

Knowledge Attitude and Practices Towards the Use of Insecticide Treated Mosquito Nets Among Pregnant Women in Lukolo Health Center III Jinja District.

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Abstract



Background:^a

There are an estimated 25 million pregnancies in sub-Saharan Africa at risk of malaria, the consequences of which can be serious for both mother and fetus in terms of morbidity and mortality. The Government of Uganda (GOU) through the Ministry of Health (MOH) and implementing partners like the Global Fund and the Roll Back Malaria initiative were compelled to try to maximize the use of Insecticide Treated mosquito Nets (ITNs) to mitigate the effects of malaria among vulnerable populations.

Methodology:

A descriptive cross-sectional survey was used which involved both qualitative and quantitative methods of data collection and it involved 126 (one hundred twenty-six) respondents using self-administered questionnaires. Data collected was thematically presented and analyzed using descriptive frequencies and percentages using Microsoft excel.

Results

This study showed that pregnant mothers' knowledge of the use of insecticide-treated nets was good. However, the respondents' attitude towards the use of Insecticide-treated nets was poor/ negative as up-to 60% of them felt putting on the mosquito net was inconveniencing, 67% didn't think that it was important to sleep under an ITN when one had taken Fansidar at ANC. Also, the practice of pregnant mothers towards the use of ITNs was not good too as only (43%) of the mothers had ITNs. A big number (71%) couldn't afford them, and (10%) believed they didn't need them. Important to note too, most (57%) mothers continued to use ITNS even when they had holes as, (3%) used it for other things like catching white ants.

Conclusions and recommendations:

The majority of the pregnant mothers' knowledge towards the use of insecticide-treated nets was good as mothers could identify that malaria is transmitted by mosquitoes. The government, through the Ministry of Health, should intensify free distribution of nets by conducting frequent mass distribution campaigns in the country.

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1 Background

Malaria is a parasitic infection caused by malaria parasites and transmitted by a female anopheles mosquito (Schantz *et al.*, 2010). Worldwide, an estimated half of world populations are at risk of malaria (WHO,2020). It was revealed that Malaria poses an enormous burden to the world's population, with 216 million cases and 655,000 deaths attributable to this mosquito-transmitted parasite in 2010 alone (Fuge *et al.*, 2015). According to Odoko *et al.*, (2017), Malaria, the burden is largely borne by Africa where 91 % of deaths occur, with pregnant women, their unborn babies, and children under five years of age most at risk of infection and adverse outcomes (Fuge *et al.*, 2015). These groups are at high risk due to weakened and immature immunity respectively (Fuge, 2015).

Center for Disease Control (CDC, 2020) notes that each year, there are an estimated 25 million pregnancies in sub-Saharan Africa at risk of malaria, the consequences of which can be serious for both mother and fetus in terms of morbidity and mortality. Schantz *et al.*, (2019). Low birth weight (<2500 g) is considered to be the leading cause of death among infants in sub-Saharan Africa (Adeyemi, 2017).

Taremwa *et al.*, (2017) note that Malaria remains a major infectious disease in most developing countries. Uganda has the third-largest malaria burden in Africa, and malaria accounts for high morbidity and mortality among pregnant women and children under five. Malaria during pregnancy is linked to gestational anemia that is associated with low birth weight, abortion, and miscarriage.

Due to such effects, the Government of Uganda (GOU) through the Ministry of Health (MOH) and implementing partners like the Global Fund and the Roll Back Malaria initiative were compelled to try to maximize the use of Insecticide Treated Mosquito Nets (ITNs) to mitigate the effects of malaria among vulnerable populations. Also, the World Health Organization-Global Malaria Program encouraged global efforts to fortify the use of ITNs for malaria prevention. The use of effective ITNs are considered key to the elimination of the mentioned advance sequela among the vulnerable populations (WHO, 2010).

As a result of these concerted efforts Ugandan household, ITN possession rate rose from 47% in 2009, to 60% in 2011 and 90% in 2014. It is antic-

ipated that ITN possession will rise ensuing government programs to implement regular replacements. Although ITN use has proven to be effective in the prevention of malaria, the end-user acceptability remains a prime challenge Uganda Bureau of Statistics (UBOS, 2014). Therefore, given the high rate of household possession of ITNs in Uganda, yet the continuing high rates for malaria, this prompted the researcher to carry out a study to explore the knowledge attitude and practices towards the use of insecticide-treated mosquito nets among pregnant women in lukolo health center III, Jinja District, Uganda.

