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Perceptions Associated with Insecticide Treated Mosquito Net usage among Antenatal Clinic Attendees at Buchi Clinic

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Abstract

Introduction: Malaria is a life threatening disease caused by *plasmodium* parasites that are transmitted to people through the bite of an infected female anopheles mosquito. Malaria during pregnancy is dangerous to the mother and fetus. This study is aimed at determining the perception that pregnant women have towards insecticide treated mosquito nets. Insecticide Treated Nets (ITNs) are considered one of the most effective interventions against malaria and have been endorsed by the World Health Organization for the global anti-malaria efforts.

Methods: A cross sectional study was carried out at Buchi cinic from February 2022 to April, 2022. Semi structured questionnaires were used to collect data from consenting pregnant women. Data was entered on a computer and analyzed using the Statistical Package for Social Sciences (SPSS) software version 26.

Results: A total number of 195 participants consented to taking part in this study and were interviewed. Majority of the participants were between the ages of 20-35 (60.2%). Most of the women (67.2%) had good knowledge, and majority (71.3%) had good attitude towards ITNs. Additionally the reasons for non-usage of ITNs were; discomfort, low mosquito activity/season and not enough room.

Conclusion: Majority of the participants in this study had good perception, good knowledge and good attitudes towards ITNs.

Keywords: Statistical package • World health assembly roll back malaria • Antenatal clinics • World health organization

Introduction

Background

Malaria infection is a serious public health problem which can result in maternal and new born morbidity and mortality when attained in pregnancy. The World Health Assembly in 2015, and the Roll Back Malaria (RBM) partnerships action and investment to defeat Malaria (AIM) have embraced the goal of a "world free of malaria" and have put forward ambitious targets of reducing malaria case incidence and mortality rates globally by at least 90% by 2030. However, despite these efforts, there remains an estimated 3.2 billion people in 97 countries and territories at risk of malaria infection. About 214 million malaria cases were estimated to occur in 2015 leading to 438, 000, deaths and key challenges exist to sustaining and improving on recent gains [1]. Malaria is a threat to more than 40% of the world's population. Approximately 50 million pregnant women are exposed to malaria each year and of all the annual malaria cases in the world, 90% occur in sub-Sahara Africa, and the majority of these cases are in children under the age of five. Additionally, an estimated 74% of the population in sub-Saharan Africa lives in areas that are endemic to malaria and 80% of malaria cases are managed at home [2].

Furthermore, in most sub-Saharan countries, people develop a certain degree of immunity to malaria during the first decade of life due to repeated exposure to malaria infection. Despite this immunity, pregnant women, especially primigravidae, have a higher susceptibility to *Plasmodium falciparum* infection, manifested by a higher prevalence and intensity of parasitemia [3]. Malaria is the leading cause of morbidity and the second leading cause of mortality in Zambia. Malaria transmission occurs in almost all parts of the country and accounts for up to 40% of the overall infant mortality

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rates and up to 20% of the overall maternal mortality rate. Transmission takes place from November to May, a high proportion (around 45%) of hospitalizations and outpatient department visits are attributable to malaria [4]. According to Singh the main prevention strategies in pregnancy are the use of insecticide treated nets as well as the use of intermittent preventive treatment with anti-malarial medications. Tuba, et al. continue to say that malaria incidence and death rates have tripled over the past three decades, but in the period 2003 to 2007, most provinces had a downward trend in malaria incidence, and nationally, the incidence dropped from 425 per 1,000 in 2006 to 358 per 1,000 in 2007. This may have been a result of the impact of aggressive efforts towards implementation of the nationally prioritized malaria control strategies *i.e.* ITNs, case management, Intermittent Presumptive Treatment (IPT) and vector control, specifically In-Door Residual Spraying (IRS). The policy guidelines of the Zambian government relating to malaria, state that, subsidized ITNs should be accessed through the Antenatal Clinics (ANC) and under five children clinics since children less than five years of age and pregnant women are prioritized risk groups.

ITNs are defined as any net that has been treated at least once in the previous 12 months, or is a permanently treated net, according to the identified brand and based on WHO recommendations for long-lasting insecticidal nets [5]. They are an effective tool to prevent malaria in children in *Plasmodium falciparum* malaria transmission settings [6]. ITNs are virtually side effect free, relatively cheap/free, and easy to use (*i.e.* to hang and to sleep under), and not only protect against disease but also provide relief from nuisance biting mosquitoes [7]. To benefit from ITNs for prevention of malaria, at either the individual or the community level, requires not only household ownership but also use, or at least deployment. Several barriers to use of ITNs present themselves and these include lack of ownership, insufficient knowledge by users of the link between mosquito bites and malaria and lack of knowledge as to who should be the main users of the mosquito nets. Other studies report poverty as a barrier to use, in that poorer households have immediate needs including food, water and medical care, and therefore sell their mosquito nets to meet their basic needs and likewise, the poor may store ITNs for future sale or use rather than use them [8,9].

