Utilization of Obstetric Ultrasound Protocols among Sonographers in Five Selected Hospitals within Kampala District

Moses O. Wanjira[1], Namanya Naboth[1], Trevor S.Siakamba[1], Mwanandi K. Mwakemwa[1], Betty M. Namakula[1], Racheal Ankunda[2]

[1]. Bachelor's of Diagnostic ultrasound student Alumni, Ernest Cook Research and Education Institute.
[2]. Department of Research, Ernest Cook Research and Education Institute.

DOI: 10.29322/IJSRP.8.4.2018.p7648
http://dx.doi.org/10.29322/IJSRP.8.4.2018.p7648

Abstract- Objective: To evaluate the availability, knowledge and utilization of obstetric ultrasound protocol among sonographers.

Design: Observational, descriptive, cross-sectional study.

Setting: Radiology departments in; Mulago National Referral hospital, Nsambya hospital, Kibuli Muslim hospital, Case hospital, Lubaga Mission hospital and Naguru hospital.

Participants: 32 Sonographers and radiographers who perform Obstetric ultrasound scanning.

Outcome measures: Availability of protocol manuals, knowledge on usefulness and conformity to the protocols.

Results: Only one of the five participating hospitals in Kampala had obstetric ultrasound protocol manuals on site. However, 81% of sonographers were aware of the existence of obstetric ultrasound protocols. Majority of sonographers (84.4%, 27/32) were knowledgeable about the importance of obstetric ultrasound protocols. Over half (56.3%, 18/32) of the sonographers reported that adherence to obstetric ultrasound protocols helped to achieve accurate diagnosis. Pregnancy localization was done by all participants while uterine wall survey for anomalies was least performed (28.1%, 9/32). Work overload was reported as the main reason for not following protocol all the time (31.3 %, 10/32) and Continuous Medical Education (CME) was suggested as the best way to improve protocol utilization.

Conclusion: Obstetric ultrasound protocols are lacking in most hospitals in Kampala. Despite the lack of protocols, sonographers were knowledgeable on the importance of obstetric protocols especially in regard to achieving accurate diagnosis. Most sonographers observed adhered to most aspects of the obstetric ultrasound protocols. Workload was reported as the main reason for not following protocols and CMEs were recommended by majority as best way of improving compliance to protocols.

Index Terms- Obstetric , Protocol, Sonographer, Ultrasound.

I. Introduction

Obstetric ultrasound protocols are professional standards that are used for systematic examination of pregnant mothers. Since introduction of ultrasonography in the late 1950's, with subsequent publication of Protocols in 1996, ultrasound has become a very useful diagnostic tool in obstetric management (Woo, 2006). Internationally, utilization of obstetric ultrasound protocols has promoted safe and effective use of ultrasound in clinical medicine for more than 50 years as documented by the American institute of ultrasound in medicine (AIUM) in 2013.

Since the publication of the guidelines for professional working standards in 1996, service provision, technology and patient expectations in medical ultrasound have been transformed. These professional working standards are made available to sonographers to be used as guidelines for good practice (United Kingdom association of sonographers - UKAS,2008). Utilization of obstetric ultrasound protocols plays an important role in the examination of every pregnant woman. Protocols facilitate assessment of; fetal viability, number of fetuses, fetal age estimation and identification of fetal anomalies (Novakov et.al, 1999). Protocols also help in standardization of working procedures in radiology departments.

In 2015, new clinical working guidelines and obstetric ultrasound protocols were reviewed and published in Canada by the society of ultrasound in obstetrics and gynecology. The intentions of these standards were to ensure a uniform level of care among the sonographers thorough out Canada and other countries including Uganda (Prenatal Services BC. 2015). In Uganda, the ministry of health produced Standards on diagnostic and therapeutic radiology in 2012. However, conformity to these guidelines in Uganda is not known.

According to Geeta (2003), routine obstetric ultrasound in pregnancy is very important. She further explains when it should be done, how it should be done, who should perform it and how the report should be documented by sonographers. UKAS (2008) concurred with her document, all these findings emphasize the need for compliance to protocols.

In Africa and Uganda in particular the adherence to obstetric ultrasound protocols among the hospitals is not known. No published research work has been conducted to show the extent of conformity to Uganda's Ministry of Health 2012 standards on diagnostic imaging and therapeutic radiology. It is upon this background that we conducted a study to establish the existence and utilization of obstetric ultrasound protocols in five selected hospitals in Kampala district and make necessary

recommendations to improve the quality of obstetric service provision.