According to the WHO malaria report 2011, a total of 655,000 deaths are reported globally. Of these, 91% occurred in Africa alone. WHO recommends the effective use of ITNs as a key to the elimination of malaria infections among pregnant mothers and children (WHO, 2010). As a result of these concerted efforts, UBOS (2014) reported that the Ugandan household ITN possession rate rose from 47% in 2009, to 60% in 2011 and 90% in 2014. And it is anticipated that ITN possession will raise ensuing government programs to implement regular replacements. Although ITN use has proven to be effective in the prevention of malaria, the end-user acceptability remains a prime challenge. Despite such efforts by the government, Health Information Management System (HIMS 2018) of lukolo H/C III, 6 out of every 10 admitted pregnant mothers are diagnosed with Malaria. Therefore, these continuing high rates for malaria prompted the researcher to carry out a study to explore the knowledge and attitude towards the use of insecticide-treated mosquito nets among pregnant women in lukolo Village, Jinja District.

2 METHODOLOGY

Study design and rationale.

The study was a descriptive cross-sectional study design that used qualitative and quantitative methods of data collection. The study design was chosen because would give the researcher the ability to easily gather information without bias. The design was also chosen because it would offer the researcher an opportunity for probing for more information through explanations of otherwise unclear responses

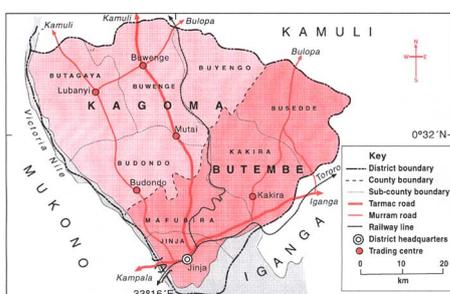
Study area rationale.

The study was conducted in the Jinja district with a focus at lukolo health center III. Jinja District is located in the Southeastern part of Uganda. The district is subdivided into 3 counties namely, Butembe, Kagoma, and Jinja Municipality. The district is bordered by Kamuli, to the north, Luuka to the east, Mayuge to the southeast, Buvuma to the south, Buikwe to the west, and Kayunga Districts to the northwest. The biggest population of the occupants are Basoga, the other ethnicities in the district (15%) include the Baganda, the Bagisu, the Iteso, the Karimojong, and the Bagwere to mention, etc.

Lukolo health center III is found in Budondo County, Lukolo village, nawangoma parish It is a 25-bed public health center II under the Uganda Ministry of Health. It offers; Health Education, Nutrition screening and treatment, Environmental Health (WASH) and Sexual and Reproductive Health, Immunization, General screening of various disease conditions and Family Planning services, Outpatient and emergency care services, Inpatient care, HIV/TB care, Maternity, Antenatal, Postnatal, Dental care, Eyecare, Mental health care, Laboratory Services, and referral. It boasts of a workforce of at least 30 Health workers.

It was used for this study because it's the most active Health unit in the parish, and receives a great number of pregnant mothers, and would enable the researcher to get the required number of respondents without bias. The research would help draw measures for any shortcomings in the prevention of malaria and the deaths it results in.

2.1 Map of Jinja district showing the location of the study area



Study population.

The study included all the pregnant mothers that attend lukolo health center III, Jinja District.

2.2 Sample size determination

The research used a sample size that was calculated from a static formula

$$N = z^2pq \text{ The Kish and Leis Lie formula (1965). } d^2$$

Where,

n- Required sample size

d- Error of 10%

z- Represents 1.96 critical value of the standard normal distribution.

P-estimated prevalence of malaria in pregnant mothers was 0.91% deaths occurrences in Africa (Fuge, Ayanto and Garmano, 2015)

Q-100-p.

$$n = (1.96)^2 \times 0.91 \times (1-0.91) \div (0.05)^2$$

$$n = 126$$

Therefore, the sample size was 126 respondents expected in the study.

Sampling technique.

The researcher employed a simple random sampling technique to select the students.

Sampling Procedure.

The sample size was selected by a simple random method. The researcher wrote "Yes" on 10 small papers and "NO" on the other 10 small papers, mixed all together in a box. I then instructed the mothers each to pick only one. Whoever picked a paper with Yes was interviewed thus 10 mothers were recruited every day for 2 weeks and 3 days from 8:30 am to 4:30 pm making a total of 30 respondents.

Inclusion Criteria.

Only pregnant mothers that attend Lukolo health center III who was available and willing to consent to participate in the study were included.

Study Variables.

Independent variables

Included; Age, marital status, religion, occupation, approximate monthly income, and education levels.

Dependent variables.

(a). The knowledge of the pregnant mothers regarding the use of insecticide-treated mosquito nets?

(b). The attitude of pregnant mothers towards the use of insecticide-treated mosquito nets?

(c). The practices of pregnant mothers towards the use of insecticide-treated mosquito nets?

Data collection procedure

Before data was collected, the research team first introduced themselves to the lukolo health

III administration. They briefed them about the intended study and its objectives for which permission was sought and access was granted to access the facility (maternity wing) and consequently the eligible participants.

