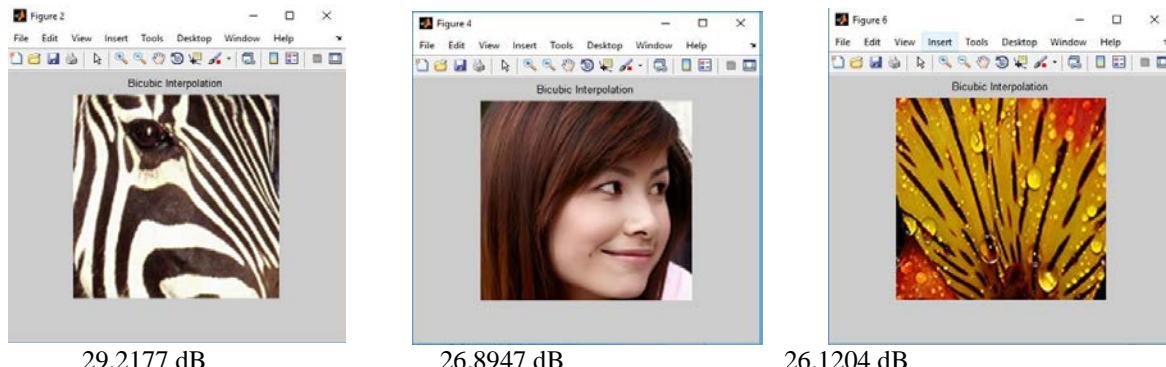
<http://dx.doi.org/10.29322/IJSRP.9.05.2019.p8999>

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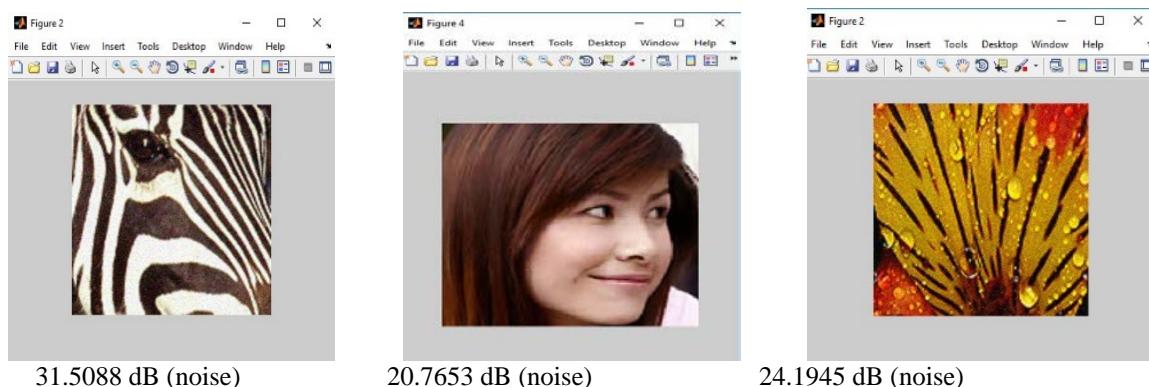
This study is motivated by the image super-resolution using convolutional neural network (SRCNN) algorithm. Hence the experimental setups follow a three-layer SRCNN architecture and parametrically as adopted by Dong et al [11]. The supremacy of the algorithm is tested by comparing it to other state-of-the-art such as sparse coding (SC) proposed by Yang et al [1], bicubic method, image denoising via principal component analysis with local pixels grouping (LPG-PCA) by Zhang et al [21] and other known methods of which their techniques are relevant and the codes to their models are publicly made available by the authors. Our novel named Randomized Convolutional Neural Network for Image Super-Resolution (RCNNSR) is evaluated using Caffe package configured through visual studio 2015. For feature extraction this is linked to a MATLAB platform to extract the features. Selections of fewer images (such as the zebra, lady, flower, etc.) from the dataset were used for evaluations and other computations such as the peak signal to noise ratio (PSNR). Following the setup of SRCNN, we set the filters as $f_1 = 9$, $f_2 = 5$, $f_3 = 5$, thus, $(9 - 5 - 5)$ and $n_1 = 64$, $n_2 = 32$. Also set $\mu = 0.9$ [22] and the up scaling factor for bicubic interpolation is considered as 3 for the training of the network. The initialization of the filter weights for each layer is a zero (0) mean and a standard deviation of 0.001 randomly derived from a Gaussian distribution, with zero (0) biases. The learning rates set for the layers of the network are 10^{-4} for the first two layers and 10^{-5} for the third layer. The training phase establishes the preparation of the ground truth images $\{X_i\}$ of pixel-dimension 32×32 pixel sub-images. The sub-images are cropped in a random manner from the training images. Now, these sub-images are samples considered as small images instead of patches. Such a technique is employed to prevent any post-processing such as averaging of overlapping patches. Also, the LR sample $\{Y_i\}$ is prepared by blurring the sub-image by Gaussian Kernel. This is then sub-imaged using bicubic with the same up scaling factor. Comparatively, we employed the training set, protocols, and the test set as described in [22]. 91 images were considered as the training set. Within the training set, we selected three (3) images for evaluation purposes with the upscale factor 3. We set $c = 1$ in the first layer and that of the last layer for the luminance channel (in YCbCr color) which is in accordance with other relevant traditional methods relating to luminance channels. Ensuring the same input and output image sizes, and eliminating border effect in the training phase, the layers of the network were structured with adequate zero-padding during the testing phase.

Simulation Results

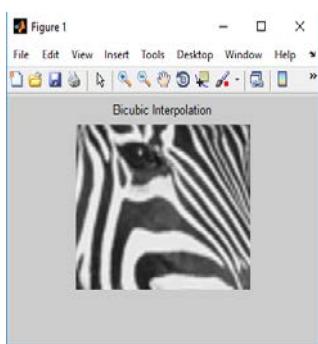
Bicubic output for Sparse Coding (SC)



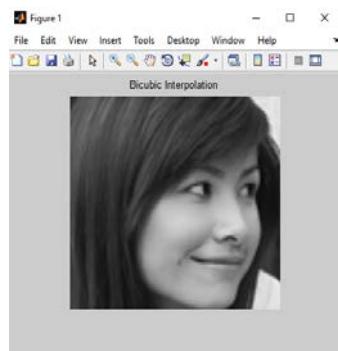
Bicubic output for Principal Component Analysis with Local Pixels Grouping (LPG-PCA)



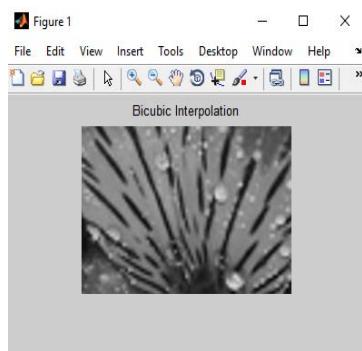
Bicubic output for Randomized Convolutional Neural Network for Image Super-Resolution (RCNNSR)



22.643732 dB

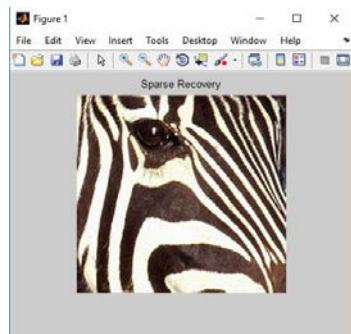


32.562617 dB

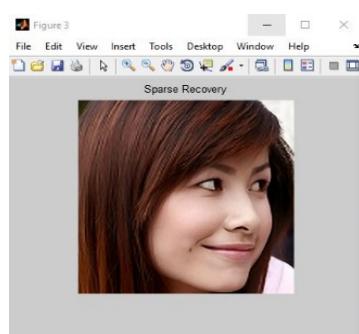


24.323178 dB

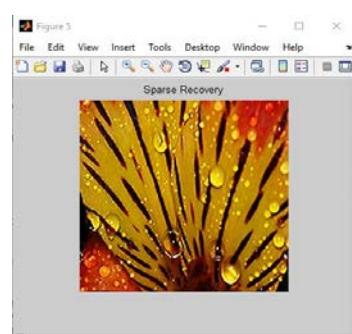
Simulation Results for Sparse Coding (SC)



29.3898 dB

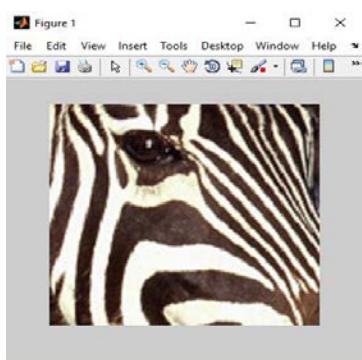


26.9301 dB

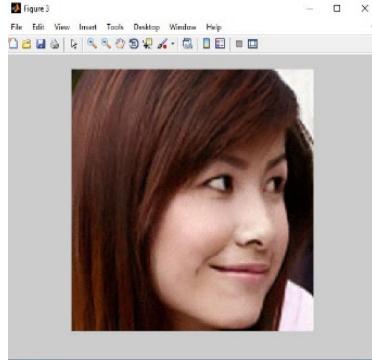


26.3030 dB

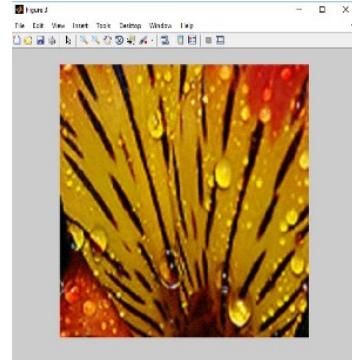
Simulation Results for Principal Component Analysis with Local Pixels Grouping (LPG-PCA)



26.4232 dB

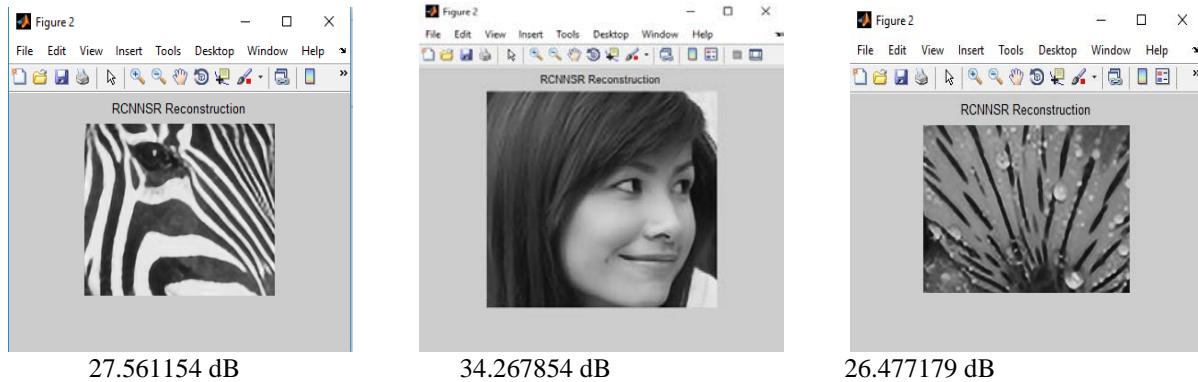


33.6703 dB



25.4995 dB

Simulation Results for Randomized Convolutional Neural Network for Image Super Resolution (RCNNNSR)



Evaluations

Table 1: The result of 3-images in PSNR (dB) selected from 91 trained datasets

Image \ Technique	RCNNNSR	RCNNNSR Cubic	SC	SC Cubic	LPG-PCA	LPG-PCA (Noise)
Zebra	27.5612	22.6437	29.3898	29.2177	26.4232	20.7653
Lady	34.2679	32.5626	26.9301	26.8947	33.6703	32.5988
Flower	26.4772	24.3232	26.3030	26.1204	25.4955	24.1945
average	29.4354	26.5100	27.5410	27.4109	28.5297	26.1371

Table 1 show the results of our algorithm (RCNNNSR) compared to other state-of-the-art. We calculated the PNSR and the bicubic value for each image used for the experiment is 3. With respect to the other two algorithms (Sparse coding and LPG-PCA) we compared each peak signal to noise ratio (PSNR) values of the selected images. Now based on the result, our algorithm produces a satisfactory outcome and averagely outperforming the other methods. Comparatively, the LPG-PCA (PSNR value) is much closer to ours model (RCNNNSR) with a difference of 1.138dB (Zebra), 0.5976dB (lady) and 1.2391dB (flower). Also, in each simulation, we considered the bicubic outputs of the various images and their corresponding estimates. The bicubic algorithm is one of the common techniques in image super-resolution and although it is better than other interpolation-based methods, it produces jaggy artifacts. Even with such defect in the images which can be analyzed by inspection, the RCNNNSR bicubic images are much sharper and of good quality compared to the sparse coding and the LPG-PCA (noise) although the SC cubic is higher for the zebra and the flower. With the sparse coding, our algorithm outperformed the sparse output by 7.3378dB (lady), 0.1742dB (flower) but the sparse coding PSNR value for the zebra outperformed our model by 1.8286. Although the simulation time is not a priority, the LPG-PCA algorithm takes much time during execution and followed by SC. Generally, the PSNR value shows how quality the image is, and vice versa. Hence, on the average, our algorithm RCNNNSR shows a higher PSNR value (29.4354dB) followed by the LPG-PCA (28.5297dB) and SC (27.5410dB).

5. Conclusion

Conclusively, we have provided a deep learning technique for image super-resolution. Our proposed Randomized Convolutional Neural Network for Image Super-Resolution (RCNNNSR) method cements an end-to-end mapping learning by totally exploiting the nonlinearity existing between the low-resolution images and the high-resolution images. We seek to recover more information of the images as possible, hence we utilized the randomized leaky rectified linear unit as an activation function to handle the problem of over compression because the rectified linear unit simply set or squash any value (information) below the $x > 0$ quadrants to zero. In updating the weights of the deep convolution neural network, the optimization path of the classical momentum shows large oscillation which is prevented by employing the Nesterov's Accelerated Gradient and also to aid facilitate the loss function convergence. Comparatively, sparse representation methods operate by handling separately each component whilst our technique jointly optimizes all the layers in the network. However, the supremacy of our algorithm is tested by comparing it to other state-of-the-art to know how to further improve the technique.

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Freshwater Resource Indices: Literature Review & Applications

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Abstract- Water is a scarce resource hence there is a general concern over its use. In particular, freshwater scarcity is recognized as a prominent environmental concern. As a result, the concept of water footprint as a measure to tackle the potential impacts of water use arose. The balance in water consumption is necessary because freshwater is essential to the daily life of human beings and its supply is also limited. As the global population rises, the need for fresh water grows too. In addition, if human beings do not take steps to keep the water footprint level as low as possible, the world will run short of fresh water. Scholars project that by 2030, the global demand for freshwater will surpass supply by approximately 40 percent (Brown & Matlock, 2014). The reduction in the supply of water will certainly have a negative impact on the global manufacturing and agricultural industries. It is therefore vital to investigate how water footprint is applied at an individual level, the business sector, and the national level. The paper reviews current freshwater indices used globally and categorizes them according to differing requirements:

- Human Requirement
- Economic Requirement
- Ecological Requirement

Keywords: Freshwater Management. Water Indices. Water Resource Management. Water Footprint.

- i. INTRODUCTION
- ii. WATER FOOTPRINT

The water footprint concept is concerned with

the objective to show the hidden links between human consumption and water use as well as between global trade and water resources management. The water

footprint concept emerged out of the ecological footprint concept and was first introduced by Hoekstra in 2002 in an attempt to come up with a consumption-based indicator of water use (Hoekstra et al., 2016). Primarily, it is an indicator of use of fresh water that shows the direct and indirect use of water by a producer or consumer.

According to Hoekstra et al (2016), the total water footprint of a product comprises of three components namely the blue, green and gray water footprint. The blue water footprint measures the volume of freshwater that evaporates from the world blue water resources (surface water and groundwater) to make the goods and services that an individual or a community consumes. The green water footprint is the amount of water lost from the global green water resources (rainwater preserved in the soil as soil moisture). Lastly, the gray water footprint measures the amount of polluted water, which associates, with the creation of all goods and services for an individual or community. The gray water footprint is calculated as the amount of water that is required to dilute pollutants to levels that make the quality of the water to remain above the recommended water quality standards.

Many approaches have been used to evaluate the vulnerability of water resources, such as the water scarcity and water stress. However, there have been challenges in the measurement of water vulnerability because of many variables to water use, supply, and scarcity. Choosing the criteria to use in water assessment is often more of a policy decision than a scientific decision. This article explores the various literature reviews that have been written on the methodologies that have been used over the years and the application of the water footprint in different contexts.

1. BASED ON HUMAN REQUIREMENT

Brown & Matlock (2014) describe the scarcity of freshwater as a measure of the available water

resources in comparison to the human population. The results are usually displayed in terms of annual per capita water and presented on a national scale. The analogy behind this approach is that when the amount of water required for human demand is known, and then the amount of water available to each can act as a measure of scarcity. The following passages discuss some of the methods used to measure water scarcity based on human water requirements.

1.1. THE FALKENMARK INDICATOR

Falkenmark (2017) defines it as the ratio of the total annual runoff available for human consumption. It is the most widely used indicator to measure the amount of water stress. To come up with the index, surveys were conducted in several countries, and the water use per individual in each economy was calculated. Using the per capita water usage, the water conditions in a particular location can be grouped as no stress, stress, scarcity, and absolute scarcity. The index thresholds of 1, 700m³ and 1, 000m³ per capita per year are taken to be the thresholds between water stressed and scarce areas (Falkenmark, 2017). This index is employed in assessments on a country scale where the data is available and gives results that are easy to understand. The emphasis of the Falkenmark water stress index is placed on the individual water usage and thus avails a way of differentiating between climate and human-induced water scarcity.

1.2. BASIC HUMAN REQUIREMENT

A scholar by the name Gleick (2016) came up with a water scarcity index that looks at scarcity as a measurement of the capacity to meet all water needs for basic human requirements. For example, drinking water for human survival, water for sanitation purposes, water for hygiene as well as modest household needs for preparing food. The minimum amount of water that was proposed to sustain each of the functions is as follows. According to the data from the National Research Council of the National Academy of Sciences the least water required for drinking to ensure human survival under normal temperate climates with regular human activity is approximately 5 liters per person per day (Gleick, 2016). The necessary water requirements for bathing indicate that the minimum volume of water needed for adequate bathing is about 15 liters per person per day. The other aspect that requires the use of water is the disposal of human waste. Nonetheless, with the emergence of modern technology for sanitation globally, proper disposal of human waste can be done with little or even no water. However, water is still

used to a large extent in many societies to dispose of wastes. Studies reveal that about 20 liters of water per person per day is required to dispose of human waste. The last primary requirement of water use is food preparation. The proposed minimum requirement for this function is 10 liters per person per day.

The entire suggested water requirement for essential human functions totals to approximately 50 liters per person per day. Various stakeholders recommend that the relevant international organizations, as well as water providers, adopt the stated water requirements to meet the basic needs. Besides, Gleick came up with the “benchmark indicator” of 1,000m³ as a reference that was even adopted by the World Bank.

1.3. SOCIAL WATER STRESS INDEX

Ohlsson (2015) builds on the Falkenmark indicator by integrating the “adaptive capacity” of a society and examining at how variables such as economic, technological, among others affects the general availability status of freshwater of a region. Ohlsson posits that the ability of a society to adapt to harsh scenarios is a function of the spread of wealth, education opportunities as well as political participation (Ohlsson, 2015). The most widely accepted indicator used in the assessment of such societal factors is the UNDP Human Development Index (HDI). The HDI operates as a weighted measure of the Falkenmark indicator to account for the capacity to adapt to water stress and is referred to as the Social Water Stress Index.

2. BASED ON ECONOMIC REQUIREMENT

2.1. PHYSICAL AND ECONOMICAL WATER SCARCITY

Author Egan (2012) carried out an analysis with the involvement of renewable freshwater resources available for human consumption, with respect to the main water supply. The examination considered countries to be physically water scarce if more than 75 percent of the flow of the rivers is diverted for purposes such as agriculture, industry and domestic consumption (Egan, 2012). Using this approach, it means that dry areas are not considered as water scarce. Signs that indicate the scarcity of water include diminishing groundwater, severe environmental degradation as well as water allocations that support some sectors over others. On the same note, nations that have sufficient renewable resources with less than 25 percent of water from rivers diverted for human

use, but require to make considerable improvements in existing water systems to make such resources available for use are considered to be economically water scarce.

The most recent methodology was developed by Hoekstra (2016) and calculates water scarcity by incorporating green, blue and grey water prints. Also, Hoekstra introduced a new concept known as water pollution level that measures the volume of water flow pollution using grey water. In Hoekstra's calculation, polluted water is regarded as unusable water and is therefore not included in the calculation of water resource availability. In the development of his concept, Hoekstra faults other methodologies for not including various factors. One of the arguments raised is that water withdrawals partly go back to a catchment (Hoekstra et al., 2016). Therefore, using water withdrawal as the main indicator of use of water is not an appropriate approach of evaluating the impact of the withdrawal at the scale of the catchment. Instead, Hoekstra posits that blue water consumption in a region would be best expressed in terms of a blue water footprint. The second point that Hoekstra elicits is that the availability of water ought not to be solely defined by total runoff because it overlooks the proportion of the runoff needed to maintain the environment. Rather, the environmental demand needs to be subtracted from the total runoff. Lastly, evaluating the scarcity of water, as a function of the annual water usage and resource availability does not factor in the variations during the year. Instead, it would be more accurate if monthly values are considered. In Hoekstra's approach, the overall evaluation of water scarcity can be derived by summing up all the water footprints (Hoekstra et al., 2015). The water scarcity in this methodology can be obtained at local, river basin as well as global levels while including ecological, policy, socio-economical, and human impacts.

Ridoutt et al. (2015) came up with a methodology that compares the carbon and water footprint concepts. The main effects of including water consumption on product life cycles were determined. In this study, the scholars suggest that the potential damage to the quality of freshwater ecosystem through minimized environmental flows be the focus (Ridoutt et al., 2015). Carbon footprinting is recognized as a simple concept whereby the emissions from all main greenhouse gases are additive and is displayed as a single figure in the units of carbon dioxide equivalents. A lot of water footprints are expressed as a single figure too only that they are not configured using a standardization procedure. In addition, many water footprints that have been published are a raw

collection of all types of water consumption, that is, blue, green and even dilution of water. Ridoutt et al. argue that various kinds of water consumption ought not to be simply summed up to produce a total water footprint because the opportunity cost, as well as the impacts linked with each form of uses differ.

3.2 WATER RESOURCES AVAILABILITY AND CEREAL IMPORT

Yang & Zehnder (2012) indicate that approximately 70 percent of the global freshwater withdrawals are used for agriculture. Hence, there is a link between the water resources that are available and the capacity to produce food. Countries that have scarce freshwater compensate for the inadequacy by importing food. The primary type of food that is imported includes cereal grains. Scholars such as Yang and Zehnder postulate that using the quantity of food that is imported; a model can be developed to serve as a water-deficit indicator (Yang & Zehnder, 2012). Then from the developed model, experts can establish a threshold that can give a regional separation between water-scarce and water-abundant statuses. Regions that fall below the established thresholds would lack the necessary amount of water needed for local food production; hence cereal grains ought to be imported to fill the gap left by the water deficit.

During the development of a model using cereal grain imports, yearly average data was used for each country, which represents a single unit because the available data were annual as well as country based. Also, it was noted that there was ease to quantify water transfer across political boundaries. Mainly, Africa and Asia were used in the analysis because their total net annual cereal grains imports amounted to above 110 million tons in the 1990s, which means that all excess freshwater resources from all other continents are required (Chapagain & Orr, 2013). Besides, the two continents are home to a majority of people living in poverty and inadequate food. During the analysis, a water availability of 5000m³ per capita year was used as the cutoff value to ensure that the countries with water scarcity were put in mind while allowing for a comparison with countries that had abundant water. Moreover, the countries that were analyzed were limited to only those that have inhabitants exceeding one million.

From the analysis, Yang et al found out that in almost all the countries that were under the water-deficit threshold, there was a rise in per capita cereal import. Nevertheless, per capita import remained unchanged in the countries above the threshold, indicating that no measurable relationship exists between changes in their per capita water resources and the amount of cereal import. Comparing Falkenmark's threshold of 1,700m³ per capita year, studies indicate that it falls within the threshold calculated by Yang et al. (2012). Nonetheless, the threshold calculated by Yang et al. is dynamic and can change with irrigation practices or improvement measures inefficient water use as opposed to Falkenmark's threshold which is fixed. Moreover, the threshold suggested by Yang et al. does not account for the use of non-renewable groundwater because of the lack of systematic data. Therefore, the threshold may not provide accurate results in some instances.

3. BASED ON ECOLOGICAL STRESS AND SUSTAINABLE USE

3.1. WATER RESOURCES VULNERABILITY INDICES

The indices discussed in the above passages only measure the status of water resource relying on human water needs as well as water availability, majorly on a national scale but do not incorporate renewable water supply, and national, yearly demand for water. However, authors such as Shiklomanov and Markova suggest the use of estimates of current and projected water-resources use by region and sector in 1987 (Shiklomanov & Markova, 2013). They grouped the water use into industrial, domestic and agricultural sectors and examined water lost from reservoir evaporation as well. In the analysis, economic and population variables were used. Later on, Raskin et al. used Shiklomanov's water resource availability results to improve on the approach by substituting water demand with water withdrawal. Raskin et al. argued that water demand varies across cultures, societies and regions hence the use of the term was prone to give inaccurate assessments (Raskin et al., 2016). The Water Resources Vulnerability Index also known as the WTA ratio was then described as the fraction of the total yearly withdrawals to available water resources (Raskin et al., 2016). From this ratio, a country whose annual withdrawals lie between 20 and 40 percent is considered water scarce whereas that whose annual withdrawals exceed 40 percent is

considered severely water scarce (Raskin et al., 2016). This approach and the 40 percent threshold is popularly used in analyzing water resources and is termed as the "criticality ratio."

4.2 WATERSHED SUSTAINABILITY INDEX

Scholars Chavez and Alipaz (2017) suggest the use of a Watershed Sustainability Index (WSI) which combines hydrology, life, environment, and policy; each having the variables pressure, state, and response. The Watershed Sustainability Index is structured in a manner to be watershed or basin-specific and is intended to cover an area that does not exceed 2,500 km². Therefore, vast areas need to be broken into smaller sections. The Watershed Sustainability Index is a mean of four indicators namely the life indicator, the policy indicator, the hydrologic indicator, and the environmental indicator (Chaves & Alipaz, 2017). Each of the parameters is assigned a score of 0, 0.25, 0.50, 0.75, or 1.0 (Chaves & Alipaz, 2017). All the indicators are equal in weight, but parameters may change from one basin to another and therefore should be picked by consensus among stakeholders. However, the use of WSI relies on the availability of information that is specific to watersheds. Most regions lack such information hence making the application of this model on a global scale not feasible.

3.2. WATER SUPPLY STRESS INDEX

McNulty et al. (2014) proposes a methodology that attempts to measure the relative magnitude of water supply as well as demand at the 8-digit USGS Hydrologic Unit Code level. In the model, the water supply stress index was calculated for every 8-digit Hydrologic Unit Code watershed in the US and focusses on the water-stressed locations that are ignored in assessments of larger areas. The water supply stress index is different from other water availability measurement methods because it incorporates anthropogenic water demand (McNulty et al., 2014). It is thus possible to have areas with high yearly levels of precipitation with a high water supply stress index value.

4. CONCLUSION

According to Brown & Matlock (2014), evaluation of water footprint and taking the right measures is necessary for the survival of humankind and other organisms. The balance in water consumption is necessary because freshwater is essential to the daily life of human beings and its supply is also limited. As the global population rises, the need for fresh water grows too. In addition, if human beings do not take

steps to keep the water footprint level as low as possible, the world will run short of fresh water. Scholars project that by 2030, the global demand for freshwater will surpass supply by approximately 40 percent (Brown & Matlock, 2014). The reduction in the supply of water will certainly have a negative impact on the global manufacturing and agricultural industries.

It is therefore vital to investigate how water footprint is applied at an individual level, the business sector, and the national level. To start with, there are recommended levels of water footprint that individuals are not supposed to exceed. People use fresh water for bathing, cooking, and other domestic use. According to Egan (2012), companies that supply water to people's places of residence can better get a hint of the volume of water they are required to supply to cater for domestic use. Using the estimates, the companies can reduce wastage by supplying only the needed amount. The rationing makes people practice responsible use of water. Many individuals when presented with the figures of the required water footprints for their daily use, they strive to keep it at a minimum low. Thus, the figure is important for public awareness. It is important that everybody knows what is happening in regards to water availability so that each person takes steps in contributing to the sustenance of natural resources.

Jeswani & Azapagic (2012) point out that many businesses especially those that involve production use the water footprint figures to make sure that their activities are in tandem with the requirements. In many companies, fresh water is a basic requirement for their activities. After use, the industries release effluents that could result in the pollution of the local water system. Originally, most companies decided to adopt sustainable practices only after public pressure. However, many companies presently are beginning to embrace responsible practices in the use of fresh water. The businesses realize that failure to engage in sustainable practices might taint the corporate image, financial risks caused by pollution, a threat of increased regulatory control, and inadequate freshwater available for operations (Jeswani & Azapagic, 2012). Currently, many business ventures are adopting alternatives to conserve water. For instance, some restaurants provide their customers with special hand wipes that eliminate the need for tap water upon the realization that many people waste too much water while washing their hands. Besides, many companies are recycling water. For instance, water that is used for washing purposes can be recycled and used to flush the loos.

Brown & Matlock (2014) also suggest that different governments mainly use the water footprint figures to enforce various measures. The government can instruct the water supply companies to ration the water supply so that it does not exceed the maximum amount stipulated. Moreover, most countries are instituting regulation measures regarding how water ought to be used in the various freshwater bodies. For example, the government can ban all the irrigation activities that use fresh water from certain water bodies. The production activities of various companies that rely on the fresh water can also be limited so that the amount of water consumed does not rise above footprint level (Brown & Matlock, 2014). Therefore, the government mainly takes the enforcement role, whereby individuals or entities that are found to go against the laid down measures are arrested and charged accordingly.

To conclude, Water management is very essential. Owing to the changes in the global climate as well as the increase in population, it is necessary that steps be taken to conserve fresh water for posterity. It is the reason why different scholars have attempted to devise the methodology of coming up with a water footprint measure. Although all the methodologies discussed vary, they all express the need to conserve the various freshwater bodies. Perhaps it is accurate to note that the variation arises out of what form of water ought to be included in the calculation. The various water footprint levels are used by individuals, companies, and governments to evaluate their use of freshwater.

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Determination of Total Flavonoid Content of Commonly Consumed Commercial Tea

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Abstract - In this research work, the leaf of *Camellia sinesis* (L.) Kuntze, Myanmar name Let-phet, was selected to qualify and quantify the flavonoids present in it. The commercial teas were purchased from Ywa Ngan Township, Southern Shan State, Myanmar. Firstly, to get the ready-to-drink product, the infusion of commonly consumed commercial tea was prepared by the hot distilled water. Moreover, the infusion prepared from commercial tea was checked for qualitative test of flavonoids. In addition, total flavonoid content in 1 cup (200 mL) of this ready-to-drink product was evaluated by the Aluminium Chloride (AlCl_3) method using PD 303-UV spectrophotometer, at 415 nm. The total flavonoid content of this selected sample was expressed as mg quercetin equivalent (QE) per 200 mL of ready-to-drink product prepared from 2 g of commercial tea.

Index Terms - *Camellia sinesis* (L.) Kuntze; flavonoids; Commercial tea; Aluminium Chloride method; UV spectrophotometer.

I. INTRODUCTION

Tea is one of the oldest non-alcoholic beverages in the World. The origin of the tea is considered to be around the Myanmar (Burma) regions. From there it has been spread to China, Indonesia and India. Taxonomically it is known as *Camellia sinensis* (L.) Kuntze and belongs to the family Theaceae [1]. It grows best in tropical and subtropical areas with adequate rainfall, good drainage and slightly acidic soil [2]. There are two varieties of tea. *C. sinensis* var. *sinensis* (China tea) is grown extensively in China, Japan and Taiwan, while *C. sinensis* var. *assamica* (Assam tea) predominates in South and Southeast Asia, including Malaysia [3].

It is no surprise to find various types of tea being offered in stores and restaurants in almost every parts of the world. Tea is the second most consumed beverage in the world, after water, with an estimate of 20 billion cups enjoyed every day. Three main types of tea are green tea, black tea and oolong tea. These teas are characterized by the degree of fermentation where fermentation is the process of oxidizing green tea to produce black tea [4-8]. Tea is manufactured in three basic forms. Green tea is prepared in such a way as to preclude the oxidation of green leaf polyphenols. During black tea production, oxidation is promoted so that most of these substances are oxidized. Oolong tea is a partially oxidized product. Fresh tea leaf is unusually rich in the flavanol group of polyphenols known as catechins, which may constitute up to 30% of the dry leaf weight [9]. Drinking tea

not only quenches thirst but also brings health benefits. While black tea may decrease blood pressure; green tea may regulate body temperature, blood sugar and enhance digestion; and oolong tea is excellent for its anti-diabetic, anti-obese and anti-inflammatory properties [10].

Tea is one of the most widely consumed beverages in the world. *C. sinensis* has been used for tea beverage since 3000 B.C. consisting of the leaf and bud of the plant *Camellia sinensis* [11]. Flavonoid and caffeine are the most abundant type of phenolic compound and alkaloid found in tea respectively [7,12]. Phenolic compounds are considered the most important constituent of tea since it is the largest component and act as bioactive ingredient that enhances the therapeutic action of tea [7,10].

The reasons for the worldwide popularity of tea were unique aroma and characteristic flavor, but recently, its popularity has increased due to its potential health benefits against cardiovascular diseases and cancer as well as pharmaceutical activities such as antihypertensive, antiatherosclerotic, hypocholesterolemic and hypolipidemic properties mostly from activities of antioxidant flavonoids present in tea. Monomeric flavonoids (flavan 3-ols or tea catechins) present in *C. sinensis* leaf are transformed to polymeric theaflavin and thearubigin by oxidation occurring during tea fermentation. The distinctive color, decreased bitterness and astringency and characteristic flavor are derived from the fermentation process giving fermented teas a marked distinction from non-fermented green tea. Even though teas are available in many different fermentation levels from green to black, the difference in phytochemicals and volatile compounds in tea with different degrees of fermentation has not been fully investigated yet within the same tea leaf [13].

This present research work is aimed at determination of total flavonoid content from commonly consumed commercial tea sample available in Myanmar market. It is essential to have knowledge of the actual levels of bioactive ingredients in the commercial tea consumed in various parts of the Myanmar in relation with human health. In the present research the commercial tea was analyzed for determining the total flavonoid content.

1.1 Botanical Description

Family Name	-	Theaceae
Botanical Name	-	<i>Camellia sinesis</i> (L.) Kuntze
Myanmar Name	-	Let-phet
English Name	-	Tea
Genus	-	Camellia



Figure 1: The plant, flower and leaves of *Camellia sinensis* (L.) Kuntze

II. MATERIALS AND METHODS

2.1 Sample Collection

The commonly consumed commercial teas, *Camellia sinensis* (L.) Kuntze were purchased from Ywa Ngan Township, Southern Shan State, Myanmar.

2.2 Extraction Procedure

Distilled water (200 mL) was firstly heated 97°C, to which the bag containing 2 g of selected sample was immersed for 10 minutes. During the first 30 seconds, the bag was submersed 10 times. After 5 minutes, the procedure was repeated, and at the end of the 10 minutes, the tea bag was carefully removed and the tea was immediately conditioned in a beaker. This beaker was covered to avoid water evaporation and after cooling, it was filtered and then centrifuged with 3200 rpm for 30 minutes. The volume of infusion was adjusted again to 200 mL. 200 mL of ready-to-drink product was obtained.

2.3 Qualitative Test for Flavonoids

Ferric Chloride Test:

A few drops of neutral ferric chloride solution were added to 1 mL of extract solution. Formation of blackish red color indicates the presence of flavonoids.

Shinoda's Test:

To 1 mL of extract solution, a small piece of magnesium ribbon or magnesium foil was added and a few drops of concentrated HCl were added. Change in pink red colour shows the presence of flavonoids.

Lead-acetate Test:

To 1 mL of extract solution, a few drops of aqueous basic lead acetate solution were added. Formation of precipitate indicates the presence of flavonoids.

2.4 Quantitative Determination of Total Flavonoid Content

2.4.1 Principle

The basic principle of Aluminium chloride colorimetric method is that aluminium chloride forms acid stable complexes with the C-4 keto group and either the C-3 or C-5 hydroxyl group of flavones and flavonols. In addition it also forms acid labile complexes with the ortho-dihydroxyl groups in the A- or B- ring of flavonoids. Quercetin is reported to be suitable for building the calibration curve. Therefore standard quercetin solutions of various concentrations were used to build up the calibration curve [14-17].

2.4.2 Preparation and Determination of Standard Quercetin

10 mg of the standard quercetin was taken in a test tube. 100 mL of MeOH was added to the standard compound. The stock solution was obtained. It was diluted with MeOH in various ratios to obtain four ranges of concentration, such as 25 µg/mL, 50 µg/mL, 75 µg/mL, and 100 µg/mL respectively. Then, 4.0 mL of solution was prepared for each concentration. 0.5 mL of each standard quercetin solution was taken in test tube and 1.5 mL methanol, 0.1 mL of 10% aluminium chloride, 0.1 mL of 1 M potassium acetate and 2.8 mL distilled water were added separately to each tubes.

These tubes were left at room temperature for 30 min after which the absorbance of the reaction mixture was measured at 415 nm with UV/ Visible spectrophotometer. The calibration curve was plotted by using the resulted absorbance data of standard quercetin solutions at concentrations 25 µg/mL to 100 µg/mL in methanol. The calibration curve of standard quercetin is shown in Figure 2 [14-17].

2.4.3 Determination of Total Flavonoid Content of Commonly Consumed Commercial Tea

The total flavonoid content of commonly consumed commercial tea was measured by aluminium chloride (AlCl_3) according to the spectrophotometric method using quercetin as a standard. Firstly, 0.5 mL of ready-to-drink product was taken in test tube and 1.5 mL methanol, 0.1 mL of 10% aluminium chloride, 0.1 mL of 1M potassium acetate and 2.8 mL distilled water were added into tube.

This tube was left at room temperature for 30 min after which the absorbance of the reaction mixture was measured at 415 nm with UV/ Visible spectrophotometer. The assay was performed in triplicate. The total flavonoid content of ready-to-drink tea leaf product was expressed as mg quercetin equivalent (QE) /200 mL (1 cup) of ready-to-drink product prepared from 2 g of commercial tea [14-17].

III. RESULTS AND DISCUSSION

Evaluation of Total Flavonoid Content in Commonly Consumed Commercial Tea

Special Test for Flavonoid

The infusion obtained from selected commercial tea with hot distilled water was examined by using the special qualitative tests of flavonoid. The resulted data are tabulated in Table 1.

Table 1: The results of qualitative test for flavonoid

No	Experiment	Observation	Inference
1.	Ferric Chloride Test:	Blackish red colour was appeared	Flavonoid may be present
2.	Shinoda's Test:	Colour turns to pink red colour	Flavonoid is present
3.	Lead Acetate Test:	Precipitate was produced	Flavonoid is present

From these results, it was observed that the infusion of the selected sample consists of flavonoid compounds.

Total Flavonoid Content in Commonly Consumed Commercial Tea

The calibration curve was plotted against by using the resulting data of standard quercetin solution as shown in Table 2 and Figure 2.

Table 2: The results of absorbance values of standard quercetin solutions

No	Test Sample	Concentration ($\mu\text{g/mL}$)	Absorbance
1	Standard 1	25	0.165
2	Standard 2	50	0.308
3	Standard 3	75	0.495
4	Standard 4	100	0.636

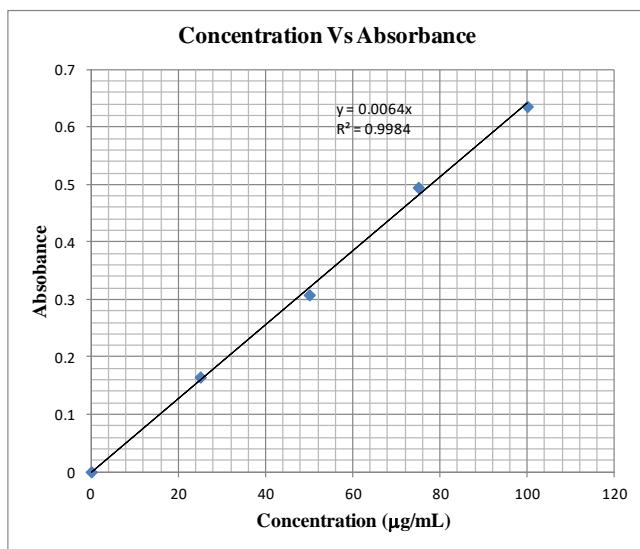


Figure 2: Concentration absorbance calibration curve for standard quercetin

In addition, the total flavonoid content of the infusion prepared from selected commercial tea was carried by aluminium chloride spectrophotometric method using the quercetin as a standard. The absorbance of prepared sample solution (0.5 mL or 500 μL) was measured by PD 303-UV spectrophotometer at 415 nm with respect to the blank solution. The results are described in Table 3.

Table 3: The results of absorbance values and concentrations of extract solutions of commonly consumed commercial tea

No	Name of Sample	Flavonoid (mg/200mL)	Flavonoid (mg/200 mL) Mean \pm Standard Deviation
1.	Commonly consumed commercial tea	19.7	19.6 ± 0.17
		19.4	
		19.7	

From this result, the amount of total flavonoid content of analyzed sample was obtained by using the standard graph. The total flavonoid content present in the infusion prepared from selected commercial tea was found as 19.6 ± 0.17 mg quercetin equivalent (QE) per 200 mL (1 cup) of ready-to-drink product prepared from 2 g of commercial tea. Therefore, this result suggests that 1 cup (200 mL) of ready-to-drink product or infusion prepared from 2 g of commercial tea contains the significant amount of the total flavonoid content.

Flavonoid compounds that are secondary metabolites are antioxidant. The capacity of flavonoids to act as antioxidants depends on their molecular structure. The position of hydroxy groups and other features in the chemical structure of flavonoids are important for their antioxidant and free radical scavenging activities. Quercetin, the most abundant dietary flavanol, is a potent antioxidant because it has all the right structural features for free radical scavenging activity.

IV. CONCLUSION

The total flavonoid content of the infusion obtained from the commercial tea could be evaluated by UV spectrophotometer using the Aluminium chloride method at 415 nm. It was observed that the total flavonoid content of the ready-to-drink product is 19.6 ± 0.17 mg quercetin equivalent (QE) per 200 mL (1 cup). The resulted data of the current study showed that the selected sample, the ready-to-drink product prepared from commercial tea, had the considerable amount of total flavonoid compounds. The results of present research are important since the beneficial health effects of dry tea leaf are mostly connected with antioxidants, mainly catechins. It is important to inform the consumer that the total natural antioxidant flavonoid content in 1 cup (200 mL) of infusion prepared from commercial tea had 19.6 ± 0.17 mg quercetin equivalent (QE) which is significant amount.

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An Action Research on Applying a Blended Learning Program to Enhance Students' TOEIC Listening Program

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Abstract- This paper investigates the use of blended learning (BL) in an on-ground traditional face-to-face TOEIC course and seeks to determine the extent to which the blended TOEIC listening course significantly affects the improvement in students' TOEIC listening performance, how students experience the teacher's practice and behavior and measure the students' perceptions of the blended learning environment with respect to its effectiveness. The purpose is to explore how to prepare English teachers to create a productive BL environment for their students. Both quantitative and qualitative research methods were used. In this case, the use of research may be directed by emphasizing on either quantitative or qualitative approaches in the mixed method research (Creswell, 2009). Qualitative and quantitative data were collected through the questionnaires at the end of the course. Quantitative data would also be collected and analyzed to evaluate the effect of the blended TOEIC listening course by continuous evaluation and the pretest and posttest at the beginning and the end of the course respectively. The results from the data revealed that the Blended TOEIC listening course significantly affected the improvement in students' TOEIC listening performance. In addition, most of the students involved in the study are generally happy about the program and they recognize the benefits of the curriculum in enhancing interaction between them and their classmates as well as their teacher.

Index Terms- blended learning, TOEIC, listening, listening performance, listening improvement.

I. INTRODUCTION

With the emergence of online technology, the modern classroom is changing, nobody can deny the effectiveness of applying information communication and technology and the internet in foreign language teaching; therefore, living in the 21st century with a lot of new technologies coming into beings, teachers of English need to make use of these new technologies to apply in their English language teaching. The computer with the internet is the one among the achievements of the new technologies and computers have had a great marvelous impact in English language teaching, so merging these two fields – computers and English language is inevitable in a world where

many things are being automated and implemented into computer programs.

Listening ability is one of the important skills in foreign language learning and no one can deny its important role. However, listening skills in language learning have not received sufficient attention and listening remains one of the least understood processes in language learning. Hardly has anyone doubted nowadays that listening skills must be trained and practices regularly and continuously. The contemporary application of high-technology in language teaching and learning is listening online which can also be consolidated into traditional classroom listening to audio from cassettes or CDs. Researchers and language practitioners have also perpetuated that listening skills could be chosen by the learners for a long period of time and the present advantages of high technology allow the use of a combination of learning techniques in which the method blended learning of listening skills in English classrooms is employed and applied effectively. From our own experience as English teachers in teaching English in general and listening skill in specific, we have found that students encounter many difficulties when studying listening and since having a big gap in listening comprehension, when converging on the TOEIC syllabus they tend to be disheartened. Therefore, our study attempts to examine the practice of blended learning in the sense of its classic definition and present some evidence of its positive contribution to the students' TOEIC listening performance.