II. Materials and Methods

Observational, descriptive, cross-sectional study was conducted to assess utilization of obstetric ultrasound protocols among sonographers in five selected hospitals between July and August 2016.

The study employed various sampling techniques appropriate for each study objective.

a. To determine availability of obstetric ultrasound protocols- the researchers used purposive sampling technique to select five head of departments from the five selected hospital, since they were knowledgeable and were able to provide required information on and show evidence of availability of ultrasound protocols in their departments.
b. To assess the knowledge and utilization of ultrasound protocols, the researchers used stratified sampling technique to select sonographers in five selected hospital. Sonographers were grouped in various strata's which in this study were the hospitals. The researchers then got the list of all sonographers in each hospital. To get the number of sonographers in each hospital (strata) to participate in the study, the following formula was used.

$$x=\frac{f}{N}Xn$$

N=total study population in five hospitals.
n=study sample size.
f=total number of sonographers per hospital.
x=desired sample size per hospital.

After determining the sample size in each hospital, the researchers used simple random sampling technique to select the sonographers who participated in the study. Those selected were then observed by two independent observers while they performed an obstetric ultrasound scan. The observers completed a check list on utilization of obstetric ultrasound protocols while a standardized semi-structured questionnaire was used to assess their knowledge.

The data was collected by the five researchers in five hospitals on different days in a period of two weeks between July and August 2016.

Descriptive statistical analysis was performed with SPSS version 19.0 and results presented using frequencies, tables, charts and graphs.

The study was approved by Mengo Hospital Research and Ethics Committee (MHREC). Clearance to carry out the study was also sought from the respective hospital research committees. Participation was voluntary. The procedure and benefits of the study were explained to the participants. Each participant was provided with informed consent. To ensure confidentiality, code numbers instead of names of sonographer(s) and hospital on the questionnaire were used.

III. RESULTS

Availability of Obstetric Ultrasound Protocols

Table 1: Awareness of availability of obstetric ultrasound protocols

Awareness of obstetric ultrasound protocol	Response	Frequency(n=32)	Percent (%)
	Yes	26	81.2
	No	6	18.8

The majority of sonographers -81.2%, (26/32) were aware of availability of obstetric ultrasound protocols as opposed to only 18.8% (6/32) who were reported not being aware.

Availability of obstetric ultrasound protocol versus knowledge on importance of ultrasound protocols

Table 2: Availability of obstetric ultrasound protocol versus knowledge on importance of ultrasound protocols

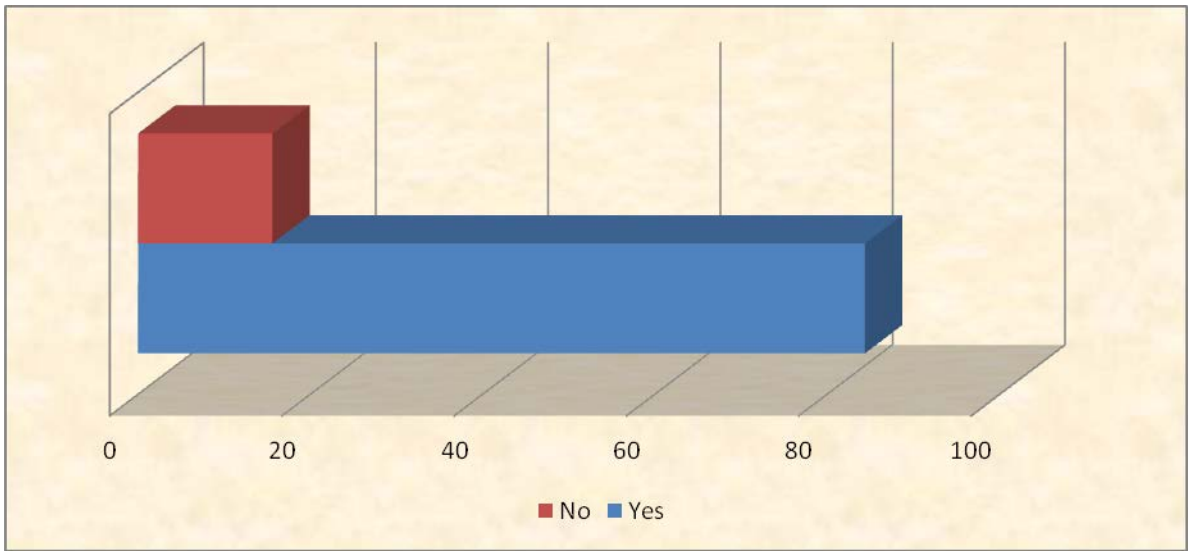
Hospital Code	Number of respondents	Availability of protocol Manual	Knowledge on Importance of Obstetric Protocol	
			Yes	No
A	4	No	4 /4	0/4
B	6	No	4/6	2/6
C	7	No	5/7	2/7
D	10	Yes	8/10	2/10
E	5	No	4/5	1/5