After an introduction and briefing rounds at the facility (maternity wing), participants were selected using the simple random method. Data was collected by the research team from the eligible participants using self-administered questionnaires upon explaining the purpose of the study and them voluntarily consenting to take part in the study.

Data collection methods

Data collection will be done by the principal investigator to administer the Questionnaire and Informed Consent Forms for Focus Group Discussions on the Knowledge attitude and practices towards the use of insecticide-treated mosquito nets among pregnant women in Lukolo Health Center III, Jinja district.

Focus group discussion

Focus groups, a total of six focused group meetings (3 for mothers and 3 for fathers separately) was held each with eight respondents. An FGD guide was developed to elicit information regarding socio-cultural issues. This technique was used to provide data on food taboos, child feeding practices, social food norms, and cultural beliefs affecting diet/food choices, beliefs on breastfeeding, general knowledge, and other culturally associated issues. The moderator was a public health officer who was well versed in the Ateso language; there were two note-takers and two observers. The guide was prepared in English and later translated to Luganda (the local language).

Data Collection Procedure.

The data was collected using a pretested semi-structured questionnaire that was answered by the pregnant mothers in the health center

Piloting the study.

A pilot study was carried out at maternity ward lukolo health III to check whether data collection tools suitable to be used for data collection and make sure that it was safe and convenient for the study. This was done by pre-testing the tools before the actual data collection.

Data quality control.

Data quality control was assured through the following;

a) Training of research assistant.

b) A clear inclusion and exclusion criterion was made i.e. only respondents who consent were take part in the study while those who did not consent were not part of the study.

c) The questionnaires were pre-tested before the actual process of data collection.

d) Ample time was allowed for the collection of the data to enable the researcher to attend to his respondents.

Data interpretation, analysis, and presentation.

Data was collected, compiled manually be sorted, processed, and analyzed manually using scientific calculators and results will be presented in statements, percentages, figures, frequency distribution tables, bar graphs, pie-charts, etc. for easy interpretation and the averages were determined.

Ethical Considerations.

The proposal was approved; an introductory letter was obtained from the Principal Mildmay Institute of health sciences which was presented to the In-charge of Lukolo health center III who granted the researcher permission to research the unit. The researcher obtained consent from the respondents every day and the respondents were assured of absolute confidentiality. The respondents did not write their names on the interview guide.

3 Limitations of the Study.

1) The impatience by the mothers as they wanted to be worked on so they could go back home.

2) Time; since the study time was limited. The researcher used quicker methods like the use of a questionnaire in data collection which saved time.

3) The limited funds delayed the completion of the study. The researcher had to mobilize funds from reliable sources.

Dissemination of Results.

The research findings on the factors of pneumonia among children under-five years were disseminated to all stakeholders.

A copy was submitted to UAHEB (Uganda Allied Health Examinations Board) in partial fulfillment for the award of Diploma in Clinical Medicine and Community Health.

Lukolo health center III administration for any appropriate interventions.

The Library of Mild May School of Clinical Officers (MSOCO) for further references.

The research supervisor an appreciation for his contribution.

3.1 Copy is retained for the researcher's records

DATA PRESENTATION AND ANALYSIS

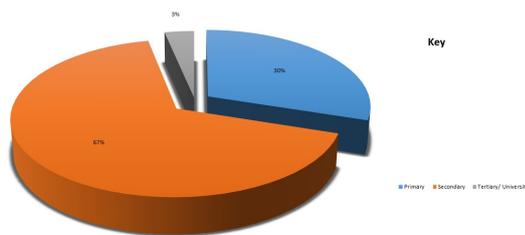
Socio-demographic data of the respondents:

From the table above, the majority of the respondents were aged between 26 and 33 years 72(57.1%), and the least 4 (3.8%) 42 and above.

Regarding respondents' religion, the majority of them were Anglicans 51(40.4%), and the minority 8 (6.3%) Muslims.

About the respondent's marital status, most of them were married 109(86.3%), and the least 4(3.2%) cohabiting.

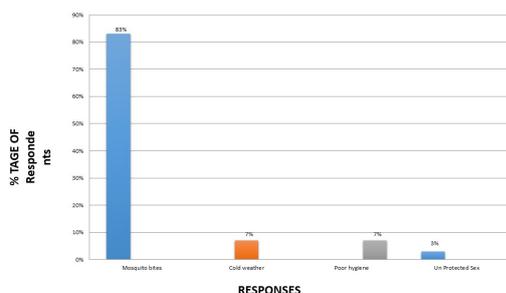
Figure 1: Showing Respondents' level of education



According to figure 1, above the majority of the respondents, 84(67%) had studied up-to secondary level, and the minority 4(3%) reached university

Knowledge of pregnant mothers towards the use of Insecticide Treated Nets.