From all these above reasons, this study aims to provide English teachers and students with productive blended learning environment in an intensive TOEIC Listening course. For the purposes of this study, a productive blended learning environment is defined as one in which students can learn necessary knowledge and skills and which issues them with a positive learning experience. A positive learning experience for students is defined as the knowledge and skills that meet their values, priorities and needs. More specifically, this study seeks to accomplish two goals. The first goal is to discover to what extent the blended TOEIC listening course affects the improvement in students' TOEIC listening performance and the other one is to discover the attitudes of students about the blended learning environment during their TOEIC listening course.

II. LITERATURE REVIEW

1. Blended learning

In general, blended learning is defined as a combination of online and face-to-face education, but the definition somewhat varies according to different scholars. According to Sharma (2010), there are three definitions of "blended learning" that are pertinent in the world of education. The prototypical interpretation of the term is "the integrated combination of traditional learning with web based online approaches" (Oliver and Trigwell, 2005, p. 17). From the learner's viewpoints, blended learning is effective in satisfying the learner's satisfaction in that it enhances the learner's convenience and accessibility (Cottrell & Robinson, 2003), meeting the various needs and learning styles (Dziuban, Hartman & Moskai, 2004), encourages interaction between learners (Osguthorpe & Graham, 2003), and it creates an environment where both real-time and delayed interaction are available. Blended learning also improves the learning achievement by fostering active interaction between learners, learners and teachers, and learners and lessons.

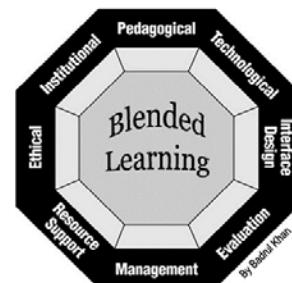
In the word of Osguthorpe and Graham (2003), teachers may be attracted to BL thanks to its benefits such as improving pedagogy, providing greater access to knowledge, and facilitating increased opportunities for social interaction. As different researchers focus on a multitude of variables, factors, and variants of instructional approaches in an attempt to gain knowledge about the usefulness of blended learning, leading to the result of somewhat muddied researches focusing in the area of blended learning; therefore, several researchers (Bliuc, Goodyear and Ellis, 2007; Shea, 2007; Vignare, 2007) call for more and better research that goes beyond to seek and to establish useful frameworks for the integration and application of BL in education. They also believe that research should focus on key aspects such as assessing, quality and blended learning environments.

2. Blended learning frameworks

According to Hornby (1995), a framework is a structure giving shape and support to something. Frameworks for blended learning also varies for different learning goals. Alammay et al. (2014) presented three distinct design approaches for developing blended learning modules namely: low-impact approach in which online activities are added to an existing course, medium-impact approach which designs an online activity to replace an existing activity and high-impact approach which focuses on developing a blended module from the outset or redesigning a face-to-face or web-enhanced module as a blended learning module. However, according to Alammay et al. (2014), it can increase the teachers' workload and be challenging for the teachers or lecturers to develop an appropriate online activity due to lack of time and incentives. Another framework for E-Learning' was created by Badrul Khan (2003). Khan's e-learning framework which is also referred to as Khan's Octagonal Framework because of its octagonal shape representing the eight dimensions of the e-learning environment provides a framework that enables educators to select appropriate ingredients for flexible learning environments (Khan 2003). While Khan's Octagonal Framework focuses primarily on e-learning, Singh (2003) adapted this framework to focus on blended learning. In the words of Singh, the framework created by Khan (2003) can serve as a guidance to outline, create, provide, organize and assess blended learning programmes. Khan's framework consists of eight dimensions as be shown in Figure 1. The framework has eight dimensions

namely: institutional, pedagogical, technological, interface design, evaluation, management, resource support and ethical. Each of these dimensions in the framework represents a category of issues that need to be addressed in order to create a meaningful learning experience (Singh 2003).

Figure 1. Khan's Octagonal Framework adapted by Singh (2003)



The institutional dimension is involved in issues relating to organizational, administrative affairs, academic affairs and student services with reference to matters of education. Staff involved in designing and implementing blended learning programmes should consider the preparedness of the organization, availability and structure of content and infrastructure as well as the students' needs. According to Singh (2003), a needs analysis should be conducted to ascertain the needs of the students.

The pedagogical dimension refers to teaching and learning needs. This dimension addresses issues concerning content that has to be delivered, students' needs and learning objectives. This dimension also includes the design, organization and methods and strategies of blended learning environments. In Singh's view, the learning goals or learning outcomes need to be listed and the most appropriate delivery method is selected. The technological dimension considers issues related to technology infrastructure used in blended learning environments, particularly the e-learning aspects. This includes infrastructure planning such as servers that support the learning programme, bandwidth and accessibility, security and hardware and software. This includes creating a learning environment with the appropriate tools to be able to deliver a learning programme (Singh, 2003). This dimension also addresses the need for finding the most suitable learning management system that could manage multiple delivery types and a content management system that catalogues the learning content for the learning programme (Amalou, 2006).

The interface design directs to the overall look and feel of the blended learning programme. Teachers need to ensure that the user interface supports all the components and features of the blend. The interface design dimension includes page and site design, content design, navigation, and usability testing. The user interface needs to support all the elements of the blend. It has to be able to unite the different components of the blend, which will enable the students to use the different delivery types as well as switch from one delivery type to another. In the words of Singh, issues relating to content structure, navigation, graphics and 'help' features are also addressed in this dimension.

According to Singh (2003), the evaluation dimension involves both assessment of learners and evaluation of the instruction and learning environment. Programmes should have the capability to evaluate the efficiency of a learning programme as well as the performance of the students. This dimension also addresses

maintenance of learning environment and distribution of information, registration and notification and scheduling the different elements of the blend (Singh, 2003).

3. TOEIC listening test

In the TOEIC Listening Section, there are 100 questions and lasts for about 45 minutes:

In part 1, students see ten pictures. For each picture, they will hear four statements and they must select the statement that best matches the picture. Students should see the picture carefully and try to predict the vocabularies and statements they might hear. By first picking out the key focus of the picture and quickly brainstorming related vocabularies and possible statements, they are likely to be much better prepared when they actually listen.

In part 2, students will listen to the questions or statements followed by three possible responses. They must choose the response that best matches the question. This part of the test is a pure listening challenge as there are no clues students can use to predict what they are going to listen to.

In part 3, students will listen to ten conversations and then answer three questions for each conversation. The students should answer questions as quickly as they can especially when the listening text is still being read. Moreover, students need to use the time between conversations to skim the next three questions, predict what they are going to listen to and isolate exactly what they should be listening for.

As in part 3, in Part 4 students will listen to ten monologues followed by three questions for each. The difference is that instead of a conversation, the listening features a single speaker giving a talk: a report, a speech, an advertisement, etc.

4. ICT Tools and Listening

According to Vandergrift (2011), information and communication technology (ICT) can be a great asset for listening development. Thanks to technology, ELT teachers can choose audios and videos from different sources according to their learners' needs and use multimedia to improve their listening lessons (Lynch, 2009; Flowerdew and Miller, 2005). ESL as well as EFL listeners can also be supported by ICT in many ways. First, they can independently access the recording from their computers, mobiles or other audio devices. Second, they can carry the listening tasks at his/her own pace without having to depend on the pace of the class (Wilson, 2008). Third, thanks to multimodality, "the opportunities for processing input are amplified" (Rost, 2007, p.102). In fact, with multimedia devices the second language listener can control the audio, see images while listening and use subtitles and the transcript. Moreover, with the replay, pause and rewind options, the listener is no longer subject to the temporal and linear nature of speech.

III. METHODOLOGY

1. Research questions

The research was conducted to address the following two research questions:

1. To what extent does the blended TOEIC listening course affect the improvement in students' TOEIC listening performance?
2. What are the students' attitudes towards the blended learning environment during their TOEIC listening course?

2. Participants of the study

Since the study was designed to assess the effectiveness of applying a blended learning program to improve students' TOEIC

listening performance, therefore, students' role was put into great consideration. The total of 16 learners in a TOEIC class were chosen as the subjects of the study. They are at elementary level and enrolled in TOEIC 450 course. These learners were selected because they all belonged to one class to whom the researcher was in charge of teaching listening. All of the participants were willing to join the course and all of them confirmed that they have a sufficient amount of background on the information technologies and have ample computer skills. Most of the participants were students at colleges or universities in Thai Nguyen.

3. The blended TOEIC listening course

The blended TOEIC listening course was planned and designed by the researcher in order to provide an alternative instructional environment for the on-ground TOEIC listening course. The blended TOEIC listening course was organized as a combination of both face-to-face and online instructional assignments. The class meets face-to-face every week for two hours in the classroom and the rest of the activity was carried out online. In class, teacher would instruct the learner to discuss the previous online assignments, and learn different kinds of questions in the different listening parts. The learners would have chances to take part in pair works or group work to practice listening, discuss some topics or questions related to the lesson. Teacher also gave the learners feedback as well as tips for the listening task, some of which are also provided on the course web page as power point presentation. The TOEIC learners enrolled in a 12 - week TOEIC course and were asked to complete a variety of assignments both online and offline. Since the course is a mixture of face to face and online classes. The materials used were a combination of handouts with CDs and videos prepared by the teacher as well as various e-learning resources uploaded and linked through the Moodle system. A number of Moodle technology features are utilized such as discussion, forums, and online assignments.

4. Data collection instruments and data collection procedures

The data to be analyzed principally came from three main sources, namely students 'record, listening comprehension tests and student questionnaire.

Students' record

Before and after each listening part, students would be given a mini listening test as it could shed some lights on students' performance. To see the students' performance of each listening part, the average of the students' marks before and after studying each part would be calculated by Excel software and compared with each other.

TOEIC listening comprehension test

TOEIC, the Test of English for International Communication, has been used a certified English test around the world. To diagnose students' listening proficiency and to compare test scores within the groups, two certified TOEIC test scores were submitted before the course started and later after it was completed. The pre- and the post-tests were the same form of the questions. The time allowed was 45 minutes with 100 multiple choices items and 4 different listening parts. The researcher did not use the same test for pretest and posttest, but they were two different tests with the same form and level to avoid students remembering the pretest and checking the answers.

The pre-test was administered at the beginning of course in December 2017 and the post-test when the course ended in March 2018, right after the students completed blended TOEIC listening

course to compare their listening competence before and after the treatment. Beginning of the course teacher use the Practice Test one from the book "Longman Preparation Series for the New TOEIC Test – introductory course" - by Lin Lougheed (2006) to test the student's entry level and use Practice Test Two to assess the progress of the student at the end of the course.

Student questionnaires

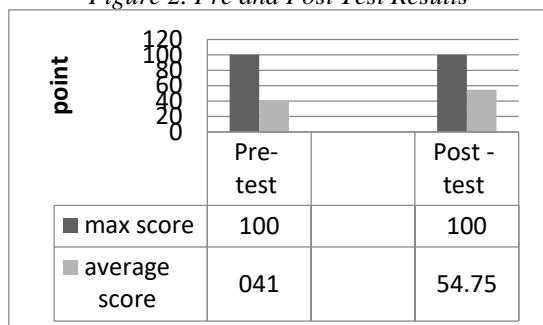
Three types of questions were included in the students' questionnaire: rating scales, multiple choices and open questions. The Likert scales - strongly agree/agree/ neither agree nor disagree/disagree/strongly disagree - were used with statements about the listening sessions, their effect so that the answers could be quantified and analysed easily (Mackey and Gass, 2005).

IV. FINDINGS AND DISCUSSIONS

1. The level of the blended TOEIC listening course in the improvement of students' listening performance

To answer the first research question, the scores of TOEIC listening pre - test and post- test were analysed and compared. This comparison of the average marks of the pre and post-tests shows that there has been a significant improvement in the student's performance in the post-test (see Figure 2).

Figure 2. Pre and Post Test Results



As can be clearly seen, there was a significant rise in the average score of the whole students. In the pre-test, the mean stood at 40,81. After 12-week training, this figure rose to 54,75, which is an indicator of the students' general improvement.

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Table 1. Group's performance in the pre-test and post-test

	N	Min	Max	Sum	Mean	SD
Pretest	16	33.00	51.00	653.00	40.81	1.36
Posttest	16	47.00	65.00	876.00	54.75	1.48

Table 1 reveals that there is a significant difference between the mean scores of the studied samples in TOEIC listening performance on the pre-test and the post-test of the TOEIC listening test in favor of the post assessment. As illustrated in this table, the study samples indicated more improvement in their TOEIC listening performance in the post- test than that in the pre-test.

Table 2. Results of the Paired-Sample T-tests

	Paired Differences	t	df	Sig.

	Mean	S.D	Std. Error	95% Confidence Interval of the Difference			
				Lower	Upper		
Pretest - Posttest	-13.93	3.25	.81	-15.67	-12.20	-17.12	15 .000

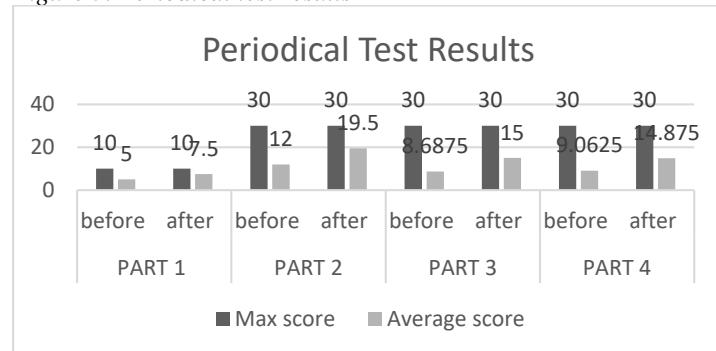
As can be seen from the table 2, the p – value or the sig. level was less than .05 ($p \leq 0.0$). It means that the result from the pre-test and post-test was significantly different. Therefore, the TOEIC listening blended course did have positive effects on the studied students' listening performance.

It can be concluded from the results that the participants' listening performance was improved considerably in the TOEIC listening post - test than in the pre - test thanks to the application of the blended TOEIC listening course.

In addition, as mentioned above, before and after each listening part, students were also given a mini listening test as it could shed some lights on students' performance. The difficulty level of listening sections in TOEIC listening is different. Specifically, listening parts 1 and 2 are less difficult than listening parts 3 and 4.

As can be seen from the Figure 3, through the results of the mini - tests before and after each listening part, it is found that results of the after tests are higher than those of the previous tests in most students. Figure 3 also illustrates that the students scored higher in listening parts 1 and 2 than in listening parts 3 and 4. However, the results in each listening section showed the improvement. To be specific, average score of listening part 1 increases from 5 to 7.5 and the second part is from 12 to 19.5 while listening parts 3 & 4 sees the increase from 8.7 to 15 and 9 to 14.9 respectively in their average results. Since the level of difficulty of the listening parts increased, the students' average mark of listening part 3 and part 4 decreased gradually is understandable.

Figure 3. Periodical test results



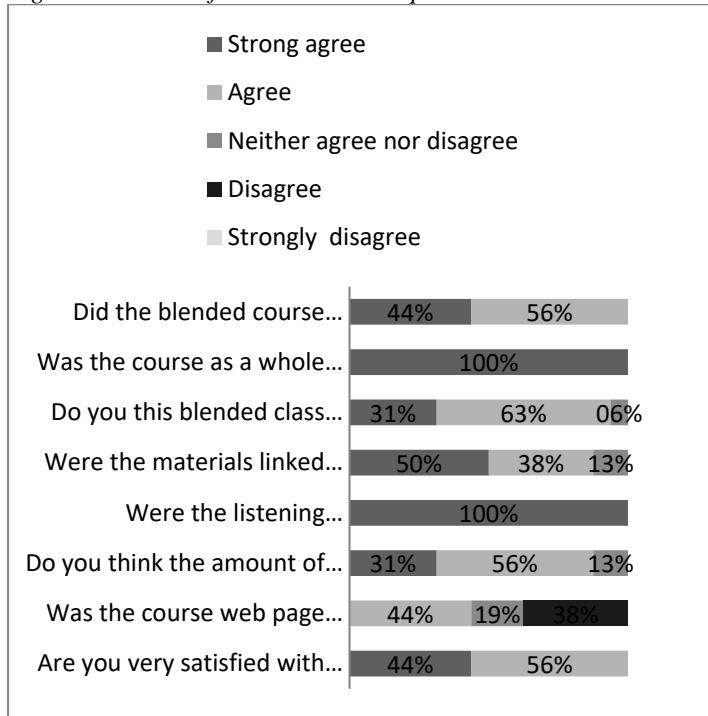
In conclusion, the students' improvement was evidently shown, which demonstrated the necessity and effectiveness of blended listening course to enhance students' listening ability. In other words, blended learning is an effective teaching method to develop the students' listening skill.

2. Learners' attitudes towards the blended learning environment during their TOEIC listening course

The 16 students' response in the questionnaire was also constructive. All the students stated that they like the course, this blended course meet their learning needs. While 100% of the

students agree that the course as a whole was beneficial for them, 37,5 % of them had encountered difficulty when using the web page and did not find the course convenient for using.

Figure 4. Results of the Likert- scale questions



In relation to the volume of the assignments and activities assigned to the students, as shown in figure 3.3, the amount of listening assignment seemed to be appropriate for nearly 90% of students and more than 90% of the students thought that this blended course has improved their listening performance.

In order to evaluate student satisfaction, students were asked to respond to the question: "Did you enjoy doing the online assignments?" 93,75% of students replied "yes" and only 6,25% replied "no" (figure 4). This is a very positive outcome, particularly in light of the association between students' motivation and learning success.

In conclusion, based on the data analysis, the implementation of blended learning in teaching listening was effective. Apart from some exceptions, the results from the blended TOEIC listening course questionnaire reveal that almost all participants are generally satisfied with the blended learning course. The students in the sample of the study expressed their positive attitudes towards this experience and they even want to study more English course in the same way and they also want to recommend the course to their friend in the future. Additionally, the participants realized the benefits of this model such as enhancing interaction between them and their instructor. This illustrates that the students feel that they can develop their English fluency and become more accurate comprehended of English if they receive good listening practice.

V. CONCLUSION

From the thorough analysis and discussions of the data collected from the survey questionnaires and score analysis, significant findings were identified.

Firstly, it was discovered that the TOEIC listening blended course did have positive effects on the studied students' listening performance.

Secondly, from the questionnaires, it was found that most of students had positive view toward the implementation of blended learning model in listening class. Most students liked learning listening as a part in language skills. Based on students' response toward the implementation of blended learning model, it could improve students' listening skill. In addition, by the implementation of blended learning model, students could study by themselves in learning listening and when a lecturer gave students tasks in Listening comprehension via online, students could fulfill the task and respond lecturer' task via online too. Last but not least, by implementing the blended learning model, students could improve their understanding and comprehension because they could find many learning sources via online Analyze and understand all the provided review comments thoroughly. Now make the required amendments in your paper. If you are not confident about any review comment, then don't forget to get clarity about that comment. And in some cases there could be chances where your paper receives number of critical remarks. In that cases don't get disheartened and try to improvise the maximum.

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Hybrid Post-Tensioned Concrete Shear Walls Behavior Under Seismic Loads

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Abstract- Recent researches and studies have demonstrated that post-tensioned reinforced concrete shear walls have attractive characteristics in resisting lateral loads resulting from seismic forces, such characteristics like self-centering capacity and the ability to experience non-linear horizontal relocations with little harm. The main disadvantage of these wall systems is the small amount of energy dissipation causing an increase in the lateral displacements when experiencing a seismic loading.

This study examines a “hybrid” concrete shear wall system that uses mild steel reinforcement as well as the use of post-tensioned steel for flexural strength and inelastic energy dissipation. A logical parametric examination is carried out in order to compare the expected seismic behavior of the concrete wall subjected to seismic loading in a series of prototype or model hybrid walls of post tensioned steel in a precast concrete shear walls and cast-in-place concrete shear walls. Results have indicated that the use of mild steel in addition to post-tensioned steel in reinforcing the concrete shear wall has enhanced the characteristics of the concrete shear wall regarding resisting seismic forces especially in reducing the lateral displacement (i.e., dislocation) resulting from an earthquake loading.

Combining traditional reinforced concrete structures with post-tensioning technology creates a hybrid concrete wall. The hybrid wall includes mild steel combined with post-tensioned (PT) steel gives many advantages over the traditional reinforced concrete wall such advantages include better energy dissipation and higher self-centering capacity as well as more ductile conduct over lateral dislocations. Subsequently, post-tensioning steel and mild steel both are adding value to the flexural strength of the wall which would result in minimizing the total area of steel required for the needed flexural strength in a traditional reinforced concrete shear wall. The seismic conduct of hybrid unbonded PT concrete walls is examined in this study. ABAQUS software is being utilized with finite element analysis for different hybrid concrete walls. The outcomes of this study demonstrate that the big nonlinear dislocations in post-tensioned shear wall might be decreased by utilizing increasingly mild steel support in the hybrid unbonded PT concrete shear wall system. The PT steel gives a restoring force power that removes the residual deformations after cyclic loading.

Index Terms- Hybrid. Shear wall. Post-tension. Reinforced concrete. Seismic.

I. INTRODUCTION

Concrete shear walls are well-known load resistance structural systems. Concrete shear walls have many advantages in usage as lateral (i.e., horizontal) load resistance structures such as cost-effective, high performance in resisting lateral loads such as seismic loads, thus usage of concrete shear walls is considered the main structures to resist lateral loads as they have proven their superior characteristics in resisting horizontal loads. The main criteria in design that a designer would like to achieve when designing a seismic resistance structures are ductility, strength and stiffness. Concrete shear walls have proven their excellent performance in meeting those criteria (Fintel, 1995).

The ongoing improvement and development of precast concrete techniques because of their building speed and their exceedingly controlled manufacturing has prompted the ongoing precast concrete shear walls process advancement (Chiou, et al., 2006). The precast concrete shear walls design has commonly pursued similar standards utilized for cast-in-place concrete walls, with changes made as suitable for the nature of the precast walls. The hybrid post-tensioned concrete shear walls combine the advantages of both reinforced concrete shear walls and the self-centering ability provided by the post-tensioned steel bars.

The post-tensioned steels bars show a significant resistance improvement against seismic loads, also reduces permanent deformations resulting after earthquake events.

Self-centering capability is the capacity of a structure to return to its original unreformed position after the unloading of a big no-linear movement.

As states earlier post-tensioned wall including only post-tensioning (PT) steel bars do not have enough amount of energy dissipation needed to limit the lateral displacement resulting from seismic loading, hence the need to replace some of the PT steel reinforcement area with mild steel bounded reinforcement, the same strength could be achieved accordance with less non-linear displacement and more dissipation of seismic energy. Area result a total reinforcement steel area (PT reinforcement plus mild steel reinforcement) will be less than the reinforced concrete wall of same flexural strength this may lead to more compact wall dimensions and hence more cost-effective constructions.

This study is focusing on examining the conduct (i.e., behavior) of the hybrid post-tensioned concrete wall experiencing an earthquake loading. The past researches and studies (Kurama 2002, Smith et al 2010 and Chavan et al 2017) were dealing with such wall systems as a precast system consists of separate wall

boards that are fixed together. Meanwhile; this study compares such a precast wall system with another system that is unified unit cast monolithically in place. Never the less; the results of the current study indicate that the hybrid unbonded post tensioned cast in place and the post tensioned precast concrete shear walls are comparable and go alone with those results found by previous study for hybrid unbonded precast shear wall systems (Chavan et al,2017 and Shatnawi et al,2018).

Study Limit States

The high-strength unbonded post-tensioned concrete shear walls may experience a significant dislocation without loss of strength (i.e., high ductility) or reduction in self-centering capability. Nevertheless, as expressed prior, post-tensioned walls including just post tensioning (i.e., PT) bars don't give an adequate amount of energy dissipation to resist the dislocations resulting from earthquake loading sufficiently. Thus, substituting a certain portion of the post-tensioning reinforcement steel area with mild steel reinforcement will provide the equivalent flexural strength yet with decreased nonlinear dislocations and improved energy dissipation. Anyway, the total area of steel reinforcement (i.e., PT reinforcement steel area in addition to mild steel reinforcement area) that conveys the flexure strength of the concrete shear wall is not as much as that of the conventional reinforced concrete wall of comparable strength, strengthened concrete wall of; this may prompt increasingly minimized wall measurements (i.e., more compact wall dimensions) which could result in lower costs.

For the unbonded post-tensioning member, the standard suspicion of strain compatibility between the tendon and adjacent concrete couldn't be achieved unlike the bonded system. In the unbonded system, the change in the tendon strain is uniform over the unbonded length of the tendon. At the end of the day, the tendon strain relies upon the change length of the concrete adjacent to the tendon over the unbonded length; the growth in

tendon stress, Δf_p , is determined by computing the increment in

tendon strain, $\Delta \varepsilon_p$ which is determined as the length increasing that happens in tendon after deformation over its original length. Thus, the tendon stress and the strain are related to the member deformation rather than the section deformation. Thus, when the concrete acquires its ultimate strain at compression face the strain in unbonded tendon, would be lower than if the tendon was bonded to the concrete, and in this manner, the unbonded tendons can achieve the inelastic strain at bigger whole member deformations. Along with the writing referenced before, a few analysts had inspected the conduct of the post-tensioned cast-in-place (PT-CIP) shear walls (Aaleti et al. 2009, Erkmen et al 2009, Henry et al.2012, Hassanli et al,2016, Henry et al.2016). However hardly investigating the execution of hybrid PT-CIP shear walls with mild steel under the impact of the seismic loading.

Structure Limit States and Corresponding Capacities Estimation

For a specified member or area of a structure a force and a deformation limit are determined to stand for the capability of that member or area, this specific limit is being defined as the limit state. The limit states for the hybrid unbonded post-tensioned

concrete walls are presented thru the utilizing the ideal base shear-roof drift relationship appeared in Figure 1.

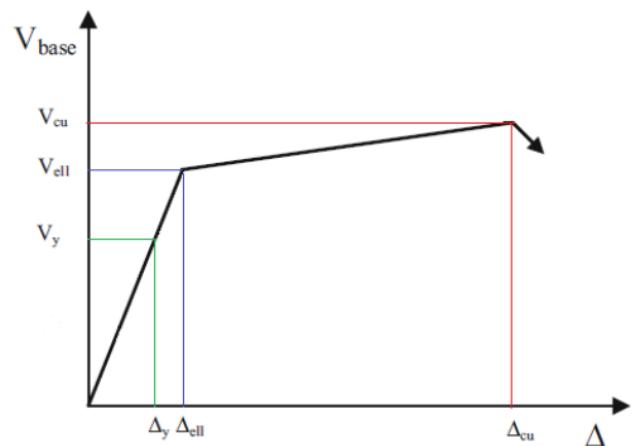


Figure 1: Hybrid unbonded post tensioned wall idealized base shear vs roof dislocation relationship.

Effective Linear Limit of Base Shear-Roof Drift Relationship

(V_{ell} , Δ_{ell})

The horizontal load reaction of the proposed hybrid unbonded PT concrete shear wall is generally straight elastic, until a time when a decrease in the lateral stiffness of shear wall is achieved, such an occurrence is called softening (Kurama,1999). In a hybrid unbonded PT concrete shear wall, softening happens in a smooth and persistent way. Thus, an adequate linear limit for the base shear-roof drift relationship is characterized, and in this investigation, it is allocated when the lowest value of slope f the base shear-roof drift starts as appeared in Figure 2.

Softening of a hybrid unbonded PT concrete shear wall may happen because of two reasons: (1) nonlinear conduct of concrete; (2) nonlinear conduct of PT steel in tension. Nevertheless, due to unbonding of the hybrid PT concrete shear wall, nonlinear conduct of PT steel happens after critical horizontal deflection in the wall happens. Along these lines, the viable linear limit of base shear-roof dislocation relationship is controlled by the nonlinear conduct of concrete.

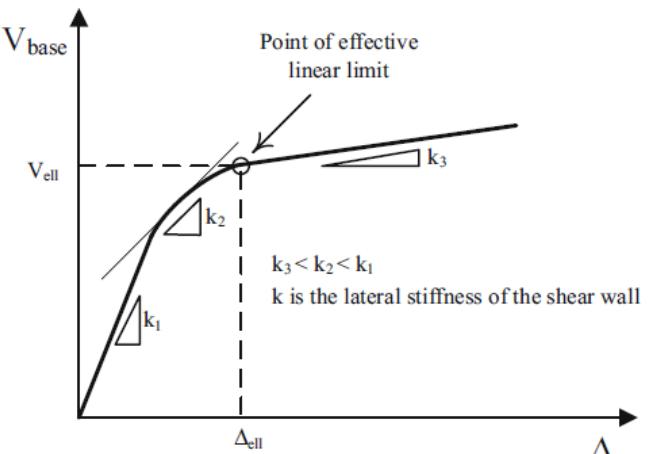


Figure 2: Effective linear limit point on base shear vs roof drift relationship.

The nonlinear distribution of concrete in compression is replaced by the comparable rectangular stress block as permitted by the American Institute of Concrete, ACI 318-14 (American Concrete Institute, 2014). The depth of this square is determined as pursues:

$$a = \frac{N_i + A_s f_y - A'_s f'_s}{0.85 f_c' h_w} \quad (1)$$

And so, base moment, M_{base} and base shear, V_{base} are computed as:

$$M_{base} = \frac{1}{2} C \left(l_w - a \right) + A_s f_s \left(d - \frac{l_w}{2} \right) - A'_s f'_s \left(\frac{l_w}{2} - d' \right) \quad (2)$$

$$V_{base} = \frac{3}{2H} M_{base} \quad (2)$$

$$C = 0.85 f_c' a h_w = A_s f_y - A'_s f'_s + N_i \quad (3)$$

Where C represents the value of the total compressive stress resultant at wall base, a stands for the depth of the comparable (equivalent) stress block, A_s represents the area of mild steel bars

reinforcement in the tension side of the concrete shear wall, A'_s is the mild steel reinforcement in the compression side of the concrete shear wall, f_y is the mild steel yield stress, f'_s is the mild steel stress on the compression side of the concrete shear wall, f'_c is the concrete compressive stress, d represents the distance between the mild steel area's centroid on the tension side and the extreme edge of compression of the wall, d' represents the distance between the mild steel area's centroid on the compression side and the extreme edge of compression of the wall. The base

shear and roof drift at softening are given as V_{ell} and Δ_{ell} , respectively.

Yielding of Mild Steel

Mild steel reinforcement is designed so that it would yield in tension in the anticipated hybrid unbonded PT shear wall so that it will limit the maximum nonlinear dislocation, and provide the needed energy dissipation. As the shear wall contains number of mild steel bars distributed at its both sides, this limit state will be defined as the first happening of yielding in these bars. Never the less, the base shear and roof displacement when the mild steel yields are donated as V_y and Δ_y , respectively. At tensile steel level concrete stress is being computed by dividing the yield stress of mild steel by the modular ratio, n calculated as follows:

$$n = \frac{E_s}{E_c} \quad (4)$$

Where E_s is defined as the modulus of elasticity for mild steel and E_c is defined as the modulus of elasticity for concrete.

Yielding of Post-Tensioning Steel

The yielding of post-tensioning steel would happen when the strain value approaches the value of the yield strain of PT steel. Therefore, this limit state occurs only when the PT cast in place shear wall undergoes a significant displacement. The base shear

and roof displacement at yielding of PT steel are donated as V_{py} and Δ_{py} , respectively.

Crushing of Concrete

The failure of shear wall would occur when the concrete at the base of shear wall fails in compression, this happens at an ultimate concrete compressive strain of ϵ_{cu} , this maximum usable concrete strain is specified by ACI318-11 as $\epsilon_{cu} = 0.003$ beyond which the concrete fractures. The base shear and roof dislocation when concrete approaches its ultimate compressive strain are donated as V_{cu} and Δ_{cu} , respectively.

Building Description

The investigation is done on a six-story office building of plan view as appeared in Figure 3; this arrangement looks like the one utilized by Kurama (2005) with modified measurements and number of spans. Tow unbonded mixture PT concrete shear walls give horizontal load resistance; gravity loads are supported by reinforced concrete frames and hybrid PT concrete shear walls. This study focuses on the seismic conduct of one of the inside concrete shear walls (i.e., wall (A) appeared in Figure 3a, that resist the seismic load in the N-S direction. The concrete shear walls in this building are chosen to be having a length, $l_w = 6.0$ m and thickness, $h_w = 0.35$ m. Each floor height is assumed to be equal to 3.0 m which makes the total height of the building, $H = 18$ m as appeared in Figure 3b.

The seismic analysis is being performed with respect to the ASCE/SEI 7-16 (American Society of Civil Engineers, 2016) for a structure of design risk category II and placed over stiff soil (i.e., site class D). The mapped spectral response accelerations were $S_s = 0.50$ g for short period and $S_1 = 0.20$ g for 1-s. period; g is defined as the gravitational acceleration. That lead to a seismic design category (C). The allowable story drift was chosen to be $0.020h_{xx}$, in which h_{xx} represents the story height beneath the level x.

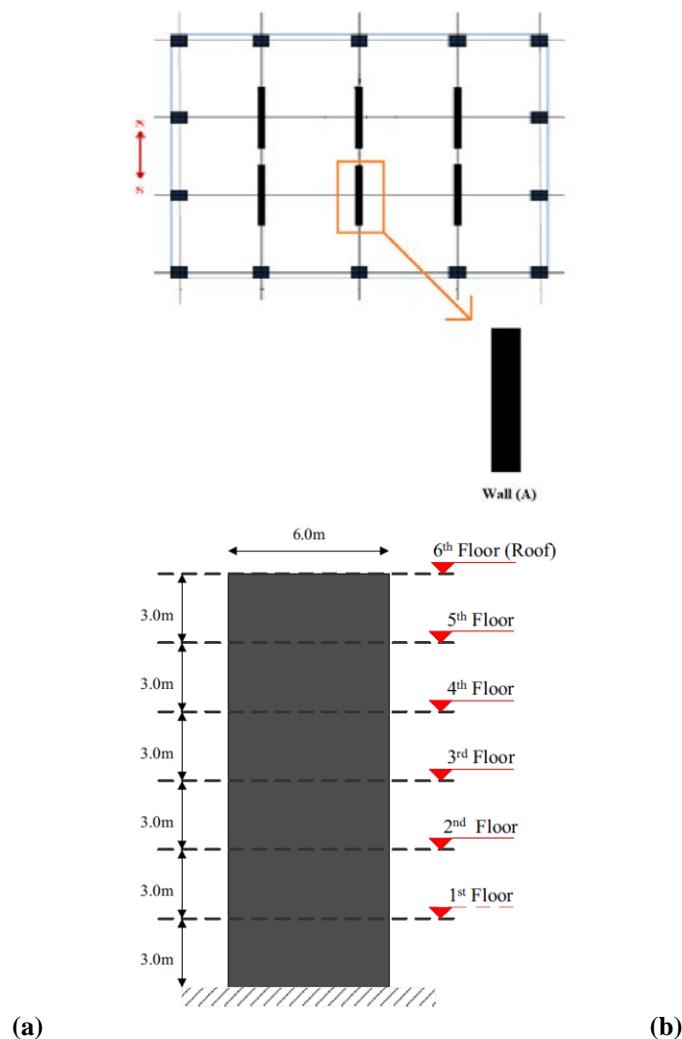


Figure 3: Assumed building configuration in our study, (a) plan view and (b)elevation view of wall A.

Analytical Model

The analytical model suggested in this study for the concrete wall is developed based on previous models developed like the model developed by Kurama et al (1996) and Kurama et al (1999). For instance, Figure 4 demonstrates the analytical model for a six-story wall.

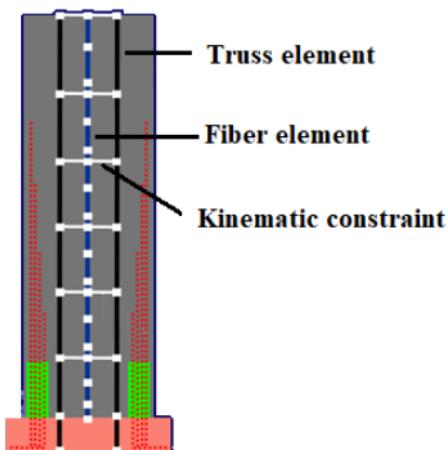


Figure 4: Elevation view of analytical model in our study

The analytical model in this study assumes that the mild steel reinforcement are anchored adequately and fully bonded to the concrete, thus any slip results from bond or anchorage failure is neglected. The assumed stress-strain relationship for the mild steel is shown in Figure 5 this relationship is created depending on experimental results reported by Paulay and Priest (1992).

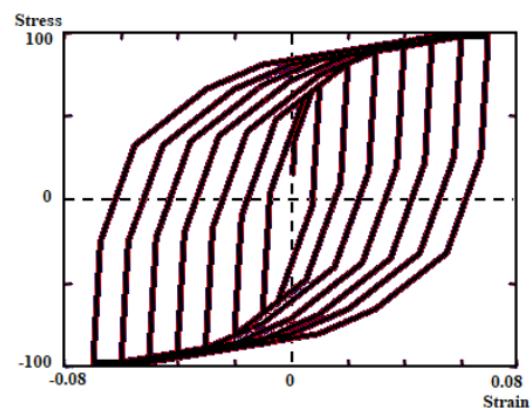


Figure 5: Mild steel of analytical model

Analytical Model Assumptions and Limitations

As depicted in detail by Kurama (1999), the ideal conduct of unbounded post-tensioned precast walls under horizontal loads is controlled primarily, by the opening of gaps along the horizontal joints and, to a less degree, by the axial-flexural deformations of the wall boards.

A great standpoint of utilizing fiber beam-column section components for the wall boards is that an accurate model can be created utilizing just uniaxial stress-strain models for the concrete, post-tensioning steel and mild steel, and the components of the wall. The model referred to as the fiber wall demonstrate, represents the axial- flexural interaction in the wall, the gap opening along the level joints, and the hysteretic conduct of the mild steel, post-tensioning steel, spiral confined concrete, and unconfined concrete fined concrete. Note that buckling and low cycle fatigue crack of the mild steel bars are not demonstrated.

The accompanying presumptions are made for the hybrid PT concrete shear wall model (prototype); the Seismic forces are acting in the long direction of the wall and they are totally resisted by concrete shear walls. Also, the Seismic weights of structures at

each floor level, (i.e., w_x) are equivalent and for the building under investigation, the center of mass and center of rigidity are correspondent, which implies no torsional impacts of earthquakes are integrated. As well as the seismic forces at each floor would be transferred to the walls by floor and roof rigid diaphragm. Hence; the wall experiences a similar lateral distortion at each floor level because of unbending rigid diaphragm statement. Deformations that may happen in the foundation are not counted. Anchorage of the post-tensioning tendons remains completely viable amid the seismic reaction of the walls. Long-term losses in post-tensioning force because of shrinkage and creep not being taken into consideration. The mild steel bars reinforcement is completely attached (bonded) to concrete, which means that any slip or bond failure is not counted.

II. ANALYTICAL MODELING

Selection of Elements

In order to be able to demonstrate the general behavior and some unique characters of the hybrid walls with a general more common and basic analysis technique; a basic Finite Element model was created using the ABAQUS software where a model of monotonic lateral load analysis was implemented. This model has the few assumptions which were made specifically to simplify the analysis and make it more appropriate for the design office, these assumptions include using the yield point to be the measured strength of the unconfined concrete which implies an elastoplastic concrete conduct (i.e., behavior) this assumption makes the Finite Element model unable to capture the concrete cracking, also; using the measured yield strength for the elastoplastic conduct of mild steel, in addition to the previous assumption other assumptions were made such as the rigid or hard contact between base board to foundation joint, and lumped post tensioned and mild steel areas at the wall centerlines. However; the contact behavior at the base joint and gap opening were modeled. See Figure 6.

ABAQUS software programming (2008) is being utilized to show the proposed model concrete shear wall. An eight-node first-order three-dimensional solid components are utilized to demonstrate the solid concrete wall.

The reinforcing bars are displayed utilizing the three dimensional, two-node truss components embedded inside the concrete components. Post-tensioning tendons are displayed utilizing three-dimensional, two-node beam components demonstrating the strands inside a three-dimensional, two-node pipe component utilizing the external conduits (ducts). These conduits are inserted inside the concrete components. The unbonded tendon slip is being characterized utilizing the three-dimensional single-node internal tube-to-tube component. These components are reasonable for characterizing the collaboration between an external and inner pipe or an external pipe and an internal beam with respect to this case. The default mechanical surface collaboration with the cylinder to-tube contact component is frictionless which agrees to the meaning of unbonded tendons.

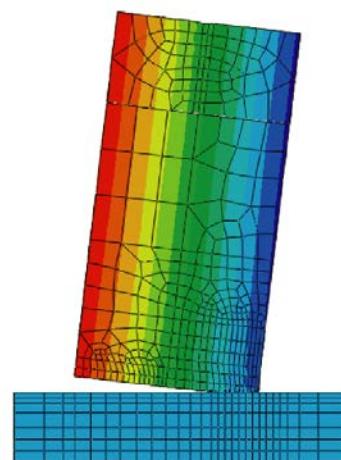


Figure 6: Analytical modeling; finite element (ABAQUS) model.

Boundary Conditions and End Anchorage

The post-tension force's level is dictated by considering dislocation and geometric similarity conditions as opposed to the strain similarity presumptions commonly made in bonded reinforcement. This is on the grounds that strain similarity between the concrete and the unbonded tendons does not exist at the section level. Or maybe, the change in tendon strain is associated to the wall distortion between the two tendon anchorages. For unbonded PT concrete shear walls, the transfer of force from the tendons to the concrete is by methods for the end anchors and the profile of the tendons. The strains in the tendons allocated all through their entire length.

To achieve the above-mentioned conditions, the Beam Multiple-Points Constraint (MPC), which is a built-in function in ABAQUS software programming (2008), is being applied at the end anchorage with the purpose that a rigid component is shaped between the two-node beam elements components (i.e., strands) end nodes and the concrete wall nodes. Plus, fixed boundary conditions are allocated to the nodes of the bottom face of the concrete shear wall. The MPC is likewise used to connect the nodes at the upper and lower floor levels to keep up indistinguishable horizontal dislocation of various floor levels and to guarantee the rigid diaphragms assumption made up earlier. The referenced above conditions guarantee that the deformation and geometric similarity conditions are verified between the PT tendons and the concrete at various strand levels.

Table 1: properties of the material that used in the analytic model

Property	Concrete	Mild steel	PT steel
Mass density (kg/m^3)	2400	7860	7860
Poisson ratio, ν	0.200	0.303	0.303
Modulus of elasticity	29,725	200	190,000

y, E (MPa)			
Strength	$f'_c = 40$	$f_y = 414$	$f_{py} = 1670$
Strain	$\varepsilon_{cu} = 0.00300$	$\varepsilon_y = 0.00207$	$\varepsilon_{py} = 0.0879$

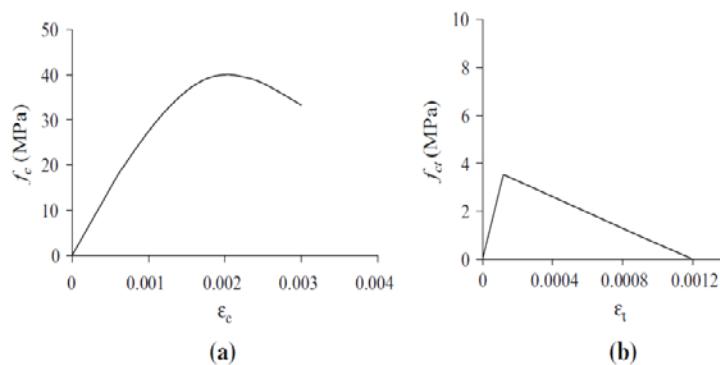


Figure 7: Stress-strain model of concrete under (a) Compression loads and (b) Tensioned loads.

Materials Properties

Three materials are characterized for the concrete shear wall model demonstrate: concrete, mild steel, and high-strength PT steel. The materials characteristics and properties are elaborated beneath and showed in Table 1.

Concrete

A concrete cylinder compressive strength of 40 MPa is estimated, the uniaxial stress–strain models for this material under both compressive and tensile forces are shown in Figure 7.

The nonlinear material conduct of concrete in ABAQUS is portrayed utilizing the material model "concrete damaged plasticity". This model is characterized by utilizing concrete damaged plasticity, concrete compression hardening, and concrete tension stiffening choices. The conduct of stress-strain of the concrete under uniaxial compressive loading could be divided into three zones. The principal zone demonstrated by the linear-elastic branch, which can be figured as a direct linear-elastic function of the modulus of elasticity:

$$f_c = E_c \varepsilon_c \quad (5)$$

Where E_c for $f'_c = 40 \text{ MPa}$ equivalent to $E_c = 4700\sqrt{40} = 29,725 \text{ MPa}$

f_c is the compressive stress of concrete.

This linear branch closes at about 0.45 f'_c according to American Concrete Institute (2014), and it is characterized utilizing "elastic" alternative accessible inside ABAQUS (2008). The second zone is determined by the ascending branch up to the estimation of f'_c that is 40 MPa, come to a strain value equal to $\varepsilon_o = 0.002$. The third zone is shown by the post yielding branch which is finished by greatest usable value of concrete solid strain $\varepsilon_{cu} = 0.003$ indicated by American Concrete Institute (2014). The nonlinear compressive conduct of concrete (i.e., second and third

zones) is characterized utilizing "concrete compression hardening" choice.