Table 2 above shows that only one hospital (1/5) was observed to have obstetric ultrasound protocol manual on site. It also demonstrated that knowledge on the importance of obstetric protocol was reported in all hospital; A 100%, (4/4), B 66.6% (4/6), C 71.4%, (5/7), D 80% (8/10) and E 80%, (4/5).

Level of knowledge of sonographers on the importance of obstetric ultrasound protocols

The study further ascertained the level of knowledge of sonographers on the importance of obstetric ultrasound protocols.

Figure1: Level of knowledge of sonographers on the importance of obstetric ultrasound protocols



The study findings in figure 1 above show that the majority of the sonographers are knowledgeable about the importance of obstetric ultrasound protocols. Eighty four percent (27/32) were knowledgeable as compared to 15.6% (5/32) who reported that they are not knowledgeable about the importance of obstetric ultrasound protocols.

The sonographers were further probed on the level of knowledge on the specific importance of obstetric ultrasound protocols and the results are presented in table 3 below.

Table 3: Knowledge on Importance of Specific obstetric ultrasound protocols

Knowledge on Importance of the protocols	**Frequency(n=27)**	**Percent (%)**
Accurate diagnosis	18	66.6
Detect fetal anomalies	16	59.2
Better patient management	4	14.8
Viability and position ascertainment	3	11.1
Patient satisfaction and confidence increased	2	7.4
Reduced patient waiting time	2	7.4
Client acceptance	1	3.7
Reduced patient referrals	1	3.7
Ease of scanning	1	3.7
Help to reduce acoustic shadow and artifacts	1	3.7
Allows standardization to reduce variations	1	3.7

***Summation greater than frequency since some participants were aware of more than one importance of obstetric ultrasound protocol.*

The study findings in table 3 above show that the majority of the sonographers acknowledged that obstetric ultrasound protocols help to achieve accurate diagnosis 66.6%(18/27),detection of fetal anomalies 59.2%,(16/27),better patient management 14.8%(4/27), viability and position ascertainment 11.1%(3/32) and reduced patient waiting time 7.4%(2/27). Other importances mentioned were; reduced patient referrals, ease of scanning, reduced acoustic shadow and artifacts and standardization to reduce variations.

Compliance to Obstetric Ultrasound Protocols

Figure 2: How often the recommended obstetric ultrasound protocols are followed by sonographers.