Figure 3: Responses on how malaria is transmitted.



From figure 2 above, the majority 104(83%) of the respondents said that malaria was transmitted

through mosquito bites while the least 4(3%) said unprotected sex.

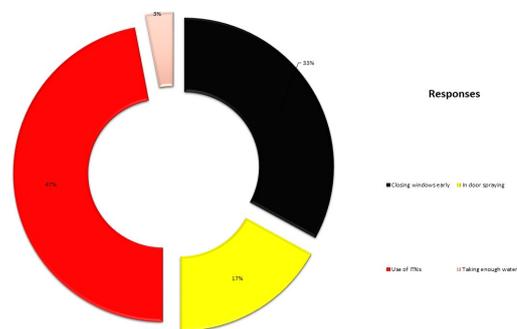
Text 1: Responses on any four signs and symptoms of malaria.

The majority 67(53%) of the participant mentioned 3 and below while the minority 18(47%) gave all the four correct signs and symptoms.

Text 2: Responses on the cause of malaria.

The majority 84(67%) of the participants replied that it was malaria parasites, a few 16 (13%) said playing in rain while the least 9 (7%) attributed it to cold weather.

Figure 4: Showing responses on how malaria can be prevented



From the figure above, most 59(47%) of the respondents noted that malaria could be prevented by the use of Insecticide-treated Nets. The least 4(3%) drinking enough water.

From the above table, the findings revealed that the majority of the respondents, 59(47%) answered that mosquitoes breed in stagnant water while the least 4(3%) in the latrines.

Text 3: Response on where participants got the information regarding Insecticide-treated nets.

When asked the above question, most of the respondents, 72 (57%) attributed it to the hospital, a few 42(33%) on radio and TV while the least 12(10%) from neighbours.

The attitude of pregnant mothers towards the use of insecticide-treated nets.

According to table 4 above, when respondents were asked whether they believed the use of ITNs was the best way of preventing malaria, the majority 67(53%) said no while the remainder, 59(47%) answered yes.

Regarding if one could die due to malaria if you didn't use an ITN, most 67(53%) answered yes while the least, 9(7%) weren't sure.

Table 1. Showing socio-demographic data of the respondents.

Responses	Frequency (n=126)	Percentage (%)
Age:		
18 – 25 years	42	33.3
26 – 33 years	72	57.1
34 – 41 years	8	6.3
42 and above	4	3.8
Marital status:		
Married	109	86.5
Single	13	10.3
Divorced	0	0
Cohabiting	4	3.2
Religion:		
Catholics	42	33.3
Pentecost	25	20
Anglican	51	40.4
Moslems	8	6.3

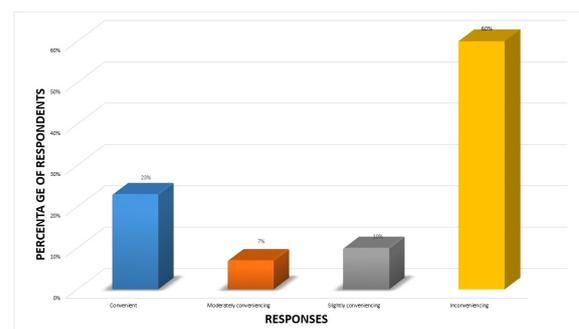
Table 2. Responses on where mosquitoes breed from.

RESPONSES	FREQUENCY;N=126	PERCENTAGE (%)
Stagnant water	59	47
Bushes around the home	50	40
In Cold environment	13	10
In latrines	4	3

Table 3. Showing the distribution of responses on the attitude of pregnant mothers towards the use of insecticide-treated nets (ITNs).

Responses	Frequency (n= 126)	Percentage (%)
Yes	59	47
Do No	67	53
you Yes	67	53
Ben No	50	40
ive Not sure	9	7
the Yes	42	33
Do No	84	67

About whether it was important to sleep under an ITN when one had taken Fansidar at ANC majority 84(67%) of the respondents answered no while the least 42(33%) said no.

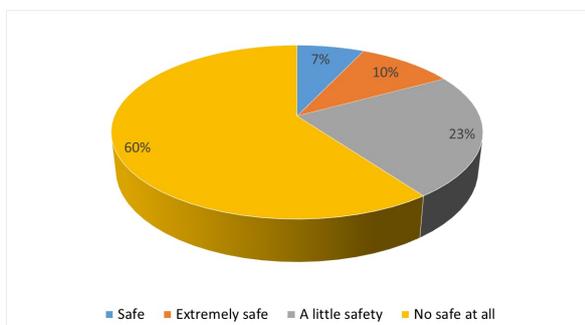
**Figure 5: Responses on convenience to use the Insecticide-treated nets on beds.**

From the figure above, most 75(60%) of the respondents found putting the ITNs on bed inconveniencing. And the least, 9 (7%) moderately inconveniencing.