As well as, under tensile loading in order to characterize the uniaxial stress–strain model of concrete; the concrete tension stiffening choice is utilized, this choice is important to characterize the relation and interaction between the concrete and the reinforcing bars when cracking happens (2008). The stress–strain curve defined to by this model is displayed in Figure 7b. This curve is divided into two lines associated at the estimation value of elasticity of concrete, f_{ct} that is estimated American Concrete Institute (2014), as pursues:

$$f_{ct} = 0.56\sqrt{f'_c} \quad (6)$$

Which equals to 3.5 MPa for $f'_c = 40 \text{ MPa}$

The stress–strain curve is linear elastic below this value, and the tensile strains can be computed giving the following equation:

$$\varepsilon_t = \frac{f_t}{E_c} \quad (7)$$

Where f_t is the tensile stress of concrete.

From the equation above, it could be acquired that the most extreme value for tensile strain for the concrete model is equivalent to 0.012%, and this esteem is representing the failure strain of concrete. After the failure point, a stiffening curve is ought to be characterized to represent the strain softening conduct for cracked concrete and to incorporate the impact of the reinforcement interaction with concrete. For relatively heavy reinforced concrete, tension stiffening is proposed as the pressure is decreased to zero at a total strain of around ten times the strain failure (2004). This maximum upper limit is expected for the present model as appeared in Figure 7 so as to consider the presence of high-strength PT reinforcement in addition to the conventional mild steel reinforcement.

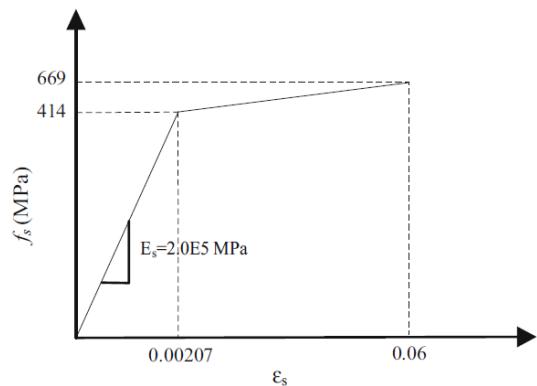


Figure 8: Mild steel stress-strain curve.

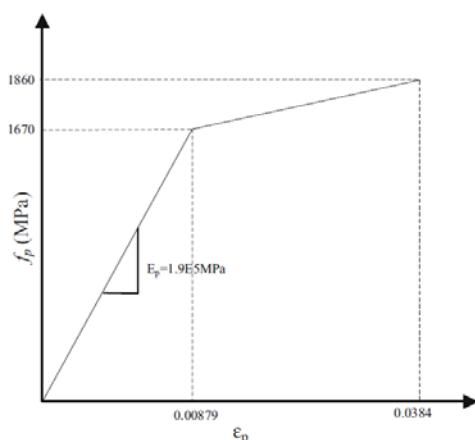


Figure 9: Post tensioned steel stress-strain curve.

Mild Steel

A bilinear model is appeared in Figure 8 , and it is assumed for demonstrating the stress– strain conduct of mild steel. Properties of mild steel are equivalent to the values that are embraced by Kurama (2002), in which the ultimate strength and the yield strength are assumed to be equivalent to the values with $f_y = 414$ MPa and $f_u = 669$ MPa, respectively. The elastic choice is utilized to characterize the linear section up to the yielding point. Never the less, post-yielding zone is demonstrated utilizing the "plastic" choice, which is utilized to recognize the plastic part of the elastic– plastic material. By incorporating the kinematic hardening parameter to the plastic choice, the bilinear model is shown in Figure 9.

Post-Tensioned Steel

Tendons Grade 1860 seven-wire strands are utilized in this investigation; the stress– strain relationship is appeared in Figure 9, and it is demonstrated as a bilinear model in the similar way as the mild steel reinforcement utilizing the plastic alternative with kinematic hardening parameter to show the post-yielding conduct.

Modeling of Loads

The loads which are incorporated into the wall model are three types of loads, according to the American Society of Civil Engineers (i.e., ASCE): Minimum Design Loads for Buildings and Other Structures, ASCE/SEI 7-16 (2016) and ACI 318-14 (2014):
 1. Post-tensioning force
 2. Gravity loads.
 3. Lateral (horizontal) loads.

In the examination of hybrid PT concrete shear wall model, the three loads are imposed so that to isolate progressive steps starting with the post-tensioning force, then the gravity loads, lastly the equivalent static horizontal loads.

Post-Tensioning Force

The post-tensioning force is displayed in the model utilizing the initial condition choice gave in (ABAQUS, 2008). Jacking stress esteem is chosen considering the prerequisites of ACI 318-14 (American Concrete Institute, 2014); that the tensile stress in prestressing shall not be greater than $0.94 f_{py}$ as well as not more than $0.80 f_{pu}$, where f_{py} and f_{pu} are yield stress and ultimate stress for the PT steel, respectively. An effective stress esteem, f_{pe} of equivalent to $0.49 f_{pu}$ is anticipated for this examination; this

esteem is after allowance for all prompt (immediate) prestress loss. By imposing the initial condition type stress, the post-tensioning stress could be transferred from the end anchorage (MPCs) to the concrete, causing the pre-compressive stress in concrete ($f_{pc} = P_e/A_c$), where P_e is the post-tensioning steel area multiplied by f_{pe} and A_c is the concrete wall cross-sectional area.

Gravity Loads

Gravity loads comprise of the superimposed dead and live loads conveyed by the wall dependent on the suitable tributary from Figure 9.

Live load is load as indicated by the Building Code Requirements for Structural Concrete as minimum design load for an office building (American Concrete Institute, 2014). This esteem is observed to be 2.5kN/m^2 while the superimposed dead load is taken equivalents to 3 kN/m^2 . These gravity loads are characterized as a surface load applied at every story level.

Horizontal (Lateral) Load

The seismic load is applied utilizing equivalent horizontal force technique. The structure base shear portion resisted by wall (A) [see Figure 3] is determined with no consideration of any torsion that might be brought about by the eccentricity, e . The static horizontal load is shown as a concentrated nodal force at the highest point (i.e., top) of the cantilever shear wall. After the horizontal force is applied, the base shear is determined and after that distributed at every story level as indicated by Building Code Requirements for Structural Concrete (American Concrete Institute (2014)) as illustrated in Figure 10.

In a static technique in ABAQUS/Standard, the default load function is linearly increasing over an examination step; this implies that load is linearly increased with time at every increment until achieving the predefined esteem toward the finish of the step.

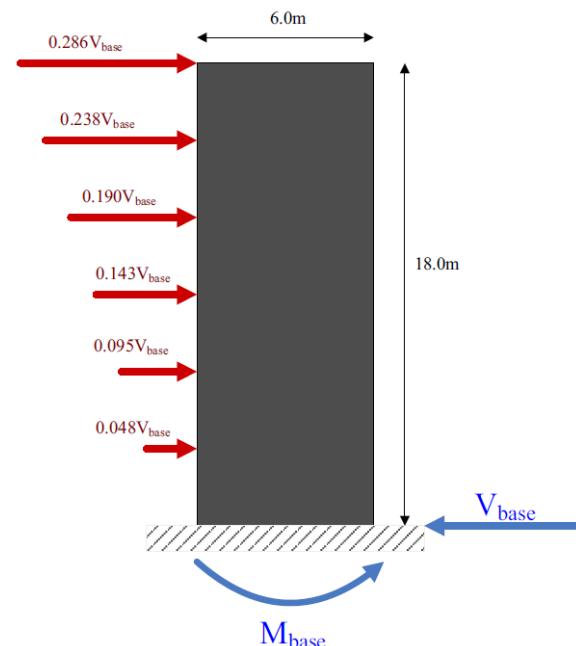


Figure 10: Wall base shear vertical distribution.

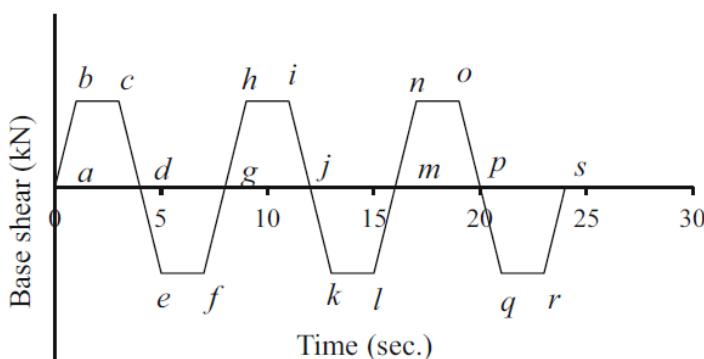


Figure 11: Cyclic horizontal load.

To examine the cyclic conduct of hybrid unbonded PT concrete wall, a second situation where a non-default load function appeared in Figure 11 according to Kurama (2002) is characterized. In this model, each load cycle comprises of loading branch at which horizontal load linearly increased with time to greatest (yielding) value. A constant loading branch is at which the horizontal load holds constant, unloading branch at which the load is linearly decreased to zero parallel to that of loading line, and lastly the loading is reversed.

Six model (prototype) concrete shear walls are examined in this study under proportionate static and static cyclic horizontal load. The flexural strengths of these walls are equivalent. Wall HP1 is a hybrid unbonded PT precast shear wall with A_p / A_s equal to 50%, HP2 is a hybrid unbonded PT precast shear wall with A_p / A_s equal to 75% wall, HC1 is hybrid unbonded PT cast-in-place shear wall with A_p / A_s equal to 50% wall, HC2 is hybrid unbonded PT cast-in-place shear wall with A_p / A_s equal to 75% wall, RC is standard reinforced concrete shear wall and PT is a typical unbonded post tensioned concrete shear wall . A proportion A_p / A_s is embraced for the examination the conduct of hybrid unbonded PT shear walls, where A_p is the post-tensioning steel area and A_s is the mild steel area.

III. RESULTS

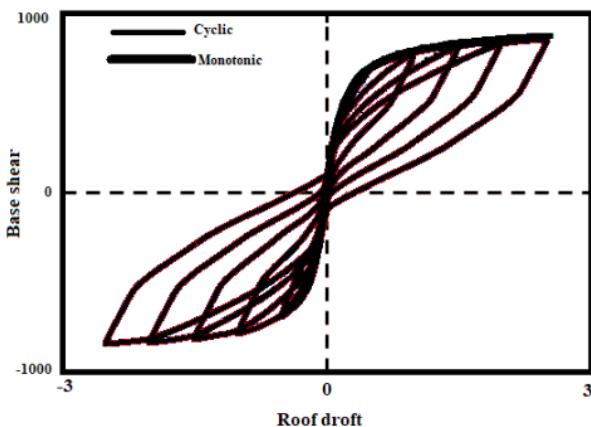


Figure 12: Model walls behavior under horizontal loads.

Figure 12 demonstrates the normal base shear versus roof drift ($V - \Delta$) conduct of the model (prototype) walls under joined gravity loads and reverse cyclic horizontal loads (Kurama, 2002). The gravity loads following up on each wall are thought to be equivalent to $1.00D + 0.25L$, where D and L are the unfactored design dead load and the unfactored unreduced structure live load, individually. This mix of dead and live loads is expected to denote to the measure of gravity load that might follow up on the walls during a seismic loading.

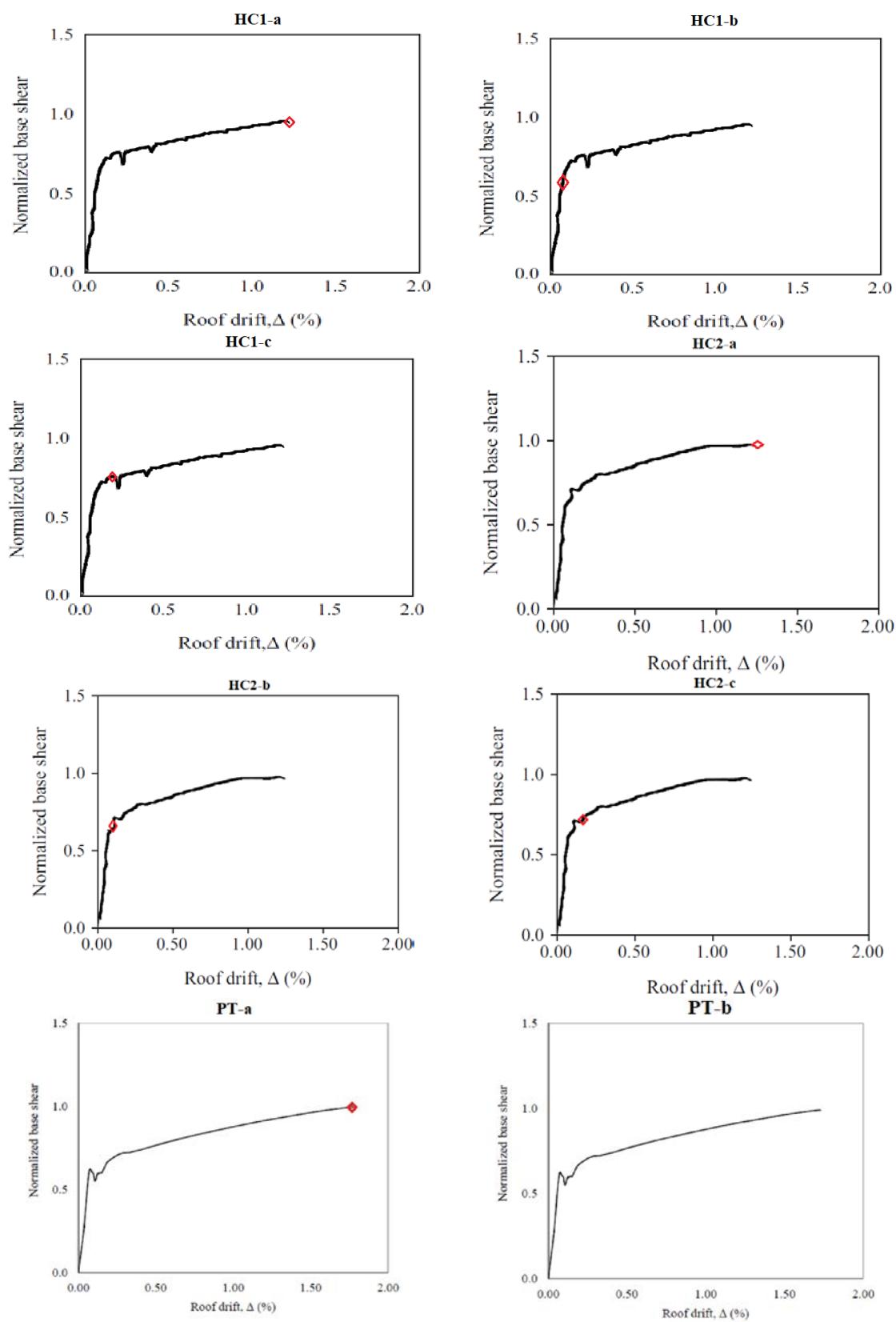
The thick line in Figure 12 demonstrates the base shear versus roof drift conduct of the model wall under consolidated gravity loads and monotonic horizontal loads as acquired from static push-over examinations explained by Kurama (kurama,2002).

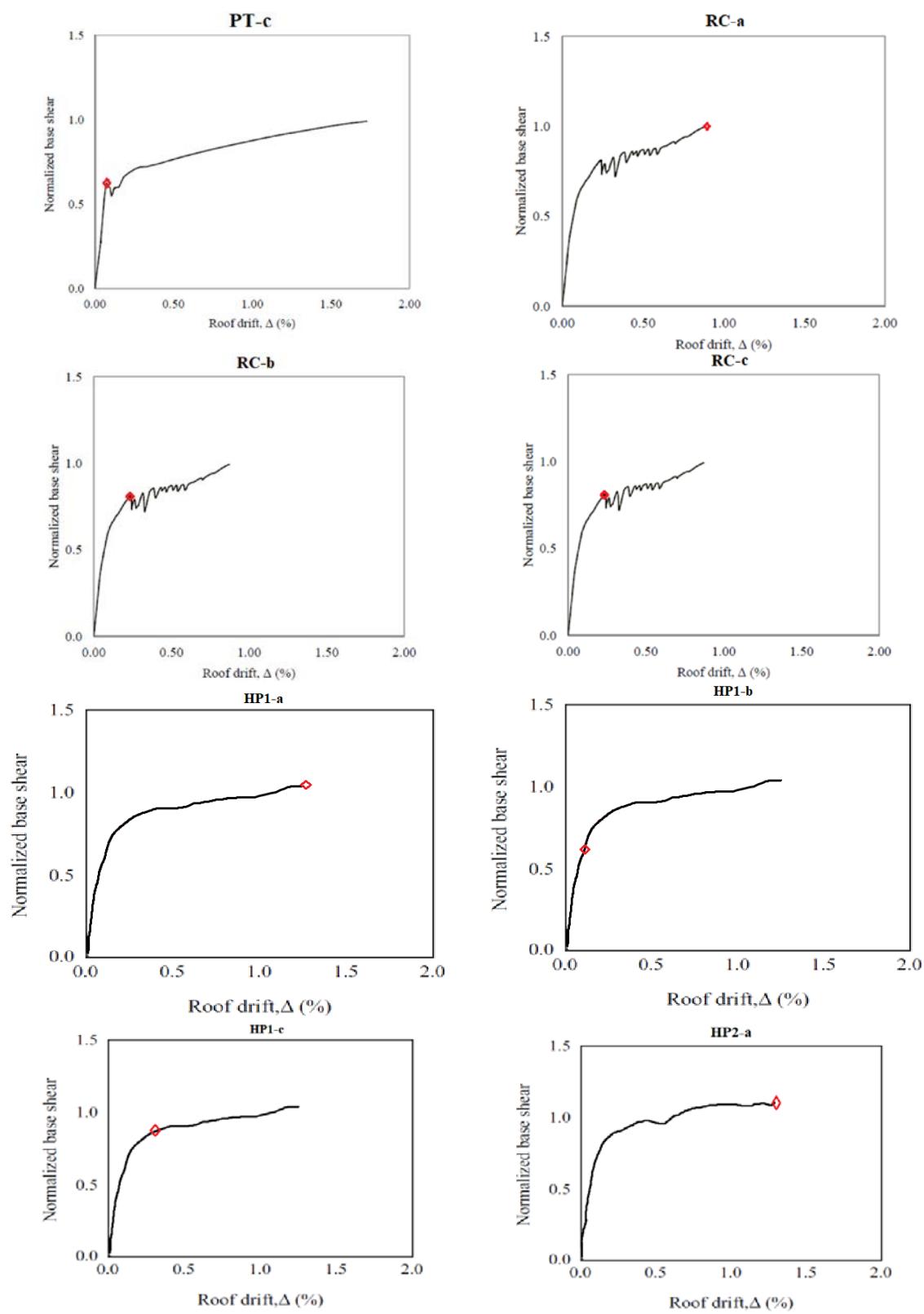
The base shear, V . is equivalent to the aggregate of the horizontal forces employed at the floor and rooftop levels, and the roof drift Δ , , is equivalent to the horizontal dislocation at the rooftop level over the wall height .The dispersion of the horizontal forces divided by the height of the walls is thought to be equivalent to the dissemination of inertial forces comparing to the principal (i.e., first) mode of vibration from a linear elastic modular examination of each structure. It's observed that inertial force dissemination is greatly various from the expected basic mode dispersion divided by the height of the walls during a massive seismic loading, but this isn't explored in this study.

Figure 13 demonstrates the base shear versus roof drift connections of the model hybrid HP1, HP2 HC1 and HC2 walls, As known, the increase of the mild steel reinforcement quantity will cause an increase of the amount energy dissipation of the walls.

As expressed before, limit states are considered for the hybrid unbonded PT concrete shear wall; each limit state is demonstrated on the standardized base shear-roof drift plot below:

(RC: Conventional reinforced concrete shear wall, PT: Traditional post-tensioned concrete shear wall, HC1: Hybrid unbonded post-tensioned cast-in-place concrete shear wall with $A_p/A_s=50\%$, HC2: Hybrid unbonded post-tensioned cast-in-place concrete shear wall with $A_p/A_s=75\%$, HP1: Hybrid unbonded post-tensioned precast concrete shear wall with $A_p/A_s=50\%$, HP2: Hybrid unbonded post-tensioned precast concrete shear wall with $A_p/A_s=75\%$).





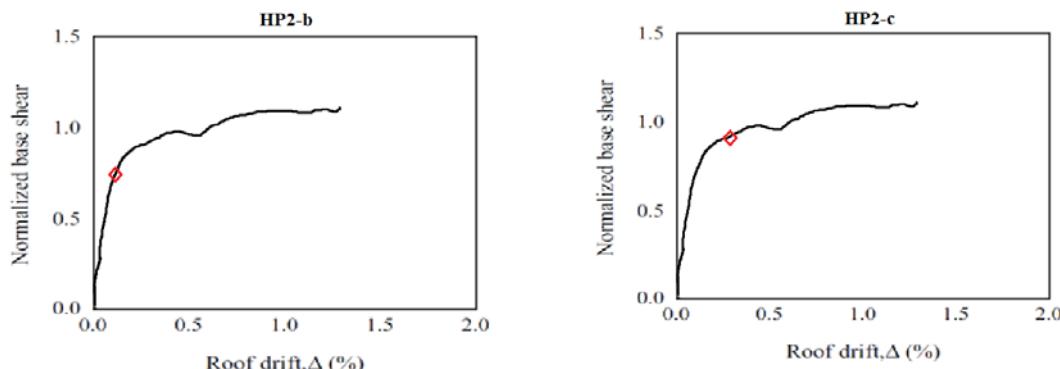


Figure 13: Model walls base shear vs roof drift under static horizontal load. a: crushing of concrete, b: yield of mild steel and c: effective linear limit.

Model walls base shear vs roof drift under static horizontal load results are summarized in the table 2 below.

Table 2: Summary Results of the walls base shear vs roof drift under static horizontal load.

Wall Type	Wall Name	A _p /A _s percentage	V _{cu} (a)	Δcu % (a)	V _y (b)	Δy % (b)	V _{ell} (c)	Δell % (c)
Reinforced Concrete	RC	–	1	0.94	0.76	0.21	0.74	0.22
Post tensioned	PT	–	0.97	1.72	–	–	0.59	0.06
Hybrid cast in place	HC1	50%	0.98	1.28	0.69	0.14	0.81	0.22
	HC2	75%	0.96	1.34	0.61	0.11	0.78	0.18
Hybrid precast	HP1	50%	0.97	1.39	0.76	0.13	0.82	0.29
	HP2	75%	0.99	1.43	0.69	0.12	0.79	0.27

The Behavior of Hybrid Unbonded PT Walls Subjected to Equivalent Static Loading

Figure 13 demonstrates the standardized base shear, V_{base} versus the horizontal roof drift, $\Delta\%$ relationships got from horizontal load investigation for the six model walls (i.e., walls, HP1, HP2, HC1, HC2, PT and RC). Rooftop drift is characterized as the horizontal dislocation over the shear wall height. As referenced beforehand, the model walls have an emulative ultimate flexural strength (i.e., have similar V_{cu}). The parametric reaction amounts for these walls are given in Fig. 18. Base shear esteems are standardized by the greatest value of base shear of the reinforced concrete wall RC (i.e., V_{cu}).

The results in Figure 13, demonstrates the extensive decrease in this amount because of utilizing the high-strength PT steel reinforcement. In this way, an ideal flexural strength can be

accomplished however with lower area of reinforcement when a portion of the conventional mild steel is supplanted by a high-strength PT steel. Looking at Figure 13 demonstrate that despite the fact that V_{cu} is equivalent for the model walls, the variety of A_p / A_s proportion prompted diverse values for the rest of parametric reaction amounts. Each of the reaction amount is being discussed below.

Effective Linear Limit

At the base shear and roof drift achieve the estimations of V_{ell} and Δ_{ell} , respectively, a drop in the wall stiffness happens. As A_p / A_s proportion changes, the terms N_i , $A_s f_s$, $A'_s f'_s$ in Equations. (1) through (3) will change. Looking Figure 13,

outlines that the variety of these terms prompted a decrease in V_{ell} and Δ_{ell} amounts as Ap/As proportion increases.

Behavior of Hybrid Unbonded PT Walls Subjected to Static Cyclic Loading

For every wall of the six model walls (i.e., HC1, HC2, HP1, HP2, PT and RC) are exposed to the reversed cyclic loading showed in Figure 11. Each of the three load cycles comprises of loading the wall with linearly increased horizontal load up to a

most extreme esteem equivalents to V_y given for each wall in Figure 13, hold constant, and after that the loading is reversed to $-V_y$ and at that point unloading.

For the post tensioned wall PT, the limit state of mild steel yielding isn't given since no mild steel reinforcement exists for this wall. Additionally, it is noted from Figure 13 that yielding of post-tensioning steel happens at a similar base shear at which the

$V_{cu} = V_{py}$. The advantage of this is that the post-tensioning steel stays elastic in which gives a restoring force to the PT shear wall that enhances its cyclic conduct as will

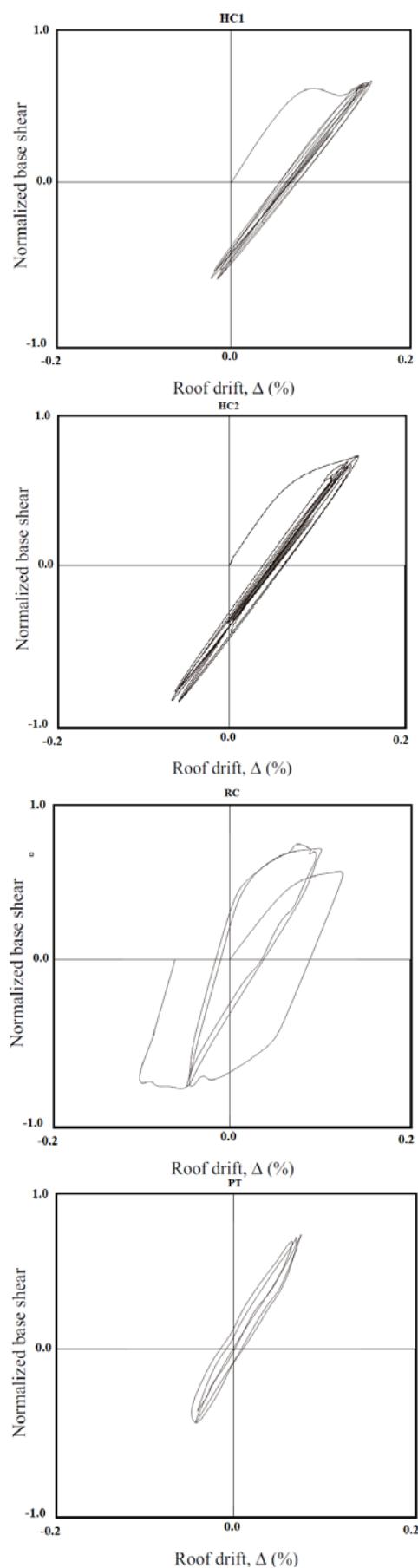
be outlined later. Hence, a yielding base shear, V_y equivalents to $0.60V_{cu}$ is expected for the use of cyclic loading for this shear wall.

Base Shear-Roof Drift Relationship

The standardized base shear versus roof drift relationship for each wall of the six model walls for, when exposed to reversed cyclic loading, are appeared in Figure 14.

The dissipated energy for each wall considered by the area of hysteresis circle (i.e., the region under $V_{base} - \Delta$ curve). It is demonstrated that the biggest hysteresis loop is acquired in Figure 14 (RC) using reinforced concrete wall RC, reinforced concrete wall dissipates energy through yielding of mild steel reinforcement. The dissipated energy is decreased gradually with the increase in A_p/A_s for the concrete shear walls as appeared

in Figure 14 as the area under $V_{base} - \Delta\%$ curve ends up smaller until achieving the instance of linear and almost elastic conduct. It is noticed the that largest dissipated energy for the hybrid walls happens at the first loop and after that declines for the second and third loops as the mild steel yields at the first loop and structure lose its strength and subsequently the amount of energy dissipated is minimized in the accompanying loops.



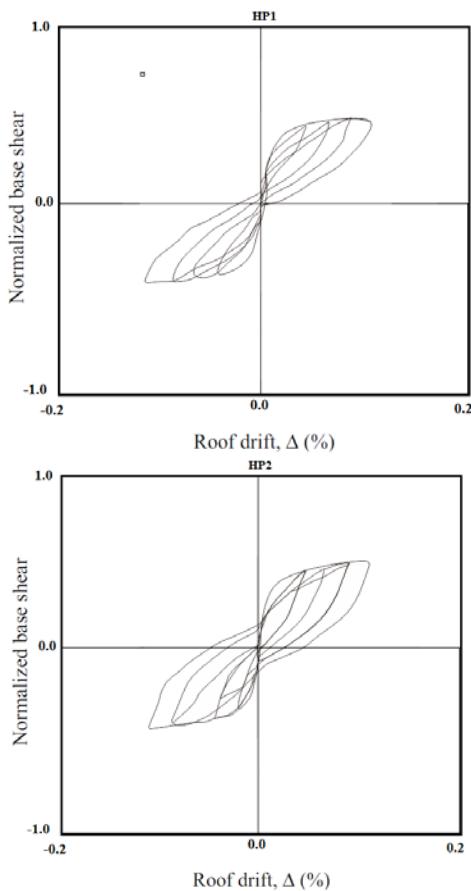


Figure 14: Model walls base shear vs roof drift under cyclic load.

IV. RESIDUAL DRIFT

Figure 14 demonstrates that roof drifts amid the cyclic stacking; it is noticed that removal tops achieved each cycle are the best for wall RC and turns out to be less for HP1, HP2 and HC1, HC2 as A_p/A_s proportion increments. However, as A_p/A_s proportion diminishes, a plastic twisting happens when first greatest sidelong power is come to. That is the point at which the parallel burden connected to the divider achieves its first most extreme esteem ($+V_y$) turns around to another greatest esteem ($-V_y$) some plastic happens in the principal heading, and accordingly, the divider does not achieve a similar horizontal relocation inverse way. The remaining disfigurements toward the finish of three cycles versus A_p/A_s proportion, for every one of the six shear walls, are appeared in Fig. 20. It is noticed that the roof drift is greatest for wall RC and reduced gradually for walls HP1, HP2, HC1 and HC2 as the proportion A_p/A_s increments. It's expected that as A_p/A_s proportion increases until maximum value the bounded occurs which is identified with the extensive restoring force given by the flexible PT tendons that make the shear wall swing back to its unique position.

V. CONCLUSION

The outcomes of past examinations (Kurama 2002) demonstrate that impressive decreases in the horizontal dislocations of post-tensioned precast walls under seismic loading can be accomplished by utilizing bonding mild steel support crossing the horizontal joints of the walls. Similarly, in this study, hybrid precast concrete walls stand for an important feasible essential lateral load resisting structure to be used in seismic areas.

In this study it is shown that the quantity of mild steel reinforcement that is needed in a wall will be depending on the needed decreases in the horizontal dislocations.

Comparing to cast-in-place reinforced walls, the quantity of mild steel that would be required in a hybrid precast wall is less due to the fact that a part of the flexural strength of the wall to resist horizontal loads is given by the post-tensioning steel.

Past researches (Kurama 2002) show that, mild steel reinforcement isn't required for walls in areas with moderate seismicity. Further investigation is expected to be done for walls in areas with high seismicity, an extended research should be applied in order to obtain a seismic design methodology for the mild steel reinforcement to accomplish an objective decrease in the horizontal dislocations, like the plan approaches produced for walls with supplemental friction dampers and viscous fluid dampers as designated by Kurama (2000, 2001).

The most vital horizontal joint for the utilization of bonded mild steel support reinforcement is the base-board to-foundation joint. The reinforcement utilized in a wall has to be adequately anchored to the base (foundation) and also has to be stretched out (extended) to an adequate height over the base of the wall to take into consideration the progression of the yield strength of the steel in tension and compression at the base-board to-foundation joint. This study has explored the predicted seismic conduct of hybrid precast and cast-in-place concrete model walls with various measures of unbonded post-tensioning steel and mild reinforcement steel support.

The Analysis outcomes of reversed cyclic loading show that the inelastic energy dissipation of the hybrid post tensioned cast in place and precast walls is improving by utilizing an increased mild steel area as this mild steel area would through yielding provides better energy dissipation, as noted the self-centering ability would be increased as the proportion A_p/A_s increases and thus the permeant deformation that happens after loading would be reduced.

By utilizing unbonded post-tensioned reinforcement in the hybrid concrete wall the total reinforcement area would be reduced which allows the wall to experience a larger nonlinear horizontal drift compared to a standard reinforced concrete shear wall having the same comparable flexural strength, hence an improvement in the wall ductility would occur. On the other hand, the advantage of hybrid shear wall over a traditional PT wall would be the fact that in a hybrid wall a part of the post-tensioned bars are replaced by mild steel bars this would limit the maximum values for drifts to a desired value with the same base shear capacity.

The outcomes of the analysis of the hybrid wall having different A_p/A_s ratios but with the same flexural strength subjected to equivalent static loads show that when the ratio A_p/A_s increments, the base shear values (V_y and V_{ell}) would be lower, and Δ_{cu} will increase, however Δ_{ell} and Δ_y will decrease.

Note that the different distribution of the strands has no major impact on the hybrid shear wall behavior. The outcomes of the examination show that the value of base shear (V_{cu} and V_{ell}) could be increased by increasing the amount of post-tensioning steel over that of mild steel, and by increasing the effective prestressing force, also by increasing concrete strength, as well as increasing the thickness of shear wall. On the other hand, the value of Δ_{cu} could be decreased by increasing the effective prestressing force, and increasing the content of mild steel reinforcement, also reducing the thickness of shear wall, as well as reducing concrete strength.

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Twin Pleasures of Plants' Leaves: UV Protection & Sensitizer of DSSC

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Abstract- Plants' leaves can prevent the UV attack although the ozone layer is still damaged by CFC emission due to the activities of human beings, and natural dyes extracted from leaves can be used in dye-sensitized solar cell (DSSC). In this work, the absorbance spectra and light harvesting efficiency (LHE%) of natural dye solutions extracted from the leaves of henna (*Lawsonia inermis*), ironwood (*Xylosteum xylocarpa*), sour sop (*Annona muricata*), mango (*Mangifera indica*), and marian (*Bouea macrophylla*) have been studied by UV-VIS spectroscopy to protect the effects of UV attack and to use as sensitizer for DSSC. There is 100% LHE between the wavelength of 190 nm and 400 nm for henna, sour sop, mango and marian. According to absorbance and light harvesting efficiency spectra, dye solutions can absorb all UV-C and most of UV-B. So, henna, sour sop, mango and marian leaves can be regarded as the best absorber of high energy photons in the UV region. The band-gap energy of all leaves is 1.8 eV. But the light harvesting efficiency of ironwood between the wavelength of 190 nm and 282 nm is 0%.

Index Terms- absorbance, CFC, DSSC, LHE%, ozone

1. INTRODUCTION

Serious environmental problem due to the large amount of chlorofluorocarbon (CFC) emission in the earth's atmosphere by the activities of human beings can cause the depletion of ozone layer. Ozone means "Smelling" in Greek. It has a very harsh odour. There is 90 percent of total ozone gas of the atmosphere in this layer. The thickness of layer (about 3 mm at STP) varies seasonally and geographically. It composes of three oxygen atoms, symbolized as O_3

and regarded as a shield for human beings to protect the dangers of UV radiation of cosmic rays.

The unit of the total amount of ozone in an overhead column of the atmosphere is Dobson Unit (DU). It is measured by how thick the ozone layer would be if it were compressed into one layer at STP. Every 0.01 mm thickness of the layer is equal to one DU. The average amount of ozone in this layer across the globe is about 300 DU or thickness of only 3 mm at STP. The term "ozone hole" should be applied to regions where the ozone depletion is so severe that levels fall below 200 DU^{[1][10]}.

Natural ozone layer exists in the second layer, stratosphere, in the height between 10 km and 50 km above the earth. The production of carbon-dioxide makes green-house effect and CFC emission causes the depletion of ozone layer. When the chemicals contain chlorine and bromine react with ozone layer, the fission of oxygen molecules (O_3) causes the ozone layer depletion. The substances that decrease the thickness of ozone layer are called Ozone Depleting Substances (ODS). They are Chlorofluoro carbon (CFC), Carbon Tetrachloride (CTC), Methyl Chloroform (MCF), Hydro Chlorofluoro Carbon (HCFC). Nowadays, the ozone layer is still being damaged by the activities of human beings.

In DSSC, the absorption of high energy photons in the UV and visible regions, and the broader absorption band are important facts for dye sensitizer. The energy levels of dye sensitizer need to match with the bottom edge of conduction band of semiconductor and the redox potential of electrolyte. It is necessary to make the good chemical bonding between the semiconductor and the dye for effective electron transfer^[3-5].

UV radiation is divided into three groups: UV-A, UV-B and UV-C. UV-C has the strongest penetrating power of the three UV groups. Table 1.1

shows the energy of the photon in the different wavelengths. Ozone layer cannot absolutely absorb UV-A, but it can absorb all of UV-C and most of UV-B. So, most UV-A and less UV-B can reach on the earth's surface. The decrease of thickness of ozone layer or its depletion can cause the problems for human beings and living things due to the falling of the intense unfiltered UV radiation. So, ozone layer is known as the natural cloth of the earth or precious gift for the earth given by Lord^[11].

Table 1.1 Energy of various spectra

Spectrum	Wavelength(nm)	Energy(eV)
IR	1200~700	1~1.8
Visible	Red	700-620
	Orange	620-585
	Yellow	585-570
	Green	570-490
	Blue	490-440
	Indigo	440-420
	Violet	420-400
UV-A	400-315	3~3.9
UV-B	315-280	3.9~4.4
UV-C	280~100	4.4~123

Although UV-A in the morning contains the health supports for human beings, the falling of UV-B from 9:00 am to 4:00 pm on the skin of human being thoroughly for 30 minutes can cause the burn of the skin, the skin cancer and the damage of cornea. UV-C with the shortest wavelength has high energy to penetrate into the skin. So, it can cause the immune system and even death, and then destroying the plants and vegetation and the death of aquatic animals. UV-A, falling on the earth, is about 95% and UV-B is about 5%. UV-B can cause the damage of the skin epidermis and the skin cancer. Between 10:00 am and 2:00 pm, 99% of UV-A and 1% of UV-B fall on the earth surface. 98.7% of all UV radiations falling on the earth is only UV-A.

UV-C with very shorter wavelength gives the dangerous conditions for human beings and living things. But it cannot reach on the earth by the filtering of ozone layer. If the ozone layer still exists without any problem, most of UV-A and less UV-B can only reach on the earth. If there is a problem on the ozone layer, all types of UV will fall on the earth, and the damage of all living things and non-living things will be caused by UV-B and UV-C. World Health Organization have developed the Global Solar UV

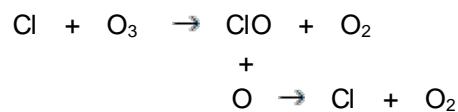
index (UVI), which provides the public with an estimate of UV radiation on any given day, shown in Table 1.2. Everyone needs to avoid outdoor exposures from 10 am to 4 pm if UV index is 8 or higher.

Table 1.2 UV Index

UV Intensity	Minimal	Low	Moderate	High	Very High
International Colour Code	Green	Yellow	Orange	Red	Purple
Index	0~2	3~5	6~7	8~10	≥ 11

The figure shows a color scale for the UV Index. It consists of eleven colored squares, each labeled with a number from 1 to 11. The colors transition from green (1) through yellow (2, 3, 4, 5, 6, 7) to orange (8) and red (9, 10) to purple (11+). Below the squares, the numbers are labeled 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11+. To the right of the scale, the text "UV INDEX" is written in a bold, sans-serif font.

Ozone depletion substance such as CFC is used in refrigerator, air-conditioner, coding spray and foam. Material which contains bromine used in fire stop and Methyl Bromide used in insect killer in agricultural sector have more power than carbon-dioxide to create the depletion of ozone layer. Free chlorine reacts very rapidly with ozone. They also show that chlorine monoxide formed in that reaction undergoes further processes that regenerate the original chlorine, allowing the sequence to be repeated up to 100,000 times. Similar reactions also take place between bromine and ozone. The ozone destroying chain reaction is shown in the following equations.



The solar system has been in existence over 4.6 billion years ago. The stratospheric ozone layer is not an original part of the earth's atmosphere. It is only a product of life on the earth. Living things could not inhabit on the surface of the earth first due to the intense unfiltered solar UV radiation after the earth. The protection against UV attack by ozone layer causes the existence of living things. But now the activities of human beings have caused the depletion of ozone layer. So there will be a question that which materials can be used to prevent the dangers of UV attack and how do we get UV protection due to the depletion of ozone layer. And then how do we solve the problem of energy crisis in the future, year after year. Planting many trees is a solution because leaves from trees can strongly absorb high energy UV photons in electromagnetic spectrum^[1].

In this work, absorbance properties of dye solutions extracted from henna, ironwood, sour sop,

mango and marian leaves have been analyzed by UV-VIS spectroscopy to protect UV attack due to the depletion of ozone layer and to use as sensitizer of DSSC. Fig 1.1 shows the electromagnetic spectrum for UV, visible and IR regions with different wavelengths.

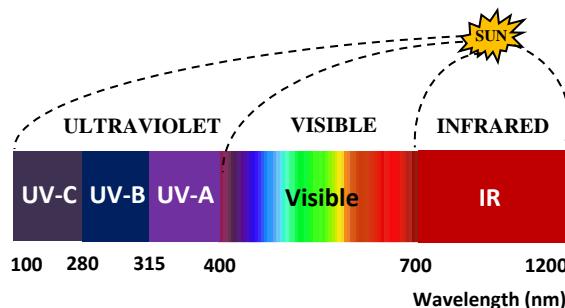


Fig 1.1 Electromagnetic spectrum

II. BACKGROUND THEORY

2.1. UV-VIS Spectroscopy

Ultraviolet visible (UV-VIS) spectroscopy is the measurement of attenuation of the beam of light after passing through the sample. Different molecules absorb radiation with different wavelengths. The absorption in the visible range directly affects the perceived colour of the chemical involved. Absorption of UV-VIS radiation causes electronic transitions from the ground state to the excited state in atoms or molecules. The minimum required energy for electronic transition from valence band to conduction band is known as band-gap energy^[2].

The absorbance of a solution is directly proportional to the concentration of the absorbing species in the solution and the path length. So, UV-VIS spectroscopy is also called the absorption spectroscopy in UV-VIS spectral region. The following equation shows Beer-Lambert law for absorption spectroscopy.

$$A = \epsilon c L = \log_{10} \frac{I_0}{I}$$

A = absorbance

ϵ = molar absorptivity or extinction coefficient

c = concentration of the absorbing species

L = path-length

I_0 = intensity of light before passing through the sample I = intensity of light after passing through the sample

The light harvesting efficiency (LHE%) of dye solutions can be calculated from the absorbance data by the following formula.

$$\% LHE = (1 - 10^{-A}) \times 100\%$$

LHE = light harvesting efficiency

A = absorbance

In DSSC, the photon-to-current conversion efficiency (IPCE) is determined by LHE%.

$$IPCE = LHE \Phi_{inj} \eta_c$$

Φ_{inj} = the quantum yield of electron injection

η_c = the collection efficiency of the injected electrons at the back contact

If Φ_{inj} and η_c are close to 100%, IPCE is equal to LHE. Fig 2.1 shows the photograph of UV-VIS spectrophotometer.



Fig 2.1 UV-VIS spectrophotometer

III. EXPERIMENTAL DETAILS

3.1. Preparation of Dye Solutions

The leaves were cut into small pieces first and grounded using motor and pestle for 10 min. After that, the powder was mixed with deionized water for 24 h and the solution was filtered by the paper filter. Henna leaves and the colour of their dye is shown in Fig 3.1.



Fig 3.1 Henna leaves and their dye solution

As shown in Fig 3.2, the colour of ironwood dye is greenish-brown.



Fig 3.2 Ironwood leaf and its dye solution

Fig 3.3, Fig 3.4 and Fig 3.5 show the leaves and their dye colours for sour sop, mango and Marian respectively^{[6][7][9]}.



Fig 3.3 Sour sop leaf and its dye solution



Figure 3.3 Mango leaf and its dye solution



Figure 3.2 Marian leaf and its dye solution

3.2. UV-VIS Spectroscopic Analysis

The point on the absorption spectrum of a solution which represents the minimum energy required for electronic transition from the valence band or HOMO level to the conduction band or LUMO level is the absorption edge of the solution. The wavelength at the absorption edge can be used to calculate the energy band-gap of the solution.

$$A = \varepsilon c L = \log_{10} \frac{I_0}{I} \quad \% LHE = (1 - 10^{-A}) \times 100\% \quad \&$$

are the absorbance and the light harvesting efficiency formulae used in UV-VIS spectroscopy. By using the light intensity before passing through the sample I_0 , and that after passing through the sample I , the absorbance of dye solutions extracted from leaves can be studied, and then LHE(%) can be calculated by absorbance data.

IV. RESULTS AND DISCUSSION

4.1 Optical Properties of henna, iron-wood, sour sop, mango and Marian leaves' dyes

The photon absorption of dye solution in the UV, visible and IR regions of solar spectrum is important for the protection against UV attack and the sensitizer of DSSC. The broader absorption gives the high performance for UV protection and DSSC sensitization, and the difference between HOMO level and LUMO level of the dyes needs to match with the energy of incident photons to absorb high energy UV photons. In this work, all absorbance data are grouped into three regions such as UV region, visible region and IR region to study.