Statement of the problem

Despite the increasing efforts by the World Health Organization and the Zambian government to increase the distribution of insecticide treated mosquito nets in hopes of decreasing the prevalence of malaria particularly in under five children and pregnant women, certain ante-natal clinic attendees despite receiving these ITNs do not make use of them and increase their risks of contracting malaria. This study therefore seeks to assess the perception of the ante-natal clinic attendees on the use of the ITNs at Buchi clinic so as to identify factors leading to lack of usage of the ITNs by certain ante-natal clinic attendees.

Rationale

Many studies just explore the preventive measures to malaria such as the distribution of ITNs but there is little knowledge as to the perception of the people about these preventive measures and why certain people refrain from using the ITNs which this study seeks to explore. Furthermore, the few studies that have been done about this are mostly in other countries. The significance of this study is that it will shed some light on the perception of ante-natal clinic attendees on the use of ITNs and may therefore provide a means of changing their perception and increasing usage of ITNs.

Literature Review

Insecticide treated mosquito nets are the primary tool for vector control, thus optimizing ITN use is important especially in the vulnerable groups such a pregnant women. It is therefore important to establish the perceptions that antenatal attendees have towards the use of ITNS. Globally there has not been any documented researches about this but studies in Africa such as a study done in Nasarawa and Cross River States in Nigeria by Diala reports that many participants believed in prevention methods that are not related to mosquitoes, such as washing hands after toilet use, cutting grass, staying out of the sun, and keeping premises clean. To repel mosquitoes, participants mentioned using a local rat poison called otapiapia and burning fragrant or "scenting" leaves rather than using ITNS:

"I keep our environment clean, because sometimes it's not even about nets. You may sit outside resting and the mosquito will come and bite you. You keep your compound clean and all the grass around you, you clear it, so that mosquitos will not come to your compound because it is the neat one. When you go to the toilet, you wash your hands and you keep your toilet clean. That will prevent you not to have malaria."

Furthermore participants also reported additional causes of malaria in which a few noted that malaria may result from an attack ("witchcraft") by somebody. More frequently, participants linked malaria to viruses, exposure to the sun, and infection from toilets, or drinking bad/impure water and connected the presence of mosquitoes to unclean or dirty environments:

"Leaving dirty things around the house causes malaria; leaving the toilet dirty, not washing and leaving dirty around the house can cause malaria. Leaving unwashed plates or clothes can cause malaria; some people don't tidy up their rooms".

These participants are therefore less likely to use insecticide treated mosquito nets as they think taking care of the other causes and other areas of their environment is a way of preventing malaria rather than using mosquito nets. Additionally a study by Megha Singh, Graham brown and Stephen Rogerson in 2012 states that most thought mosquito nets were uncomfortable to use as they caused discomfort with regards to heat, sweating and breathing, also thought they were too small to use especially for a family and were burdensome to tie and that mosquitoes still bite even with the use of mosquito nets.

Moreover, a study done by Yirsaw in Ethiopia further brings out other perceptions that some women have in relation to the use of mosquito nets such as the belief that ITNs create warmth and bed bugs, while others believed that god, not the ITN, prevent malaria: "We use bed nets for various purposes in the sense that God saves us Bed net do not save us from malaria".

"Most of the time they said it creates bed bug and warm. And also they think that they may not acquire a disease if god does not permit".

"The most common barriers to ITN utilization in the community are: they believe that bed nets produce and gather bed bugs; they think that nets are hot; there is no malaria at this time and most people think that malaria occurs only in summer. Due to this pregnant women and under-five children do not sleep under bed nets throughout the year" (female KII).

However, other participants from the same study had a different point of view in that they saw the benefits of using ITNs, of which malaria prevention was the most frequently cited benefit.

"Bed nets protects against mosquitoes, spiders and other debris" (27 years, have no formal education, orthodox Christian, women development army, Gohalla Keele in FGD).

"We prevent malaria by using bed nets and by keeping hygiene. Ad nets can protect from the bite of a mosquito. Not only this, but also it can protect from other foreign bodies" (30 years, no formal education, women developmental army, Shamash Kebele in FGD).

Also protection against pests such as cockroaches, fleas, flies and spiders, and against snake bites was a very occasionally reported non-malaria related benefit of ITN utilization.