Text 4: Responses on how they felt when using the insecticide-treated nets.

In regards to the above, majority 67(53.2%) of the respondents reported sweating a lot when using the ITN. A few 42(33.3%) felt safe while the least 17(13.5%) felt they could suffocate.

Figure 6: Responses on how respondents thought as regards the safety of the Insecticide Treated Nets.



About the safety of using ITNs to their health in the prevention of malaria in pregnancy, most 75(60%) believed they were not safe at all. The least 9(7%) thought that they are extremely safe.

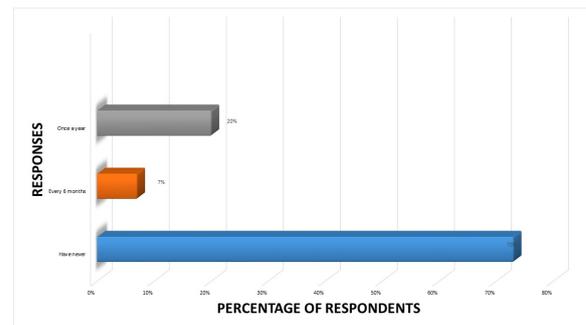
Practices of pregnant mothers towards the use of Insecticide-treated nets.

From table 5, above indicates that a majority of 72(57%) of the participants disagreed that they didn't have ITNs while the least 54(43%) had them.

Amongst those that said No, most 84(71%) couldn't afford them, a few 29(23%) found it hard access them on the market while the least, 13(10%) believed they didn't need them

In regards to the respondent's practice of using the ITNs, the biggest number 88(70%) used them once in a while the least, 9(7%) did not use them.

Figure 7: Responses on how often respondents re-treated the insecticide-treated nets.

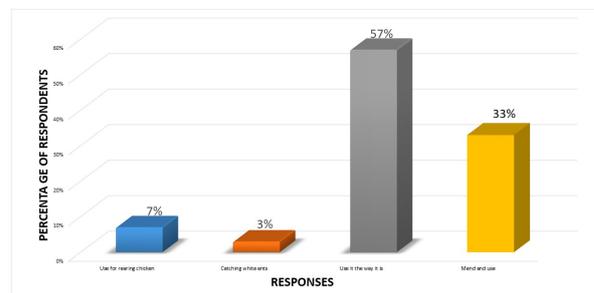


About how often respondents retreated the ITNs as seen above, the majority 92(73%) of them had never done so. And the minority 9(7%) every six months.

Text 5: Respondents' reasoning for not re-treating their ITNs.

In regards to the above, most of the respondents 97(77%) who never took their nets for re-treating said they didn't find it necessary. The least 6(5%) said had not been told to; when getting them.

Figure 8: Responses on what they do for the ITNs that develop holes.



As seen above, most 72(57%) of the respondents used the ITNs even when they saw it had holes. The least, 4(3%) used it for catching white ants.

4 Discussion of study findings
Socio-demographic characteristics of the respondents.

From the study, the majority 72(57.1%) of the respondents were aged between 26 and 33 years, and the least 4(3.8%) 42 and above. This could be possible because the former are the age brackets where women are highly more reproductive. And the latter, are fewer as probably they could have already had children and tending towards menopause.

Table 4. Showing the distribution of responses on practices pregnant mother towards the use of Insecticide-treated nets (ITNs).

Responses	Frequency (n= 126)	Percentage (%)
Yes	54	43
No	72	57
you Couldn't afford	84	71
I have No easily found on market	29	23
an- I don't need it	13	10
ever Every night	29	23
how Once in a while	88	70
if? Never	9	7

Regarding respondents' religion, the majority of them were Anglicans 51(40.4%) and the minority 8(6.3%) Muslims. This could be related to the fact that the composition of Anglicans in the general population and specifically the region is higher than the rest of the denominations.

About the respondent's marital status, most of them were married 109(86.5%), and the least 4(3.2%) cohabiting. Most of them are married since they are of age to have families and produce children.

Regarding the sources of income of the respondents, the majority 72(57%) of the respondents ran businesses. This could be probably because they had no official jobs. The least 13(3%) were employed. These few had finished school and therefore had secured jobs for themselves

About the respondents' level of education, most of the respondents 84(67%) had studied up to secondary level. This could be because of the presence of free education that is offered by the government from primary to secondary. The least 4(3%) reached university. These could have been fortunate enough to afford university education or even bright enough to have secured sponsorship from the government or elsewhere.

Knowledge of pregnant mothers regarding the use of Insecticide Treated Mosquito Nets.