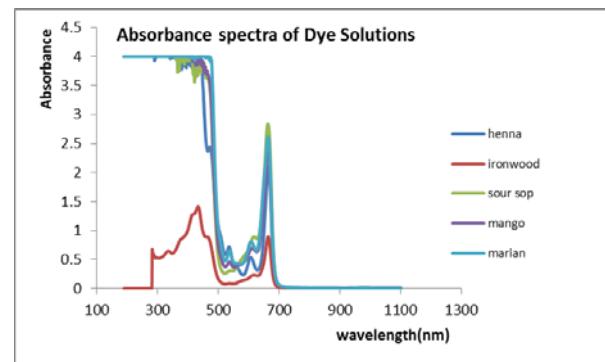


Fig 4.1 Absorbance spectra of dye solutions

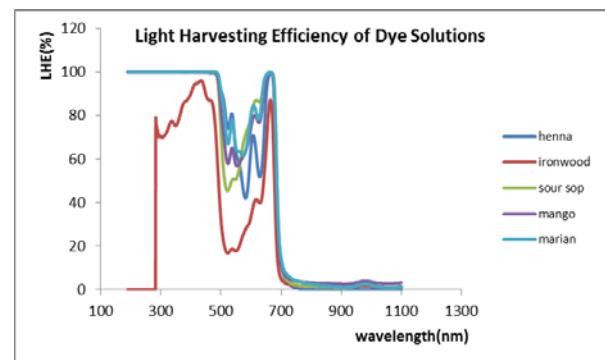


Fig 4.2 Light harvesting efficiencies of dye solutions

Fig 4.1 shows the absorbance spectra of henna, ironwood, sour sop, mango and Marian dyes extracted from leaves in Sittway township, Rakhine state, Myanmar. And then light harvesting efficiency of all dyes is shown in Fig 4.2.

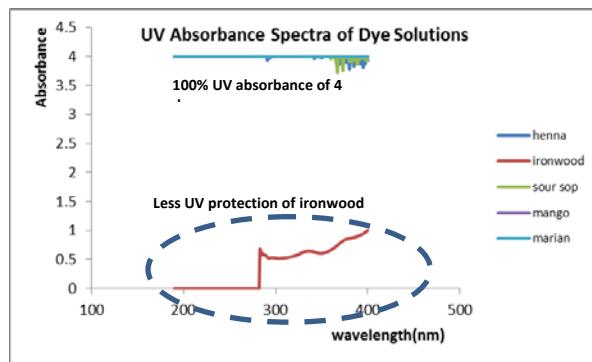


Fig 4.3 UV Absorbance spectra of dyes

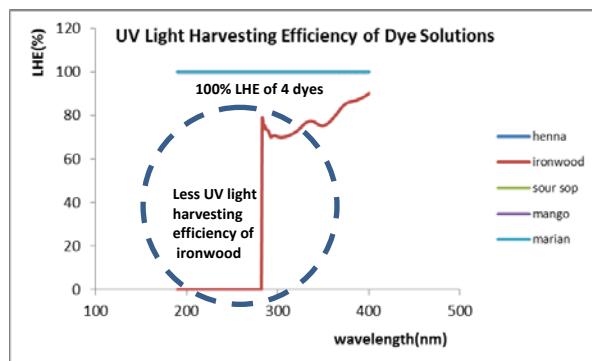


Fig 4.4 UV Light harvesting efficiencies of dyes

According to the absorbance and LHE spectra of UV region, ironwood between the wavelength of 190 nm and 282 nm has 0 absorbance and 0% LHE, shown in Fig 4.3 and Fig 4.4 respectively. So ironwood leaves cannot protect UV attack and should not be used as sensitizer of DSSC.

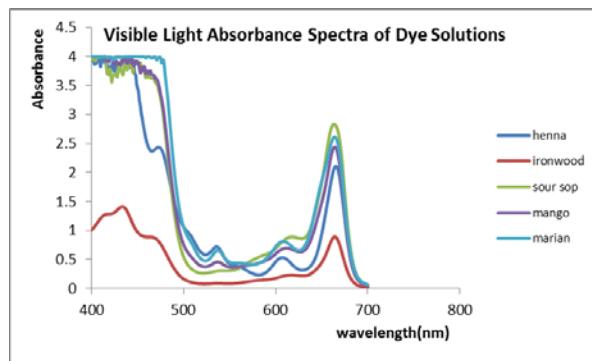


Fig 4.5 Visible light absorbance spectra of dyes

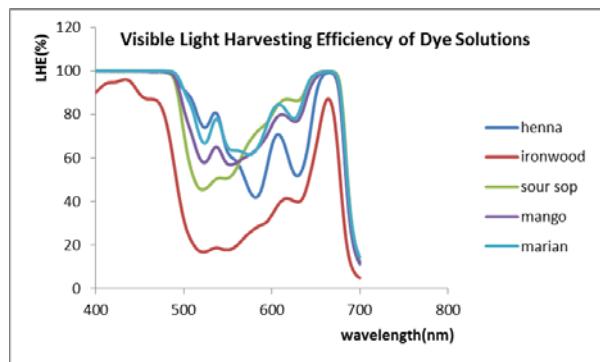


Fig 4.6 Visible light harvesting efficiencies of dyes

As shown in Fig 4.5, sour sop dye has more absorbance than others in visible region and the minimum value of LHE of sour sop at the wavelength of 521 nm is 45% and the maximum is about 100%, in Fig 4.6.

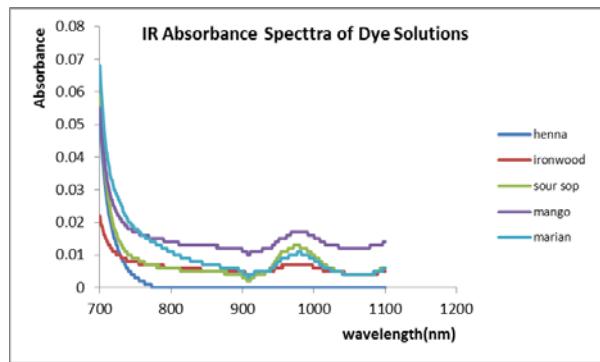


Fig 4.7 IR absorbance spectra of dyes

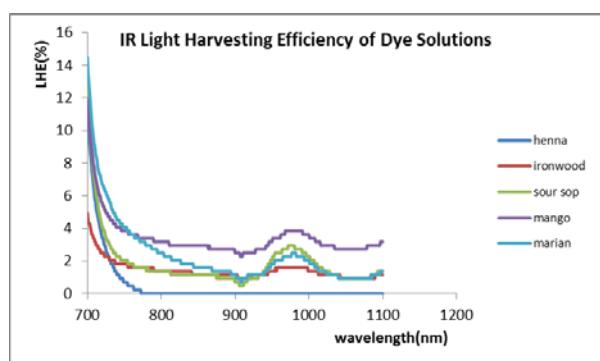


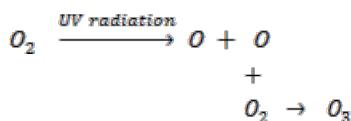
Fig 4.8 IR light harvesting efficiencies of dyes

IR absorbance spectra of all dye solutions are shown in Fig 4.7. LHE of henna is 0% from the wavelength 773 nm to 1100 nm. Since the strong cut-off point of all dyes is the wavelength of about 700 nm, the band-gap energy is about 1.8 eV^[8].

V. CONCLUSION

The absorbance properties of 5 dye solutions have been studied by UV-VIS spectroscopy. The dye with broader absorption band gives the high absorbance in UV and visible region. As shown in absorbance spectra of dyes, henna, sour sop, mango and marian leaves strongly absorb the high energy photons in UV region. On the other hand, there is 100% UV light harvesting efficiency between the wavelength of 190 nm and 400 nm. In Fig 4.3 and Fig 4.4, ironwood absorbance is zero and LHE(%) is 0% between 190 nm and 282 nm. Ozone layer depletion strongly effects on human and animal health, terrestrial plants, aquatic ecosystems, bio-geo-chemical cycles, air quality, materials, climate change and ground level UV radiation on the earth. So planting many trees is one of the protections against UV attack for human beings and living things, and plants' leaves can be used as dye-sensitizer of DSSC.

But ozone layer can be automatically created in the stratosphere when UV radiation from the sun strikes molecules of oxygen (O_2) and causes two oxygen atoms to split apart. If a free atom bumps into another O_2 , it joins up, forming ozone (O_3). This process is photolysis.

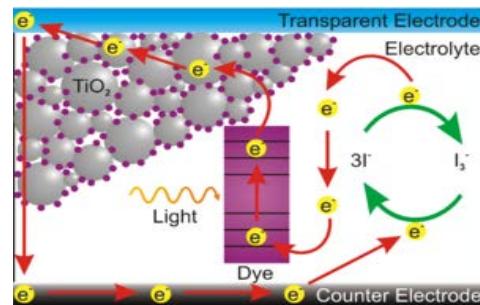


So, everybody needs to obey *Montreal Protocol* to become the original condition of ozone layer, our precious gift given by Lord, because only 3 are ozone when 2 million are normal oxygen in 10 million air molecules.

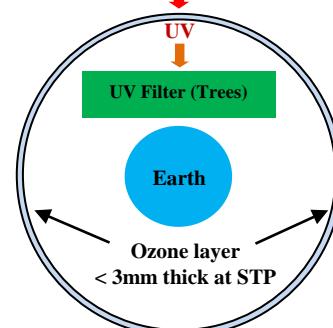
This research work can give the solution about the problem: (i) how to protect UV attack because of the damage of ozone layer? (ii) which materials used to prevent the dangers of intense unfiltered UV radiation? (iii) how to solve the problem of energy crisis in the future, year after year? To get electronic transition from valence to conduction band in DSSC, high energy UV photons must be absorbed. High energy photon absorption makes the protection against UV attack. So, plants' leaves give twin pleasures: **UV Protection** and **Sensitizer of DSSC**. Although ozone layer is still damaged by the activities of human beings, we can protect UV attack by planting many trees and we can solve the problem of energy crisis in the future by using NDSSCs. So, we must avoid the destroying the plants. To increase the number of plants, we should use other wood-replaced materials. And then it is necessary to reduce the use of ODS all over the world. Scientists predict that ozone

layer will become the original condition only when we all act to obey the laws of International Convention. If not so, two-third of the ozone layer will disappear in the earth's atmosphere in about 2065.

APPENDIX



Dye-sensitized solar cell (DSSC)



UV protection by trees



Henna Tree



Ironwood Tree



Sour sop Tree



Mango Tree



Marian Tree

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Research Status of Distributed Optical Fiber Sensing System Based on Phase-sensitive Optical Time Domain Reflectometry

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Abstract- Distributed Optical fiber sensing system based on phase-sensitive time domain reflectometer ($\Phi - OTDR$) has become one of the main distributed optical fiber sensing schemes for intrusion detection in recent years due to its excellent performance. $\Phi - OTDR$ has the advantages of simple structure, stable performance, long sensing distance and strong anti-interference ability and also has a wide application prospects. In order to learn more about the $\Phi - OTDR$ structure and working principle this paper will be introduced and carry out comparison with traditional optical time domain (OTDR). As well as the operation principles and research status of four typical $\Phi - OTDR$ disturbance sensing system of traditional, Raman, Brillouin and cascaded, meanwhile will be analyzed with the improvement of the system structure, sensing distance and location accuracy. Then, their advantages and disadvantages were summarized to provide a direction for selecting the appropriate system in practical application.

Index Terms- Distributed sensor, Fiber sensor, intrusion sensor, optical-phase sensor.

1. INTRODUCTION

Distributed fiber-optic sensing (DFOS) has many outstanding and unique advantages, such as very large-scale monitoring range, huge number of monitoring points, simple deployment and geometric versatility compared with point fiber-optic sensors. DFOS systems have found wide applications in the field of in-line health and safety monitoring, such as long bridges, electrical cables, and oil/gas pipelines, etc. great research efforts are paving the way to even much wider usability of the DFOS technology through recently achieved performance enhancement in each of the its critical parameters: measurement range, spatial resolution, acquisition time and measurement uncertainty[1].

Phase-sensitive Optical Time Domain Reflectometer ($\Phi - OTDR$) is also part of the distributed fiber optic sensing technology, it uses the backward Rayleigh scattered light to transmit in the fiber. As one of the most promising technologies for distributed vibration sensing $\Phi - OTDR$ has attracted considerable attention due to the spatial resolution, broad frequency response range, and multiple events detection capability. in this paper the $\Phi - OTDR$ system is discussed, followed by other four different structure of $\Phi - OTDR$ system's innovation and deficiencies to provide the idea for a future system construction.

2. Φ – OTDR Principle

Distributed Optical Fiber sensor (DOFS) technology based on OTDR has been very mature and widely used in optical fiber sensing system. OTDR was first introduced to monitor fiber attenuation for fault detection in telecommunication cables, later such systems have been used for a number of other applications[2]. Φ – OTDR is a kind of distributed type which is developed by the OTDR, The structure diagram of the traditional OTDR system is shown in figure 1, the light emitted by the light source enters the sensing fiber through the coupler, and the backward Rayleigh scattered light generated during the fiber transmission is reversely transmitted back to the optical input end, and then received by the photo-detector through the coupler and processed with the data acquisition, Traditional OTDR has the advantage of simple structure, low price and convenient test, etc. However, the light source used in the system is a broadband light source with low sensitivity and short sensing distance which is not suitable for long-distance disturbance sensing system.

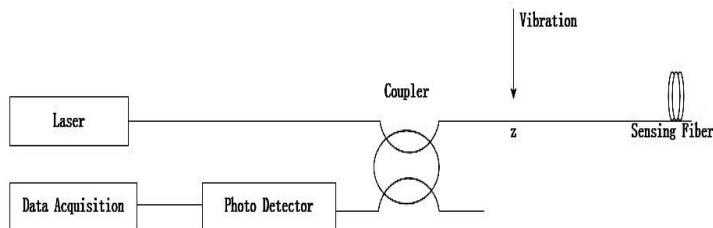


Figure 1: Schematic diagram of Traditional OTDR vibration sensor

A distributed optical fiber based on Φ – OTDR has emerged, Φ – OTDR is developed on the basis of Traditional OTDR. The working principle of the two is similar, compared with the broadband light source used by conventional OTDR system, Φ – OTDR system using ultra-narrow linewidth lasers as light source. It uses the interference effect between the backward Rayleigh light in the wide pulse, injects the high coherent light into the sensing fiber, and the detector detects the reflected coherent Rayleigh scattered light. In addition, compared to the polarization sensitive OTDR, Φ – OTDR has the unique advantage of achieving multi-point disturbance simultaneous positioning. Φ – OTDR system block diagram shown in figure 2, the continuous light generated by the narrow linewidth laser enters the acousto-optic modulator (AOM), and the signal generated is connected to the acousto-optic modulator to modulate the input continuous light into a series of pulsed light, and it amplified by erbium doped fiber amplifier (EDFA), and enters the sensing fiber through the circulator. In the process of optical fiber transmission, backward Rayleigh light generated by pulse light enters the Circulator again after reverse transmission, which is received by the photodetector and processed with data acquisition to obtain the disturbance information. When the sensing fiber is disturbed at a certain point along the line, the internal refractive index and length of the fiber at that location will change, resulting in a change in the optical phase of the optical interference and then lead to the backward Rayleigh scattering light intensity, that is, backward optical power changes, there will be disturbed when the scattering power curve minus the power curve without disturbance, the disturbance information, according to the light in the fiber speed and disturbance signal transmission time of the corresponding relationship, the distance of the disturbance signal can be accurately positioned.

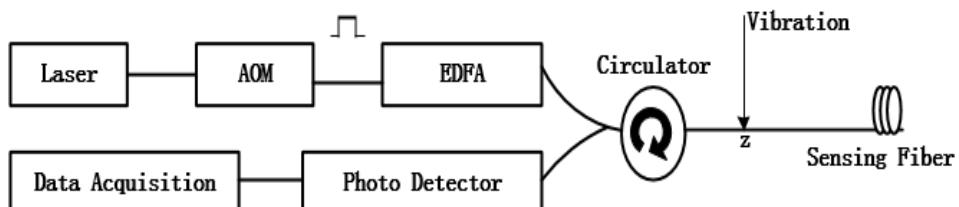


Figure 2 : Φ – OTDR system principle structure diagram

3. RESEARCH STATUS

Taylor First introduced the concept of Φ – OTDR in 1993, it is pointed out that the coherent fading effect between the backward Rayleigh scattered light generated in the OTDR sensing fiber is applied to the intrusion detection scheme. The last 20 years the researchers have made constant efforts to improve the Φ -OTDR system structure in order to improve the Φ -OTDR sensing distance and spatial resolution, mainly including the traditional OTDR, Raman, brillouin and cascading Φ – OTDR system.

3.1. Traditional Φ – OTDR

In order to verify the feasibility of the Φ – OTDR system, in 1993, Park [3]proposed a Φ – OTDR sensing technique that not only detects fiber loss and location breakpoints, but also perceives weak disturbances, compared to traditional OTDR techniques. The biggest difference is that the light injected into the fiber by the Φ – OTDR system is highly coherent and requires a very small linewidth and minimal frequency drift of the source(laser).

In 1994, Juškaitis[4] proposed the use of Φ – OTDR technology for intrusion (vibration) detection, with the development of optical amplification technology and fiber lasers, Erbium-doped fiber amplifier (EDFA) is increasingly used.

In 2003, Choi [5] used a full-light ER+ fiber amplifier combined with a F-P interferometer to achieve laser emission with a linewidth of less than 3 KHz, and then pulsed modulation by an electro-optic modulator (EOM) and a good effect is obtained, In experiment, the output power of the laser is $50\mu\text{s}$, and the linewidth is less than 3kHz and the frequency drift rate was less than 1MHz/min. the monitoring range of the system reached 12Km, Positioning accuracy 1km , and signal-to-noise (SNR) ratio is about 5.6 dB, at this point the φ – OTDR technology can be used in perimeter alarm monitoring system.

Afterwards, Juarez designed an F-P cavity laser consisting of an erbium-doped fiber amplifier (EDFA) and a pair of band-pass filters (BPF)in 2005[6], the experiment diagram is shown in figure 3. The laser output from the laser satisfies the requirements of low drift and narrow linewidth (3kHz), after being modulated by an electro-optic modulator (EOM) it becomes a pulse light injection sensing fiber with a width of $10\mu\text{s}$, the piezoelectric simulates the intrusion signal, and the direct detection combined with the erbium-doped fiber amplification enables the sensing distance to reach 12km and spatial resolution to reach 1km. later they improved the structure by adding a light polarization splitter in front of the detector to detect the two polarized beam of reflected light at the same time, which extended the sensing distance of 19km and the spatial resolution to 200m[7]. The traditional OTDR system has been developed so far, the system became very mature, mainly using EDFA for amplification. The typical structural block diagram of the system is shown in figure 2, including light source, modulator, EDFA, Circulator, Photodetector and data processing, etc.

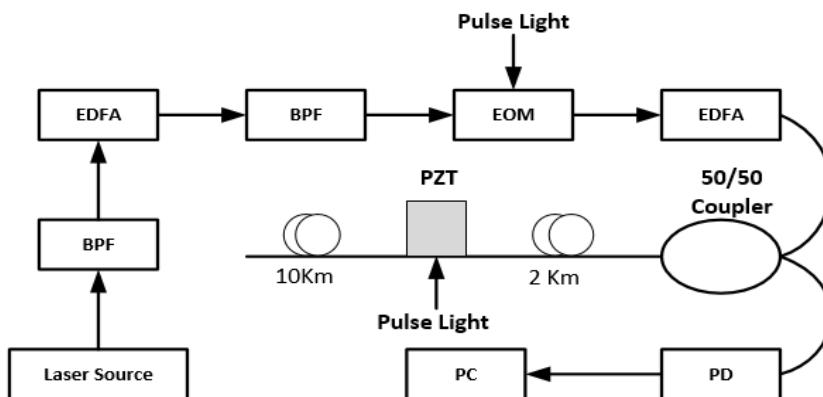


Figure 3 EDFA technology combined with Direct detection of Φ – OTDR system

with the continuous extension of sensing distance, weak signals at the far end of optical fiber cannot be detected, and nonlinear effects are accumulating, in addition, the traditional Φ –OTDR has short sensing distance and large spatial resolution, so it is not suitable for applications requiring longer distance and higher positioning accuracy, therefore, it is important to have a Φ – OTDR systems with longer sensing distance and lower spatial resolution.

3.2. Raman Φ – OTDR

In order to improve the sensing distance and positioning accuracy, Rao Yunjiang proposed a Φ – OTDR sensing system based on high-power, ultra-narrow linewidth single-mode fiber laser in 2008[8]. The sensing distance is 14km, the spatial resolution is 50m, and the signal-to-noise ratio is about 12dB and high sensitivity. In order to overcome some of the shortcomings of centralized amplification, restrain non-linearity effect, on this basis they applied the bi-directional Raman amplification technology to the Φ – OTDR system, and the sensing distance was extended to 62km, reaching the longest distance at the time[9].

By further optimizing the system parameters, the method was successfully implemented again and achieves an ultra-long detection distance of 74km and a spatial resolution of 20m. the experiment diagram is shown in figure 4, the ultra-narrow linewidth laser used in the experiment has a linewidth of 2 kHz, a wavelength of 1550nm, and a light pulse width of 200ns, the Raman fiber laser has a center wavelength of 1455nm and a maximum power output of 5W. The scheme improves the uniformity of signal light distribution across the sensing fiber, therefore, the sensing distance of the system is further extended and the spatial resolution is improved.

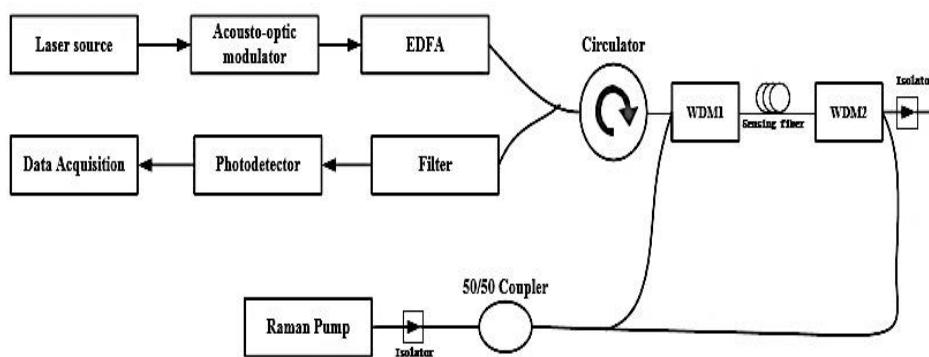


Figure 4: Experiment Diagram of Φ – OTDR system based on two way Raman amplification

Peng zhengpu proposed a forward Raman amplification combined with heterodyne detection method in 2014[10], which brought the sensing distance of the system up to 103km with a spatial resolution of 15.7m, the signal-to-noise ratio reaches 7.89dB, the experiment implemented diagram is shown in figure 5, this method not only enhances the sensing distance but also has high spatial resolution and signal-to-noise ratio, heterodyne detection is used to improve the conversion gain and SNR of backscatter light, at the same time, Raman amplification is used to compensate the propagation loss of Rayleigh backscattering light and pulse light, and the input pulse light power and Raman pump power are adjusted to optimize the system.

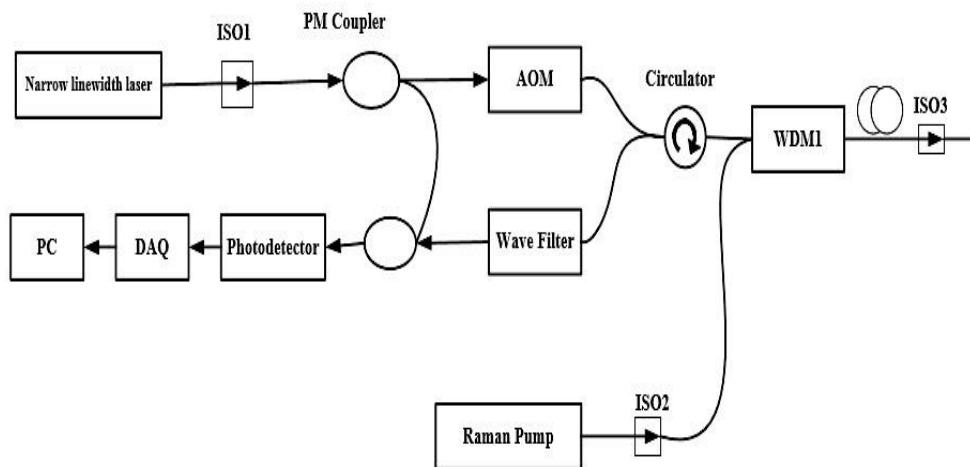


Figure 5: Φ – OTDR System experiment scheme for forward Raman amplification combined with heterodyne detection

The distributed optical fiber based on Raman amplification technology is adopted to replace the centralized amplification of the traditional EDFA, so that the system can achieve a longer sensing distance with remarkable effect. However, the pump efficiency of Raman amplification is low, higher Raman pump is required over long distances, as well as increasing the power the non-linear effect can be easily triggered, such as self-phasing modulation, modulation instability etc.[11], thereby it is limiting its further improvement

in sensing distance, spatial resolution and signal-to-noise ratio. Moreover, the complexity and cost of the system have been increased, and experiments and improvements need to be continued in practical applications.

3.4. Brillouin Φ – OTDR

Due to the limitation of Raman amplification pump efficiency, some researchers start looking for new technologies. In 2004, Wan Nan successfully built a Φ – OTDR system based on Brillouin amplification[12], for the first time, brillouin amplification is applied to distributed optical fiber disturbance sensing system and combined with heterodyne detection technology, the milliwatts brillouin pump light makes the sensing distance of the system reach 124km, and the spatial resolution is 20m, the experiment diagram is shown in figure 6. The system structure is mainly composed of laser, polarization-maintaining coupler, EOM, circulator, FBG, EDFA, PS, variable optical attenuator (VOA), AOM, PD, Spectrum analyzer (ASE), and A/D Acquisition data, etc. the backward Brillouin pump power is only 9.5dBm, it is obviously superior to the backward Raman pump power of 26.9dBm, at this point the great potential of Brillouin amplification technology for distributed fiber optic sensing is confirmed.

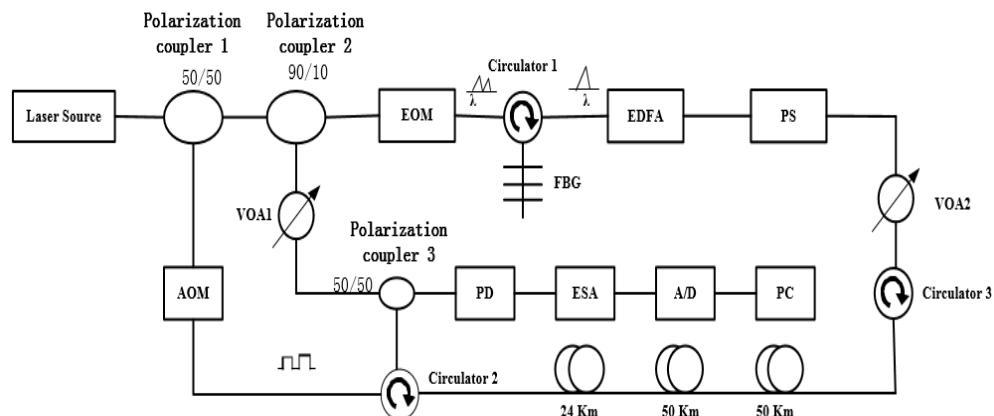


Figure 6: Experiment Diagram of Φ – OTDR system based on Brillouin amplification

Subsequently, Zeng jiajia[13] proposed a new type of partitioned distributed amplification (HDA) scheme, the system schematic is shown in Figure 7. Combination of three different pumping methods has been used, including backward brillouin pumping, second order Raman pumping based on random fiber lasers, since each pumping mode provides amplification for the signal light in each section of optical fiber, in turn distributed amplification of the entire sensing fiber is realized which effectively increases the sensing distance. Using HDA technology combined with heterodyne detection technology, the monitoring distance of the Φ – OTDR sensing system is extended to 175km and the spatial resolution is 25m. the experiment verifies the effectiveness of HDA technology.

Fiber Brillouin amplification technology is a new amplification technology applied to distributed disturbance sensing system, it's limitations lies in two points: first, the gain spectrum is narrow (about 30MHz); second, the external temperature is easy to affect the amplification effect, which has an impact on system monitoring.

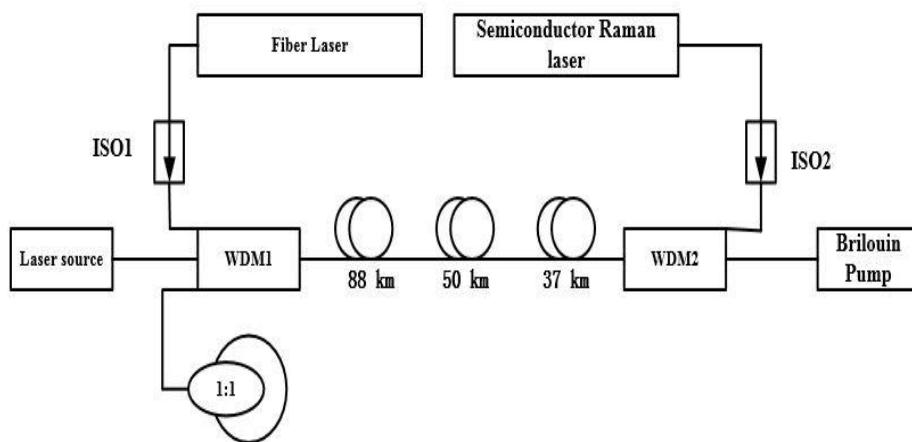


Figure 7: HDA experiment Schematic

Therefore, the schematic needs further improvement. Utilizing fiber brillouin amplification technology combined with Raman amplification technology and heterodyne detection technology, the sensing distance of the system has been extended, but the spatial resolution still needs to be improved, and the system structure need a further optimization. This method provides a reference for the follow-up research, and fully combines a variety of theories and techniques to achieve a longer sensing distance of the system and improvement of positioning accuracy. In addition, compared to the Raman gain, Brillouin's gain is much greater than the Raman gain, up to three orders of magnitude. In addition, at the same time the introduction of distributed amplification technology, the use of heterodyne detection and other methods also with the system's sensing distance has a positive effect.

3.4. Cascading Φ – OTDR

In 2013, Chen Xueyi [14] introduced a two-stage cascaded EDFA amplification structure in Φ – OTDR, a distributed optical fiber sensing intrusion detection system based on coherent backward Rayleigh scattering is constructed. Due to the erbium-doped fiber (EDF) amplification process, ASE emission consumes pump light, reduce pump efficiency, and noise interference. Therefore, an improved EDFA structure is proposed, the diagram is shown in figure 8, consists of three wavelength division multiplexers (WDM). WDM1 and WDM3 couple the signal light and pump light to EDF to interact with, WDM2 is used as channel for pumping light. After the signal light and pump light pass through WDM2 and WDM3, to a great extent suppresses the spontaneous emission noise (ASE), thereby reducing the pump light consumed by the ASE to improve the pump efficiency. The system extends the sensing distance about 35km and the spatial resolution was increased to 15m.

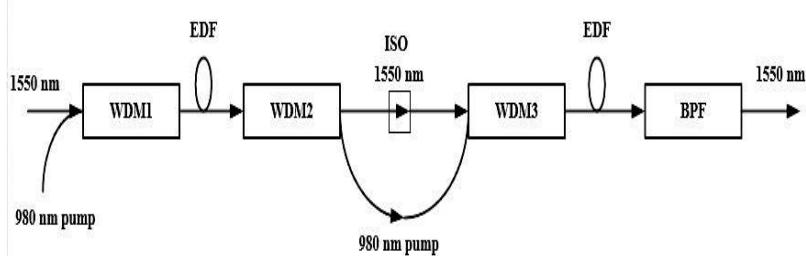


Figure 8: Schematic diagram of two-stage EDFA structure

Because the traditional EDFA technology is still limited to SBS, in order to overcome this shortcoming, Lu Qiying [15] proposed another cascaded fiber Φ – OTDR distributed fiber perturbation sensing in 2014, the experimental setup is shown figure 9. Multiple optical circulators are used in the scheme, the First one is to play the role of light isolation, the backscattered light generated will only be received and processed by the photodetector through the first circulator at the front end, and will not enter the previous sensitive fiber. Second, the sensing optical fiber is divided into many segments from short to long, which interrupts the growth mechanism of the stokes wave and reduces the SBS threshold of each level of optical fiber, as to improve the monitoring distance. The system can detect multi-point disturbance positioning at the same time, and the monitoring distance reaches 72km in the laboratory, and later carried out the experiment in the field and the feasibility of cascade scheme in practical application is verified.

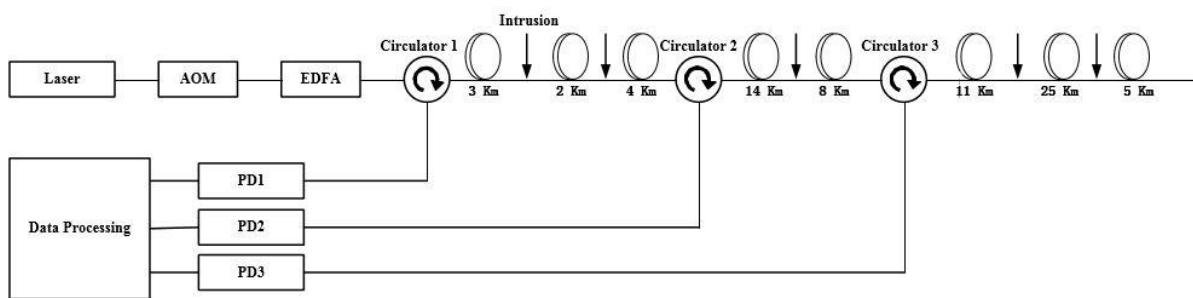


Figure 9: Cascade Φ – OTDR system experimental diagram

The cascading Φ – OTDR has a simple optical path structure and low cost, in practical applications the cascading optical path can be expanded to a further sensing distance, however, it needs to occupy multiple optical fibers, when calculating the length of each sensing optical fiber the process is tedious and the actual laying of optical fiber is easy to be affected by bending loss and other factors resulting in large deviation.

4. CONCLUSION

This paper mainly deals with the comprehensive discussion of Φ – OTDR system. The basic principle of Φ – OTDR is introduced, and related structure of Φ – OTDR system is discussed. The Φ – OTDR has the advantages of simple structure, easy installation, long

sensing distance, anti-electromagnetic interference, insulation and corrosion resistance, is capable of real-time monitoring and multi-point disturbance simultaneous positioning, and has unique advantages in long-distance perimeter security, oil and gas pipeline safety monitoring, smart grid and railway safety monitoring applications. Although the experimental system based on Φ – OTDR principle has been in pretty good stage but it can't be denied that the system indicators still need to be improved, including increasing the sensing distance of the system, the spatial resolution, frequency response range, and the signal-to-noise ratio. And the problems existing in the actual application need further exploration and improvements[16].

With development of laser technology and optical fiber sensing technology, as well as the introduction of new technologies and new principles such as EDFA technology, Raman amplification technology, Brillouin amplification, cascade. The sensing distance of Φ – OTDR system is constantly changing, increasing, positioning accuracy continuous to improve, system performance also continuous to improve, in the field of border security, oil pipeline, building structure health monitoring, communication line monitoring and have broader application prospects.

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Risk Analyses of Computed Tomography (CT) Digital Imaging Modality at the 37 Military Hospital, Accra.

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Abstract- Digital radiology is one of the diagnostic and therapeutic modalities which has been adopted in Ghana for health needs and research. Radiations come in two forms, either ionizing radiations or non-ionizing radiations, which may cause some form(s) of adverse effects. The main objective of the study was to determine and analyze the Weighted Computed Tomography Dose Index ($CTDI_w$) of CT scanner (which produces ionized radiation) for potential adverse effects at the 37 Military Hospital Radiology Department for both diagnostic and therapeutic radiology. To calculate the $CTDI_w$ values for of CT scanner. The study will ascertain the level of risk in the $CTDI_w$ values by comparing to the accepted standards for radiologic imaging; identify possible factors that may account for defective $CTDI_w$ values (if any). CT phantoms were used for the radiation exposure (scanning) in CT scanner. A clinical trial (therapeutic study) was adopted for the study. Results were analyzed and numerical calculations were used for the determination of the $CTDI_w$ values for the CT. The CT scanner produced radiation doses of 540.91mGy and 134.91mGy for the Head and Body phantoms respectively representing a percentage discrepancy of 901.52% and 385.45%. Higher doses from the scanner would lead to high patient or organ doses hence could expose individuals undergoing the scan to high doses and possible adverse events/effects could be recorded.

Index Terms- Computed Tomography Dose Index, Phantom, Radiology, Radiation

I. INTRODUCTION

Radiology uses medical imaging technology to diagnose and treat medical conditions. Radiology has been used for medical purposes for over a century and remains a cornerstone of the medical field. Radiology is divided into two fields: diagnostic and therapeutic radiology [1]. Diagnostic radiology is used to diagnose conditions (like necrosis, cataract, sterility, cancer, gene mutation etc.) and utilizes many different forms of imaging. Radiations come in two forms, either ionizing radiations or non-ionizing radiations, which may cause a lot of complications including necrosis, cataract, sterility, cancer, gene mutation etc. Computed Tomography produces ionized radiations and patients are being exposed to doses of radiations. These ionized radiations can cause adverse effects.

2 LITERATURE REVIEW

Usage of CT has increased dramatically over the last two decades in many countries [2]. An estimated 72 million scans were performed in the United States in 2007 [3]. One study estimated that as many as 0.4% of current cancers in the United States are due to CTs performed in the past and that this may increase to as high as 1.5% - 2% with 2007 rates of CT usage [4]. However, this estimate is disputed [5]. Kidney problems following intravenous contrast agents may also be a concern in some types of studies. The computed tomography dose index (CTDI) is a commonly used radiation exposure index in X-ray computed tomography and is reported by the CT manufacturers to scan personnel for each exam. The CTDI can be used in conjunction with patient size to determine the absorbed dose. The CTDI and absorbed dose may differ by more than a factor of two for small patients such as children [6].

A Monte Carlo based method to estimate radiation dose from multi-detector CT (MDCT): DeMarco et al (2005), [7], conducted cylindrical and anthropomorphic phantoms. The purpose of their investigation was to extend the verification of Monte Carlo based methods for estimating radiation dose in computed tomography (CT) examinations beyond a single CT scanner to a multi-detector CT (MDCT) scanner, and from cylindrical CTDI phantom measurements to both cylindrical and physical anthropomorphic phantoms. Both cylindrical and physical anthropomorphic phantoms were scanned on an MDCT under the specified conditions. A pencil ionization chamber was used to record exposure for the cylindrical phantom, while MOSFET (metal oxide semiconductor field effect transistor) detectors were used to record exposure at the surface of the anthropomorphic phantom. Reference measurements were made in air at isocentre using the pencil ionization chamber under the specified conditions. Detailed Monte Carlo models were developed for the MDCT scanner to describe the x-ray source (spectra, bowtie filter, etc.) and geometry factors (distance from focal spot to isocentre, source movement due to axial or helical scanning, etc.). Models for the cylindrical (CTDI) phantoms were available. For the anthropomorphic phantom, CT image data were used to create a detailed voxelized model of the phantom's geometry. The manufacturer provided anthropomorphic phantom material compositions. A simulation of the physical scan was performed using the mathematical models of the scanner, phantom and specified scan parameters. Tallies were recorded at specific voxel locations corresponding to the MOSFET physical measurements. Simulations of air scans were performed to obtain normalization factors to convert results to absolute dose values. For the CTDI body (32 cm) phantom, measurements and simulation results agreed to within 3.5% across all conditions. For the anthropomorphic phantom, measured surface dose values from a contiguous axial scan showed significant variation and ranged from 8 mGy/100 mAs to 16 mGy/100 mAs. Results from helical scans of overlapping pitch (0.9375) and extended pitch (1.375) were also obtained. Comparisons between the MOSFET measurements and the absolute dose value derived from the Monte Carlo simulations demonstrate agreement in terms of absolute dose values as well as the spatially varying characteristics. This work demonstrates the ability to extend models from a single detector scanner using cylindrical phantoms to an MDCT scanner using both cylindrical and anthropomorphic phantoms.

Although the use of computed tomography (CT) in medical diagnosis delivers relatively higher radiation doses to patients than other radiological procedures, lack of optimized protocols could be an additional source of increased dose in developing countries [8]. The aim of this study was to determine the magnitude of radiation doses received by selected radiosensitive organs of patients from CT examinations. The study was further carried out in order to assess the influence of existing CT scanning protocols on patient organ doses. In order to achieve these objectives, patient organ doses from five common CT examinations were obtained from eight hospitals in Tanzania. The patient organ doses were estimated using measurements of CTDI, exposure-related parameters and the NRPB conversion factors. Large variation of mean organ doses among hospitals was observed for similar CT examinations. These

variations were largely originated from different CT scanning protocols employed in different hospitals and scanner type. The mean organ doses in this study for the lens of the eyes (for head), thyroid (for chest), breast (for chest), stomach (for abdomen), and ovary (for pelvis), were 63.9 mGy, 12.3 mGy, 26.1 mGy, 35.6 mGy, and 24.0 mGy, respectively. These values were mostly comparable and slightly higher than the values of organ doses reported from literature for the UK, Japan, Germany, Norway and the Netherlands. It was concluded that patient organ doses could substantially minimized through careful selection of scanning parameters based on clinical indications of study, patient size, and body region being examined. Additional dose reduction to superficial organs would require the use of shielding materials.

3. METHODOLOGY

The research design for the study was a clinical experiment one (Therapeutic study). This is a study which involves the study of human subjects or any living species to answer questions about how safe a medical intervention is. The head CT phantom was scanned first. The head phantom was placed on the head rest of the CT scanner and the ionization chamber was connected to the center hole (hole 1) with other holes (Peripheral holes; 2, 3, 4 and 5) well plugged with glass rods. The Electrometer of the dosimeter was put on for the readings of the CTDIs for the determination of the $CTDI_c$ and $CTDI_p$. On the console, the region of examination was selected as Head Routine. Again the name of patient and sex was selected as PHANTOM. It was ensured that nobody remained in the CT scanner room while scanning was in process. After the scan was done, a reading was recorded from the electrometer. The scan was repeated for this hole and the readings taken accordingly. Other parameter readings like the kVp (peak kilovoltage), mAs (milliamperes), slice thickness etc. were recorded at the head region of examination. After the phantom was scanned with the ionization chamber at the center, the ionization chamber was moved to the peripheral holes starting from hole 2 up to hole 5. The phantom was scanned twice with the ionization chamber in each of the holes to ensure accurate readings. These procedures used for collecting data for the head phantom were repeated for other region of examinations by changing the region of examination to Body (Topography) Adult. CT scanner, CT-16cm head and 32cm body phantoms, electrometer, ionization chamber and dosimeter were used for data collection.

Evaluation of the weighted $CTDI_w$ from measurements of the head and body phantoms was calculated using equation (1).

$$CTDI_w = \frac{1}{3} \cdot CTDI_1 + \frac{2}{3} \left(\frac{1}{4} \sum_{i=2}^5 CTDI_i \right) \dots \dots \dots \quad (1)$$

Source: [9]

4. RESULTS AND DISCUSSION

4.1 CT HEAD PHANTOM

The data below were the set parameters before the scan was performed for the head CT phantom

Parameters	Values
mAs	270
kV	130

Scan Time	1.5s
Delay	5s
CDTI _{vol}	63.16 mGy (16cm)
DLP	995.33 mGycm
Acq.	16 x 1.2mm
Slice Thickness	4.8mm
Scan Length	152.7mm
No. of Scans	10
No. of Images	32
Table Height	160.0cm
Tilt	14.0 °

Figure 1; demonstrate the numerically calculated (NC) CTDI_w of the head phantom of 540.91mGy as against 60mGy European Commission Radiological Protection (EC) CTDI_w accepted levels. This indicates a high discrepancy of 901.52% as compared to the EC CTDI_w standard for the head. The high radiation dose of 540.91mGy for the head is unacceptable according to the European Commission radiation threshold. This would lead to high patient/tissue dose, which could lead to adverse health events. High radiation doses signify a high absorption of dose that is detrimental to the health of cells and tissues. Patients receiving these doses would therefore stand a very high risk of an adverse event from the scanner with high doses as calculated. The calculated CTDI is nine times the European Commission standard and that's an unacceptable radiation dose exposure (risk).