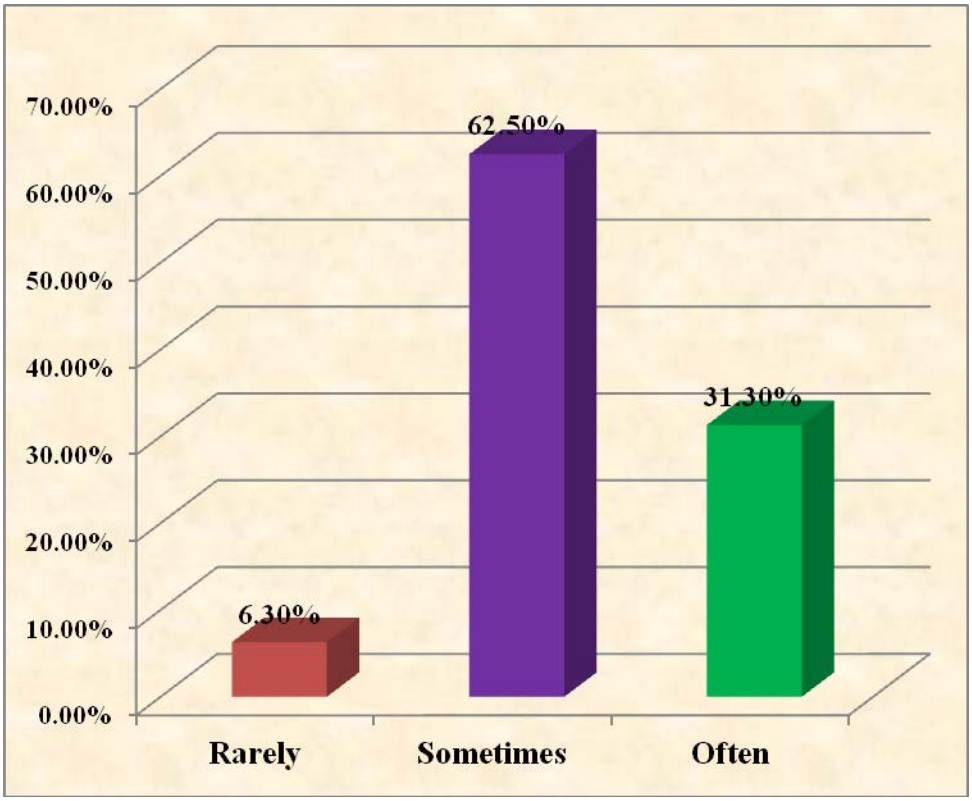


Figure 2 above shows that majority of sonographers (62.5%, 20/32) sometimes follow the recommended obstetric ultrasound protocols, while 31.3% (10/32) often follow the recommended obstetric ultrasound protocols, and only 6.3%(2/32) rarely follow the recommended obstetric ultrasound protocols

Table 4: Observations of compliance to obstetric ultrasound protocols by sonographers

Aspect	Frequency (N= 32)	Percentage (%)
First Trimester		
Pregnancy locations are done	32	100
Sonographer provides privacy to the patient	29	90.6
Fetus Viability is assessed	26	81.3
Early sign of pregnancy failure is noted and documented	25	78.1
Sonographer explains the procedure to the client	23	71.9
Sonographer introduce themselves to the client	17	53.1
Adnexa is surveyed	13	40.6
Uterine anomaly is assessed	11	34.4
Liver is used for setting gains	7	21.9

Second/third trimester		
Sonographer provides privacy to the patient	30	93.8
Sonographer confirms fetal viability	30	93.8
Sonographers confirms whether the pregnancy was intrauterine or extra uterine	29	90.6
Sonographer checks fetal presentation, lie and position	29	90.6
Sonographer confirms the number of fetus using the recommended procedure	28	87.5
Sonographer keen on the patient's consciousness	25	78.1
Sonographer surveys the placenta	24	75
Anatomical fetal survey is done	23	71.9
Sonographer performs fetal biometry accurately	23	71.9
Sonographer explains the procedure to the client	20	62.5
Amniotic fluid quantification is done	19	59.4
Maternal Kidneys are surveyed for presence of hydronephrosis	18	56.3
Sonographer introduce themselves to the client	17	53.1
The liver is used to set the gains	11	34.4
Uterine wall is surveyed for anomaly	9	28.1
Documentations		
Patients report contains relevant clinical information (Patient name, medical record number, age, date and indication)	31	96.9
Placental location and maturity is documented	31	96.9
Fetal anatomical survey is documented	28	87.5
Maternal kidneys survey are documented on the report	28	87.5
Amniotic fluid volume quantification is done	26	81.3
Infection control		
Sonographer cleans the ultrasound probe after every patient	31	96.9
The department has detergents	31	96.9
Sonographer uses gloves during ultrasound scan	20	62.5
The department has enough changing gowns for all patients seen per day	16	50

The results from the observation show that pregnancy locations were perfectly performed as an obstetric ultrasound protocol by 100.0% of participants. Relevant patient clinical information, placenta localization and maturity was performed by 96.9% of sonographers. Amniotic fluid volume quantification was documented by 81.3%(26/32) of respondents.

Majority of sonographers (96.9%) observed infection control by cleaning probe after every patient. However, half of respondents reported that departments did not have enough changing gowns for all patients. Uterine wall survey for anomaly was poorly performed by only 28.1 % and the liver was used for setting gains by only 34.4% of respondents.

Table 5: Reason for not following obstetric ultrasound protocols all the time.