According to the study, regarding the respondents' knowledge of the mode of transmission of malaria; the majority 104(83%) of the respondents said that malaria was transmitted through mosquito bites while the least 4(3%) answered unprotected sex. This showed the presence of some knowledge among the mothers. This is in agreement with Obo *et al.*, (2011) cross-sectional survey conducted in Uganda, on knowledge and Miscon-

ceptions about Malaria among Pregnant Women in a Post-Conflict Internally Displaced Persons' Camps in Gulu District that revealed that most (80%) respondents attributed malaria to be transmitted by mosquito bites, while a few 35 said not sleeping under a net.

About the responses as regards the signs and symptoms of malaria, most 67(53%) of the participants mentioned 3 and below while a few 18(47%) gave all the four correct signs and symptoms. This latter may be probably because they had ever nursed children or had ever suffered from malaria themselves. This showed that most of the respondents had some knowledge regarding the signs and symptoms of malaria. This is in support by (Khumbulani *et al.*, 2010) case-control study carried out in Ethiopia on caregivers' knowledge, perceptions, and health-seeking behavior towards childhood malaria that showed that mothers who were aware of signs, were less likely to suffer from malaria than those who didn't know the signs of malaria.

When respondents were asked about the causes of malaria, the majority 84(67%) of them replied that it was malaria parasites. This could probably be because they had learned about it in secondary school. The least 9(7%) attributed it to cold weather. This is supported by Erhun, *et al.*, (2014) study on Malaria prevention: knowledge, attitude, and practice in Lagos, where most (91%) respondents mentioned that malaria was caused by malaria parasites, 19 mentioned cold weather, and 6 mentioned eating mangoes.

Regarding the most effective method of preventing malaria, most 59(47%) of the respondents noted that malaria could be prevented by the use of Insecticide-treated Nets. The least 4(3%) drinking enough water. This showed the misinformation of

some respondents because not even half of them mentioned the most correct answer. This study comes in agreement with Tayseir *et al.*, (2015) study of the knowledge, attitude, and practices among mothers towards ITNs in Abuharira Village, where the respondents' knowledge about ITNs was somewhat fair among mothers. The majority, (51%) of them knew that mosquito bites/ malaria could effectively be prevented by the use of ITNS.

About the breeding sites of mosquitoes, the findings revealed that the majority of the respondents, 59(47%) answered that mosquitoes breed in stagnant water. This could be because they teach about it at antenatal. The least 4(3%) in the latrines. These may be the ones that do not often attend antenatal. This is supported by Oladepo *et al.*, (2010) submission on malaria knowledge and agricultural practices that promote mosquito breeding in two rural farming communities in Oyo State, Nigeria where it was concluded that agricultural practices such as the use of irrigation during rice cultivation, the use of ponds for fish farming and the storage of water in tanks for livestock provide suitable breeding grounds for the mosquito.

When participants were asked where they got the information regarding Insecticide-treated nets from; most of the respondents, 75(57%) attributed it to the hospital, a few (33%) on radio and TV while the least 12(10%) from neighbours. This showed that information was not fully passed on to the mothers. However, in another study carried out in Wakiso on Knowledge and practices on malaria prevention, it was established that knowledge on malaria prevention methods was low. Among those that had some knowledge attributed it to media, health workers, and the government through MoH's extensive campaign on increasing awareness and use of ITNs in recent years, including free distribution of pregnant women. (Musoke, 2015).

The attitude of pregnant mothers towards the use of insecticide-treated nets.

About respondents' responses on whether they believed the use of ITNs was the best way of preventing malaria, most 67(53%) said no. This could be because they also received other interventions like the use of drugs in antenatal. Tayseir *et al.*, (2015) study of the knowledge, attitude, and practices among mothers towards insecticide-treated nets in Abuharira Village also are in support of the above as it revealed that the majority of the participants had a negative attitude towards the use

of the ITNs as only 27.1% of mothers agreed that using an ITN is the best way to prevent malaria infection.

However, the remainder, 59(47%) answered yes. These could have gotten enough information regarding the management and prevention of malaria.

About whether it was important to sleep under an ITN when one had taken Fansidar at ANC majority 84(67%) of the respondents answered no while the least 44(33%) said yes. The former may have thought Fansidar is good enough to protect them while the latter fully understood the importance of ITNs from the health workers at the antenatal. Fuge *et al.*, (2015) study on the assessment of knowledge, attitude and practice about malaria and ITNs utilization among pregnant women in Southern Ethiopia, is also in agreement with the above as it revealed that the majority of the mothers did not find it important to use ITN as they were receiving drugs to prevent malaria during ANC visits.

About the above, the study also found out that, most 63(53%) answered yes in regards to the question of whether one could die due to malaria if they didn't use an ITN. Some of them may have witnessed the death of children and pregnant mothers due to malaria. The least, 9(7%) weren't sure.