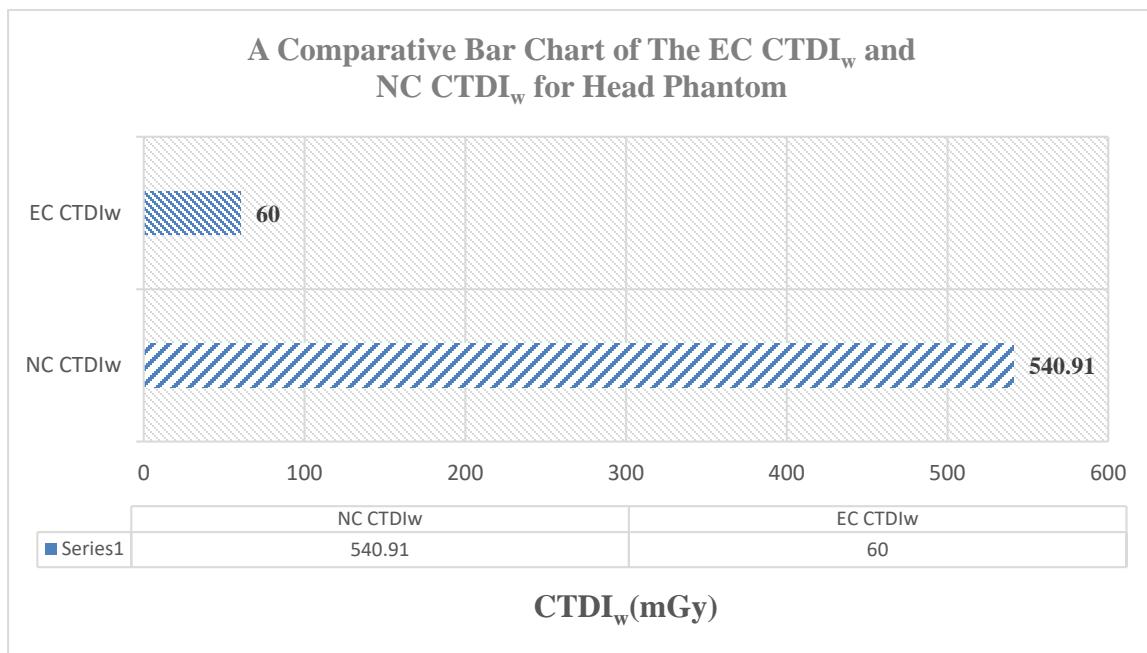


Figure 1: A Comparative Bar Graph of Numerically Calculated CTDI_w and the EC CTDI_w Head Phantom

4.2 CT BODY PHANTOM

Also these subsequent parameters were the planned and selected factors for the body CT phantom scan.

Parameters	Values
mAs	130
kV	130
Scan Time	7.79s

Delay	23s
CDTI _{vol}	14.58 mGy (32cm)
DLP	291.71 mGycm
Acq.	16 x 1.2mm
Slice Thickness	5.0mm
Scan Length	159.1mm
No. of Scans	10
No. of Images	34
Table Height	160.0cm
Range Begin	440.5mm
Range End	271.0mm
Tilt	0.0 °

Figure 2 illustrates the numerically calculated CTDI_w value of 134.91mGy as compared to the 35mGy ECCTDI_w accepted standard. This is indicating a high discrepancy of 385.45% more as compared to the EC CTDI_w standard for the body. This is indicative that the radiation dose churn out of the scanner is very high. High patient dose exposure could carry small to but nonzero risk and also high risks like tissues damage, cancer, gene mutation etc. the numerically calculated CTDI value for the body phantom is quite low compared to the head phantom which recorded over 900% of the European Commission standard. The 385.45% of the dose signifies over three times exposure to the dose. The rate of an adverse event by the scanner to a patient is 300% and more to be recorded. Again this (134.91mGy) dose did not conform to the European Commission radiologic imaging standard but outweighs it by 385.45%. This patient dose would produce a risk of one form or another.

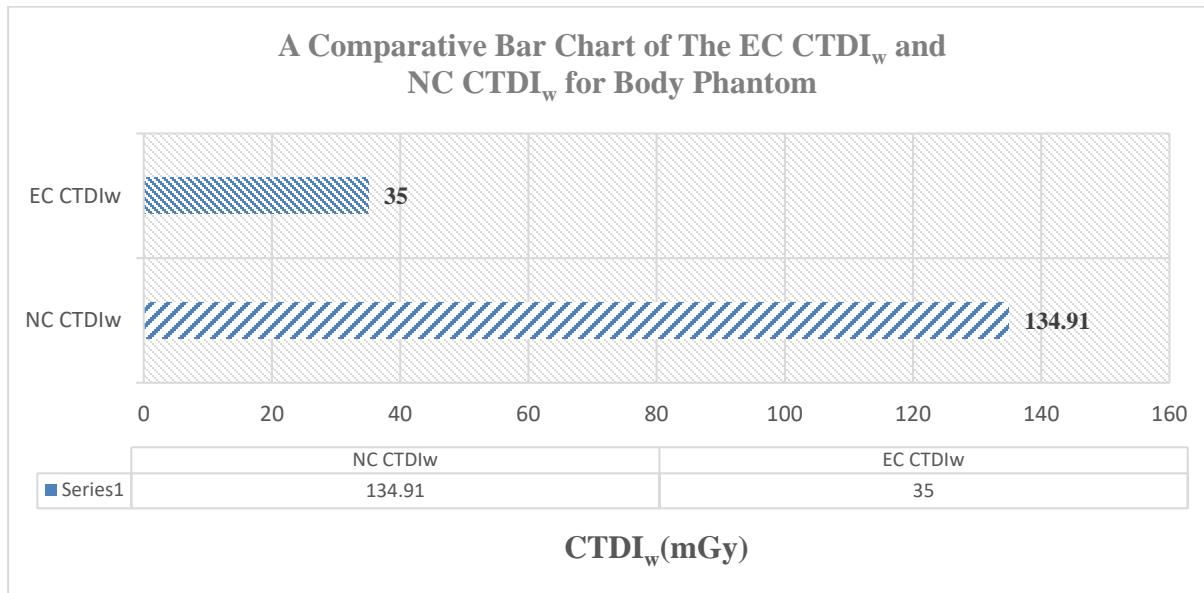


Figure 2: A Comparative Bar Graph of Numerically Calculated CTDI_w and the EC CTDI_w for Body Phantom

The question therefore arises, asking what is accounting for the high values. The overall comparative analysis of the head and body phantoms were analyzed on a bar graph in Figure 3. The Figure presents numerically calculated CTDI_w values compared to the

European Union standards of the CTDI_w values. The head phantom recorded a numerically calculated CTDI_w value of 540.91mGy, which indicated a percentage discrepancy of 901.52% compared to the European Union's standard of 60mGy. Also, the body phantom showed a discrepancy of 385.45% of the numerically calculated CTDI_w value of 134.91mGy to the accepted standard of 35mGy for the body.

The CT scanner recorded the following CTDI_w s. The Head CT phantom gave a numerically calculated CTDI_w of 540.91mGy compared to the 60mGy standard of the European Commission

(EC) with a 901.52% of discrepancy. The Body CT phantom also recorded a CTDI_w of 134.91mGy to the 35mGy of the EU with a percentage discrepancy of 385.45%.

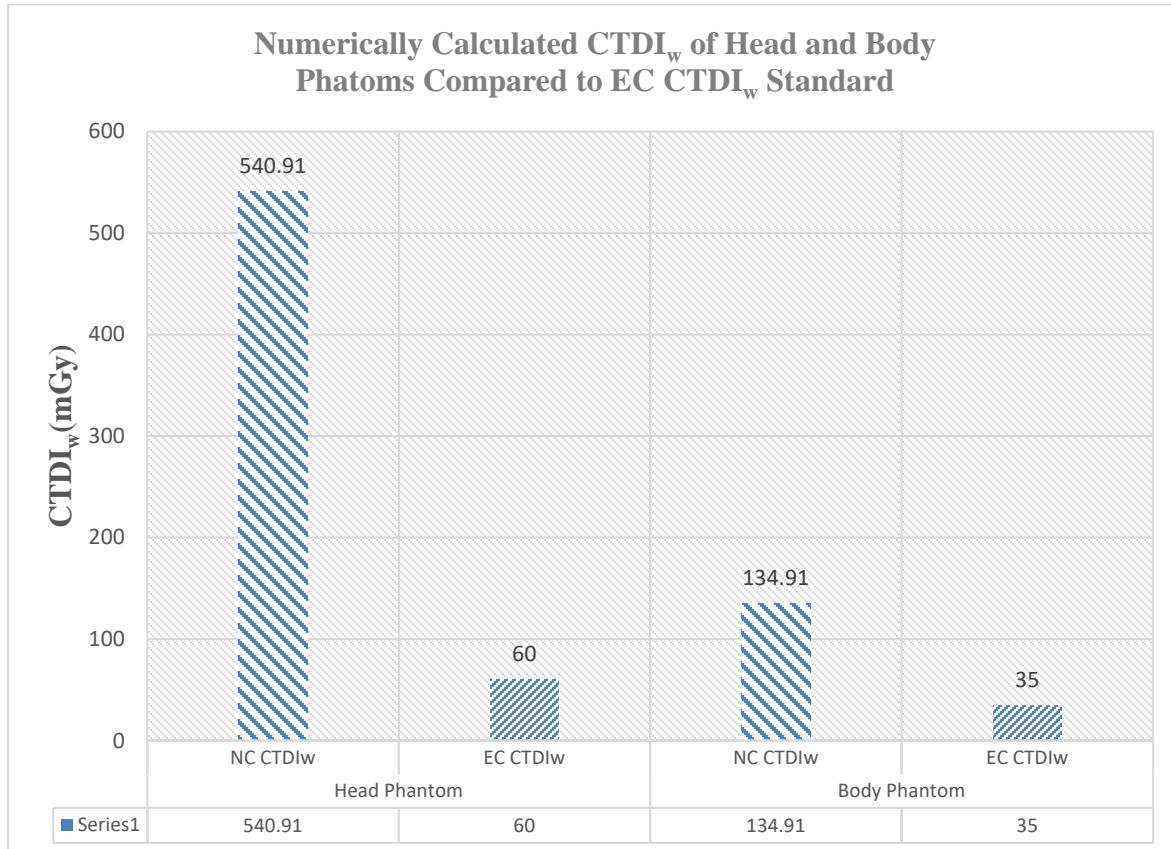


Figure 3: The Overall Analyses of the Numerically Calculated CTDI_w of Head and Body Phantoms Compared to the EC CTDI_w Standards.

5.1 CONCLUSION

The CT scanner produced radiation dose indexes of 540.91mGy and 134.91mGy for the Head and Body phantoms respectively. The CTDI_w showed a respective percentage discrepancy of 901.52% and 385.45% for the Head and Body phantoms. Higher doses from the scanner would lead to high patient or organ doses hence could expose individuals undergoing the scan to high doses and possible adverse events/effects could be recorded if the same scan parameters are used to scan human beings. The calculated CTDI_w didn't conform to the European Commissions' standards for radiologic imaging. The following parameters or factors accounted for the high percentage of discrepancy of the CTDI_w .

- The scan parameters set, i.e. mAs, kV, slide thickness, scan length etc.
- Image quality for the easy diagnosis: Contrast medium couldn't be administered to phantoms

- Number of slice: More slices required more doses to produce them.
- Table height: Tall tables bring objects for scanning close to the radiation dose where the dose is very strong.
- Type of the scanner: Multislice,

5.2 FACTORS ACCOUNTING FOR THE DISCREPANCIES IN THE CTDI_w.

- Justification: In most cases the clinician who refers a patient for a CT scan will ensure that the benefits provided by the information in the examination far outweighs the risks associated with the radiation dose.
- Radiation dose depends on the tube current (amperage), slice scan time, and tube peak kilo voltage. Increasing the mAs will increase the scan time and therefore the dose proportionally. Thus CT radiation dose is often expressed a dose per mAs (or per 100mAs),
- These are some of the scan parameters. Whereas most scanners are normalized to a 100mAs, the one used for this study normalized to 270mAs and 130mAs for the head and body respectively.
- Image quality: The greater the dose, the greater the quality of the image. Quality images lead to easy diagnosis therefore clinicians require quality images for their diagnostics.
- Table height: Taller tables bring patients or phantoms closer to the gantry where the dose is denser. Radiation doses are delivered in conical shape. This is the attenuation principle. The table heights recorded 160.0cm each for the head and body phantom scans.
- A multislice CT scanner produces high mAs hence longer scan lengths and increased radiation dose while a single slice CT scanner gives low mAs and hence low dose. The scanner for this study was a 16 slice (multislice) one.

Higher number of slices leads to high scan lengths and respective radiation doses. Table 1 give an illustration of mean or average number of images/slices for some countries compared to this study.

Region of Exam	This Study	Germany	UK	Netherland	Japan
Head	32	24	25	Not Available	9
Body	34	32	25-34	28-31	16

Table 1: Mean number of images/slices for some countries compared to this study, Source: [8]

The CT scanner recorded the following CTDI_w. The Head CT phantom gave a numerically calculated CTDI_w of 540.91mGy compared to the 60mGy standard of the European Commission (EC) with a 901.52% of discrepancy. The Body CT phantom also recorded a CTDI_w of 134.91mGy to the 35mGy of the EU with a percentage discrepancy of 385.45%.

5.3. RECOMMENDATIONS

In the analyses of the data and findings of the study, some discrepancies were identified with the CTDI_w values of the CT scanner and as a result some recommendations and suggestions were provided for radiation dose reduction As Low As Reasonably Achievable (ALARA);

- Justification: The exam must be medically indicated. Thus the exam must be beneficial to the patient

- Optimization: The exam must be performed using doses that are As Low As Reasonably Achievable (ALARA), consistent with the diagnostic task.
- Minimization of Number of slices and hence scan length without affecting the image quality
- Modulation of the exposure parameters (e.g. mAs, kV, exposure time, etc.) taking into account the age, weight, transverse diameter of the patient
- The use of protective shields (e.g. lead apron) for regions that are not a concern for examination and are highly irradiated
- Contrast media should be used to enhance image quality in patients.
- Radiologist should ensure that no more radiation is used than obtaining diagnostic information in any radiologic examination in CT.

5.4. FUTURE WORK TO BE DONE

There are other radiology imaging modalities that need to be looked at as well to determine the conformity or otherwise to accepted standards for imaging viz a viz the radiation dosages and possible adverse events that it brings to human health. Ghana is fast growing with technology and health delivery and it concerns us to find out if other health facilities using these imaging equipment conform to the standards. Other radiology equipment like the Mammography Machine, Fluoroscopy, X-Ray would be looked at.

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Influence of Anxiety on Academic Performance among Students at The Technical University of Kenya

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Abstract

Academic anxiety is the fear of studying including not having good study habits and fear of failure among others. State-Trait Anxiety Inventory for Adults (STAI-AD) and Grade Point Average (GPA) 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: Academic performance, anxiety, emotionality, worry, study skill deficit.

cases, such fear of unknown distracts student from concentrating and finishing learning activities. Just like emotional reactions, students experiencing worry generated issues, have high chances of losing focus and attention to academic duties (Lena & Kent, 2012).

Study skills can be defined as student's masterly requisite studying tactics and the management of resources such as time, in order to accomplish required learning duties. Basically, these comprise combination of intellectual capabilities and procedures enhancing effectual student learning. It can also be a plan or strategy that involves choosing most applicable studying techniques. The application and effectiveness of study skills can be improved through the use of study strategies for better academic outcomes. Mazumdar, Gogoi, Buragohai and Haloi, (2013), identify four study skills that include repetitive, procedure based, cognitive and metacognitive skills.

Study skills are measured by variables such as poor time management, academic procrastination, poor organizing and processing information, motivation and attitude, inadequate instruction time, faulty learning material, over demanding syllabus as well as insensible teaching. Consequently, students rush preparing at the eleventh hour, leading to mix-up especially during examinations. As a result, students underperform due to the inability to embrace study skills. Apparently, the three dimensions of academic anxiety are outcomes of poor study skills, hence the need to design mechanisms of checking these challenges (Kader, 2016).

The concept of task-generated interference refers to unfruitful tendencies or behaviour that emerges when a student begins to engage in academic activities. Such tendencies include; making minimal effort to get things right, giving up quickly on demanding tasks, non-participation in class activities, prioritizing non-academic activities, coming late, missing lessons, and delinquent as well as aggressive character traits. Others include taking more time answering a question he or she is not capable

The first component of academic anxiety is emotionality that is characterized with symptoms which include distress, fright (panic), high palpitations, queasiness (nausea), moist palms, touchiness (irritability), and tenseness among others. In most cases, these are feelings emanating from the inability to perform expected duties. Specifically, such feelings are as a result of inadequate preparation or inability to comprehend learning concepts. Consequently, students undergoing these signs are likely to experience diminishing concentration levels during academic activities. Undeniably, emotionality can impact negatively on student academic performance if not attended to (Saini, 2012).

Imagined or real thoughts and feelings of something bad about to happen can be referred to as worry. This concept is operationalized in terms of low self-concept, anticipating failure, obsession with repercussions of failure, being under pressure for excellent performance, family issues among others. In most

as well as frequently glancing at a clock face instead of responding to questions (Attri & Kumari, 2013)

Such academic anxiety tendencies appear to be more prevalent in higher learning institutions. Indeed, slipping university student's academic achievement globally is worrying. For instance, a report by Organization for Economic Cooperation and Development (OECD, 2015) on the influence of anxiety on student academic achievement in science, technology and mathematics courses among university students in Singapore. The findings showed students experiencing anxiety had more chances of having unsystematic, ambiguous and undefined goals and priorities. That led to students' inability to effectively budget and manage time. The study, observed correlation between anxiety and performance in Science Technology Engineering and Maths related courses (STEM).

A recent report by the Anxiety and Depression Association of America (American College Health Association, 2013) established that anxiety among college students in the United States had increased from 6.7% in 2000 to 12.9% in 2013. In 2014, the American College Health Association reported that 23% of college students reported anxiety as a factor affecting their functioning in the past year. Work and school performances are often domains that individuals with anxiety persistently and excessively worry about (American Psychiatric Association, 2013). The excessive worry hinders the ability to do things efficiently and in a timely manner. The time and energy that is spent worrying would leave less time to study or do homework, and negatively affect an individual in many other areas. Lowe and Ang, (2012) conducted a survey among university students in Southern Queensland University, Australia, demonstrated that untreated anxiety in young adults may lead to several behavioural, physical, and mental difficulties that impede academic performance. As if that is not enough, the findings attributed procrastination and negligence of academic obligations especially homework, assignments as well as achieving targets to heightened stress levels. Besides, the study observed that such stressed students usually cognitively think about their inadequacies, disappointments as well as personal underperforming. Consequently, their self-worth is eroded by such mind-set which results into underperformance academically.

In a more recent study on association between anxiety and student class concentration, Dalkiran, Baltaci, Karatas and Nacakci (2014) observed university student representing 40% of the total student population, visited hospitals for psychological issues, concentration challenges and stress. As well, they depicted heightened neuroticism and stress levels had correlation with dismal academic outcomes since tension affected their learning concentration, remember learned concepts and general scrawny answers to examinations.

A study done by Larson, Orr, and Warne (2016) explored both physical and mental health issues on student performance among university students in Australia. Some of the physical health difficulties the study measured included asthma, allergies, mononucleosis, strep throat, and urinary tract infections. The study found that mental health issues were significantly and negatively associated with Grade Point Averages. The study also observed that physical health issues were often correlated with mental health issues. For example, students who had high levels

of stress, or difficulties handling stress, reported physical health issues affecting their diet and sleep.

In South Africa, study skills determine performance in end of term examinations among secondary school students in Pretoria, (Ebrahimi & Khoshhsima, 2014). In addition, the study found out that those students who had deficit in time management, examination preparations and notes making during learning obtained low marks in end of term examinations in contrast to their colleagues who excelled in the same tests due to having better study skills. This study confirms many findings in different studies that connect better academic performance to study skills. Further, there is clear indication that academic performance of students can be influenced by a variety of factors including academic major, self-perception of abilities, levels of anxiety during examinations and student background features.

Similarly, students experiencing anxiety issues in Malaya, exhibited poor memory, concentration loss, weak self-concept as well as weak intellectual or cognitive ability. As a result, most students displayed emotional reactions such as nervousness to difficult learning activities or general education engagements that were demanding. Overall, heightened anxiety had a bearing on their academic achievements (Prima, Muhammad, Ahmed, Tutut & Suriya, 2010).

Mohammed, Hailu, and Muhammad (2017), examined effects of examination anxiety on university students' academic performance in Northwest University, Kano, Nigeria. They established that students with heightened levels of anxiety scored lower grades compared to their counterparts who obtained higher grades with moderate levels of anxiety. It was therefore evident that academic anxiety has a bearing on the academic achievement of university students.

Additionally, the study noted that academic anxiety can no longer be ignored due to its effects on student academic performance. Academic institutions have a key role to assist students handle academic anxiety through properly executed guiding and counselling programmes. Expectedly, relationships among administration, teachers, parents and learners is meant to develop the intellectual, academic and personal aspects. Also, it should build their social and emotional faculties, as well as assisting students identify and appreciate their strengths and weaknesses.

In their study on status of university education in Kenya, Mukhwana et al, (2016), attribute worrying student indiscipline, drug abuse among others on academic anxiety that exert pressure on students. Additionally, this study found that some 35 per cent of engineering students failed at Technical University of Kenya, 30% Bachelor of Laws (LLB) of Kenyatta University, 22% Moi University, 20% University of Nairobi (Parklands Campus). Further, 5% University of Nairobi's Mombasa Campus and 2% Jomo Kenyatta University of Agriculture and Technology. Among private universities, 8% Catholic University, 6% Kabarak University, 4% Mount Kenya University and 2% Nazarene University (UNESCO, 2017).

Basically, anxiety level that is moderate and controllable is beneficial. This is because it motivates to put extra exertion to finish assignment as well as prepare for assessment. However, when the human body is unable to cope with anxiety due to extreme levels, academic anxiety turns into an issue that warrants resolution (Kaur, 2012). Admittedly, such heightened

academic anxiety levels, if not addressed, can have far reaching repercussions on students especially on academic outcomes (Lena & Kant, 2012). Sadly, students who fail to manage their anxiety levels end up missing lessons, develop social challenges, score low grades, defer learning, repeat some course units or worse get discontinued (Arul, 2013).

Expectedly, academic institutions should contribute to the total educational process directed to the development of personality of youthful students (Saket, 2014). Unfortunately, most learning institutions are unable to assist students to confront this monster of academic anxiety. Essentially, counselling inculcates academic focus and promotes healthy college life in students through mitigating against failure, drop out and wastage. Hence, efforts towards ensuring equity, retention and high completion rates have not yielded expected returns (Bala & Shaafiu, 2016).

The increasing industrial and technological developments, changes of the nation's educational system that lay more emphasis on pursuit and excellence in the academic than the emotional and other faculties of child development, have exuberated student anxiety. Further, the traditional counselling systems that provided adequate information on youth growing up issues have collapsed due to new social patterns of modernity that confine children to schools where they spend 90% of their time from early age through higher education institutions.

The Technical University of Kenya, formally Kenya Polytechnic, was upgraded to University College in 2007 before assuming full-fledged university status thereby leading to expansion in enrolment, courses and facilities. Majorly, the university focuses most courses on engineering although it has introduced arts, management and business courses to supplement its core program at undergraduate, diploma and certificate levels. Technical University of Kenya, Nairobi campus, has had reported cases of student unrest, drug abuse, promiscuity, sudden death and worrying failure in examinations.

For instance, according to Mukhwana, et al, (2016), 35% of engineering students were forced to reseat supplementary examinations due to low scores in 2016. There is also a possibility of unreported cases of student indiscipline among other unbecoming behaviour at the Technical University of Kenya. In spite of the university's laudable achievement, the country has witnessed shocking revelations of students committing suicide, dropping out of college, increased delinquent case as well as massive failure of students in key examinations (Ministry of Education, 2016).

In 2015, UNESCO raised concerns on the quality of graduates being produced by universities and colleges in Kenya. The United Nations' body observes that the country's education system is failing to produce graduates with the knowledge and

LITERATURE REVIEW

Chapter two presented the theoretical and empirical reviews; conceptual framework and summary of literature and research gaps. Basically, the materials from which information is drawn emanated from various sources. This was in line with giving the study problem in question a theoretical perspective and conceptualization that helped in guiding the study. Equally, it was meant to generate a road map for the study as well as the blueprint for interpreting the results.

skills crucial for Vision 2030, in its report dated September, 2015 (UNESCO, 2017). The UNESCO report advise bold actions be taken to restore the credibility of Kenya's universities in terms of declining performance. This is especially critical in the age of a competitive knowledge-based global economy. Kenya's true and most dependable resource is the quality of its human capital, and it cannot afford to gamble with the future of her young generation. Accordingly, increasing effects of the academic anxiety phenomenon motivated this current research.

1.2 Problem Statement

There is a general increase in the cases of failure of students in examinations, dropouts, violence, college conflicts, addiction, wrong career choices, disciplinary problems, promiscuity, attempted suicide and sudden and unclear deaths in Kenyan universities especially at the Technical University of Kenya (Mukhwana et al., 2016). Although this state could be attributed to various causes, it appears academic anxiety is at the root cause of these issues which compromise academic performance (Bala & Shaafiu, 2016). One can therefore deduce that students who experience academic anxiety are likely to underachieve academically.

From a research approach, most of the studies done in this area are in other contexts (Othieno, Okoth, Peltzer; Malla, 2014). There is little empirical evidence on the impact of academic anxiety on academic performance in the Kenyan context and only few related studies have been done (Othieno, Okoth, Peltzer; Malla, 2014). Conceptually, the researcher is not aware of any previous study on academic anxiety at the Technical University of Kenya on the study topic. Accordingly, this contextual and conceptual research gap motivated the current study on the influence of academic anxiety on academic performance among university students at the Technical University of Kenya.

1.3 Research Objectives.

The study set out to:

- (i) Demonstrate that emotionality negatively influences academic performance among university students of Technical University of Kenya.
- (ii) Expose that worrying inhibits academic performance among students of Technical University of Kenya.
- (iii) Reveal that study skills deficits have a negative impact on academic performance among students of Technical University of Kenya.
- (iv) Validate that task-generated interferences negatively influence academic performance among Students of Technical University of Kenya.

2.1.1 Influence of Worry on Academic Performance among University Students

Generally, research directly links academic anxiety to diminishing execution of responsibilities especially among students (Devine, et al, 2012). Iglesia, Stover and Liporace (2014) observed sharp dissimilarity between worry and emotionality in terms of the level each of the two-impact student academic activities. In their explanation, biological or physical reactions depict emotionality while mind based reactions show

worry. Precisely, they found out that worry reactions such as fear, have more bearing on test performance. This finding was in consistent with Suresh's (2016) observation that observed worry is more associated with lower performance than emotional reactions or responses.

Kader (2016) conducted a study on the link between worry and class attendance among middle college students in 5 diploma colleges in Jakart. An open-ended questionnaire was administered on 20 sample students through stratification in addition to use of FGDs and data was qualitatively analysed. The study established that students, who displayed worry or cognitive reactions, did not find it unusual to miss lessons. The study established that students were preoccupied with predictions of failure to the point that they were not motivated to attend classes but waited until examination time to finding ways of cheating in examinations.

While it is true the concept of worry is the independent variable for this study as in the two mentioned studies (Iglesia & Stover, year and Liporace & Kader, 2016 year), the first and second studies have tested performance and class attendance as dependent variables respectively, and they differ from that of the current study which examines worry in relation to academic performance. Still on conceptualization, while the first study used comparison between emotionality and worry on test performance, the current study examined worry and emotionality separately in relation to academic performance.

In terms methodology, Iglesia, Stover and Liporace are silent on methodology while Kader employed purely qualitative approach of open-ended questionnaire and FGD on a very small sample. The open-ended questionnaire suited anxiety as worry and emotionality were personal experiences that varied from one individual to another hence FGDs tool was not suitable as it denied participants freedom to air individual experiences. Therefore, such methodological weaknesses must have impacted on the findings of the two studies and hence might not be relied on wholesale by the current study.

Brady, Hard and Gross, (2018), in a study in Texas, USA, observed that a certain amount of anxiety could be beneficial to performance or productivity. Specifically, preliminary findings largely from laboratory discoveries submitted that moderate anxiety levels are likely to improve performance of students in mathematics. However, replicating or attaining such desirable academic outcomes in other subjects under certain daily classroom limitations or challenges, is a question worthy examining. In the effort to explain this paradox, a test to determine the influence of a slight or little anxiety entrenched or expressed in an email sent by lecturers or subject could motivate students in a preliminary or orientation university course.

To do the above, just the night prior to the first assessment or examination, first-year students got an email containing or not containing an introduction in the email meant to make them understand test or examination anxiety as useful or unhelpful to better performance. As expected, students who characteristically experienced anxiety before or during testing, performed better in the test, proving that low levels of anxiety in terms of worry boosted student performance. Indeed, examination results analysis showed decreased test or examination worry motivated students to perform better in examinations among first-year students. By and large, the conceptual scope and geographical

scope, especially target population, were not very similar to the current study.

2.1.2 Influence of Emotionality on Academic Performance

Studies have revealed that emotionality influences academic performance in way or another. For instance, a study by Nadeem and Zaidi (2012), examined the effect of anxiety on overall performance of university student in the context of Bahawalpur, Pakistan. Descriptive research design was used and anxiety determining questionnaire administered on 97 students sampled using stratified sampling.

Findings of regressively analyzed data revealed that an escalation in anxiety leads to diminishing student academic achievement in students with symptoms of anxiety. However, the above study should be considered with caution because it examined anxiety generally on academic performance while the current study specifically focusses on academic anxiety on student performance. In terms of methodology, the two studies have targeted population with similar academic characteristics although the geographical scope varies greatly.

Othieno, et al. (2014), examined correlation between prevalence of academic anxiety and socio demographic and its influence on depression among university students in Kenya. It was found that anxiety, as manifested, depression-induced conditions were most prevalent students joining university for the first time especially the married, from low income households and those residing outside the university premises. Also, performance in academic, religion as well as the university or college one learned contributed significantly to increased depression levels. To that end, the study concluded that an association exists between depression and academic outcomes among university students. Therefore, proper measures are required in universities in detecting and addressing such anxiety reactions especially the most affected.

While it is appreciated that this study targets university students, the focus area of socio demographic and its influence on depression is significant. As well, the conceptual focus of this study differs from what the present study is emphasizing. Indeed, socio demographic factors are very different from academic anxiety while depression is more of a medical condition that is a sum of prolonged causes. To this end, findings of this study are related to the current study that investigated academic anxiety among students.

2.1.3 Influence of Study Skill Deficits on Academic Performance among University Students

Dalkiran, Baltaci, Karatas and Nacakci (2014) in their study established that study skills determine academic outcomes of students. They further define study skills as student's masterly requisite studying tactics and resource management such as time in order to accomplish required learning duties. Additionally, it was found out students demonstrating studying shortages like time misuse, poor notes making, preparing for tests and active participation in class, did poorly in most subjects. Admittedly, this study has immense relevance to the current study in terms of conceptuality although it is silent on method used in developing the variables. Accordingly, it contributes to the comprehension of anxiety in terms of study skills deficits and its influence on academic performance.

According to Bala and Shaafiu (2016), trained students in intellectual imagery methods and memory-aiding appliances did better than their counterparts who were never trained. Nevertheless, though trained, they are not able to utilize the skills until guided well. Further, it was revealed students with shortfalls in such study tactics, fail timetabling, adhering to timetable besides not allocating adequate time for study. In the end, such students achieve marginally overall academically. Lastly, they found out that students good at procedural type of skills make best use of time due to prudent time management, timetabling and consistently adherence to study schedules. Granted that this study equally examines the concept of study skill deficits and its impact on academic performance, brings semblance to the present study. However, sampling techniques especially small sample size of this study elicits some deficiencies and limitations to this study hence the findings might not be quite representative.

According to Grills-Taquetel, Fletcher, Vaughn and Stuebing (2012), inability to cultivate effectual study behaviour puts pressure on students, consequently increasing chances of experiencing anxiety. Typically, such students are likely to display anxiety reactions such as deferment, stalling, postponing academic tasks. Similarly, postponing academic activities or tasks, is likely to cause challenging anxiety levels linked to such procrastination or deferment. Bansal (2013), takes this theme further by offering remedies to study skills shortfalls. First, he advises that recognizing or identifying study skill shortages is instrumental towards addressing such shortfalls. Secondly, categorizing the discrepancies offered suitable intervention measures. Next step involved effort to rank these academic activities according to their importance before allocating adequately commensurate time and finally dedicatedly implementing each of them.

The study reviewed above articulates the study skill concept that forms part of the four key rudiments or dimensions that make up learning-based anxiety current study. Seemingly, the target population was same as what the current study targeted although the exact year of sampled students is not known. Conceptually, the study had some credence to guide the current study although not substantially due to difference in geographical setting. This study by Grills-Taquetel et al (2012), investigated the relationship between assessment generated anxiety and academic outcomes among university students at Northwest University in Nigeria's Kano State. Applying descriptive research design as well as recruiting 350 participants consisting of 203 and 147 male and female respectively, data was collected through EEAQ).

Relying on two hypotheses and analysing collected data with the help of correlation of the SPSS, the study observed little correlation between academic outcomes and test related anxiety. This study, therefore, suggested the need for teacher counsellors to equip students with skills of evading anxiety.

Conceptually, this study had some correlation with the current study in terms of focus area. Indeed, study skills concept was examined but in relation to examination performance. However, it could contribute in guiding the current study in terms of focus area. Although this study targeted university the same way the current study did, there are noticeable differences

in terms of analysis where EEAQ) is used as opposed to STAI used in the current study.

2.1.4 Influence of Task-generated Interference on Academic Performance among University Students

Using a meta-analysis research design on 562 studies Zirk-Sadowski, et al, (2015) investigated the association between test generated anxiety on the academic outcomes. The findings showed that test anxiety strongly impacted academic performance among students. This implies anxiety is a leading or principal factor in lowering academic performance of students. Additionally, students demonstrating heightened anxiety got lower grades as opposed to superior scores of those experiencing reduced anxiety. Fiore (2012) explored the impact of anxiety on completion of academic tasks. It was revealed that the higher the anxiety, the lower the performance reported and escalates as anxiety becomes extreme. Specifically, such students overcome by tasks being undertaken, coupled with self-degrading mind frame as being unable, eventually give up.

Both Zirk-Sadowski and Fiore, focused generally on relationship between examination generated and task completion in their studies without specifically examining the concept of task-generated interference as required by the sub-headline being examined in the current study. However, their focus areas are relevant to the entirety of the current study.

2.2 Literature Gap

Most of the studies reviewed above, have some minimal relevance to the current study conceptually and methodologically. To this end, various components of academic anxiety have been articulated to some degree but not as the current study adequately discuss them. In fact, some have either specifically discussed particular indicators of some of the four dimensions but not in relation to overall student outcomes or generally discussed anxiety. In terms of research methodology, few studies have focused on university students and there is no single study which has examined anxiety and its impact on academic outcomes among students at the Technical University. Additionally, very few studies had utilized STAI as determinant or measurement of academic anxiety. Further, some sampling issues especially small sample sizes and even in the case of large sample sizes, the features of such samples are very unique from The Technical University this current study targeted. Still, methodological issues such as sampling techniques, research designs among others characterize the studies reviewed above.

Therefore, from the above studies, the researcher did not find any published study that examined the influence of academic anxiety among university students in Kenya with special reference to The Technical University of Kenya. Besides, the inconsistencies and contradictions make these studies not conclusive in this area hence necessitating further studies in this area. A few studies above shed light on what this current study set out to achieve by reporting that increased anxiety levels had a bearing on lower academic achievement.

Like the current study's objective, annotations advanced in literature reviewed in this section, though minimal, infer an association between anxiety and academic achievement. Contextually, the current study bid to establish if this same association observed in the studies discussed here indeed occurs particularly at The Technical University of Kenya.

METHODOLOGY

3.1 Research Design

This chapter discussed research design, participants and sampling procedures, instruments of measure, data collection procedure, data analysis, and ethical issues in research. Shekhar (2014) describes research design as one that consists of road map under which collection, measurement and analysis of data is based. According to Cooper and Schindler (2014), this is a strategy or structure in which answers to the research questions are thoroughly examined and obtained. Research design entails showing the methods and procedures for collecting and analysing data into meaningful information that would yield answers to the research questions (Merriam, 2014).

The study employed a quantitative approach with the use of basic analytical techniques such as mean, standard deviation and percentages. Also utilized was correlational and regression designs to allow it draw inferences from the existing disparity between the independent and dependent variables in the present study. Correlation suited this study because it explained the relationship between academic anxiety and student academic performance. Implicitly, correlation showed the extent to which academic anxiety influences academic performance of students. On the other hand, regression analysis was used to determine the strength of the relationship between academic anxiety and student academic performance (Creswell, 2013).

Accordingly, this method attempted to determine how anxiety related with academic outcomes. Indeed, this design

Table 1. Determining Sample Strata

Department	N	N	n/N*357	Strata
Mechanical	5000	1500	1500/5000*357	107
Electrical and electronic	5000	1200	1200/5000*357	85
Infrastructure and built environment	5000	900	900/5000*357	64
Architecture	5000	800	800/5000*357	57
Survey	5000	600	600/5000*357	43

Whereas; N represented the targeted population while n designated the sample size distributed across various departments in tandem with Krejci and Morgan's (1970) table for determining sample size for a known population.

Purposive sampling was used to exclusively focus on final year students. Purposive sampling method proved to be effective as only limited numbers of people served as primary data sources due to the nature of research design, aims and objectives. A purposive sample is where a researcher selects a sample based on their knowledge about the study and population (Shekhar, 2014). The researcher had chosen this method because she was clear about the informant qualifications.

3.3 Instruments of Measure

was suitable because it sought to establish the extent of association between academic anxiety and academic performance of students (Yu, Abdullah & Saat, 2014).

3.2 Sample Size and Sampling Procedures

The researcher obtained the list of 5000 final year students in the engineering faculty from the administrative office in each department. Thereafter, using Krejcie and Morgan (1970) table (Appendix iii) for determining sample of a known population, a population of 5,000 subjects having a minimum sample size of 357 students was achieved. Further, stratified sampling was used to ensure equal representation of the five departments at the university. These included Mechanical, Electrical and Electronic, Infrastructure and Built environment, Architecture and Survey department.

The sample size for each stratum was determined based on student number in the five departments. The distribution of students was as follows 1500 Mechanical School students, 1200 electrical and electronic school students, 900 infrastructures and built environment school students, 800 architecture school students and 600 survey students. The stratum for each department was calculated as shown in Table 1.

The researcher used State-Trait Anxiety Inventory for Adult (STAI-AD) to determine or measure anxiety levels in adults (Yin, 2014). This instrument was able to differentiate temporal anxiety referred to as state anxiety from long-term anxiety condition called trait anxiety. It was simple and this implicitly made it crucial for evaluating persons portraying characteristics of anxiety. It was widely adopted in many countries all over the world. This was the top determinant of anxiety in human beings ever developed (Chauhan, 2016).

The STAI has 39 items allocated to anxiety subscales comprising worry reaction, emotional reactions, study deficit skills and task-generated interferences. Range of scores for each subtest is 20–80, the higher score indicating greater anxiety. In this current study, a cut point of 39–80 has been suggested to detect clinically significant symptoms for the

anxiety for students. All items are rated on a 4-point scale (e.g., from "Almost Never" to "Almost Always"). 1) Almost

Never, 2) Somewhat Always, 3) Moderately Always, and 4) Almost Always. Higher scores indicate greater anxiety.

Table 3. Interpretation of STAI

Measure	Score	Interpretation
Almost Never	Below 20	Lowest
Somewhat Always	21-39	Low
Moderately Always	40-59	Medium/High
Almost Always	60-80	Highest

Source; Spielberger, (1966).

GPA of students is derived by calculating the average of student's total earned points divided by the total. TUK had adopted the British degree grading system with a student scoring an average mark of 80 and above was interpreted to mean high with GPA of between 2.7 and maximum 4.0, 65-79 was interpreted as moderate with a GPA of between 1.0 and 2.3 while score below 65 was interpreted as low with less than 1.0 GPA.

According to this grading system students who scored below 40% were deemed to have not qualified or satisfied the examination minimum requirements. Students were asked to indicate their individual marks and GPA which was determined through the following scale;

Table 4. Interpretation of GPA level

Letter Grade	Percent Grade	4.0 GPA Scale	Interpretation
A	93-96	4.0	High
A-	90-92	3.7	High
B+	87-89	3.3	High
B	83-86	3.0	High
B-	83-86	3.0	High
C+	80-82	2.7	High
C	77-79	2.3	Moderate
C-	73-76	2.0	Moderate
D+	70-72	1.7	Moderate
D	67-69	1.3	Moderate
F	65-66	1.0	Moderate
	Below 65	0.0	Low

3.3.1 Interpretation of STAI and GPA level

To classify students' performance academically, the following interpretation was applied as displayed in Table 5.

Table 5. Interpretation of STAI and GPA level

STAI's score	GPA	Interpretation
80 > STAI	2.50>GPA	Low
80 < STAI	2.50<GPA	High

Source: Spielberger, (1966).

3.3.2 Reliability of (STAI-AD and GPA) Scales

This study used Cronbach's scale to determine reliability. Internal consistency ranging from 0.86 to 0.95 was deemed reliable. To optimize content validity, most items were selected from other academic anxiety measures on the basis of strong associations with others related scenario. To ensure reliability of STAI, the alpha values of the STAI in previous studies and that the study was also tested for reliability with this group. Previous studies such as Choden, (2012), Kader (2016), Srivalli (2013) Ebrahimi and Khoshima (2014) documented reliability and validity test of 0.923, 0.898, 0.912 and 0.910 respectively.

A four-Likert scale closed-ended questionnaire covering the four constructs of anxiety and one item on academic performance which required the respondents to provide their GPA scores for the previous academic year. STAI was used to determine anxiety levels among students. Section A examined respondent's demographic features. Sections B to E of the questionnaire consisted of a test anxiety assessment in accordance with the research objectives as recommended by Yazan (2015). Section F sought to obtain the GPA of students. The researcher requested students to indicate their performance in form of GPA. Performance was measured in terms of student scores as specified in the GPA system.

The researcher first obtained an authorization for research from NACOSTI and letter from the TUK to conduct the study.

3.4 Data Collection Procedure

Research tools administering team were rigorously trained in order to avoid any errors in the data collection process and to reduce bias. The researcher sought consent from the respondents who signed the consent before participating in the study. The tools had an introductory part explaining how confidentiality was to be maintained and precise instruction on how they were to respond to the items. The questionnaires were administered by researcher and trained research team higher return rate. The study respondents were guided through the study and requested to provide required data and any clarification needed by the respondent was addressed on the spot.

3.5 Data Analysis

The returned questionnaires formed the basis for the analysis. The questionnaires were cleaned, verified, coded and tallied according to the themes. The researcher used, mean, standard deviation, percentages, correlation and regression of the SPSS application to analyse quantitative data from the questionnaires. Correlation was used to determine the

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the research findings, data analysis and data presentations in form of tables, graphs and figures. The chapter also offers the interpretation of the results from the findings collected from the sampled respondents. All findings are analysed within 95% confidence level and error margin of 5%. Data analysis entails separation of data into constituent elements and examining separately in relation to the whole more than just examining what has been collected in order to make deduction and inference. Indeed, this involves scrutinizing the acquired information and making inferences. Yu, Abdullah and Saat (2014) defines data analysis as the process of ordering and restructuring data from the field in order to grasp the overall connotation as presented by research questions to illustrate the issues.

The responses in the questionnaires were interpreted for analysis based on the fundamental assumptions of a Likert scale of 1 – 4, where 4= Almost Always; 3=Moderately Always; 2= Somewhat Always; 1= Almost Never. The returned questionnaires formed the basis for the analysis presented in this chapter. The questionnaires were then

relationship between academic anxiety and student academic performance. Implicitly, correlation showed the extent to which academic anxiety influences academic performance of students. On the other hand, regression analysis was used to determine the strength the relationship between academic anxiety and student academic performance.

Descriptive statistics were presented in the forms of tabulation, diagrams, graphs and certain numerical procedures all which aim at summarizing the material in a form which display its distinctive features that aid analysis. Inferential statistics on the other hand is a branch of statistics largely concentrates on data analysing and inferring meaning (Kihn & Ihantola, 2015). The responses in the questionnaires were interpreted for analysis based on 4-point Likert scale where: 4= Almost Always; 3=Moderately Always; 2= Somewhat Always; 1= Almost Never. The researcher will employ correlation to determine influence of academic anxiety on student achievement.

verified, coded and tallied according to the research objectives. Thereafter, they were quantitatively and qualitatively analyzed by use of SPSS (Scientific Package for Social Sciences) version 21.

What followed was presentation of findings in frequencies and percentages through the use of tables and charts. In each sub-section, responses of all categories of respondents are analysed and reported, an interpretation of the analysis is made to attach significance and offer explanations to the findings and make inferences. Correlation and regression analysis techniques were applied for verification, level as well as significance of anxiety vulnerability on student academic performance.

4.1.1 Participants' Responses to Worry Experiences

The first objective sought to assess the impact of worry on academic performance of students at the Technical University of Kenya. Students were asked to indicate on a four-point Likert-type scale how often they experience the feeling described in each statement. The responses to worry reactions of the Anxiety Inventory are as summarized and presented in Table 6.

Table 6. Influence of Worry on Academic Tasks (n = 249)

Worry Experience Reactions		4	3	2	1	SD	M
During learning, I'm confronted with predictions of failure	F	49	166	27	7	.647	3.03
	%	19.7	66.7	10.8	2.8		
I experience self-degrading thoughts while learning	F	66	119	49	12	.840	3.00
	%	26.5	47.8	19.7	4.8		
When learning, I'm preoccupied with the consequences of doing poorly	F	61	123	57	14	.804	2.82
	%	19.3	49.4	25.7	5.6		
Parents and school place high demand and pressure for excellent results	F	61	117	57	14	.832	2.90
	%	24.5	47.0	22.9	5.6		
Family related problems preoccupy my mind while at school	F	55	134	52	8	.747	2.95
	%	20.9	53.8	20.9	3.2		

School related problems disturb while learning	F	72	113	55	9	.811	3.00
I'm always thinking of my personal problems while learning	%	28.9	45.4	22.1	3.6		
	F	75	137	29	8	.731	3.12
	%	30.1	55	11.6	3.2		

* 4= Almost Always; 3=Moderately Always; 2= Somewhat Always; 1= Almost Never. f=Frequency; SD=Standard Deviation; M=Mean

Manifestly, the statistics in Table 6, demonstrate certain worry reactions were most profound among respondents. A case in point is a disturbing 166 respondents represented by 66.7% with SD and M of .647 and 3.03 respectively indicated that during learning they are confronted with predictions of failure as a worry related reaction. A further 123 respondents represented by 49.4% with SD and M of .804 and 2.82 respectively reported that they were always preoccupied with the consequences of doing poorly as a reaction to when confronted with a difficult academic activity.