Reason for not following protocols all the time	Frequency(n=32)	Percentage (%)
Workload	10	31.3
Emergency cases	3	9.4
Just ignored	2	6.3
Limited time for patients	1	3.1
Ignorance	1	3.1
Not significant	1	3.1
Under motivation	1	3.1
No response	13	40.6
Total	**32**	**100.0**

Obstetric ultrasound protocols were not followed all the time due to; workload -31.3% (10/32), emergency cases-9.4%(3/32), just ignored-6.3%(2/32) while ignorance, limited time for patients, not significant and under motivation were each reported by a single participant. Forty percent (13/32) of the respondents did not respond to this question.

Table 6: Suggestion on how to improve utilization of obstetric ultrasound protocols.

The study further probed respondents on the ways of improving utilization of protocols among sonographers. The table below represents their various suggestions.

Suggested ways of improving utilization of protocols in the hospital	Frequency(n=32)	Percentage (%)
Continued Medical Education	15	46.9
Pining protocol in the room	3	9.4
Provision of protocol manual for sonographers	3	9.4
Awareness workshops/seminars/ conferences	1	3.1
Constant reminders, set rules, use of templates	1	3.1
Emphasizing their use in the department	1	3.1
Hiring more staff to reduce workload	1	3.1
Policy formulation and enforcement	1	3.1
Infection control	1	3.1
Weekly Seminars with clinicians, midwives, conferences	1	3.1
No response	2	6.3
TOTAL	**32**	**100**

Continuous Medical Education was suggested by majority-46.9% (15/32) as the best way of improving utilization of ultrasound protocols followed by provision of protocol manual -9.4%(3/32) and Pining protocol in the room. Other suggestions included awareness seminars, constant reminders, hiring more staff to reduce workload and policy enforcement.

IV. Discussion

The availability of obstetric ultrasound protocols in five selected hospitals in Kampala

The majority of hospitals did not have the protocol manual and only one hospital had the protocol manual on site. None of the hospitals had any of the obstetric ultrasound manuals pinned

on the wall or disseminated to sonographers. Despite the protocol manual being available in one hospital, it was not readily available for the sonographers to utilize and this might have contributed to some participant reporting that they are not aware of the importance of protocols. This is in contrast to Uganda MOH (2012) document which promotes the availability of obstetric ultrasound protocol manuals in all imaging departments in Uganda. Availability of protocols promotes its utilization as emphasized by Uganda MOH (2012) "protocols should be referred to and followed for all imaging investigations."

The level of knowledge of sonographers on the importance of obstetric ultrasound protocols.

Majority of the sonographers are knowledgeable about the importance of obstetric ultrasound protocols. Being knowledgeable about the importance of obstetric ultrasound protocols is a positive attribute which encourages the sonographers to follow the obstetric ultrasound protocols.

Despite of obstetric manual not being available in four of the five hospitals, knowledge on the importance was reported in all hospitals. This implies that there is no significant correlation between availability of protocol manual and the knowledge on the importance of obstetric ultrasound protocols (Pearson chi-square 0.903, not in results).

The sonographers were further probed on the level of knowledge on the specific importance of obstetric ultrasound protocols and the more than half of the sonographers reported that obstetric ultrasound protocols help to achieve accurate diagnosis. This finding is in line with Steven et.al (1999) who reported that, protocols improve consistency of health care provision. In their study, they observed that patients with identical clinical problems received different care depending on the clinician/sonographer, hospital or location where protocols are not utilized as opposed to where they are utilized. Half of the respondents reported that obstetric ultrasound protocols help to detect fetal anomalies. This is in line with (Novakov et.al, (1999) who stated that protocols facilitate assessment of; fetal viability, number of fetuses, fetal age estimation and identification of fetal anomalies.

The utilization of obstetric ultrasound protocols by sonographers in five selected hospitals in Kampala

The majority of the sonographers reported that they utilize the recommended protocols when performing obstetric ultrasound. This is a promising trend for the sonographers and only needs to be further encouraged to improve on compliance to 100%.

We further assessed how often the recommended obstetric ultrasound protocols are followed by sonographers and we found that more than half of sonographers sometimes follow the recommended obstetric ultrasound protocols , while only a third often follow the recommended obstetric ultrasound protocol often and very few of them rarely follow the protocols. This is an indication that recommended protocols are to large extent followed by sonographers though not at all times. MOH (2012) reported that, adherence to proposed protocols increases the benefits ultrasonography offers in the management of obstetric patients and maximizes the possibility of detecting many fetal anomaly. Therefore obstetric ultrasound protocol should be easily accessible in all healthcare institutions to make it easier for them to be followed.