Regarding the respondents' responses on convenience to use the Insecticide-treated nets on beds, most 75(60%) of them it inconveniencing. Probably because one had to put in around the bed and well tucked in even when they were tired. And the least, 9(7%) moderately inconveniencing. These may have weighed the risk of not putting it on versus no putting on the ITN. Belay and Deressa *et al.*, (2018) study on the use of insecticide-treated nets by pregnant women in northern Ethiopia also is in agreement with this as they reported that 66.8% of the respondents had a negative attitude and linked it to their thoughts that the ITNs waste a lot of time putting them on their beds.

In regards to how mothers felt when using the insecticide-treated nets, the majority 67(53.2%) of them reported sweating a lot when using the ITN. This could have been related to the hot weather sometimes. A few (33%) felt safe while the least 17(13.5%) felt they could suffocate. This showed that most respondents had a negative attitude toward the use of ITNs. This is in support of Okwa *et al.*,(2012) as regards the Artisans and traders' knowledge, attitude, and practices of malaria con-

trol in selected areas of Lagos, Nigeria discovered that slightly more than half of the pregnant women (51.1 %) had a negative attitude towards ITNs. Many of them felt nets made them sweat, suffocate, and are allergic to them.

By how respondents thought as regards the safety of the Insecticide Treated Nets to their health in the prevention of malaria in pregnancy, most 75(60%) believed they were not safe at all. This could be related to their concerns about the presence of chemicals in them that they thought could harm them or may have shown reactions. The least 9(7%) thought that they are extremely safe. The latter may have never shown any reaction after using these nets. Belay *et al.*, (2018) study on the use of insecticide-treated nets by pregnant women in northern Ethiopia also supports this as they reported that 66.8% of the respondents had a negative attitude and linked it to their thoughts that the ITNs were not safe for them.

Practices of pregnant mothers towards the use of Insecticide Treated Nets

When pregnant mothers were asked if they owned an Insecticide-treated net, the majority 72(57%) of the participants disagreed while a few 54(43%) agreed. The former may have not taken an interest or even did not know their use while the latter had received them from the health facilities around them. This is in opposition with Tayseir *et al.*, (2015) study of the knowledge, attitude, and practices among mothers towards insecticide-treated nets in Abuharira Village: where the results revealed that (66.0%) of mothers reported that they owned an ITN.

About the above, amongst those that said No, most 84(71%) couldn't afford them, a few 29(23%) found it hard to access them on the market while the least, 13(10%) believed they didn't need them. This is in agreement with Musoke *et al.*, (2015) study carried out in Uganda on Knowledge and practices on malaria prevention in two rural communities in Wakiso District: where it was noted that the practice of use of ITNs among pregnant mothers was low as they were seen to be expensive and is unavailable on the local markets.

Regarding how often pregnant mothers used the ITNs, the biggest number 88(70%) used them once in a while the least, 9(7%) did not use them. Those that used them may have understood the benefits of sleeping under the ITN. Steketee *et al.*, (2011) report on the Burden of Malaria in Pregnancy in

Malarial-Endemic Areas; also shows the poor practices towards the use of these nets as only (21.4 %) of the mothers used ITNs every night rather than the majority of them (78.6 %) that used them seasonally particularly during the cold season as they believed that that's when mosquitoes bite.

About the responses on how often respondents re-treated the insecticide-treated nets; the majority 92(73%) of them had never done so. This could be probably because they had never been told of the need to do so. The minority 9(7%) every six months. Guyatt *et al.*, (2011) study on malaria in pregnancy as an indirect cause of infant mortality in sub-Saharan Africa equally revealed this poor practice towards the use of ITNS as they found out that majority of the respondents took excessively too long to re-treat their nets, with a few doing it within the normally recommended interval of six months.

When the respondents that didn't re-treat their ITNs were asked why most of them 97(77%) reasoned that they didn't find it necessary. The least 6(5%) said had not been told to; when getting them. Such reasons could be related to those found out by Nwabiani *et al.*, (2011) study on assessing the knowledge, attitude, and practice of pregnant women and their families in the utilization of ITNs in Ghana, which concluded that almost all of the pregnant women (96.8 %) who owned ITNs had never re-treated their ITNs mainly because of the absence of K-O tab in the area.

As regards what pregnant mothers could do for the ITNs that developed holes, most 72(57%) of them continued to use them the way they were. These may not even have thought of the fact that they can be mended. The least, 4(3%) used it for other things like catching white ants. The Malaria Consortium (2018) in their baseline study on strengthening Uganda's response to malaria (SURMA) in Mid-north and Karamoja sub-region, also noted that nets given by the government were used for fishing, making ropes to tether animals, catching white ants, etc. Which is such a bad practice.