The descriptive analysis of the score obtained from the administered anxiety questionnaire revealed most students at the university experience moderate level of worry related anxiety. Likewise, 134 represented by 53.8% with SD and M of .747 and 2.95 respectively, signposted that family related problems preoccupy their mind while at school. Finally, 137 represented by 55% with SD and M of .731 and 3.12 respectively, branded thinking of their personal problems

while learning as a major response to a challenging academic endeavour.

Implicitly, over three-quarters of the students at the university reported of experiencing moderate high level of worry reactions. On the other hand, the sub-theme "school related problems" which students labelled as an impediment to their academic performance, had the lowest response of 113 represented by 45.4% with SD and M of .811 and 3.00 respectively. Comparatively, this research variable had lower prevalence among students than the other three research constructs.

4.1.2 Emotionality Experiences

To determine the level of emotionality among respondents, students were asked to rate their experiences of the various emotional reactions described in the statements in the table below. The responses to the Anxiety Inventory are summarized and presented in Table 7.

Table 7. Influence of Worry Emotionality on Academic Tasks (n = 249)

Emotionality Experience Reactions		4	3	2	1	SD	M
I always feel fast heartbeat during demanding learning activities	F	80	139	21	9	.725	3.16
	%	32.1	55.8	8.4	3.6		
I often feel nausea in class when confronted with tough situation	F	63	158	18	10	.691	3.10
	%	25.3	63.5	7.2	4.0		
I experience sweaty palms during challenging learning events	F	65	130	41	13	.798	2.99
	%	26.1	52.2	16.5	5.2		
I experience irritability when handling severe class activity	F	53	146	40	10	.732	2.97
	%	21.3	58.6	16.1	4.0		
Nervousness grips me during involving learning activities	F	76	141	22	10	.733	3.14
	%	30.5	56.6	8.8	4.0		
I experience panic during difficult academic endeavour	F	60	164	17	8	.654	3.11
	%	24.1	65.9	6.8	3.2		
I undergo stomach upset when handling problematic subject	F	58	163	19	9	.670	3.08
	%	23.3	65.5	7.6	3.6		
Fear of failure grips me when challenging academic activity approaches	F	69	153	18	9	.692	3.13
	%	27.7	61.4	7.2	3.6		

* 4= Almost Always; 3=Moderately Always; 2= Somewhat Always; 1= Almost Never. f=Frequency; SD=Standard Deviation; M=Mean

Evidently, the findings in this theme (research construct) on emotional reactions show reactions that had higher responses. To that end, 164 respondents represented by 65.9% of the respondents with a SD and M of .654 and 3.11 respectively pronounced panic condition the experience during difficult academic endeavour. Additionally, 163 represented by 65.5% with SD and M of .670 and 3.08

electively, designated stomach upset as an emotional reaction to problematic academic exercise. Finally, 153 represented by 65.5% with SD and M of .526 and 3.23 respectively, branded fear of failure as emotional comeback to a challenging academic activity. However, the emotional reaction "sweating palms during challenging learning events" received the least response of 130 respondents represented by 52.2% with SD

and M of .798 and 2.99 respectively. The interpretation is that three-quarters of the students at the university experience moderate anxiety level in terms of emotionality.

4.1.3 Participants' Responses to study skills deficits Experiences

Study skills are instrumental in propelling students to better performance, however, a deficit of such skills, undeniably, negates performance. Therefore, the third

objective sought to determine the level of emotionality among respondents. Students were asked to rate their experiences of the various emotional reactions described in the statements and responded as shown in Table 8.

Table 8. Study Skills Deficit Experiences (n = 249)

Study skills deficits Experience attributes		4	3	2	1	SD	M
Expectation and demands impede my studying skills	F	72	131	32	13	.801	3.06
	%	28.9	52.6	12.9	5.2		
I procrastinate difficult learning activities	F	80	144	17	7	2.613	3.36
	%	32.1	57.8	6.8	2.8		
Organizing and processing Information gives me challenges	F	76	137	25	11	.756	3.12
	%	30.5	55	10.0	4.4		
I have little motivation and negative attitude towards hard subjects	F	53	174	15	7	.615	3.10
	%	22.3	69.9	6.0	2.8		
There is inadequate instruction time for most lessons	F	42	169	28	10	.666	2.98
	%	16.9	67.9	11.2	4.0		
Faulty learning material undermine my learning	F	46	175	19	9	.637	3.04
	%	18.5	70.3	7.6	3.6		
Over demanding syllabus affects my learning especially hard subjects	F	100	123	15	11	.760	3.25
	%	40.2	49.4	6.0	4.4		
Insensible teaching at TUK undermines my learning	F	57	159	24	9	.684	3.06
	%	22.9	63.9	9.6	3.6		

* 4= Almost Always; 3=Moderately Always; 2= Somewhat Always; 1= Almost Never. F=Frequency; SD=Standard Deviation; M=Mean

Tellingly, from Table 8, the following aspects or study skill deficits came out strongly as the ones most students have challenges with. For example, 174 respondents represented by 69.9% with SD and M of .615 and 3.10 respectively, intimated that they had little motivation and negative attitude towards hard learning activity. As well, 169 respondents represented by 67.9% of the respondents with a with SD and M of .666 and 2.98 respectively described instruction time for most lessons as not being adequate. Additionally, 175 represented by 70.3% with SD and M of .634 and 3.04 respectively, complained of faulty learning material as undermining their learning. Further, 159 represented by 63.9% with SD and M of .684 and 3.06 respectively, protested of insensible teaching at TUK undermines their learning. Nevertheless, "demanding syllabus affected their learning especially hard subjects"

aspect received the least response with only 123 represented by 49.4% with SD and M of .760 and 3.25 respectively. The implication is that most of the students at the university experienced moderate anxiety level due to deficit study skills at the time this study was conducted.

4.1.4 Participants' Responses to Task-generated interferences Experiences

Task-generated interferences can adversely affect the academic outcomes of students. To that end, the fourth objective sought to assess the impact of task-generated interferences component on academic performance of student. Students were asked to indicate on a four-point Likert-type scale how often they experience the scenario described in each statement. The responses to the findings are summarized and presented in the Table 9.

Table 9. Task-generated Interferences (n = 249)

Task-generated interferences Experiences		4	3	2	1	SD	M
I sometimes make minimal effort to get things right	F	68	163	18	4	.610	3.15
	%	25.7	65.5	7.2	1.6		
I give up quickly on hard-to-get learning tasks	F	98	127	16	8	.720	3.27
	%	39.4	51.0	6.4	3.2		
I see no need to participate in difficult academic activities	F	60	161	18	10	.684	3.09
	%	24.1	64.7	7.2	4.0		
Sometimes I prioritize crucial non-academic activities	F	105	105	29	10	.807	3.22

Due to unavoidable circumstances, sometimes I report to class late	%	42.2	42.2	11.6	4.0		
	F	87	144	11	7	.668	3.25
Due to other engagements, I miss lessons sometimes	%	34.9	57.8	14.4	2.8		
	F	74	138	27	7	.715	3.14
Due to learning pressure, at times I behave delinquently	%	30.9	55.4	10.8	2.8		
	F	74	152	18	5	.646	3.18
Difficult learning activities forces me to exhibit aggressive behaviour in class	%	29.7	61.0	7.2	2.0		
	F	59	156	27	7	.674	3.07
	%	23.7	62.7	10.8	2.8		

* 4= Almost Always; 3=Moderately Always; 2= Somewhat Always; 1= Almost Never. F=Frequency; SD=Standard Deviation; M=Mean

Statistical evidence from Table 9, suggests a trend of profound findings in relation to task-generated interferences. For instance, that a disturbing 163 respondents represented by 65.5% with SD and M of .610 and 3.15 respectively, make minimal effort to get things right. Another outstanding finding is the response of 161 students represented by 64.7% with SD and M of .684 and 3.09 respectively, who confessed that they saw no need to participate in difficult academic activities.

In the same way, 152 represented by 61.0% with SD and M of .646 and 3.18 respectively, acknowledged behaving delinquently sometimes due to learning pressure. Lastly, 156 represented by 62.7% with SD and M of .674 and 3.07 respectively, admitted that difficult learning activities forced them to exhibit aggressive behaviour in class which interfered

with their learning. Nonetheless, the task-generated interference, "I prioritize crucial non-academic activities", had the least responses of 105 respondents represented by 42.2% with SD and M of .741 and 3.26 respectively. From the findings above, it can be concluded that most students at the university experience task-generated interferences.

4.2 Students Academic Performance in Form of GPA

This part sought to establish the previous year's (two previous semesters) GPA of each respondent. Students were therefore asked to indicate their respective GPA for the previous academic year based on a 4-point scale where: 1= a GPA of between 3.3 to 4.00 GPA; 2= a GPA of between 2.7 to 3.2 3= a GPA of between 1.1 to 2.6; 4= a GPA of below 1.00. The findings are as summarised and presented in Table 10.

of range of 3.3 to 4.00. From the table above, most of the students represented by 68.3% scored the GPA of between 1.1 - 2.6. The overall mean and standard deviation stood at 2.88 and .552 respectively.

4.3 Correlation between Anxiety and Students' Academic Performance

All respondents' previous year, (2017) annual aggregate scores in form of GPA were listed down as part of the data collected during the data collection process. A correlation between anxiety and students' GPA was done. This correlation was conducted to see if students' performance could be predicted by worry reactions, emotional reactions, study skills deficits and task-generated interferences. The Pearson Correlation analysis was used to compute the correlation.

Table 10. Students Performance Expressed in GPA (n = 249)

GPA Range	Frequency	%	Mean	SD
3.3 to 4.00	11	4.4		
2.7 to 3.2	21	8.4		
1.1 to 2.6	203	81.5		
Below 1.00	14	5.6		
Total	249	100	2.88	.552

As tabulated above, majority of the students totalling to 203 representing 81.5% of the respondents attained a GPA of between 1.1 to 2.6. Next were 21 students represented by 8.4% who scored between 2.7 to 3.2 in the GPA. The least category of performance were 11 students who obtained GPA

Table 11. Correlation between Anxiety and Students' Academic Performance

	Mean	Std. Deviation	Correlation with Performance in GPA	Students N
Students Performance in GPA	2.88	.552		249
Worry reactions	2.6810	.51512	.829**	249
Emotional reactions	3.0010	.59058	.900**	249
Study skills deficits	3.0356	.66867	.815**	249
Task-generated interferences	3.0813	.58494	.889**	249

**. Correlation is significant at the 0.01 level (2-tailed).

The effect of anxiety on academic achievement was determined by finding out the coefficient of correlation between the test scores and in the last annual examination. From the results, all the factors considered had strong positive significant correlation with student's performance in GPA.

The coefficient of correlation between student aggregate marks (GPA) and student anxiety was established.

First, outputs showed a positive correlation between worry reactions and academic performance, $r=.829_{(249)}$, $p<.01$. Additionally, a positive relationship, $r=.900_{(249)}$, $p<.01$, was established between emotional reactions and student academic performance. Further, a positive relationship between study

skills deficits and student academic performance was established $r=.815_{(249)}$, $p<.01$. Finally, the findings reported a positive relationship of $r=.815_{(249)}$, $p<.01$ between task-generated interferences and student academic performance.

4.4 Regression Analysis

Table 12 Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
	B	Std. Error			
1	(Constant)	.102	.070	1.457	.146
	Worry Reactions	.056	.052	.053	.282
	Emotional Reactions	.374	.053	.400	.183
	Study skills deficits	.183	.031	.222	.156
	Task-generated interferences	.309	.047	.328	.170

Dependent Variable: Students Performance in GPA

From the statistics above, there exist positive relationship between worry reactions and academic performance ($\beta=.053$, $t=1.079$, and P value <0.05). This implies that a unit increase in worry reactions is associated with .053 decreases in academic performance. In addition, the study findings depicted a positive significant relationship between emotional reactions and academic performance ($\beta=0.400$, $t=7.005$ and P value <0.05). This implies that a unit increase in emotional reactions is associated with 0.400 increases in academic performance. Further, the findings portrayed a positive significant relationship between study skill deficits and academic performance ($\beta=0.222$, $t=5.989$ and P value <0.05). This implies that a unit increase in study skill deficits is associated with 0.222 decreases in academic performance. Finally, results in Table 4.12 showed that there is a positive significant relationship between task-generated interferences and academic performance ($\beta=0.328$, $t=6.530$ and P value <0.05). This implies that a unit increase in task-generated interferences is associated with 0.328 increases in academic performance. Accordingly, emotional reactions, study skills deficits and task-generated interferences significantly projected respondents' performance. Nevertheless, reactions to worry did not have a significant relationship with performance of students. This regression outputs show there exists a very strong substantial connection between anxiety and academic performance.

4.5 Discussion

Essentially, this section aimed at discussing the implications of the present study as well as the relationship between the findings here and previous studies. In the first place, the study established that most students were experiencing worry related reactions such as predictions of failure, self-degrading thoughts, preoccupied with the consequences of doing poorly, demand and pressure for excellent results, family and as well as personal problems. Thus, the finding of the study was confirmatory to the previous findings of Kader (2016) who displayed cognitive reactions, did not find it unusual to miss lessons and they were preoccupied with predictions of failure to the point that they were not motivated to attend classes but waited until examination time to finding ways of cheating in examinations.

The study also established that most students were mainly affected by emotional reactions such as fast heartbeat,

In order to establish strength of association between anxiety and students' academic performance, regression technique was applied to analyse the relationship.

nausea, sweaty, irritability, nervousness, panic and stomach upset as well as fear of failure were emotional reactions to challenging academic activities. Supporting this finding, Ebrahimi, and Khoshhsima, (2014), found out that emotional issues significantly impacted negatively on students' academic performance. The results of the study also showed that emotional reactions are often correlated with academic performance among students.

Likewise, the findings showed that students depicted study skill deficits such as high expectation and demands from the school and parents, poor organizing and processing information, have little motivation and negative attitude towards hard learning activity. Other study skill deficits students encounter, include inadequate instruction time for most lessons; faulty learning materials; over demanding syllabus and insensible teaching at TUK, were study skill deficits among students. This premise fits well with that of Dalkiran et al, (2014) who found out that students demonstrate studying shortages like time misuse, poor notes making, preparing for tests and active participation in class, did poorly in most subjects. The finding also echoes Brady, Hard and Gross, (2018) which showed that lack of teaching and learning resources affected student academic achievement.

Further, the study established students at the university experienced various task-generated interferences. For instance, students made minimal effort to get things right, gave up quickly on hard-to-get learning tasks and saw no need to participate in difficult academic activities. It was established students prioritized crucial non-academic activities and reported to class late. The findings showed heightened anxiety affects students' behaviour. For instance, students admitted of behaving delinquently and aggressively during learning sessions. This finding is reflected in the work of Arul, (2013) who observed that students whose characteristics of anxiety can affect students behaviourally, cognitively, and physiologically, for example, high stakes testing can be very difficult for students with anxiety and end up missing lessons, develop social challenges, score low grades, defer learning, repeat some course units or worse get discontinued. Further, this finding reinforces the finding of a study by Mohd (2014) who established that students are mostly unable to refocus their attention to the academic task as the ability to

comprehend and critically solve problems is diverted to some interfering activity.

Furthermore, findings imply most students experienced moderately high level of anxiety. This is consistent with observations made by Goff, (2011) who develops this idea further by arguing that high prevalence of mild to severe academic anxiety is present among most post-secondary students, especially the ones pursuing supposedly problematic courses. This finding is also in tandem with Aparnath, (2014) who postulates that mild or controlled anxiety levels enhances better performance while very diminished anxiety levels begets low performance.

Furthermore, the Pearson Product Moment Correlation and regression analysis found a significant correlation between anxiety and performance academically among students at the university. Implicitly, students experiencing heightened anxiety have slim chance of excelling academically. Likewise, students undergoing diminished anxiety have chances of being high academic achievers and that such a relationship cannot be attributed to chance. The results further showed that students who experienced relatively higher anxiety levels performed relatively poorer than those who did not experience high anxiety levels.

This finding is consistent with Chhanasiya and Jogsan's (2015) description of anxiety oneself physiologically, psychologically and behaviourally at a time of challenging

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

In this chapter, a summary, conclusions and recommendations for the implementation of intervention policy direction in similar contexts. The chapter begins with a summary of findings in tandem with the research questions. This is then followed by conclusions discussed thematically. To finish, recommendations are made to relevant stakeholders for possible consideration.

5.2 Summary of the Findings

The focus of the study centred on analysis of the worry reactions to academic activities, emotional responses to difficult learning activities, study deficit skills and task-generated interferences among students and their role on achievement academically. To this end, most students experienced heightened anxiety. Tellingly, research findings confirm a very solid association between anxiety and performance academically among university students in Kenya. Overall, the study established that anxiety has a strong bearing on the academic performance of students particularly university students at The Technical University of Kenya.

To confirm the study's first objective, the study found out that during learning students experience predictions of failure, self-degrading thoughts and are preoccupied with the consequences of doing poorly as a reaction difficult academic activity. Also, students reported of parents and school placing high demand and pressure for excellent results, referred to family related problems as preoccupy their mind while at school and identified school related problems as mentally disturbing them as well as branded thinking of their personal problems while learning as a major response to a challenging academic endeavour.

He further observes that although a certain amount of anxiety is required as an impetus towards positive action, an excess of the same could be detrimental to the student's well-being and may greatly contribute to low academic results. This contradicts the baseline survey report by Brady, Hard and Gross, (2018) that found the level of anxiety does not significantly one's performance in the absence of other outside factors. To them, lack of teaching and learning resources hindered good academic performance more than anxiety generated issues.

activity such as assessment moment in this case. Equally, they agreed with various studies discussed here heightened anxiety lowers academic achievement of students. Further, the findings are in tandem with view of Saket, (2014) who postulates that when anxiety increases, academic achievement decreases among both genders. Consequently, this study concludes that a significant association exists between heightened anxiety and diminished academic achievement among students.

To determine the second objective which sought to explore the level of emotionality tendencies among students, findings indicate that the feeling of fast heartbeat was an emotional reaction to demanding learning activities. Besides, nausea was identified as a reaction to a tough learning activity. Additionally, sweaty palms during challenging learning events, feeling irritable when handling severe class activity and nervousness was also an emotional experience they underwent when handling hard learning activity. As well, panic, stomach upset and fear of failure were emotional responses to challenging academic activities.

Concerning the third objective, it was established that the high expectation and demands from the school and parents, put a lot of pressure on them. Secondly, procrastination, organizing and processing information where identified as other study skill deficits. Equally, having little motivation and negative attitude towards hard learning activity, instruction time for most lessons as not being adequate and faulty learning materials, were other pronounced study skill deficits. Similarly, over demanding syllabus and insensible teaching at TUK, emerged as more study skill deficits.

Concerning the final objective, respondents admitted of making minimal effort to get things right, give up quickly on hard-to-get learning tasks and saw no need to participate in difficult academic activities. Also revealed was that sometimes students prioritize crucial non-academic activities, sometimes they reported to class late and that they missed lessons sometimes. Further, students acknowledged behaving delinquently and exhibiting aggressive behaviour due to learning pressure.

Finally, on correlating the level of anxiety on the academic achievement, the study confirmed increased levels of learning anxiety reduce chances of student excelling academically. Hence, the present study confirms a robust connotation between anxiety and student achievement academically. It is against this background that the conclusions below are made. Despite its limitations, this study should be considered to add to the existing knowledge in this area.

5.3 Conclusions

Based on the results of the research, one can safely conclude the following according to the objectives of the study. It can be concluded that students experience predictions of failure, self-degrading thoughts and are preoccupied with the consequences of doing poorly as reactions to difficult academic activity. Also, students demand and pressure for excellent results, family and as well as personal problems, negatively affect students. This proves that worry related reactions adversely affect academic performance of university students.

Likewise, the study concludes that fast heartbeat, nausea, sweaty, irritability, nervousness, panic and stomach upset as well as fear of failure were emotional reactions to challenging academic activities. Further, it was concluded that high expectation and demands from the school and parents; organizing and processing information; having little motivation and negative attitude towards hard learning activity; inadequate instruction time for most lessons; faulty learning materials; over demanding syllabus and insensible teaching at TUK, were study skill deficits among students.

Further, it was concluded that students made minimal effort to get things right, gave up quickly on hard-to-get learning tasks and saw no need to participate in difficult academic activities. Also concluded, students prioritized crucial non-academic activities, reported to class late, and behaved delinquently and aggressively during learning sessions.

Overall, anxiety affect majority of students in higher institutions especially among those pursuing demanding and difficult courses. Finally, the study concludes that high anxiety levels are a cursor to dismal academic achievement.

5.4 Recommendations

This section contains the researcher's recommendations about the key findings and how best they can be addressed by the relevant authorities through policies and further research.

5.4.1 Policy Recommendations

Undeniably, the findings of this study reveal worrying trend of significant anxiety levels among undergraduate students as well as the adverse effects on academic performance. From this study, the personality anxiety level frequencies have shown that students often suffer high anxieties and as a result, their academic performance is adversely affected. Accordingly, preventive and intervention measures need to be designed to address the nerve-wracking phenomenon.

In the first place, students should get equipped with knowledge on anxiety and effective anxiety management skills for their own benefit while in school and elsewhere. By having knowledge and understanding on this research study, it

could help many, such as educators, counsellors, and psychologist to design and develop proper intervention program to reduce psychological problems among students. The students themselves could benefit from the study. Information and ideas gained from this research could help them to face, manage, and handle the psychological problems. Therefore, enhancing knowledge and strategies in controlling psychological problems among students may help to increase their academic achievement.

In addition, students should take responsibility to seek for anxiety management help from teacher counsellors, other teachers or from the peer counselling clubs within their schools in order to ensure that their anxiety levels do not escalate to levels that impact negatively on their academic results. Besides, students should realize that individuals have the capacity to decide on how they process the problems that they encounter, and that problems that are left unprocessed unconsciously become major sources of high anxiety.

Likewise, it is imperative that the students should desist from apportioning blame, and instead proactively seek to find positive solutions to their problems for better adjustment. Specifically, students should be encouraged to use all available opportunities to raise issues that cause them anxiety so that enlightening discussions could be organized either amongst themselves or with the teacher counsellors to facilitate positive resolutions to the problems raised.

The developmental process and especially during college period when students enjoy exclusive decision making, poses many anxiety causing challenges to the students especially in the event of wrong decisions. Teacher counsellors should therefore invest a lot of time in imparting knowledge on development so as to help reduce pressure that might arise from the growth process experience. Teacher counsellors therefore should help students to learn to take positive responsibility to seek counselling help when need be.

Equally, it is vital to implore student embrace tendencies of investing adequate time in preparations for learning engagements to boost self-confidence in warding off anxiety. Additionally, correspondingly, giving financial help, moral backing as well as inspiring partaking in social events, can substantially lift students' self-concept as a remedy to anxiety especially to students taking difficult courses. In the same way, students should be advised to appreciate the fact that controllable anxiety levels are instrumental to enhanced performance.

Teachers also ought to understand the nature of student's anxiety causing factors so that they are able to address the same as part of anxiety management skill acquisition process. Counsellors at the universities should help students in overcoming the anxiety caused by academic activities in variety of ways like educate students about anxiety, provide an open-communication in classroom, teach and discuss positive coping skills with students, allow students opportunities to practice and apply coping strategies etc.

Further, certain academic activities such as testing and other assessment engagement should be properly scheduled to reduce chances of generating unnecessary pressure among students. Moreover, students should be involved in decision making on learning activities to motivate and build self-

efficacy. Indeed, participation in decision making cultivates sense of ownership hence motivates students to carry out academic activities with enthusiasm and zeal.

Furthermore, universities should strengthen the counselling units and establish specific programmes to help pupils to avoid exhibiting anxiety problems when faced with the difficult tasks/moments. Lastly, relevant government ministries and agencies in collaboration with other key stakeholders should strengthen in-service activities and workshops for lecturers to enable them get knowledge and skills on students' emotional reactivity, mental health issues and how they negatively affect pupil's academic performance.

5.4.2 Recommendations for Further Research

Conceptually, this study broadly or generally examined the role of learning-based anxiety on performance of students academically, hence the need for a further study on specific types of anxiety such as test anxiety, personality anxiety, environmental anxiety and academic anxiety other forms of anxiety within and without university environment. Contextually, there is requirement for further study based on bigger sample size as well as using more research methods.

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Influences of Scope and Coverage of the Syllabus On Implementation of the Curriculum for Physics for Secondary Schools in Kenya

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Abstract- Kenya in the vision 2030 endeavor to expand her development in infrastructure and industry; leading to urbanization and middle level economy (Republic of Kenya, 2010). If the Kenyan government is to meet her goal by the year 2030 then she must expand her Education in science and technology by improving efficacy in curriculum implementation in order to produce the required human resource. In contrast over the years students' performance in Physics at Kenya Certificate of Secondary Education (KCSE) has been low coupled with low students' enrollment. Little was known regarding influence of scope and coverage of the syllabus on the implementation of the curriculum for Physics. The purpose of this study was to determine the influence of scope and coverage of the syllabus on implementation of the curriculum for Physics for secondary schools. This study was guided by cognitive constructivism theory of learning and adopted pragmatism research paradigm, mixed method approach and triangulation design. This study targeted 224 teachers of Physics and 4140 Form three Physics students in 283 public a secondary schools in Bungoma County. Stratified and simple random techniques were used to select 22 schools. The Head of Subject (HOS) were purposively sampled from each selected school. The sample size was 22 teachers and 393 students making a total of 415 respondents. Data was collected between September and October, 2017 using Teacher Questionnaire (TQ), Student Questionnaire (SQ), Lesson Observation Schedule (LOS) and Observation Checklists (OC). Data was presented using frequency tables, figures and photographs and analyzed using both descriptive and inferential statistics. Descriptive statistics used to analyze quantitative data include; percentages and means while the inferential statistics used include; Chi-square and Pearson Product-Moment correlation. Qualitative data was analyzed thematically. Statistical Package for Social Sciences (SPSS) version 20 was used to compute the analysis at $\alpha = 0.05$ level of significance. Both quantitative and qualitative results showed that a wide scope of the syllabus leads to failure to cover the syllabus in time hence influenced the implementation of the curriculum for Physics. The study concluded that the scope of the syllabus be covered in-depth and timely. The study recommended that the syllabus for Physics should be revised. The study findings provide an opportunity for teachers to improve on their classroom practices.

Index Terms- Influence, implementation of curriculum, scope, coverage, Kenya

I. INTRODUCTION

The 8-4-4 education system in the Kenyan curriculum has Physics as one of the three science subjects offered at the secondary school level. The physics syllabus is divided into four years of study; Form One, Two, Three, and Four (KICD, 2002). It can be noted that the Physics Syllabus at secondary school level in Kenya has a total of forty one (41) topics to be covered by the learner in a period of four years (KICD, 2002).

An evaluation of the Kenyan education system by UNESCO (2010) found out that the secondary school curriculum objectives have not been fully achieved as envisaged in 2002 syllabus. The evaluation revealed that some subjects have difficult and broad content; some schools have inadequate instructional materials; and inadequate number of teachers. The scope of the Physics syllabus is said to be overloaded given the time allocated in the syllabus for each topic (UNESCO, 2010).

Studies like; Mkandawire (2010) and World Bank (2008), showed that an overloaded curriculum influence implementation of the curriculum in science subjects. The scope of the syllabus should be proportional to the allocated time for effective implementation (World Bank, 2008). The matter of instructional time in Sub-Saharan Africa (SSA) deserves high attention. The length of instruction time is a matter of considerable significance and a strong indicator of students' access to learning opportunities. The World Bank (2008) showed a positive correlation between instructional time and students' achievements and appears to be even stronger in developing countries. Intended instructional time is not the same as the actual learning time. Time allocated for some of the topics like; Waves II, circular motion, cathode rays and electronics is less than the expected (SMASSE, 2005)

Shikuku (2012) in the study on "Effect of syllabus coverage on secondary school students' performance in Mathematics in Kenya" established that this factor does not directly contribute to poor performance in mathematics. Instead, late or non-coverage of the mathematics syllabus contribute to poor performance. In the study Shikuku (2012), suggested that:

"In an attempt to improve performance, some parents arrange and pay for extra tuition for their children, so that they cover all topics within the syllabus (P.31)."

The study by Shikuku indicated a positive relationship between syllabus coverage and students' performance. In addition, it was also observed that; students' who cover the syllabus early in the year and spend more time on revision, have an even better mean score than those who cover the syllabus just before KCSE examinations.

To cover the syllabus early in the year, both students and teachers have to put in extra time for which the parents pay handsomely (Shikuku, 2012). Some schools use team teaching to ensure all topics in the syllabus are understood by all students. They also ensure both teachers and students are present in school and actually attend lessons. Other schools expel slow learners, and have a minimum mark that a pupil must obtain at Kenya Certificate of Primary Education (KCPE) for admission in Form One class (Ibid).

While the intended annual instructional time for Sub-Saharan Africa (SSA) at junior secondary level seem to be the highest in the world, the time-on task seem to be significantly reduced for a number of different reasons (World Bank, 2008). Such reasons like; low allocation of teachers' working-time, late coming of students or teachers, teacher and learner absenteeism for a variety of reasons; classroom shortages, lack of learning materials and extra-curricular activities (ibid). According to the World Bank (2008) most of the time is spent on administrative and non-administrative tasks by teachers. Teachers' workloads are also perceived to increase significantly due to the extra tasks outside classroom.

Poor time management by school administrators and teachers is another factor posing a challenge to the implementation of curriculum (Sadie, 2011). Curriculum implementation is also hindered by what goes on in schools. Students' learning time is mismanaged by administrators and the class teachers for instance in most schools, a lot of time is taken up by activities such as assemblies, games activities, meetings held by visiting government officials, health talks, variety shows held during lesson time, teacher in-service programs such as; Head of Department (HOD) workshops, subject workshops organized by Sub-County, and County Education offices.

The poor working conditions for the teacher poses another challenge (Mkandawire, 2010) to curriculum implementation. In the same vein, poor salaries, housing and general poor service also demoralize the teacher who may resort to go into private commercial enterprises to supplement meager salaries.

The Kenyan education sector has had regular teachers' strikes due to poor remuneration (Ayiro, 2015). These strikes indicate that the level of motivation of Kenyan teachers is low. The teachers' strikes also reduce learning time hence hinder effective curriculum implementation in schools. If various educational policies and programs are to be effectively implemented, teachers ought to be adequately trained and motivated. After pre-service training which provides foundation for professional service, teachers need to keep a breast with new development in the system through in-service training (SMASSE, 1998). Other professional support staffs such as laboratory technicians and librarians also need to be in-serviced in order to

give sound support to the teaching staff in the implementation of the curriculum.

The government of Kenya has invested a lot of resources in the curriculum implementation process through free secondary Education and Strengthening Mathematics and Sciences in Secondary Education (SMASSE) project. Yet students' performance and enrolment in Physics KCSE remains alarmingly low at 39.0 and 26.6 percent respectively over the years 2011 to 2015. Enrollment in Physics declined from 39.15% to 24.83% within the same period (KCSE, 2014).

This study therefore endeavored to investigate the influence of scope of syllabus on implementation of Physics curriculum for secondary schools with a view of making implementation of the curriculum for Physics in secondary schools effective.



II. OBJECTIVES OF THE STUDY

The objective of this study was to:

1. Find out the influence of scope and coverage of the syllabus on the implementation of the curriculum for Physics for secondary schools in Kenya.

III. RESEARCH HYPOTHESIS

The following was the research hypothesis:

HO1: Scope and coverage of the syllabus does not influence implementation of the curriculum for Physics for secondary schools in Kenya

IV. THEORETICAL FRAMEWORK

This study was guided by the cognitive constructivism theory of learning developed by Jean piaget (1967). Constructivism theory emerged in the late 1980s, although its roots are much older. The basic belief of constructivism is that knowledge is actively constructed by learners rather than transmitted by the teacher (Hirumi, 2002; Liaw, 2004). Therefore, learning is considered as an internal cognitive activity. Although varying constructivist theories exist, there is agreement between the theories "that learning is a process of constructing meaning, it is how people make sense of their experience" (Jonessen, 1991). Cognitive constructivists think that learners build knowledge actively through the interactions in the teaching-learning activities within the learning environmental. The constructivist learning methods involves educators implementing curriculum using experiences of their learners who are active in the learning process. Cognitive and social learning constructivist theories give strong support to the design of pedagogical and social activities, respectively. The activities cause stimuli for learning. In addition, teachers are facilitators in a constructivist learning environment; the pedagogical design must enable teachers to provide various learning resources and learning activities to be employed within the available time (Qiyun, 2008).

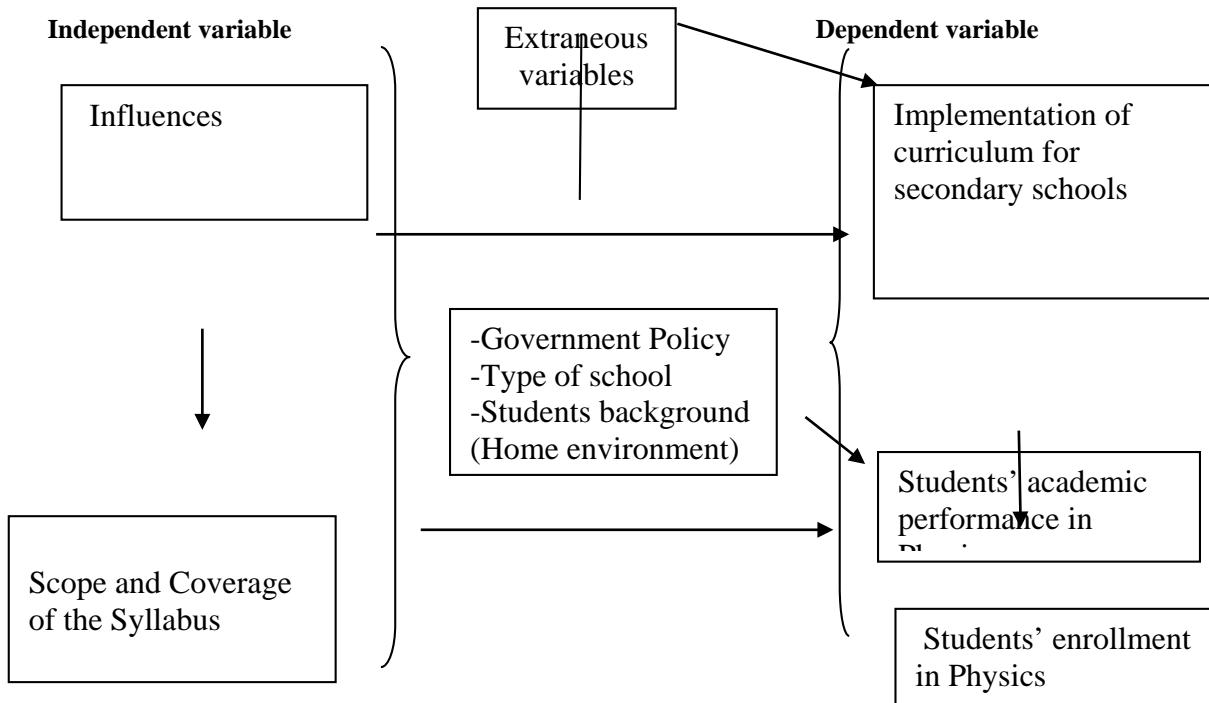
The instructor is responsible for making sure the information is in a format the students can comprehend. In agreement with constructivist theory this study sought to determine the influence

of scope of the syllabus on the implementation of the curriculum for Physics.

Based on cognitive constructivism, pedagogical design must support and satisfy the needs and learning intentions of individual learners. Therefore, the scope of the syllabus should not be a rigid frame to be covered in a specific period of time because unplanned knowledge can be acquired in the process. When applying this theory to independent learning, it was essential to understand that individual learners can construct different knowledge even given the same condition Jonessen (1991). In relation to constructionist theory, this study sought to find out the influence of scope of syllabus on the implementation of the curriculum for Physics for secondary schools in Kenya.

Therefore, cognitive constructivist theory was relevant to guide this study. It emphasize on a flexible scope of the syllabus.

Figure 1. A Conceptual Framework for the Relationship between Scope and coverage of syllabus and Implementation of the curriculum for Physics.



Source: Researcher (2015)

The conceptual framework in Figure 1, scope and coverage of the syllabus are hypothesized to influence implementation of the curriculum for Physics. The framework postulates that scope and coverage of the syllabus directly influenced students' academic performance and students' enrollment in Physics. However, this relationship may be modified by government policy, type of school and family background from which the student comes.

VI. RESEARCH METHODOLOGY

Research design

This study adopted a descriptive survey design, which involved the use of questionnaire and observation methods of data collection. Descriptive survey design provides numeric

In relation to constructivist theory, this study sought to find out the influence of scope and coverage of the syllabus on implementation of the curriculum for Physics for secondary schools in Kenya.

CONCEPTUAL FRAMEWORK

This study was guided by a schematic model. In this model research variables and the relationship between them is shown diagrammatically. Independent variables (IVs) are placed on the left and dependent variables (DVs) on the right separated by the intervening variables at the middle. The conceptual framework is shown in figure 1.

descriptions of some part of the population (Miles & Huberman, 1994). In this design the researcher describes and explains events as they are, as they were or as they will be. Descriptive survey design enabled the researcher to have a rapid data collection and ability to understand a population from a part of it (Creswell, 2009). Descriptive survey design was deemed appropriate for this study since research seeks to develop relevant true statements, ones that can serve to explain the situation that is of concern or that describe the causal relationship of interest (Neuendorf, 2002).

Population and Sample

The study population comprised all students and teachers in 283 public secondary schools secondary schools in Bungoma County. The sample consisted of Form 3 students of Physics in the sampled schools, assumed to represent the student population

because they had selected the subject, as well as accurately report on the matter under study. The schools were stratified as mixed and single gender schools. A stratified random sample of 22(10%) schools participated out of 283 public secondary schools in the County. Stratified sampling technique was used to ensure that the three categories of the schools (boys, girls and mixed) were represented in the sample in the proportion in which they appear in the population (Silverman, 2003). The use of this technique helped to improve representativeness and also to bring on board any differences that may exist between the school categories (Tuckman, 1978). Thus, the sample comprised seven boys' schools, seven girls' schools and eight mixed schools. One teacher for Physics was selected from each sampled school. A simple random of 10, 15 or 20 respondent from each single streamed, double streamed or a three and more streamed schools respectively participated in the study. In total, the study involved 415 respondents, 22 teachers (16 male and 6 female) and 393 students (236 boys and 157 girls).

Research instruments

This study employed questionnaires, lesson observation guide and observation checklist as instruments to collect data. The selection of these tools was guided by the nature of data to be collected, the time available as well as the objectives of the study (Bergman, 2008). This study was mainly concerned with teachers' and students' views, opinions, and attitudes about implementation of the curriculum for Physics for secondary schools in Kenya. Such data could best be collected through the use of questionnaire, lesson observation and observation checklist (Kothari, 2009).

Questionnaires

This study employed two sets of questionnaires: Teachers' Questionnaire (TQ) and Students' Questionnaire (SQ). Both questionnaires were structured to incorporate closed-ended and open-ended questions. This was to bring balance between the quality and quantity of data collected (Bergman, 2008). But on the other hand, provide more information. This study adapted some items from standardized and validated item from Fiske and Taylor (2008). Some of the items were modified to fit the present study. There were five questions on scope and coverage of the syllabus. The respondents were asked "Rate the following statements on scope and coverage of the syllabus in your school" The response was on likert scale having five degree of agreement such as; Strongly agree = 5; Agree = 4; Undecided = 3; Disagree = 2; Strongly disagree = 1.

Finally, there were two open-end questions. The first asked respondents "What do you think are the major influences on the implementation of the curriculum for Physics in your school?" and the second question was "What do you think should be done in order to manage these influences in your school?" Open-ended questions gave respondents complete freedom of response in their own words but the amount of space provided desired a brief answer.

Lesson Observation Schedule (LOS)

This study used Lesson Observation Schedule (LOS) meant to assess the extent to which the syllabus was covered at that time of the year as well as find out the efficacy of coverage.

LOS was used to obtain primary data during classroom lessons or laboratory lessons. In the first part of the schedule the observer filled in data on: name of the school, class, time, subject and roll or number of boys and girls in the class. The Second section of the schedule was the introduction of the lesson where the observer filled in data on topic being covered and effectiveness in syllabus coverage in terms of teaching methods, learners' motivation, teaching- materials and teaching-learning activities used.

Data analysis

Data collected from the field was compiled, sorted, edited, to ensure accuracy and consistence to facilitate coding. Quantitative data collected using closed-ended questions and observation checklist was coded using numbers while qualitative data from open-ended questions and lesson observation was organized in narrative form into themes. Data was then analyzed using both descriptive and inferential analysis techniques (Creswell & Plano, 2007). The descriptive statistics used for analysis of quantitative data were percentages and means while the inferential statistics used were chi-square and Pearson Product-Moment correlation. Data was analyzed using the Statistical Package for Social Science (SPSS) version 20 at $\alpha = 0.05$ level of significance. Qualitative data was organized in narrative format and analyzed thematically. Chi-square was used to establish the relationship between scope and coverage and implementation of the curriculum for Physics for secondary schools (Morgan, 2007). If the probability of the computed Chi-square value was less than the level of significance set, the null hypothesis was rejected and concluded that the two variables were not independent of each other and vice versa (Kothari, 2009). Pearson Product-Moment correlation coefficient was used to measure the relationship between scope and coverage of the syllabus and implementation of the curriculum for Physics for secondary schools.

V. RESULTS

Influence of scope and coverage of the syllabus on the implementation of the curriculum for Physics for secondary schools

The objective of this study was to investigate the influence of scope and coverage of the syllabus on the implementation of the curriculum for Physics for secondary schools in Kenya. To achieve this objective, the respondents were asked to rate statement on scope and coverage of the Physics curriculum. Scope and coverage of the syllabus were defined in terms of too wide, adequate time allocated, work load, teaching pace and completion of form One and Two topics at the end of each year respectively. The responses were recorded on a five-point likert scale ranging from: Strongly Agree = 5 to Strongly disagree = 1. Data on this objective was analyzed under the hypothesis "Scope and coverage of the syllabus does not influence the implementation of the curriculum for Physics for secondary schools."

4.6.1. Data from Teachers' and Students' closed-ended Questions

Data from teachers' and Students' Questionnaires are presented in Table 1.

Table 1. Influence of scope and coverage of the syllabus on the implementation of the curriculum for Physics for secondary schools

Scope and coverage Of the syllabus	Response		SA		A		U		D		SD	
	N	%	N	%	N	%	N	%	N	%	N	%
F1. The syllabus is too wide to be covered within the available time	149	35.9	75	18.1	30	7.2	53	12.8	108	6.0		
F2. The time allocated for physics is inadequate to cover all topics	56	13.5	170	41.0	17	4.1	130	31.3	41	10.1		
F3. The work load affects the coverage of the Physics syllabus	134	32.3	107	25.8	39	9.4	59	14.2	76	8.3		
F4. The syllabus is too wide that teachers teach at a fast pace	113	27.2	94	22.7	28	6.7	97	23.4	83	0.0		
F5. I never completed form One and Two topics in the year respectively	93	22.4	60	14.5	5	1.2	61	14.7	195	7.0		
Mean	109	26.2	101	24.3	24	5.7	80	19.3	101	24.3		

Key: SA= Stronglyagree; A= Agree; U= Undecided; D= Disagree; SD= Stronglydisagree

As shown in Table 1, 109 (26.2%) and 101(24.3%) respondents, stronglyagreed and Agreed respectively. In total, a majority 210(50.5%) of the respondents agreed that the scope and coverage of the syllabus influenced the implementation of the curriculum for Physics for secondary schools. In contrast, a minority 181(43.6%) disagreed that scope and coverage of the syllabus influenced implementation of the curriculum for Physics. Notably, 24(5.7%) respondents were undecided. Overall, the findings indicated that a significantly higher percentage of the respondents 50.5% held that the scope and coverage of the syllabus had an influence on the implementation of the curriculum for Physics for secondary schools.

4.6.2. Data from Teaches' and Students' open-ended Questions

The reports given by teachers and students in the open-ended questionnaires were consistent with data from close-ended questionnaires. One teacher in identifying major influences on implementation of the Physics curriculum wrote:

The scope of the syllabus for Physics is not in par with the allocated time for the subject in the school timetable. The time allocated is not enough to allow adequate coverage of all planned topics and objective in the curriculum.

Majority of the teachers also identified workload as a key influence on implementation of the curriculum for Physics.

Students seemed to agree with teachers that scope and coverage influenced implementation of the curriculum. Accordingly, one student had reported in an open-ended questionnaire that:

Our teacher of Physics did not cover all form One and form Two topics. The teacher had a tendency of skipping one or two topics to be able to complete the syllabus for the sake of the fourth coming examinations.

4.6.3. Data from lesson observation

It was observed that only six (42.8%) schools could be able to completed form Three syllabus by the end of the year out of 14 schools in which lesson observations were made. Majority, eight (57.2%) of the schools were still lacking behind in the syllabus coverage.

Hence, it is not surprising if students fail in KCSE examinations if the syllabus is not effectively covered.