The study determined how various component of protocol was being observed by sonographers. Pregnancy location was observed by 100% (32/32) of participants. This is in line with (AIUM2013, SOGC2005 and UKAS, 2008) recommendation and should be maintained through rewarding strategies such as certificates of good performance. However, poorly performed were uterine wall survey and using liver for setting gain and so more emphasis should be ensured to improve compliance. In addition we assessed ways of improving conformity to protocols and Continued Medical Education (CME) was suggested by most participants. This was supported by ASA (2014) recommendation that, "relevant professional development should continue through a sonographer's working life since science and technology develops and society changes." Heads of radiology departments should encourage all sonographers to participate in CMEs on obstetric ultrasound.

Despite the fact that obstetric ultrasound protocols were lacking in most hospitals in Kampala, majority of the sonographers are knowledgeable about the importance of obstetric ultrasound protocols. Most of the sonographers acknowledged that obstetric ultrasound protocols aids in achieving accurate diagnosis. Most sonographers observed adhered to the recommended obstetric ultrasound protocols. Fetal localization was done by majority of sonographers. However, uterine wall survey for anomalies and use of the liver for setting gains was poorly observed by most sonographers.

Work overload was quoted by most participants as the main reason for not following protocols always. Continuous medical education was suggested by majority as the best way of improving compliance to protocols

Competing Interest
No competing interest declared

Funding
The research was funded by the researchers only.

REFERENCES

[1] America Institute of Ultrasound in Medicine (2013) AIUM Practice Parameter For The Obstetric Ultrasound Examination
Available from: www.**aium**.org

[2] Australasian sonographers association (ASA, 2014) *Standard of Practice.*
Available from: http:a-s-a.com.au

[3] British Medical Ultrasound Society (BMUS 2009) Guidelines for the Safe Use of Diagnostic Ultrasound Equipment Pp 2-6.
Available from: www.bmus.org

[4] Geeta Sharma, S.T.(2003) *Routine Use of Obstetric Ultrasound: A Textbook of Obstetric and Gynecology*.1st edition, Pp 74-88, New York, Parthenon Publishing.

[5] Ministry of Health (2012) Standard on Diagnostic Imaging and Therapeutic Radiology In Uganda 1st edition.

[6] Novakov A, Vejnovic T, Stojic S, Belopalvovic Z (1999): A Proposed Protocol for Obstetric Ultrasound Examination.

[7] Perinatal Services BC.(2015) Healthy Women Having Healthy Pregnancy and Infants.
Available from: www.perinatalservicesbc.ca

[8] Society of obstetrician and gynecology (SOGC, 2005) *Clinical Practice Guidelines.*

Available from: http://www.sogc.org

[9] Steven H Woolf, Richard Grol, Allen Hutchison, Martin Eccles, Jeremy G.(1999) *Potentials Benefits, Limitation and Harms of Clinical Guidelines.* Pp 318-321.

[10] Woo, J.S (2006) Obstetric Ultrasound: A Comprehensive Guide. Available from: http://www.research.easybib.com

Figures and Tables

List of Tables

List of Figures

AUTHORS

First Author – Wanjira Otieno Moses, Bachelors of Diagnostic Ultrasound, ECUREI, moses.wanjira@gmail.com

Second Author – Siakamba Trevor Ishmael, Bachelor of Diagnostic Ultrasound, ECUREI, siakamba@yahoo.com

Third Author – Naboth Namanya, Bachelor of Diagnostic Ultrasound, ECUREI, namanyanaboth2@gmail.com

Fourth Author – Mwanandi S.Mwakemwa, Bachelors of Diagnostic Ultrasound, ECUREI, mfede1961@yahoo.com

Fifth Author – Namakula Betty, Bachelor of Diagnostic Ultrasound, ECUREI, betty@yahoo.com

Sixth Author – Racheal Ankunda, Master in Public Health, ECUREI,ancheal2002@yahoo.com

Correspondence Author – Wanjira Otieno Moses, moses.wanjira@gmail.com, moses.wanjira@yahoo.com, phone +254721302099.