5 Conclusions

Basing on the research findings, the majority of the pregnant mothers' knowledge of the use of insecticide-treated nets was good. As mothers could identify that malaria is transmitted by

mosquitoes, knew the different breeding sites of mosquitoes and understood that the use of ITNs was one of the preventive measures of malaria.

However, the respondents' attitude towards the use of Insecticide-treated nets was poor/ negative as up-to 60% of them felt putting on the mosquito net was inconveniencing, 67% didn't think that it was important to sleep under an ITN when one had taken Fansidar at ANC.

Also, the practice of pregnant mothers towards the use of ITNs was not good too as only (43%) of the mothers had ITNs. A big number (71%) couldn't afford them, and (10%) believed they didn't need them. Important to note too, most (57%) mothers continued to use ITNS even when they had holes as, (3%) used it for other things like catching white ants.

Recommendations

Having demonstrated that most women were unable to afford insecticide-treated nets and, given the need to increase net use among this very vulnerable group, the government, through the Ministry of Health, should intensify free distribution of nets by conducting frequent mass distribution campaigns in the country. The other possibility which the government could explore in the bid to increase net coverage is to use the existing ANC network throughout the country. In this manner, more women are likely to be reached, since there are already mechanisms of ensuring compliance to maternal health care.

The government should look into ways of facilitating the sale of highly subsidized nets, such as partnering with private manufacturing companies or enhancing social marketing approaches. The government should support the creation of an enabling environment within which the private sector is encouraged to participate in ITN production and distribution. This can occur by promoting widespread demand for ITNs and by reducing taxes and tariffs on ITNs, raw materials for their manufacture, and insecticides recommended for the treatment of nets.

The study revealed that net re-treatment intervals were varied among the bed net users. This will have a net effect on the potency of the nets in killing or repelling mosquitoes. To overcome this barrier, the government through the Ministry of Health and partnership with the private sector and non-governmental organizations should look into ways of implementing mass treatment campaigns

and making treatment kits more widely available in the commercial sector.

Communication strategies should emphasize the effectiveness of net treatment in killing and repelling mosquitoes. Marketing of long-lasting ITNs and treatments will help to overcome the challenge of getting people to re-treat nets.

The Ministry of Health should increase regular community sensitization campaigns to ensure greater awareness of the importance of sleeping under insecticide-treated nets among the vulnerable groups. A study to assess the impact of the utilization of ITNs on health benefits should be undertaken.

The in-charge, Lukolo Health center III, should spear head organization of community outreaches to increase access to health services, especially among rural and hard-to-reach communities. As people involved in health service delivery, they can be utilized to carry out health promotion on malaria control methods such as larviciding, mosquito repellents, and window and door screens in the region.

Implications to the clinical practice

Health workers especially the clinical officers as immediate promoters of health should understand that creating only awareness about the use of insecticide-treated nets (ITNs) is not enough. People should be motivated to create a culture and enhance their understanding of practicing preventive measures against malaria, like the use of ITN, environmental intervention, and insecticide spray.

The above could be achieved through formal education. The involvement of formal education in malaria control has a critical role to play. Education System and the Malaria Control Programme in Uganda should work closely, especially on malaria education for behavioral change.

Furthermore, the Health authority should enhance the training of volunteers and local leaders towards proper utilization of ITNs.

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7 List of Abbreviations and Acronyms

CDC: Center for Disease Control

IUGR: Intrauterine Growth Retardation

GOU: Government of Uganda

MOH: Ministry of Health

ITNs: Insecticide Treated Mosquito Nets

WHO: World Health Organization

UBOS: Uganda Bureau of Statistics

HIMS: Health Information Management System

H/C: Health Centre

SURMA: Strengthening Uganda's response to malaria

FGD: Focus group discussion

UAHEB: Uganda Allied Health Examinations Board

MSOCO: Mild May School of Clinical Officers

ANC: Antenatal care

DEFINITIONS OF OPERATIONAL TERMS

MALARIA is a parasitic infection caused by malaria parasites and transmitted by a female anopheles' mosquito

ENDEMIC. This is a disease that is present permanently in a region or population.

FETUS. A developing human from usually two months after conception to birth.

MORBIDITY. Refers to having a disease or symptoms of a disease

MORTALITY. Refers to being susceptible to death.

MISCARRIAGE. The spontaneous loss of a woman's pregnancy before the 20th week of gestation can be both physically and emotionally painful.

KNOWLEDGE. Is it a fact of having information, general understanding, or familiarity with a subject, place, or situation?

PRACTICES The actual application or use of an idea, belief, or method as opposed to theories relating to it.

ATTITUDE Is the degree to which a person has a favorable or unfavorable evaluation of behaviour.

CONSORTIUM. is a group made up of two or more medicine combined to achieve a therapeutic effect.

ANTIMALARIAL. Refers to medicines used to treat malaria infection.

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