Based on the findings from questionnaires and lesson observations, the researcher carried out data analyzed using chi-square to test the null hypothesis that, “*Scope and coverage of the syllabus does not influence implementation of the curriculum for Physics for secondary schools*. The results of chi-square are summarized in Table 2.

Table 2. Chi-square results on influence of scope of the syllabus on the implementation of the curriculum for Physics

Chi-square	observed frequency (O)	Expected frequency (E)	sig.
321.720	5	19.8	0.001
df	20		

0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 19.8.

The results on Table 2, shows computed Chi-square values; $F(5,321) = 19.8$; $df = 20$; $p < .05$). This gave a significant value of 0.001 which is below the P value = 0.05, hence the researcher rejected the null hypothesis that stated that “*There is no significant influence of scope and coverage of the syllabus on the implementation of the curriculum for Physics for secondary schools.*” Therefore the alternative hypothesis which states that

there is significant influence of scope and coverage of the syllabus on the implementation of the curriculum for Physics for secondary schools was accepted. It was concluded that there is significant influence of scope and coverage of the syllabus on implementation of the curriculum for Physics for secondary schools.

Further, Pearson Product Moment correlation coefficient was used to establish the degree of relationship between scope and coverage of the syllabus and implementation of the curriculum for Physics for secondary schools. The findings are shown in Table 3.

Table 3. Pearson Product Moment correlations on scope and coverage on the implementation of the curriculum for Physics for secondary schools

Variable	r	r ²
Scope and coverage of syllabus	0.121**	0.014

Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Results presented in Table 3, shows that there was a significant positive correlation between scope and coverage of the syllabus on the implementation of the curriculum for Physics.

Scope and coverage was found to have a small but significant influence on the implementation of the curriculum for Physics ($r = 0.014$, $p < 0.01$). The results shows r^2 to be 0.014 which imply that 1.4 percent implementation of the curriculum for Physics is predicted by the scope and coverage of the syllabus.

VI. DISCUSSION OF THE STUDY FINDINGS

The objective for this study was to find out the influence of scope and coverage of the syllabus on the implementation of the curriculum for Physics for secondary schools in Kenya. As shown on Table 1, 50.5% of the respondents indicated that Scope and coverage of the syllabus had influence on the implementation of the curriculum for Physics. The results on Table 2, showed the computed Chi-square values; $F(5,321) = 19.8$; $df = 20$; $p < .05$). It was established that there is significant influence of scope and coverage of the syllabus on implementation of the curriculum for Physics for secondary schools. Findings on Table 3, indicated that scope and coverage of the syllabus influenced the implementation of the curriculum for Physics by 1.4 percent.

It was established that the syllabus for Physics was too wide. Most teachers did not cover all topics in form One and Two but skipped some topics due to the inadequate time allocated for Physics. The syllabus coverage in most schools was not in-depth and timely. These influenced the implementation of the curriculum for Physics for secondary schools in Kenya.

This finding is in line with the findings by Mkandawire (2010). Mkandawire (2010) asserted that scope and coverage of the syllabus depended on the available time. Mkandawire further argued that allocated time does not necessarily translate into actual learning if teachers spend some of the allocate time on other activities. A teacher who is not conscious is not disciplined and a drawback in as far as curriculum implementation is concerned.

For instance, a teacher of Physics who goes to class five (5) minutes late for each lesson in a particular class every day, will have lost 25 minutes at the end of the week. This is a lot of learning time wasted and will derail syllabus coverage and implementation of the curriculum since curriculum developers do not take this time into consideration when developing the curriculum.

Kyule et al., (2016) noted that “curriculum implementation is a composite of the learner, teacher, teaching resources, teaching methodologies, anticipated experiences and outcomes (P.76).”

In the same line, the study by Shikuku (2012) offered an empirical support indicating that late or non-coverage of the syllabus contributed to the poor performance. The study further suggested that students who had in-depth and timely syllabus coverage were likely to be more successful in examinations compared to those who had a shallow and late coverage.

Provision of adequately trained teachers is too often an impediment to providing quality Education in Kenya. According to Ayiro (2015) the Education sector in Kenya is still grappling with a shortage of teachers estimated at 80,000 tutors. Glaring inconsistencies on the side of the government has been observed every time critical areas including: quality of Education, relevance of Education offered, provision of computers and other resources

for teaching and learning process. Shortage of teachers in schools results to the overloading of the few who are employed by the government. This forces them to have a heavy workload to teach. This reduces effectiveness in implementation of the curriculum in secondary schools.

The curriculum revision of 2002 envisaged that learners would be equipped with competencies to operate effectively in a knowledge based economy (UNESCO, 2010). Many factors play a role in motivating curriculum reforms some of these include: whether the curriculum objectives are clear, pertinent to the needs of society, achievable and realistic; whether the curriculum is overloaded; the scope and depth of the existing curriculum; areas of unnecessary overlap within and across subjects; availability, adequacy and appropriateness of the resources (physical and human) for effective curriculum implementation (UNESCO, 2010).

Furthermore, the evaluation of the Education process by UNESCO (2010) found out that Kenyan schools burden learners with frequent Continuous Assessment Tests (CATs) at the expense of learning due to the high stakes placed on summative examinations. Internal examinations, Mocks and final examinations also take up learning time for non examination classes. Other consequences of this situation include private tutoring, extra-tuition, remedial teaching and use of commercially developed examination papers which at times do not conform to the curriculum or what the teacher has taught.

Teacher absenteeism from schools for various reasons also costs the students by depriving the learner of valuable time. In addition, the need to devote inordinate amount of time to the management of problems of large classes effectively reduce students' time on the learning task which results in the failure to complete the intended content for the lesson and will necessitate the allocation of more time to the same task (Mkandawire, 2010).

Studies in developing countries like; Mkandawire (2010), UNESCO (2010), Shikuku (2012), Ayiro (2015) and Kyule (2016) revealed disparities between intended instructional time in the curriculum implementation, actual time allocated in schools and the time learners spend actually learning (time on task). The time spent in situations where students and learning materials are well matched; learning occurs in a fairly ideal fashion (academic learning time). This study has also confirmed that scope and coverage of the syllabus in Kenya one of the developing countries influence implementation of the curriculum for Physics hence need for curriculum revision.

VII. CONCLUSION

The following conclusion was made on the basis of the research findings:

The scope and coverage of the syllabus influenced the implementation of the curriculum for Physics for secondary schools. A wide scope of the syllabus forced teachers to teach at a fast pace to cover it within the allocated time on the school timetable. This made an average and slow learners lack behind. As a result of the wide syllabus, most schools never covered the form One and two topics. A wide scope of the syllabus therefore hindered an in-depth and effective coverage of the curriculum. It is therefore crucial that the scope of the syllabus for Physics is reviewed to fit into the allocated or available time.

VIII. RECOMMENDATION

Curriculum developers should systematically consult with the teachers so as to holistically revise the overloaded curriculum for Physics in order to improve curriculum implementation.

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Design And Construction Of A micro-Controller Based power Conservation Device For Hall

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ABSTRACT:

This paper presents the implementation of PIC microcontroller based Powerconservation device for large hall using thermal, temperature and illumination sensors with in/out counter at the entrance. The thermal sensor used for detecting human presence through infrared radiation of heat by human body, temperature sensor is used to continuously monitor the hall temperature in sub areas. The illumination sensors are used to measure the lux level. The multiple sensors outputs multiplexed on I2C communication protocol and extended with P82B715D to connect all the sensors in sub areas. The sensors output are in digital format which required no conditioning interface to PIC18F4550. The fans and lights control signals are multiplexed and isolated from AC high voltage. The Microcontroller preset values are compared with sensors readings to turn ON/OFF fans/lights. Light are turned off when lux is below 300lux and fans are turned on when temperature is above 20°C when there is presence of human with that sub areas. The numbers of persons are counted at the entrance and the system switches every appliance off with no person counted.

KEYWORDS: Thermal Sensor, Temperature Sensor, Link Extender, Ethernet CAT 5 cable, Multiplexer.

1.0 INTRODUCTION

Electricity is one of the most important resources in this century, we should conserve electricity proactively by way of automation. Many times we come outside the room/hall and forget to turn off the light/fan, thus the electricity is wasted (1). Home automation is a widely used and accepted automation system. There are many approaches to control the electrical and electronic home appliances according to the attendance of persons [2], [3].

These project, “Microcontroller Based Power conservation device for hall” will address the challenge of energy wastage by controlling lights and fans in entire or sub areaswithin the seminar hall or conference center where persons are not occupying. And when number of persons inside the room is zero, power supply inside the hall can be cut using a relay interface.

This paper is aimed at creating a system that can control multiple appliances according to their locations’ variables of light intensity, temperature and human presence in sub areas of the hall. We have proposed a large hall of (12m X 9m), partitioned into four zones of (6m X 4.5m). Utilizing natural ventilation and sunlight, each zone requirement of light intensity and cooling varies with building

location and geographical orientation, as the level of electric light and fan cooling varies even in sub areas within a zone [4]. Another crucial challenge is choice of sensors, the parameters like distance, angle and coordinates are calculated using the position of the sensing device for accurate human location in the field of view (FOV) or targeted location. IR sensors for concerning range, accuracy, and FOV. This research work has proposed Omron D6T-44L-06 MEMS IR sensor which results 4x4 array pixel low-resolution thermal image as graphical output. The number of required sensors is based on size of FOV and human count by avoid the interference range between multiple sensors [5].

The number of ports required and the distances from MCU necessitate expanding the port and extending through Ethernet cable, and output multiplexed such that the device can be scaled to handle large number of actuators. A prototype system was developed that efficient, reliable and scalable in energy saving in hall

RELATED WORKS

Microcontroller based power conservation have been widely used in the past for home monitoring of electricity consumption and conservation. In [6] the system counts both the entering and exiting visitor of the auditorium or hall or other place, where it is placed. Depending upon the sensors interruption, the system identifies the entry and exit of the visitor. The hardware part mainly consists of a digital computer, an Arduino Uno board, Infrared Sensor module, LM358, 16x2 LCD. The same objective is also targeted in [7] and [8]. Specifically

[7] Using Microcontroller AT89C51" is a reliable circuit that takes over the task of controlling the room fan and room lights as well as counting number of persons / visitors in the room very accurately, while [8] an efficient automatic Fan speed control system that automatically changes the speed level according to the change in environment / room temperature was implemented to solve the problems associated in Fan speed manual control system as metabolic rate of one's body decreases with falling asleep. To solve these problems the system made use of; AT89C51 Microcontroller, temperature sensor (LM 35), Analog to Digital Converter (ADC) and the Liquid Crystal Display (LCD). With the temperature sensor directly connected to the Analog to Digital Converter (ADC). The goal of home Automation are power saving as well as reduces the complicity of human work which is targeted in [9], where the authors uses more effective and versatile components to proactively monitor and control home appliances including light, fan, (HVAC) heating Ventilation and conditioning. Scaled to cover large room and appliances.

All the previous papers mainly focus on energy monitoring at small scale, while our work also addresses the problem of energy conservation through multiplexing and addressing of large number of input / outputs components using serial and parallel data

communication technologies, also integrating more variable of human presence sensing and human temperature sensing, location differential, in terms illumination and temperature variation within a hall. [10], [11]

System Overview

In this paper is a device for turning ON/OFF of multiple Ceiling Fans and Lights according to the zones temperatures and illuminationswithin a hall. It senses the room temperature in sub areas, count the number of persons and displays it on the Liquid Crystal Display (LCD) which serves as the output of the system. It requires the presence of person in the hall before these appliances can be turn on. It reads the room temperature and visitor's body thermal radiation through Omron D6T thermal sensor to control fans, while the particular zone illumination are read from LDR to switch light ON/OFF, depending on the values set in the PIC 18F2550 microcontrollerwhich is the brain of this device. The visitors counter is placed at the entrance.

The hardware components employed in designing this device includes :- PIC18F4550 microcontroller, OMRON D6T Thermal Sensor,TMP100 Temperature sensor, Light Dependent Resistor(LDR),Liquid Crystal Display (LCD), Relays Driver (ULN2803), Thermal Sensor Switch (PCA9548AWD),Link Extender (P82B715D), Ethernet cat5 cable, Multiplexer (74HC595), resistors, capacitors, , Ceiling Fan, light bulb and power supply. This is a wonderful breakthrough in digital control system and technological advancement in general.

System Architecture

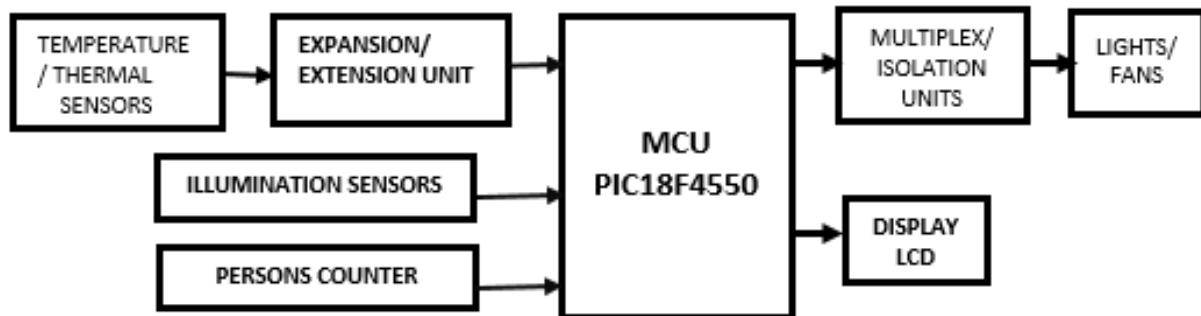


Figure 1 Block Diagram

The overall system architecture as shown in figure 1 is composed of three subsystems, namely the monitoring, the processing, and the control subsystems. The monitoring reads; temperature, light intensity, presence of persons, and count persons. The processing units exploit the data collected by the monitoring system and compare with the preset values to control the behavior of each single appliance.

Principle of operation

The System is based on the interruption of IR beam. An IR beam is used as the source of light beam. when people enters the hall the counter will automatically get incremented by itself and on leaving the hall the counter will get decremented. Once the counter is zero in other words once everyone leaves the hall the system will automatically turns off every appliances.

Flow Chart

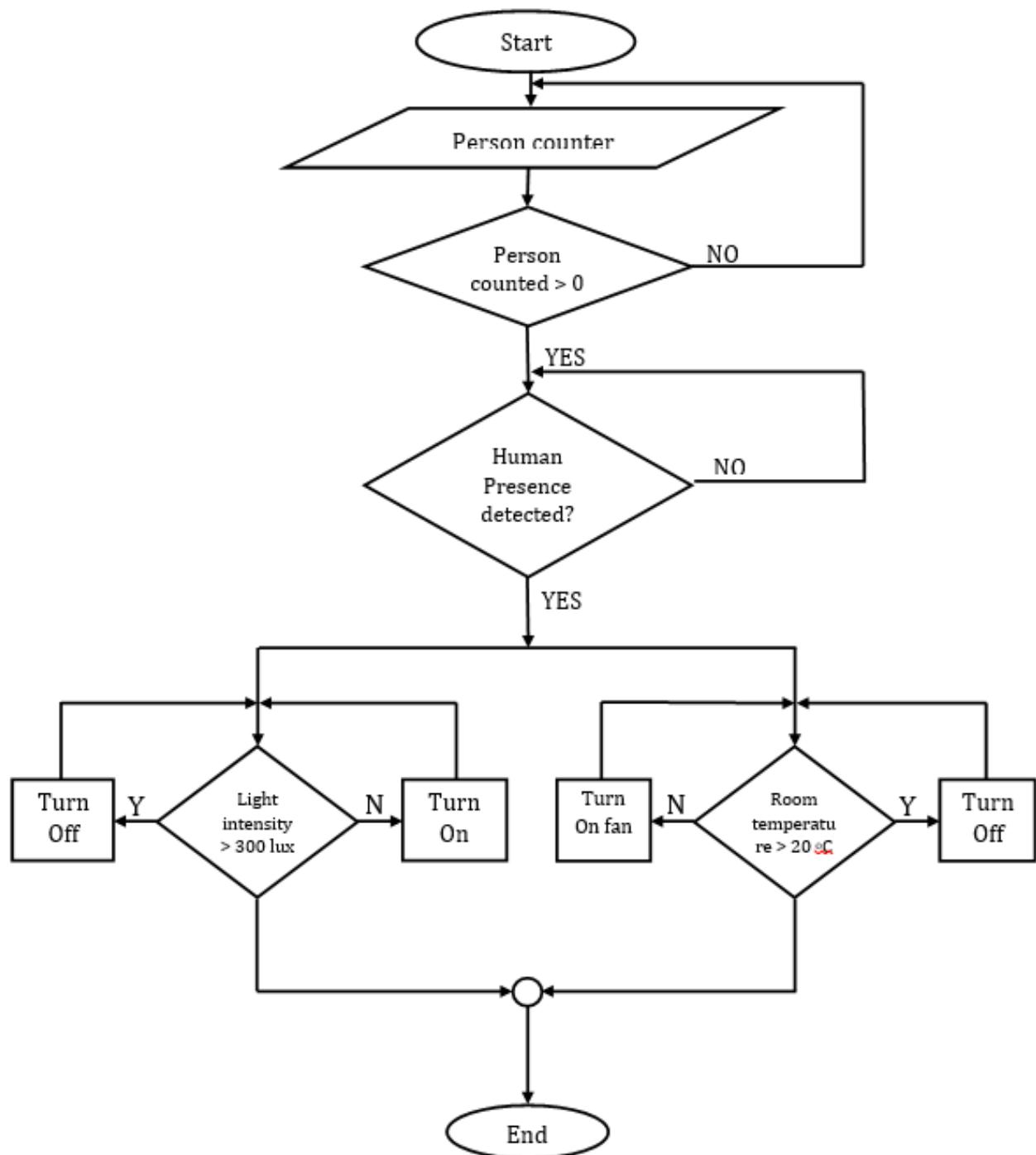


Figure2. Flow chart for the complete system

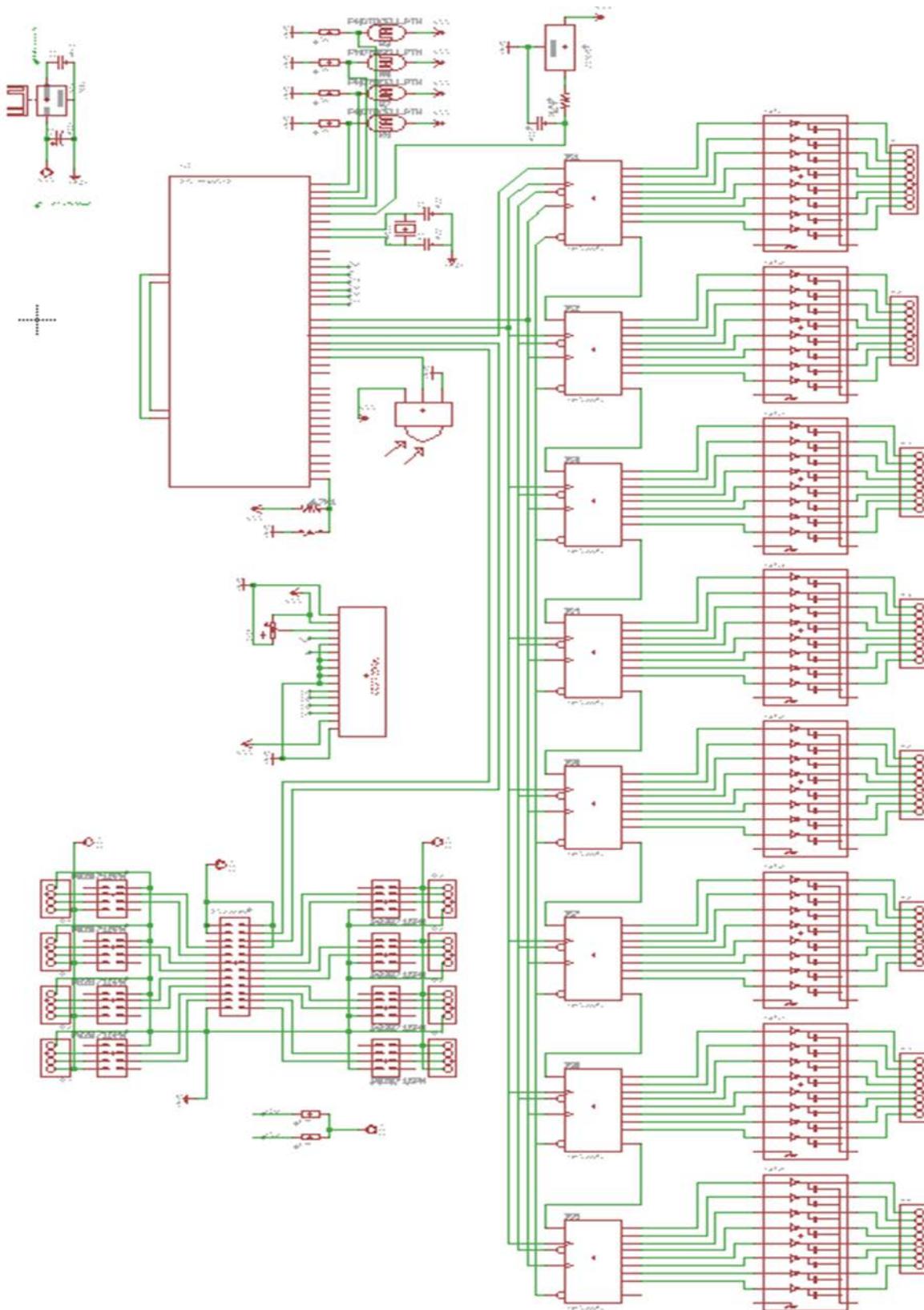


Figure 3. Complete circuit diagram.

Conclusion and Future Work

The result indicates this control method can be scaled to cover large building from single location, provide energy conservation for home appliances in the smart home environment. It approach home automation with digital output and I2C interface that simplifies interfacing and data communication. It works effectively in term of energy saving compared to the existing limited input variablescontrolling method. However, it has room for improvement in this project. In the future, the system will be integrated with wireless interfacing of sensors and other functionality incorporated.

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Design And Implementation Of Class Attendance Management System Using Fingerprint Recognition

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ABSTRACT

Attendance is the action or state of going regularly to or being present at a place or event. Attendance in an organization is important to ensure the continuous operation as it determines the strength of the organization. In most institutions the current attendance monitoring system for students is still being manually done. This method is time consuming, error prone and fosters laziness on the part of students, nonchalance attitude to classroom lectures and activities, student nepotism and deliberate lecture skipping which may prevent students from obtaining good academic performance. One reliable and efficient way to curb and totally do away with the error prone, student nepotism etc. is employing computerized fingerprint recognition attendance monitoring system which will enable management of the department ascertain the academic strength of each student in terms of student punctuality, regularity, commitment to classroom lectures and generate reliable attendance report for each student stored in a secured database. The system will also enable parents/guardian to monitor their wards as attendance report will be sent to them via email anytime the student misses a class. This paper presents an attendance system was designed using Visual Basic.Net which was used to connect the text field to database and MySQL was used for the database solution.

KEYWORD: DATABASE, ATTENDANCE SYSTEM, FINGERPRINT, FINGERPRINT RCOGNITION,
STUDENT REGISTRATION

INTRODUCTION

Attendance register system is very important in the learning process and one of the main aspects that determine students' performance. Even though there is no causal relationship between students high attendance and good academic performance, but there is a positive link between them. Usually, students with good or excellent academic performance have high attendance rate (kamal 2015). The student's academic information consists of monitoring their performance and progress periodically which seems to be a huge workload on lecturers to handle and update on the progress of subjects for the respective classes (**Somasundaram et.al 2016**). Keeping these issues in mind a system is designed to overcome the problems associated with attendance system. Biometric systems have been widely used for the purpose of recognition (**Tabassam 2009**). These recognition methods refer to automatic recognition of people based on some specific physiological or behavioral features such as facial, iris/ retina, voice, DNA and fingerprint. fingerprint recognition has a very good balance of all the desirable properties. Every human being possesses fingerprints with the exception of any hand related disabilities. Fingerprints are very distinctive fingerprint details are permanent, even if they may temporarily change slightly due to cuts and bruises on the skin or weather conditions. Live-scan fingerprint sensors can easily capture high-quality images and they do not suffer from the problem of segmentation of the fingerprint from the background. The deployed fingerprint-based biometric systems offer good performance and fingerprint sensors have become quite small and affordable because fingerprints have a long history of use in forensic divisions worldwide for criminal investigations. A fingerprint is the pattern of ridges and valleys on the surface of a fingertip. The end points and crossing points of ridges are called minutiae. It is a widely accepted assumption that the minutiae pattern of each finger is unique and does not change during one's life. Ridge endings are the points where the ridge curve terminates, and bifurcations are where a ridge splits from a single path to two paths at a Y-junction.an example of a ridge ending and a bifurcation is illustrated in Figure 1. In this example, the black pixels correspond to the ridges, and the white pixels correspond to the valleys.

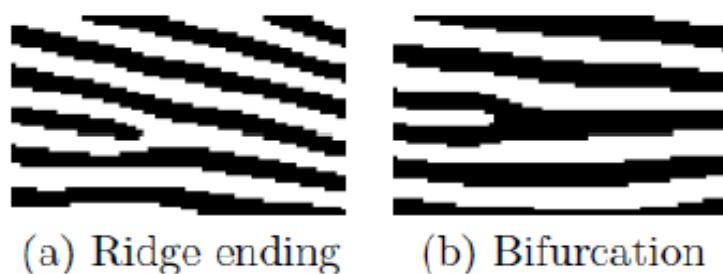


Figure 1 Example of a ridge ending and a bifurcation (Rishabh & Prashant 2011)

Attendance Management System is software developed for daily student attendance in schools, colleges and institutes (Saurabh et. al 2017). An attendance management system is a combination of software and hardware system developed for daily student attendance in schools and institutions. This facilitates access to the attendance of a particular student in a particular class. This system will also help in generating reports and evaluating the attendance eligibility of a student (sogbaise et.al 2018). The students tend to sign for their friends who are not present for that day. Manually computing for the total percentage of attendance a student meet is as tedious as the attendance sheet could be irregular or even misplaced. The verification and authentication of student to determine the student eligibility for exam with the use of identity cards can be inadequate since the plastic identity cards can be forged. The use of hand held attendance management device as presented in sogbaise et.al 2018 has drawbacks such limited attendance space of 100 students (small size memory), the device has an operation time of maximum fifteen minutes caused by limited power supply (device is battery powered). All of these problems present in sogbaise et.al (2018) this paper seeks to solve.

Review of related works

Tabassam et.al 2009 developed an Academic Attendance Monitoring System Using Fingerprint Identification for four (4) courses and fifty (50) students. The system was developed using Digital Persona's Software Development Kit, Microsoft Visual Studio 2008 and Sql Server 2005, interfaced with a fingerprint scanner for

biometric Identification. There are five algorithms implemented in this system firstly, Capture the student's fingerprint sample and create a feature set i.e a set of unique features created to match fingerprint, secondly, Retrieve the stored templates from the repository (database), thirdly, Perform a one-to-n comparison between the fingerprint feature set and the fingerprint templates stored in database, make a decision of match or non-match. Fourthly, if match is found retrieve student's information (Registration number, Department, Subjects) from the database. And finally obtain the scheduled lecture from the database and mark attendance if student is within the specified time i.e. within 30 minutes of the lecture's starting time. If verification is not done or there is some error in enrollment of fingerprint, system goes back to its initial state without marking the attendance. Upon testing of the system there where 50 (fifty) identifications forty nine had successful identification one was unsuccessful meaning 98% performance but the system didn't incorporate a feedback mechanism In the presence of impersonation.

Kamal 2015 in a project titled development of academic attendance mangement system using bluetooth technology, designed and developed a system that manages attendance of students. The system consist of Arduino UNO, Adafruit Fingerprint Sensor , HC-05 Bluetooth Module (Master/Slave), and a laptop computer. The aforementioned components are connected together to obtain attendance from the student which is transmitted through the Bluetooth to the laptop for collation. The drawbacks of this system is that the operation time for the hand held device is not stated, the attendance size was not stated and the Bluetooth device has a communication distance of 10 meters thus exceeding 10 meters there will be no communication.

Somasundaram et.al 2016 in a paper titled Mobile based Attendance Management System, deployed an attendance management system where students takes attendance by first login on to a webpage to register and then after registration attendance taking process begins. The student on the other hand uses a mobile phone with an android mobile application which enable communication between the lecturer and students via sms. A significant draw back is if the server is down attendance for the day using the system is not realizable.

Neha et.al 2013 in a paper titled an efficient automatic attendance system using fingerprint reconstruction technique developed an attendance management system using finger print recognition system. The attendance system consist of Fingerprint Scanner, LCD/Display Module, Computer (4)LAN connection . This attendance system consists of 100 fingerprint scanners , 100 desktop computers and a LAN infrastructure. Fingerprint scanner will be used to input fingerprint of teachers/students into the computer software. LCD display will Software will be interfacing fingerprint scanner and LCD and will be connected to the network. It will input fingerprint, will process it and extract features for matching. After matching, it will update database attendance records of the students.

Ikuomola (2015) designed and developed an Educational Time and Attendance Management System (eduTAMS). The system is fingerprint-based comprehensive attendance management system for universities and colleges. It employs the use of electronic fingerprint scanner interfaced to the digital computer system for verifying student identity. The student Identity is authenticated by the fingerprint-based biometric system which compares the captured fingerprint image with fingerprint templates stored in a database. The student is granted or denied specific lecture attendance based on the result of the comparison by the backend software system running on the PC to which the fingerprint scanner is interfaced. The main purpose of this system is to take attendance of the students for lectures, calculate the attendance rate of each student and use this record with specified percentage requirement to perform authentication for access into examination venues. eduTAMS was implemented on a network environment using C# and Microsoft SQL Server 2008. Testing of eduTAMS showed no false acceptance or false rejection but showed true rejection and true acceptance.

Akinduyite et.al (2013) developed a Fingerprint-Based Attendance Management System that consists of two processes namely; enrolment and authentication. During enrolment, the fingerprint of the user is captured and its unique features extracted and stored in a database along with the users identity as a template for the subject. The unique features called minutiae points were extracted using the Crossing Number (CN) method which extracts the ridge endings and bifurcations from the skeleton image by examining the local

neighborhoods of each ridge pixel using a 3 x 3 window. During authentication, the fingerprint of the user is captured again and the extracted features compared with the template in the database to determine a match before attendance is made. The fingerprint-based attendance management system was implemented with Microsoft's C# on the. NET framework and Microsoft's Structured Query Language (SQL) Server 2005 as the backend. The experimental result shows that the developed system is highly efficient in the verification of users fingerprint with an accuracy level of 97.4%. The average execution time for the developed system was 4.29 seconds as against 18.48 seconds for the existing system. Moreover, the result shows a well secured and reliable system capable of preventing impersonation.

System design

In figure 2 is the architectural diagram of the students' attendances management system using fingerprint recognition

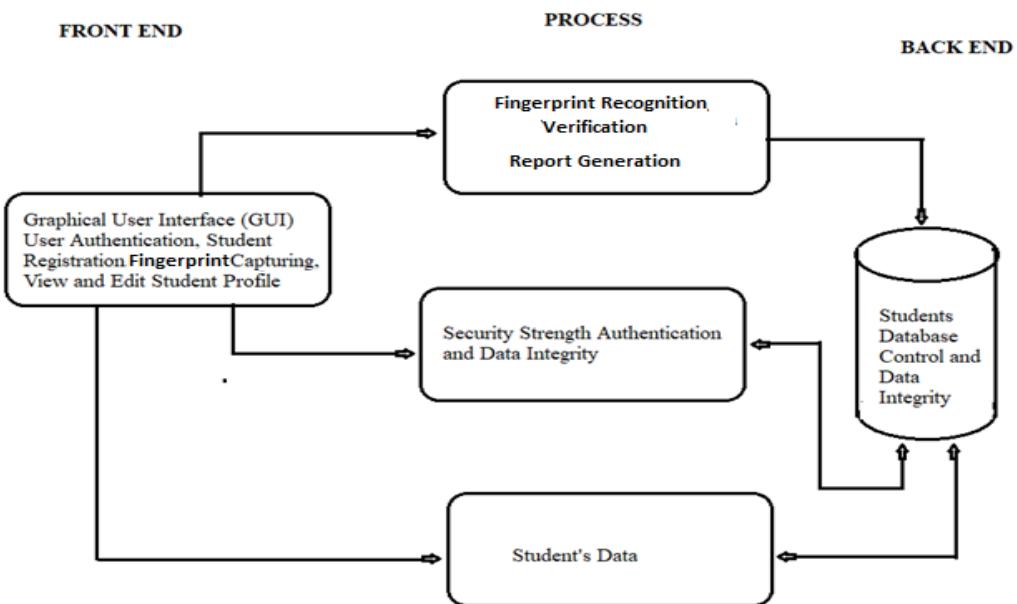


Figure 2 Architectural Diagram

The system design is more reliable and robust than the existing system as in sogbaise et.al 2018 in terms of taking attendance. Here the admin/lecturer accesses the application on the computer system and can view

student data including capturing of their fingerprint. Once this is can be done, the software recognizes the student based on the biometric (fingerprint) data entered

SYSTEM REQUIREMENT

Computer system is made up of units that are put together to work as one in order to achieve a common goal. The requirements for the implementation of the new system (student attendance management system) are:

- a) The Software
- b) The hardware

Software Requirement

For the effective implementation of the new system, the following software has to be installed on the computer system.

- i. Windows 7 operating system or later
- ii. MySQL
- iii. Visual basic.NET

Hardware requirement

- i. Pentium VI and above
- ii. 256 MB RAM and above
- iii. 40GB HD and above
- iv. CD-ROM drive

The design language is VB.NET and for the database administration system, MySQL database was utilized as a part of dealing with information's inside the system. With this system Security is ensured: Student won't have the capacity to stamp attendance for their kindred colleague since it requires understudy's fingerprint to check attendance. Data put away in the new system will be exceedingly secured. There will be no removal of

information and data or misusing of information and data which will prompt harm. Just approved clients will be permitted to approach the database system

The database name is Attendance and consists of five tables some of the tables are shown below:

1. fingerprint_capture
2. Attendance
3. Departments
4. faculty
5. levels
6. table person

Table 1.1: Fingerprint_capture

Column	Type	Null	Default
gu_id	varchar(50)	No	
Fingerprint image	Longblob	Yes	NULL
FingerprintCode	Longblob	Yes	NULL
serial_number	bigint(20)	No	
Height	bigint(20)	No	0
Width	bigint(20)	No	0
server_date_time	Timestamp	No	CURRENT_TIMESTAMP

Table 2.2: Attendance

Column	Type	Null	Default
gu_id	varchar(50)	No	

SN	int(11)	No	
Fullname	Text	Yes	NULL
Department	Text	Yes	NULL
Faculty	Text	Yes	NULL
Level	Text	Yes	NULL
Matric_No	Text	Yes	NULL
Posting_Staff	Text	Yes	NULL
Attendance_Date_Time	datetime	Yes	CURRENT_TIMESTAMP
Server_Date_Time	datetime	Yes	CURRENT_TIMESTAMP

Table 3.3: Departments

Column	Type	Null	Default
<i>department_id</i>	int(11)	No	
Department	text	Yes	NULL
Faculty	text	Yes	NULL
faculty_id	int(4)	Yes	NULL

Table 4.4: Faculty

Column	Type	Null	Default
<i>faculty_id</i>	int(11)	No	
Faculty	varchar(50)	Yes	NULL
faculty_abrev	varchar(10)	Yes	NULL

Table 5.5: Levels

Column	Type	Null	Default
SN	int(11)	No	
Level	varchar(10)	No	
posting_staff	varchar(200)	No	
server_date_time	Timestamp	No	CURRENT_TIMESTAMP

A use case diagram as shown in figure 3 graphically depicts the interactions between the system, the external system and the user. Use case diagrams play a major role in system design because it acts as a roadmap in constructing the structure of the system

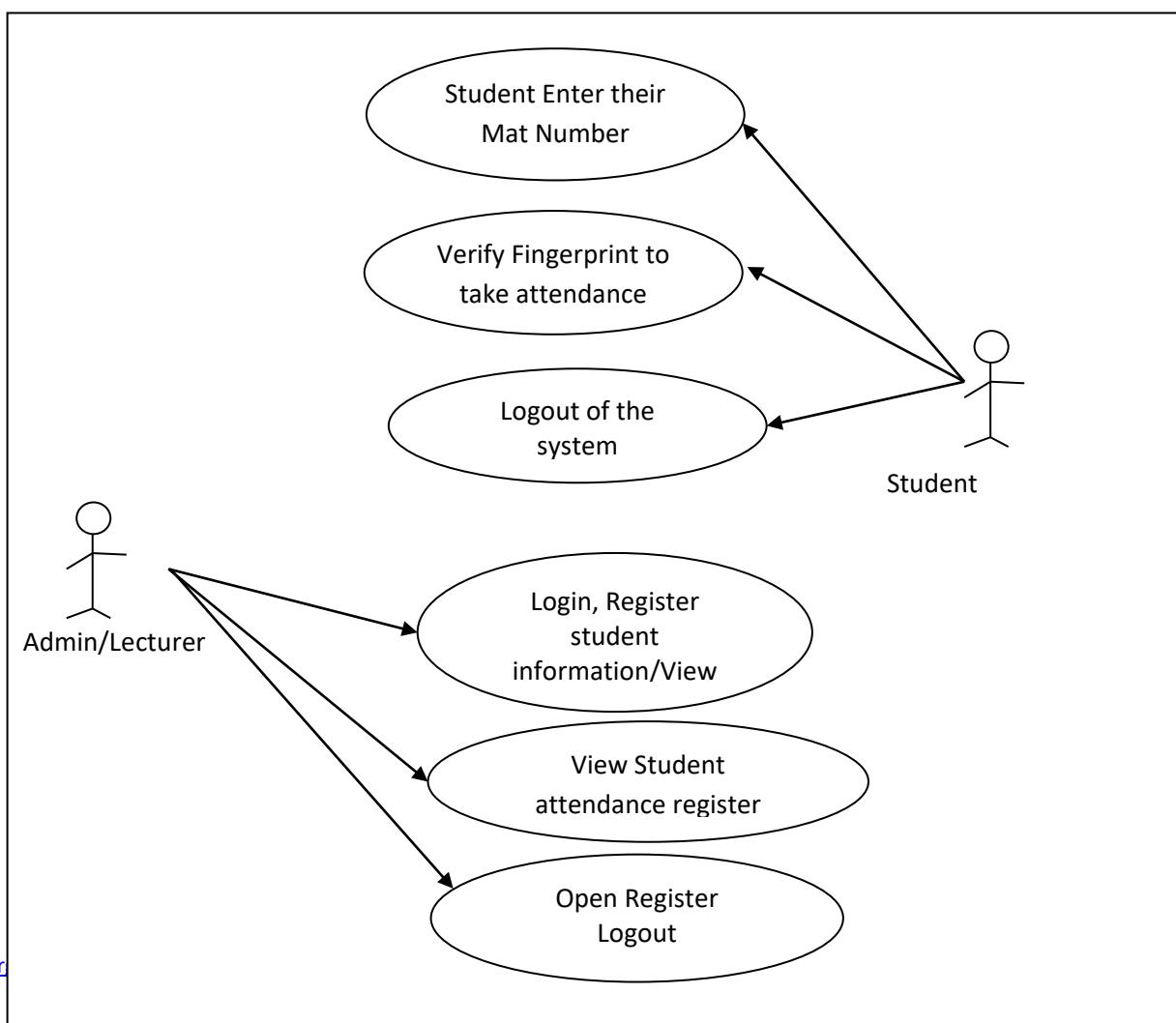


Figure 3: Use case diagram for the system

IMPLEMENTATION AND DOCUMENTATION

Figure 4 and figure 5 shows an implementation of the finger print based class attendance system showing student registration form and login interface respectively

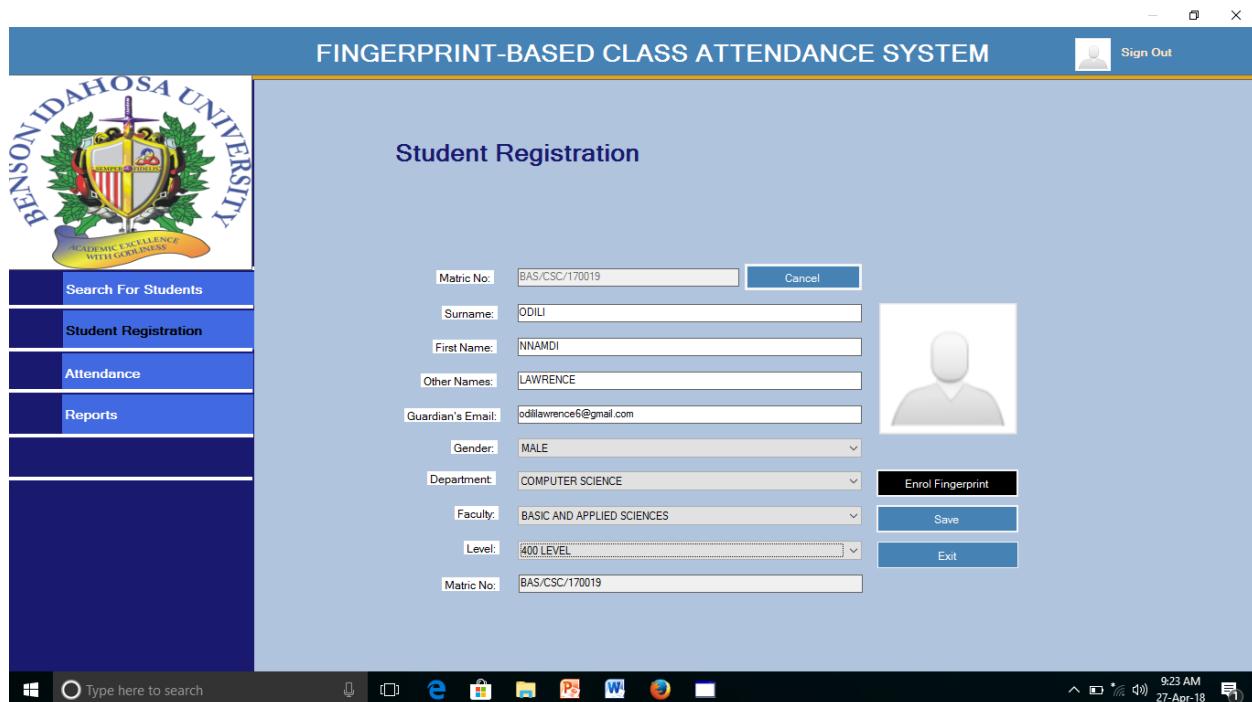
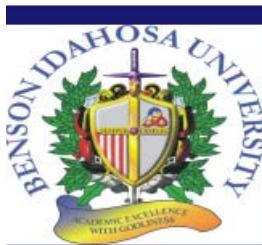


Figure 4 student registration form



FINGERPRINT-BASED CLASS ATTENDANCE SYSTEM

Please Enter login Details

Username:

Password:

Figure 5 Login form

Figure 6 is shows the attendance summary of the fingerprint class attendance system generated during the attendance process

The screenshot shows a web-based application titled "FINGERPRINT-BASED CLASS ATTENDANCE SYSTEM". At the top right is a "Sign Out" button. The main title "FINGERPRINT-BASED CLASS ATTENDANCE SYSTEM" is centered above a "Generate Reports" section. On the left, there's a vertical sidebar with the university logo and menu items: "Search For Students", "Student Registration", "Attendance", and "Reports". The "Reports" item is highlighted. The "Generate Reports" section contains a "Department" dropdown set to "ALL DEPARTMENTS", "Attendance Date" from "2018-04-01" to "2018-04-30", and a radio button group for "Attendees", "Absentees", or "All" (which is selected). A "Generate Report" button is present. Below this is a "Reports Summary" box stating "Total Students: 5". To the right is a table titled "Attendance Summary" with columns: FULLNAME, MATRIC_NO, DEPARTMENT, FACULTY, LEVEL, NO OF CLASSES HELD, DAYS PRESENT, and PERCENTAGE ATTENDANCE. The table lists five students: DIMKPA CH., GABRIEL S., OBAZUAYE..., ODILI NNA..., and SOGBAIKE All students are listed under the "All" category. The last row is marked with an asterisk (*).

	FULLNAME	MATRIC_NO	DEPARTMENT	FACULTY	LEVEL	NO OF CLASSES HELD	DAYS PRESENT	PERCENTAGE ATTENDANCE
►	DIMKPA CH.	BAS/CSC/1...	COMPUTER...	BASIC AND ...	400 LEVEL	2	1	50%
	GABRIEL S.	SMS/MAC/...	COMPUTER...	BASIC AND ...	400 LEVEL	2	0	0%
	OBAZUAYE...	BAS/CSC/1...	COMPUTER...	BASIC AND ...	400 LEVEL	2	1	50%
	ODILI NNA...	BAS/CSC/1...	COMPUTER...	BASIC AND ...	400 LEVEL	2	1	50%
*	SOGBAIKE ...	BAS/CSC/1...	COMPUTER...	BASIC AND ...	400 LEVEL	2	1	50%

Figure 6 generated report

Test Result

This is the result obtained after testing the system with the test plan and test data. During the testing, the actual and expected results were compared to ensure they produced same result or if there is a difference, it should be slight and negligible. Hence the result:

Table 6: Comparison between expected and actual results

TEST CONDUCTED	EXPECTED RESULT	ACTUAL RESULT
Admin enters username and password	Admin should be able to access the main menu if the correct user name and password is entered properly.	Admin that enters the correct username and password was granted access to the main menu
Admin click on student	Admin enters a new student	Admin was able to login to the

information	Information to get his or her user details.	system and view student details
Lecturer/admin clicks on take attendance	A form will be displayed to the user, the form enables the students to capture and take attendance	The lecturer/admin was able to take students attendance.

Conclusion

The enhanced student attendance management system using fingerprint authentication solves the problem of buddy signing, lopsided records and impersonation. The system preregisters and authenticate student during attendance process, determines the eligibility of a student for exam based on the threshold number of times of attendance by each student and finally validates if there is a case of impersonation prior to examination and sends e-mail if there is such occurrence.

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Rishabh .M and Prashant .T (2011): Student Attendance System Based On Fingerprint Recognition and One-to-Many Matching, A thesis for Bachelor of Technology National Institute of Technology Rourkela

Akinduyite C.O*, Adetunmbi A.O, Olabode O.O, Ibidunmoye E.O (2013) Fingerprint-Based Attendance Management System Journal of Computer Sciences and Applications 1(5) pp 100-105

A New Approximate Bayesian Decision Rule About the Mean of a Gaussian Distribution Versus the Classical Decision Rule

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Decision- Rules about the mean of a Gaussian distribution are presented and compared. Considering the square error loss function, our approximate Bayesian decision rule for the mean of a normal population is derived. Using normal data and SAS software, our approximate Bayesian test results were compared to their classical counterparts obtained with the well-known classical decision rule. It is shown that the proposed approximate Bayesian decision rule relies only on observations that are under study. The classical decision rule, which uses the standard normal and the student-t statistics, does not always yield the best results; the proposed approach performs often better.

Index Terms- Hypothesis testing, loss functions, statistical analysis.

I. INTRODUCTION

Life testing in reliability has gained interest from theorists as well as reliability engineers. distribution - which has been and is still widely used in industry and in academia - is considered. The normal distribution is defined as follows:

$$f(x) = \frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2};$$
$$-\infty < x < \infty, -\infty < \mu < \infty, \sigma > 0. \quad (1)$$

A test of hypothesis consists in testing a given theory or belief related to n parameter based on some sample information. Whenever the underlying model is found to be normal or approximately normal, the classical approach considers the following decision rule for a level of significance of alpha and a sample of size n (Mario F. Triola, 2007):

For a normal population with known variance, the classical method uses the following test

$$z = \frac{\bar{x} - \mu_0}{\sigma/\sqrt{n}}$$

wth the following rejection and non rejection regions for a Two-Tailed Test Hypotheses:

$$H_0: \mu = c$$
$$H_A: \mu \neq c$$

Non Rejection Region: $(Z_{1-\alpha/2}, Z^{\alpha/2})$

Rejection Region: The complement orf $(Z_{1-\alpha/2}, Z^{\alpha/2})$ in the set of the real numbers R.

For a normal opulation with unknown variance, the classical method uses the following test statistic wth the following rejection and non rejection regions for a Two-Tailed Test:

$$t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}}$$

Two-Tailed Test Hypotheses:

$$H_0: \mu = c$$
$$H_A: \mu \neq c$$

Non Rejection Region: $(t_{n-1,1-\alpha/2}, t_{n-1,\alpha/2})$

Rejection Region: The complement of $(t_{n-1,1-\alpha/2}, t_{n-1,\alpha/2})$ in the set of the real numbersR.the real numbers R.

New Approximate Bayesian Decision Rule
About the mean of a Gaussian Distribution
Two-Tailed Test
Hypotheses:

II. METHODOLOGY

Even thouh no specific analytical procedure exists that allows identification of the appropriate loss function to be used in Bayesian analysis, the most frquently used is the square error loss function. One of the reasons for selecting this loss function is due to its analytical tractability in Bayesian analysis. The square error

loss function places a small weight on estimates near the true value and proportionately more weight on extreme deviation from the true value of the parameter. The square error loss is defined

$$(2) \quad L_{SE}(\hat{\theta}, \theta) = (\hat{\theta} - \theta)^2$$

The use of the square error loss function along with a suitable approximation of the Pareto prior leads to the following approximate Bayesian confidence bounds for the normal population variance (Camara, 2003)

New Approximate Bayesian Decision Rules About the Mean of a Gaussian distribution

To obtain the approximate Bayesian decision rule for mean of a normal population, the close relationship that exists between confidence intervals and hypothesis testing is used. Considering the following approximate Bayesian confidence intervals the following approximate Bayesian decision rule is derived:

The use of the square error loss function along with a suitable approximation of the Pareto prior led to the following Approximate Bayesian confidence bounds: for the population mean
(Camara, 2003):

$$L_c = \frac{1}{(n-2-2\ln(\alpha/2))}$$

$$U_c = \frac{1}{(n-2-2\ln(1-\alpha/2))}$$

III. NUMERICAL RESULTS

To compare the proposed approximate Bayesian decision rule with the classical approach, samples obtained from normally distributed populations (e.g., 1, 2, 3, .4, 7) as well as approximately normal populations (e.g., 5, 6) are considered. SAS software was used to obtain the normal population parameters corresponding to each sample data set.

The observed value, which is the value of the test statistic under the assumption that the null hypothesis is true, will be denoted by t_0 for the classical method and by T_0 for the approximate Bayesian method.. If the observed value, falls into the rejection region, the null hypothesis will be rejected at a level of significance selected beforehand. If the observed value falls into the non-rejection region, the null hypothesis will not be rejected at the selected level of significance

Data Set #1:

24, 28, 22, 25, 24, 22, 29, 26, 25, 28, 19, 29 (Mann, 1998, p. 504).

Normal population distribution obtained with SAS:

$$N(\mu = 25.083, \sigma = 3.1176)$$

The population and sample variances are: $\sigma^2 = 9.71943$, and $s^2 = 9.719696$. For the following test of hypothesis, classical and approximate Bayesian non-rejection regions are presented in Table 1. Table 1 was used to conduct the following five tests of hypothesis about the normal population variance corresponding to the first data set.

$$U_{\mu(SE)} = \left(\frac{\sum_{i=1}^n (y_i - \bar{y})^2}{n-1} + \bar{y}^2 - \frac{\sum_{i=1}^n (y_i - \bar{y})^2}{n-2-2\ln(\alpha/2)} \right)^{0.5} - a$$

$$L_{\mu(SE)} = \left(\frac{\sum_{i=1}^n (y_i - \bar{y})^2}{n-1} + \bar{y}^2 - \frac{\sum_{i=1}^n (y_i - \bar{y})^2}{n-2-2\ln(1-\alpha/2)} \right)^{0.5} - a$$

Hence we can easily infer the following test statistic:

$$T = \frac{(x^2 + s^2 - u^2)}{(n-1)s^2}$$

With the following lower and upper Approximate Bayesian critical values:

Table1: Two tailed tests of hypothesis- Classical and Approximate Bayesian Non-Rejection

Non-Rejection Regions		
C. L. %	Regions	
	Classical Method	Approximate Bayesian Approach
80	-1.3634_1.3634	0.0685_0.0979
90	-1.7960_1.7960	0.0623_0.0990
95	-2.2010_2.010	0.0575_0.0995
99	-3.1060_3.1060	0.0486_0.0999

C. L. %	Non-Rejection Regions	
	Classical Method	Approximate Bayesian Approach
80	-1.3722_1.3722	
90	-1.8125_1.8125	0.7350_0.1086
95	-2.2281_2.2281	0.06111_0.1105
99	-3.1693_3.1693	0.0512_0.1101

	Observed value Classical Method	Observed value Aprox. Bayesian Method
u = 10.182 =	-0,0027778	0.09925
u = 10.2	-0.141667	0.009288
u = 10.3	-0.2805556	0.05729
u = 12.4	-3.0833	-0.7703

Null Hyp(Ho)		
	Observed value Classical Method	Observed value Aprox. Bayesian Method
u = 25.083	0.000367	0.09103
u = 25.1	-0.074111	0.08305275.
u = 25	0.09259	0.1299102
u = 28	-2.917	-1.357

Example 2

13, 11, 9, 12, 8, 10, 5, 10, 9, 12, 13.

Normal population distribution obtained with SAS : $N(\mu = 10.182, \sigma = 2.4008)$

Population and sample variances: $\sigma^2 = 5.76384$, $s^2 = 5.763636$

Data 2

Table2: Two tailed tests of hypothesis- Classical and Approximate Bayesian Non-Rejection Regions

Example 3

16, 14, 11, 19, 14, 17, 13, 16, 17, 18, 19, 12.

Normal population distribution obtained with SAS: $N(\mu = 15.5, \sigma = 2.6799)$

Population and sample variances: $\sigma^2 = 7.18186$, $s^2 = 7.181818$

Table1: Two tailed tests of hypothesis- Classical and Approximate Bayesian Non-Rejection

C. L. %	Non-Rejection Regions	
	Classical Method	Approximate Bayesian Approach
80	-1.3634_1.3634	0.0685_0.0979
90	-1.7960_1.7960	0.0623_0.0990
95	-2.2010_2.010	0.0575_0.0995
99	-3.1060_3.1060	0.0486_0.0999

Null Hyp(Ho)		
	Observed value Classical Method	Observed value Aprox. Bayesian Method
$u = 15.5$	0	0.09093
$u = 15.6$	<u>-012987</u>	<u>0.05153</u>
$U=15.7$	-0.2597	<u>0.0119</u>
$u = 17.8$	<u>-2.987</u>	-0.8788

Example 4

27, 31, 25, 33, 21, 35, 30, 26, 25, 31, 33, 30, 28.

Normal population distribution obtained with SAS:
 $N(\mu = 28.846, \sigma = 3.9549)$

Population and sample variances: $\sigma^2 = 15.64123$,
 $s^2 = 15.641025$

52, 33, 42, 44, 41, 50, 44, 51, 45, 38, 37, 40, 44, 50, 43.

Normal population distribution obtained with SAS:
 $N(\mu = 43.6, \sigma = 5.4746)$

Population and sample variances: $\sigma^2 = 29.97124$,
 $s^2 = 29.971428$

C. L. %	Non-Rejection Regions	
	Classical Method	Approximate Bayesian Approach
<u>80</u>	-1.3450_1.3450	0.0568_0.0757
90	<u>-1.7613_1.7613</u>	<u>0.0527_0.0766</u>
95	-2.1448_2.1448	<u>0.04903_0.076625</u>
99	<u>-2.9768_2.9768</u>	0.04237_0.07686

C. L. %	Non-Rejection Regions	
	Classical Method	Approximate Bayesian Approach
<u>80</u>	-1.3562_1.3562	0.0569_0.0757
90	<u>-1.78229_1.78229</u>	<u>0.0527_0.07</u>
95	-2.1788_2.1788	0.0497_0.0767
99	<u>-3.0545_3.0545</u>	0.0424_0.0424

Null Hyp(Ho)		
	Observed value Classical Method	Observed value Aprox. Bayesian Method
$u = 43.60$	0	0.6666
$u=43.55$	<u>0.0355</u>	<u>0.0764</u>
$u43.58$	0.01418	<u>0.0705</u>
$u = 47$	<u>2.41</u>	<u>-0.6185</u>

Example 6

52, 43, 47, 56, 62, 53, 61, 50, 56, 52, 53, 60, 50, 48, 60, 55.

Normal population distribution obtained with SAS:
 $N(\mu = 53.625, \sigma = 5.4145)$

Population and sample variances: $\sigma^2 = 29.31681$,
 $s^2 = 29.316666$

Table 6

Null Hyp(Ho)		
	Observed value Classical Method	Observed value Aprox. Bayesian Method
$u = 28.85$	0.08383373	0.0833
$-u=28.90$	<u>-0.04545</u>	<u>0.06799</u>
$u=30$	-1.045	<u>-0.277</u>
$u=32$	<u>--2.86</u>	<u>-0.937\\</u>

Example 5

C. L. %	Non-Rejection Regions	
	Classical Method	Approximate Bayesian Approach
80	-1.3406_1.3406	0.0537_0.0703
90	<u>-1.75331</u> 1.7531	<u>0.0500</u> 0.07100.0 <u>468</u> 0.0710
95	-2.1314_2.1314	<u>0.0468</u> 0.0712

80	--1.341_1.345
90	<u>-1.7530</u> 1.7530

	99	-3.9467 2.9467	<u>0.0407</u> 0.071 4
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Null Hyp(Ho)		
	Observed value Classical Method	Observed value Aprox. Bayesian Method
u = 82.861	0	0.0286
u = 82	<u>0.1557</u>	<u>0.03224</u>
u = 82.6	0.00398	<u>0.02968</u>
u = 90	<u>-1.2988</u>	<u>-0.0072</u>

In the present study, a new approximate Bayesian decision rule for the mean of a normal population has been derived with the use of the square error loss function. Based on the above numerical results we can conclude the following:

All randomly selected tests of hypothesis show that the classical and the proposed approximate Bayesian decision rules perform well as they do not reject null hypotheses corresponding to claims that are equal to the values of the parameters under study.

Null Hyp(Ho)		
	Observed value Classical Method	Observed value 4Aprox. Bayesian Method
u = 53.625		0.06667
u = 53.6		<u>0.07276</u>
u = 53.62	0.0671	<u>0.0678</u>
u = 56	<u>-1.7556</u>	<u>-0.0525</u>

Example 7

The following observations have been obtained from the collection of SAS data sets.

50, 65, 100, 45, 111, 32, 45, 28, 60, 66, 114, 134, 150, 120, 77, 108, 112, 113, 80, 77, 69, 91, 116, 122, 37, 51, 53, 131, 49, 69, 66, 46, 131, 103, 84, 78.

Normal population distribution obtained with SAS:
 $N(\mu = 82.861, \sigma = 33.226)$

Population and sample variances: $\sigma^2 = 1103.96716$,
 $s^2 = 1103.951587$.

	Non-Rejection Regions	
	Classical Method	Approximate Bayesian Approach
80	-1.3062_1.3062	0.0259_0.0292
90	-1.6896_1.6896	0.0250_0.029
95	2.0301_2.0301	0.0242_0.0293
99	-2.7238_2.7238	0.0224_0.029
		4

1. The classical decision rule for the mean of a normal population does not always yield the best results. In fact, contrary to our proposed Approximate Bayesian decision rule, the classical approach fails, at times to reject claims that are far from being good estimates of the population mean.
2. The classical decision rule does not always yield a smaller Type II error than the approximate Bayesian decision rule. In fact the numerical results show that our new Approximate Bayesian approach performs better when it comes to rejecting a wrong null hypothesis.
3. Contrary to the classical rejection and non-rejection regions that are defined with the use of the normal table and the t-table, their approximate Bayesian counterparts rely only on the observations that are under study.
4. The approximate Bayesian decision rule can be easily applied to any normal or approximately normal data, irrespective of the size of the sample size and the confidence level that are used for the study.
5. The tests corresponding to our approximate Bayesian Decision rule have great power, since the probability that they fail to reject a wrong null hypothesis is extremely small.

Bayesian analysis contributes to enhancing well-known statistical theories such as the Estimation and Decision Theories.

Life testing in reliability has gained interest from theorists as well as reliability engineers.

distribution - which has been and is still widely used in industry and in academia - is considered. The normal distribution is defined as follows:

$$f(x) = \frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2};$$

$$-\infty < x < \infty, -\infty < \mu < \infty, \sigma > 0. \quad (1)$$

A test of hypothesis consists in testing a given theory or belief related to n parameter based on some sample information. Whenever the underlying model is found to be normal or approximately normal, the classical approach considers the following decision rule for a level of significance of alpha and a sample of size n (Mario F. Triola, 2007):

For a normal population with known variance, the classical

$$z = \frac{\bar{x} - \mu_0}{\sigma/\sqrt{n}}$$

method uses the following test statistic:

with the following rejection and non rejection regions for a Two-Tailed Test
Hypotheses:

$$H_0: \mu = c$$

$$H_A: \mu \neq c$$

Non Rejection Region: $(Z_{1-\alpha/2}, Z^{\alpha/2})$

Rejection Region: The complement of $(Z_{1-\alpha/2}, Z^{\alpha/2})$ in the set of the real numbers R.

For a normal population with unknown variance, the classical method uses the following test statistic with the following rejection and non rejection regions for a Two-Tailed Test:

$$t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}}$$

Two-Tailed Test

Hypotheses:

$$H_0: \mu = c$$

$$H_A: \mu \neq c$$

Non Rejection Region: $(t_{n-1,1-\alpha/2}, t_{n-1,\alpha/2})$

Rejection Region: The complement of $(t_{n-1,1-\alpha/2}, t_{n-1,\alpha/2})$ in the set of the real numbers R.

New Approximate Bayesian Decision Rule
About the mean of a Gaussian Distribution
Two-Tailed Test
Hypotheses:

Methodology

Even though no specific analytical procedure exists that allows identification of the appropriate loss function to be used in Bayesian analysis, the most frequently used is the square error loss function. One of the reasons for selecting this loss function is due to its analytical tractability in Bayesian analysis. The square error loss function places a small weight on estimates near the true value and proportionately more weight on extreme deviation from the true value of the parameter. The square error loss is defined

$$(2) \quad L_{SE}(\hat{\theta}, \theta) = (\hat{\theta} - \theta)^2$$

The use of the square error loss function along with a suitable approximation of the Pareto prior leads to the following approximate Bayesian confidence bounds for the normal population variance (Camara, 2003)

New Approximate Bayesian Decision Rules
About the Mean of a Gaussian distribution

To obtain the approximate Bayesian decision rule for mean of a normal population, the close relationship that exists between confidence intervals and hypothesis testing is used. Considering the following approximate Bayesian confidence intervals the following approximate Bayesian decision rule is derived:

The use of the square error loss function along with a suitable approximation of the Pareto prior led to the following Approximate Bayesian confidence bounds: for the population mean
(Camara, 2003):

$$U_{\mu(SE)} = \left(\frac{\sum_{i=1}^n (y_i - \bar{y})^2}{n-1} + \bar{y}^2 - \frac{\sum_{i=1}^n (y_i - \bar{y})^2}{n-2-2\ln(\alpha/2)} \right)^{0.5} - a$$

$$L_{\mu(SE)} = \left(\frac{\sum_{i=1}^n (y_i - \bar{y})^2}{n-1} + \frac{s^2}{n-2-2\ln(1-\alpha/2)} \right)^2$$

Hence we can easily infer the following test statistic:

$$T = \frac{(x^2 + s^2 - u^2)}{(n-1)s^2}$$

With the following lower and upper Approximate Bayesian critical values:

$$L_c = \frac{1}{(n-2-2\ln(\alpha/2))}$$

$$U_c = \frac{1}{(n-2-2\ln(1-\alpha/2))}$$

Numerical Results

To compare the proposed approximate Bayesian decision rule with the classical approach, samples obtained from normally distributed populations (e.g., 1, 2, 3, .4, 7) as well as approximately normal populations (e.g., 5, 6) are considered. SAS software was used to obtain the normal population parameters corresponding to each sample data set.

The observed value, which is the value of the test statistic under the assumption that the null hypothesis is true, will be denoted by u for the classical method and by u for the approximate Bayesian method.. If the observed value, falls into the rejection region, the null hypothesis will be rejected at a level of significance selected beforehand. If the observed value falls into the non-rejection region, the null hypothesis will not be rejected at the selected level of significance

Data Set #1:

24, 28, 22, 25, 24, 22, 29, 26, 25, 28, 19, 29 (Mann, 1998, p. 504).

Normal population distribution obtained with SAS:

$$N(\mu = 25.083, \sigma = 3.1176)$$

The population and sample variances are: $\sigma^2 = 9.71943$, and $s^2 = 9.719696$. For the following test of hypothesis,

classical and approximate Bayesian non-rejection regions are presented in Table 1. Table 1 was used to conduct the following five tests of hypothesis about the normal population variance corresponding to the first data set.

$-a$

Table1: Two tailed tests of hypothesis-
Classical and Approximate Bayesian Non-Rejection

Non-Rejection Regions		
Regions		
C .L. %	Classical Method	Approximate Bayesian Approach
<u>8</u> <u>0</u>	-1.3634_ 1.3634	0.0685_ 0.0979
9 0	-1.7960_ 1.7960	0.0623 0.0990
9 5	-2.2010_ 2.010	0.0575 0.0995
9 9	- 3.1060 3.106	0.0486 0.0999

Null Hyp(Ho)		
	Observed value Classical Method	Observed value Aprox. Bayesian Method
$u = 25.083$	0.000367	0.09103
$u = 25.1$	-0.074111	0.08305275.
$u = 25$	0.09259	0.1299102
$u = 28$	-2.917	-1.357

Example 2

13, 11, 9, 12, 8, 10, 5, 10, 9, 12, 13.

Normal population distribution obtained with SAS : $N(\mu = 10.182, \sigma = 2.4008)$

Population and sample variances: $\sigma^2 = 5.76384$, $s^2 = 5.763636$

Datata 2

Table2: Two tailed tests of hypothesis- Classical and Approximate Bayesian Non-Rejection Regions

C. L. %	Non-Rejection Regions	
	Classical Method	Approximate Bayesian Approach
80	-1.3722_1.3722	
90	<u>-1.8125_18125</u>	<u>0.7350_0.1086</u>
95	-2.2281_2.2281	<u>0.06111_0.1105</u>
99	-3.1693_3.1693	0,0512_0.ii01

90	-1.7960_1.7960	<u>0.0623_0.0990</u>
95	-2.2010_2.010	<u>0.0575_0.0995</u>
99	<u>-3.1060_3.1060</u>	<u>0.0486_0.0999</u>

Null Hyp((Ho)		
	Observed value Classsical Method	Observed value Aprox. Bayesian Method
u = 15.5	0	0.09093
u = 15.6	<u>-012987</u>	<u>0.05153</u>
<u>U=15.7</u>	-0.2597	<u>0.0119</u>
u = 17.8	<u>-2.987</u>	<u>-0.8788</u>

Example 4

27, 31, 25, 33, 21, 35, 30, 26, 25, 31, 33, 30, 28.

Normal population distribution obtained with SAS:
 $N(\mu = 28.846, \sigma = 3.9549)$

Population and sample variances: $\sigma^2 = 15.64123$,
 $s^2 = 15.641025$

	Observed value Classsical Method	Observed value Aprox. Bayesian Method
u = 10.182 =	-0,0027778	0.69925
u = 10.2	-0.141667	0.009288
u = 10.3	-0.2805556	0.05729
u = 12.4	-3.0833	-0.7703

Example 3

16, 14, 11, 19, 14, 17, 13, 16, 17, 18, 19, 12.

Normal population distribution obtained with SAS:
 $N(\mu = 15.5, \sigma = 2.6799)$

Population and sample variances: $\sigma^2 = 7.18186$,
 $s^2 = 7.181818$

C. L. %	Non-Rejection Regions	
	Classical Method	Approximate Bayesian Approach
80	-1.3562_1.3562	0.0569_0.0757
90	<u>-1.78229_1.78229</u>	<u>0.0527_0.07</u>
95	-2.1788_2.1788	0.0497_0.0767
99	<u>-3.0545_3.0545</u>	0.0424_0.0424

Table1: Two tailed tests of hypothesis- Classical and Approximate Bayesian Non-Rejection

Regions	Non-Rejection Regions		
	C. L. %	Classical Method	Approximate Bayesian Approach
	80	-1.3634_1.3634	0.0685_0.0979

Null Hyp(Ho)		
	Observed value Classical Method	Observed value Aprox. Bayesian Method
$u = 28.85$	0.08383373	0.0833
$-u=28.90$	<u>-0.04545</u>	<u>0.06799</u>
$u=30$	-1.045	<u>-0.277</u>
$u=32$	<u>-2.86</u>	<u>-0.937\\</u>

Example 5

52, 33, 42, 44, 41, 50, 44, 51, 45, 38, 37, 40, 44, 50, 43.

Normal population distribution obtained with SAS:
 $N(\mu = 43.6, \sigma = 5.4746)$

Population and sample variances: $\sigma^2 = 29.97124$,
 $s^2 = 29.971428$

C. L. %	Non-Rejection Regions	
	Classical Method	Approximate Bayesian Approach
<u>80</u>	-1.3450_1.3450	0.0568_0.0757
90	<u>-1.7613_1.7613</u>	<u>0.0527_0.0766</u>
95	-2.1448_2.1448	<u>0.04903_0.076625</u>
99	<u>-2.9768_2.9768</u>	0.04237_0.07686

Null Hyp(Ho)		
	Observed value Classical Method	Observed value Aprox. Bayesian Method
$u = 43.60$	0	0.6666
$u=43.55$	<u>0.0355</u>	<u>0.0764</u>
$u=43.58$	0.01418	<u>0.0705</u>
$u = 47$	<u>2.41</u>	<u>-0.6185</u>

Example 6

52, 43, 47, 56, 62, 53, 61, 50, 56, 52, 53, 60, 50, 48, 60, 55.

Normal population distribution obtained with SAS:
 $N(\mu = 53.625, \sigma = 5.4145)$

Population and sample variances: $\sigma^2 = 29.31681$,
 $s^2 = 29.316666$

Table 6

C. L. %	Non-Rejection Regions	
	Classical Method	Approximate Bayesian Approach
<u>80</u>	-1.3406_1.3406	0.0537_0.0703
<u>90</u>	<u>-1.75331_1.7531</u>	<u>0.0500_0.07100.0</u> <u>468_0.0710</u>
95	-2.1314_2.1314	<u>0.0468_0.0712</u>

<u>80</u>	--1.341_1.345
90	<u>-1.7530_1.7530</u>

	99	<u>-3.9467_2.9467</u>	<u>0.0407_0.0714</u>
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Null Hyp(Ho)		
	Observed value Classical Method	Observed value 4Aprox. Bayesian Method
$u = 53.625$		0.06667
$u=53.6$		<u>0.07276</u>
$u=53.62$	0.0671	<u>0.0678</u>
$u=56$	<u>-1.7556</u>	<u>-0.0525</u>

Example 7

The following observations have been obtained from the collection of SAS data sets.

50, 65, 100, 45, 111, 32, 45, 28, 60, 66, 114, 134, 150, 120, 77, 108, 112, 113, 80, 77, 69, 91, 116, 122, 37, 51, 53, 131, 49, 69, 66, 46, 131, 103, 84, 78.

Normal population distribution obtained with SAS:
 $N(\mu = 82.861, \sigma = 33.226)$

Population and sample variances: $\sigma^2 = 1103.96716$,
 $s^2 = 1103.951587$.

Non-Rejection Regions		
	Classical Method	Approximate Bayesian Approach
80	- 1.3062_1.3062	0.0259_0.0292
90	- 1.6896_1.6896	0.0250_0.029
95	- 2.0301_2.0301	0.0242_0.0293
99	- 2.7238_2.7238	0.0224_0.029
$u = 82.861$	0.00398	0.02908
$u = 90$	-1.2988	-0.0072

In the present study, a new approximate Bayesian decision rule for the mean of a normal population has been derived with the use of the square error loss function. Based on the above numerical results we can conclude the following:

All randomly selected tests of hypothesis show that the classical and the proposed approximate Bayesian decision rules perform well as they do not reject null hypotheses corresponding to claims that are equal to the values of the parameters under study.

6. The classical decision rule for the mean of a normal population does not always yield the best results. In fact, contrary to our proposed Appoximate Bayesian decision rule, the classical approach fails, at times to reject claims that are far from being good estimates of the population mean.
7. The classical decision rule does not always yield a smaller Type II error than the approximate Bayesian decision rule. In fact the numerical results show that our new Approximate Bayesian approach performs better when it comes to rejecting a wrong null hypothesis.
8. Contrary to the classical rejection and non-rejection regions that are defined with the use the normal table and the t-table, their approximate Bayesian counterparts rely only on the observations that are under study.
9. The approximate Bayesian decision rule can be easily applied to any normal or approximately normal data, irrespective of the size of the sample size and the confidence level that are used for the study.

10. The tests corresponding to our approximate Bayesian Decision rule have great power, since the probability that they fail to reject a wrong null hypothesis is extremely small.

Bayesian analysis contributes to enhancing ng well-known statistical theories such as the Estimation and Decision Theories.

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How Lack of Standardized Service Delivery by Tour Providers in Shared Tourism Destinations Negatively Affects Ecotourism Development: Case of Serengeti-Mara

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Abstract- Cross-border ecotourism development in shared ecosystems such as Serengeti-Mara needs to take a common direction even for tour operators. The EAC regional tourism policy has taken cognizance of this fact and stipulate that an agreed regional quality and standards control mechanism harmonizing the standards for registration, classification, and accreditation and grading of service providers and tourism facilities should be observed. The policy indicates that tourism service providers such as lodges, tour companies, and camps, among others, would adhere to harmonized standards for registration, classification, and accreditation and grading of service providers and tourism facilities. The standardization is meant to ensure that two sides of the border provide quality service while at the same time inequality and competition do not occur. Ironically, no set standards exist for lodges, permanent tented camps and Special Campsites in SMME. These standards include the requirement to monitor and efficiently manage the disposal of waste, use of water and fuel wood. The study used questionnaire, interviews and focused group discussion to collect primary data while secondary data were collected using journals, documents, acts, legislations, sessional papers and conventions/protocols on tourism. Data were analyzed using descriptive statistics. The qualitative data were analysed by consolidating emerging themes from the key informant interviews and topic analysis. Quantitative data were analysed using descriptive statistics such as frequencies and percentages. Data were presented in form of tables, pie charts and narrations. The result of the study indicates that service providers in SMME are yet to standardize service delivery across the border. There is a general argument that international standards are met but not in all aspects of the tourism industry. The standardization of services across Serengeti Mara is hampered by different regulations on labour, tax systems and general business operations requirements. It was found out that Tanzania lacks highly skilled labour in certain areas in the tourism industry but rigid immigration regulations such as work permits and punitive tax systems make it an attractive for skilled personnel to work in Serengeti. Although both the regional and bilateral policies indicate that exchange of skills and sharing of information through seminars/workshops and even joint training is allowed, there is no evidence of the same at the implementation level. Thus,

standardization of registration, licensing and service varies which falls short of regional and international standards service delivery. Tour operators are negatively affected by punitive taxation systems; the most affected side is Serengeti. There is no clear policy to enforce tour operators' support for local community and regulation for them to adhere to environmentally best practices. This study, therefore, recommends common policy for tour operators which would standardize operations and service delivery so that international and regional standards continue to be met. This should include harmonized immigration laws and taxation systems so that skewed revenue distribution is eliminated.

Index Terms- Cross-border tourism, standardization, bilateral, conventions and immigration

I. INTRODUCTION

The EAC (1999) regional tourism policy indicates that tourism service providers such as lodges, tour companies, and camps, among others, would adhere to harmonized standards for registration, classification, and accreditation and grading of service providers and tourism facilities. Within SMME, there exists a diverse range of visitor accommodation which include lodges, permanent and non-permanent tented camps, and public campsites of accommodation types and communal conservancies. The standardization is meant to ensure that two sides of the border provide quality service while at the same time inequality and competition do not occur. The policy indicates that partner states establish an agreed regional quality and standards control mechanism harmonizing the standards for registration, classification, and accreditation and grading of service providers and tourism facilities (EAC, 1999). This policy focuses on harmonized tourism service delivery such that tourism service providers meet international and regional standards. This standard tourism service delivery, however, is not explicit on eco-friendly policies these tourism service providers are supposed to adhere to. On tourism activities, lodges and camps ensure that education/natural history interpretation is a part of these facilities. To realize this, nature walks are conducted by schedules guided

outings for guests to visit the local community. This creates interactive experiences with local leaders, business people, artisans or craftsmen. Even hunting as a tourist activity is done within some ethical hunting programme such as being sensitive to current composition of animal populations. It is a fact that expansion of wildlife sites and related activities such as creation of hotels, lodges and camps generally improve livelihood of the communities around those sites. However, it affects the environment and natural resources which calls for proper management of waste so that it does not affect the surroundings.

II. MATERIALS AND METHODS

The Serengeti-Mara region is found within the EAC region on which the regional tourism policy applies. The United Republic of Tanzania and Republic of Kenya share one of the greatest ecological regions of migrating wildlife in the world, known as the Maasai Mara Game Reserve in Kenya and the Serengeti National Park. The Mara River, the only perennial river in the transboundary ecosystem, is often the only source of water for grazing animals during the dry season. Increasing water demands from agriculture, industries, and growing human populations are likely to reduce its availability for migratory species. Within SMME, there exists a diverse range of visitor accommodation which include lodges, permanent and non-permanent tented camps, and public campsites of accommodation types and communal conservancies. The standardization is meant to ensure that two sides of the border provide quality service while at the same time inequality and competition do not occur. To gather data, there were 92 questionnaires which were administered to respondents in total. The researcher with the help of two research assistants administered structured questionnaires to gather information from 2 EAC agency directors, 2 Park Managers, 3 directors of state agencies (KWS, TANAPA and TWS), 3 directors of INGOs, 6 directors of NGOs, 70 managers of camps/eco-camps and lodges/Eco lodges; 3 heads of conservancies and 3 heads of wildlife management areas. Secondly, the researcher used interview schedule. The researcher and research assistants spent at least 5 days in each study site to conduct interviews. Both an in-depth formal and informal interviews were done. The formal interviews were structured since they involved a set of questions of predetermined questions. The interview schedule was used with EAC agency directors, Park Managers, directors of KWS, TANAPA and TWS, directors of INGOs and NGOs and tour operators. The research instruments were trial tested in Kilimanjaro Heartland between Kenya and Tanzania. These instruments were trial tested in a pilot survey was conducted in February 2018 using 30 respondents to validate them. The Focused Group Discussion focused attention on the given involvement of the local community in ecotourism activities. This method was used to probe various aspects of ecotourism activities that Community Based Natural Resource Management Groups engage in within dispersal areas of Serengeti Mara ecosystem. There were specific topics that were discussed by the groups. Members involved in this included heads of conservancies, wildlife management areas and existing community based natural resource management groups in these dispersal areas of the SMME. In total, there were 6 Focused Group Discussion groups comprising of 7 to 12 members in each group.

This study relied on secondary data by examining books, reports, journal articles, online materials and newspaper materials and articles on aspects of ecotourism, bilateral agreement between Kenya and Tanzania, EAC Protocol on tourism and international protocols on tourism. The researcher sourced secondary data by analysis of publications such as journals on tourism, EAC tourism related legislations and government documents. These documents included Kenya tourism strategic master plan, Tanzania tourism strategic plan, bilateral and EAC regional tourism protocol/agreements.

Quantitative data were analyzed using descriptive statistics. Quantitative data consisted of measuring numerical values from which description such as frequencies and percentages were made. The data were first entered into the computer for analysis using statistical package for social sciences SPSS Version 12. This generated frequencies and percentages which were used to discuss the findings. Qualitative data basically involved themes and content analysis. The frequency with which an idea or word or description appears was to interpret the importance, attention or emphasis. Content analysis examined the intensity with which certain words had been used. A classification system was developed to record the information in interpreting results. The frequency with which a symbol or data appeared showed the measure of importance, attention or emphasis. The researcher presented data findings in form of frequency tables, pie charts, bar graphs and narratives. There were factors that affected the results of the study. One, the researcher was unable to gather information from some respondents who declined to participate or were unavailable for interviews. Also, there were geographical limitations that were experiences due to rough terrain in the wilderness, poor road network and bad weather. Lastly, there was language barrier in the rural areas. To overcome these shortcomings, the researcher engaged a tour guide to interpret and translate questions for the respondents. Further, research assistants from the area were engaged to assist in data collection. The researcher used four wheeled vehicle to overcome geographical limitations. In addition, the researcher utilized secondary materials from EAC Ministry, EAC agencies, Kenya Tourism Board and Tanzania Tourism Corporation and other institutions that had previously studied this ecosystems tourism status. On language barrier, the researcher engaged an interpreter to explain and interpret for the respondents.

III. FINDINGS AND DISCUSSIONS

The regional tourism policy indicates that an agreed regional quality and standards control mechanism harmonizing the standards for registration, classification, and accreditation and grading of service providers and tourism facilities should be observed (EAC, 1999). The policy indicates that tourism service providers such as lodges, tour companies, and camps, among others, would adhere to harmonized standards for registration, classification, and accreditation and grading of service providers and tourism facilities. Within SMME, there exists a diverse range of visitor accommodation which include lodges, permanent and non-permanent tented camps, and public campsites of accommodation types and communal conservancies. The standardization is meant to ensure that two sides of the border

provide quality service while at the same time inequality and competition do not occur.

Across SMME, tour operators who serve tourists are expected to provide service, facilities, food and beverages that meet international standards. The problem is that few SMEs are insured and do not operate professionally in Tanzania. This is the reason why Ministry of Natural Resources and Tourism (MNRT) has records of small number of registered and licensed suppliers. This is not the case with Kenya. For example, Mara has over 600 licensed tour operators, nearly double the number in Tanzania, and over 400 Luxury and four star tented camps, more than 10 times Tanzania. Kenya received only 130,000 more international tourists than Tanzania (Global Development Solutions, 2015).

Poor regulatory and tax policies hamper the growth of the local tourist sector, particularly for small- and medium-size businesses, and stakeholders are constantly at loggerheads with the government of Tanzania on the legality, fairness and conformity of new regulations with existing policy. The relatively well organised Hoteliers Association of Tanzania (HAT) and Tanzania Association of Tour Operators (TATO) complain of inadequate communication and consultation between the government and the tourism and hospitality industry over policy and taxation issues (Kathryn, 2011).

The low number of investors in Serengeti could be attributed to a government controlled sector and a socialist ideology that limited growth of tourism industry in general. Other factors include stringent investment climate that had compromised service delivery. For example, all tourist operators are required by the Tourist Agents Act to be registered and licensed in order to offer tourism services in Serengeti. This tourist operators are registered and licensed based on Class A and Class C businesses. Findings indicate that registration and licencing fees are beyond local community. A tourism officer argued that licensing and regulatory issues in both countries in tourism are cross-sectoral. For example, Kenya has a considerable body of law related to tourism and has tourism policy framework. Because of many institutions, Kenyan tourism service providers are overloaded with institutions and regulations. It was found that 44 different legislative instruments regulate the tourism sector. This intricate web of regulations is further made difficult by the overlapping functions of more than 15 public organizations regulating the sector and 11 associations and civil societies representing different markets (Global Development Solutions, 2015).

To illustrate this, the Republic of Tanzania (2006-2016) report indicates that challenges that tour operators experience in Serengeti include problems with water supplied to Seronera via a pipeline built in the early 1970's from the Bologonja Springs in the northern extreme of the Park. With years passed by, the condition of the pipeline deteriorated such that water availability is sporadic and a continual problem for the Seronera staff village, park offices and other facilities that depend on the pipeline for their water. These water supply problems have led to difficulties with the management of the Park's six public campsites, resulting in two being closed down. The facilities at the remaining campsites are overused and do not meet tourist expectations.

The policy indicates that partner states establish an agreed regional quality and standards control mechanism harmonizing the standards for registration, classification, and accreditation and grading of service providers and tourism facilities (EAC, 1999).

This policy is focuses on harmonized tourism service delivery such that tourism service providers meet international and regional standards. This standard tourism service delivery, however, is not explicit on eco-friendly policies these tourism service providers are supposed to adhere to.

The findings indicate that tourism facilities do not have a Leadership in Energy and Environmental Design (LEED) certificate as a sign of commitment to adoption of eco-friendly policies. This certificate is important because tourist facilities demonstrate their commitment to minimizing environmental damage when putting up new or renovating buildings. These facilities should be LEED certified with evidence of appropriate use of alternative energy so that one could operate 'off the grid' and adoption of water conservation practices. A park manager argued that use of tertiary waste water treatment including recycling and eco-friendly disposal practices are in place. Further, lodges are fitted with alternative energy sources such as solar panels.

The researcher also asked park managers, directors of EAC agencies/KWS/TWS/TANAPA and tourism officers in Ministries of EAC and Tourism to identify eco-friendly policies that apply to SMME with regard to tourism related businesses. The number of

respondents was 10. Two questionnaires were not returned. Table 1 is a summary of findings.

Table 1: Eco-friendly Practices in SMME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	LEED certified	0	00.0	00.0	00.0
	Use of alternative energy	4	50.0	50.0	50.0
	Waste water treatment	3	37.5	37.5	87.5
	Recycling/compositing	1	12.5	12.5	100.0
	Practices	8	100.0	100.0	
Total					

Table 1 indicates that fifty per cent (50%) 4 of the respondents agreed to use of alternative energy sources such as solar as a requirement for tourism facilities while thirty-seven per cent (37.5%) 3 of the respondents agreed that treating waste water is a measure while twelve and a half per cent (12.5%) 1 agreed to recycle and compositing practices. These tourism facilities are not environmentally certified.

It is a fact that expansion of wildlife sites and related activities such as creation of hotels, lodges and camps generally improve livelihood of the communities around those sites. However, it affects the environment and natural resources which calls for proper management of waste so that it does not affect the surroundings.

On tourism activities, lodges and camps ensure that education/natural history interpretation is a part of these facilities. To realize this, nature walks are conducted by schedules guided outings for guests to visit the local community. This creates interactive experiences with local leaders, business people, artisans or craftsmen. Even hunting as a tourist activity is done within some ethical hunting programme such as being sensitive to current composition of animal populations. The discussion indicates that culture as a tourist product is not given much attention by park management.

To find out effects of tourism activities by tour operators on culture of local community, the researcher analysed the regional policy which indicates that partner states develop common policies to minimize adverse impacts of tourism on the environment and natural resources. Further, partner states should designate world heritage sites and other conservation areas that protect the environment, respect the rights of local communities and provide appropriate access, infrastructure and services for visitors (EAC, 1999).

The regional tourism policy points out that environmental and natural resources need to be protected from tourism activities. With regard to local communities, their rights need to be protected. By mentioning rights, the policy does not directly imply that local culture needs to be protected from tourism activities. Therefore, protection of local culture is not clearly stated in the policy. One of the key aspects of ecotourism is that local culture remains intact in view of tourism activities.

To this end, the researcher asked park managers, tourism officers in Ministries of EAC and Tourism, directors of EAC agencies, KWS, TWS and TANAPA to identify any socio-cultural effects of tourism activities on the local populace culture in SMME. The number of respondents was 10. Two questionnaires were not returned. Table 2 is a summary of findings:

Table 2: Effects of Tourism Activities on Local Community Culture

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Changes in community value systems and behavior	1	12.5	12.5	12.5
	Commercialization of local culture	3	37.5	37.5	50.0
	Collective traditional life style	3	37.5	37.5	87.5

	Change of Community structure	1	12.5	12.5	100.0
	Total	8	100.0	100.0	

Table 2 indicates that thirty-seven per cent (37.5%) 3 of the respondents agreed that there is commercialization of local culture and collective traditional life style as a result of tourism activities across SMME. Findings show that twelve and half per cent (12.5%) 1 of the respondents agreed that there are changes in community value systems and behaviour, and change of community structure. In an interview, a tourism officer said:

The Maasai depend on their livestock and environment for their basic needs, but things have changed because local community depends on food produced from outside the area. This is due to change of life style from pastoralism to semi-agriculture and pure agriculture. In addition, indigenous medicine-based knowledge is on the decline (Interview held on 30th March, 2018 at Tourism Ministry, Nairobi).

This assertion indicates change in life style as a result of tourism across the SMME. The local community's needs are not fully supported by tourism activities. This finding concurs with Kathryn (2011) argument that ecotourism activities are yet to completely support local community economic needs. However, a tourism officer argued that preservation and maintenance of the indigenous knowledge of traditional Maasai food and medicine is through ethno-botany research that provides a quantitative, analytical understanding of potential impact of these changes to the Maasai Mara ecosystem. Further, educating the young members of the Maasai community about their traditional food, medicines and cultural contexts is important. But cultural distortion is rampant due to tourism activities. In an interview, a tourism officer opined:

Maasai culture is distorted as a result of over-commercialization. For example, traditionally, a Maasai woman would do beadwork for her own beauty, her and for ceremonial purposes such as weddings, circumcision and childbirth ceremonies. Today, the beadwork is not only for beauty and ceremonies but also as a business (Interview held on 3rd May, 2018 at Tourism Ministry, De re salaam).

Traditionally, the Maasai women did bead work for beauty and ceremonies but today it mainly to sell to tourists. Moreover, this business is infiltrated by non-Maasai communities who either imitate the Maasai beadwork or buy them cheaply from the Maasai women. This finding concur with Kathryn (2011) argument that sell of handicraft is a commercial activity. This denies the Maasai their traditional art and crafts heritage as well as income. This beadwork, Maasai 'Shuka' and other traditional craft are now littered in all major towns in Kenya. These negative cultural impacts are a result of host communities' direct and indirect interactions with tourists and with the tourism industry. The effects arise when tourism brings about changes in communities' value systems and behaviour; which has threatened indigenous identity.

Therefore, unchecked tourism activities can cause changes or loss of local cultural identity and values, through commercialization of local culture as is the case with communities living around SMME. Tourism has commercialized local culture, local customs and festivals to conform to tourist expectations. This standardization is as a result of having to satisfy tourists' desires. This could cause severe social stress on local communities in the form of cultural distortion and damage to cultural heritage.

IV. CONCLUSION

On tourism service delivery, each side of the border independently oversees tour operators' operations within its borders. Thus, standardization of registration, licensing and service varies which falls short of regional and international standards service delivery. Tour operators are negatively affected by punitive taxation systems; the most affected side is Serengeti. There is no clear policy to enforce tour operators' support for local community and regulation for them to adhere to environmentally best practices. Tourism policies applicable to Serengeti Mara are yet to be harmonized due to state sovereignty. Lack of harmonization of these norms, practices or strategies with regard to ecotourism development has resulted into little community development, incompatible land uses, restricted flow of tourists between the parks and competition among stakeholders.

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