In another study conducted in Nigeria by Ango in 2015; most of the respondents believed that use of ITN is safe in pregnancy and protects both mother and baby from malaria in pregnancy while other participants in the study believed that the chemicals in ITNs are dangerous in both mother and baby.

Different studies have been done on the preventative measures of malaria in pregnancy in Zambia but none outline the perceptions that pregnant women have towards the use of insecticide treated mosquito nets in Zambia.

From the above, it is apparent that a wide coverage of ITNs does not always correlate with use. Various perceptions on the use of ITNs exist which may serve as barriers to ITN use by ante-natal women and various other beliefs and preferences may also hinder the use. It is therefore essential to assess the perception of ante-natal women on the use of ITNs so as to increase the usage and adherence to the ITNs. However it is also important to note that some perceptions encourage the use of ITNs.

Objectives

General objective: To investigate pregnant women's perception on the use of insecticide treated mosquito nets.

Specific objectives

- To establish knowledge of pregnant women on the importance of using insecticide treated mosquito nets.
- To establish attitude of pregnant women about the usage of insecticide treated mosquito nets
- To document reasons for non-usage of ITNs among the women who possess them
- To make recommendations to policy makers on how to encourage usage of ITNs among antenatal attendees at Buchi clinic

Research questions

- What are the perceptions that pregnant women have towards ITNs?
- How much do pregnant women at Buchi clinic know about ITNs?
- What are the attitudes that pregnant women have towards ITNs?
- What are the reasons for non-usage of ITNs among those that possess them?

Measurements

Functional definitions

Insecticide treated mosquito nets: This refers to mosquito nets that have been treated permanently or at least once in the previous twelve months, according to the identified brand and based on WHO recommendations for long lasting insecticidal nets. They are a personal protection that has been shown to reduce malaria illness.

Malaria: A life threatening disease caused by *plasmodium* parasites that are transmitted to people through the bite of an infected female anopheles mosquito.

Perception: Refers to the way a person thinks about and interprets something and their idea of what it is like in this case what pregnant women think of the use of ITNs.

Knowledge: The information and understanding that one has gained through learning (education) or experience. It will be established based on how questions are answered as well as how many questions from the questionnaire are answered.

Attitude: Refers to the positive and negative beliefs associated with ITNs. Positive attitudes are the beliefs which support ITN usage. Negative attitudes on the other hand refer to beliefs that discourage ITN use.

Scales of measurements

Socio-demographics: The participants were classified into three categories; below 20, 20-25 and above 35.

Knowledge: The level of knowledge was assessed using a total of 6 questions. Each question, a correct answer awarded a specific score while a wrong answer was awarded a score of 0. Thereafter, using summation from the 6 questions, the level of knowledge was graded into four categories, namely

- **No knowledge:** if participant had a score between 0-1
- **Poor knowledge:** if participant had a score between 2-4
- **Average knowledge:** if participant had a score between 5-7
- **Good knowledge:** if participant had a score between 8-10

Attitude: Attitude was assessed using a total of 3 questions. For each question, a score of 1 was awarded to a correct answer whereas a score of 0 was awarded to a wrong answer. Thereafter, using summation of the 3 questions, attitude was graded into two categories, namely

Bad attitude: when a participant answers 1 or less questions correctly.

Good attitude: when the participant answers 2 or 3 questions correctly (Figure 1).

Conceptual framework

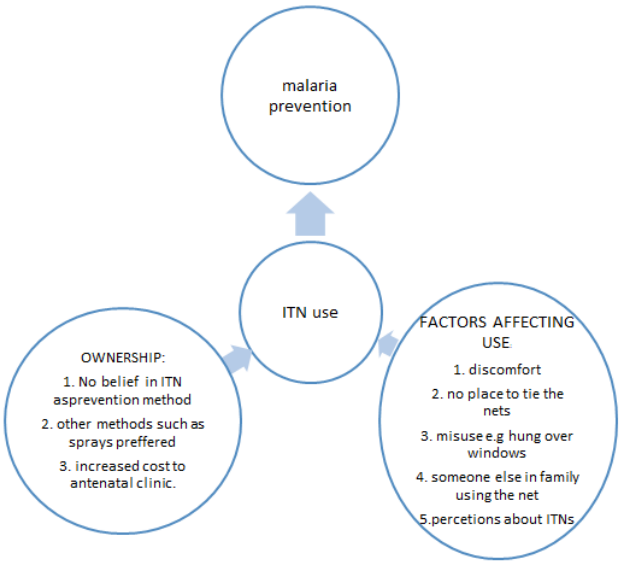

Figure 1. Conceptual framework.

Methodology

Study site

The study was conducted at Buchi clinic which is located in Buchi compound of Kitwe district. The clinic has a catchment of 24,193 people of which 12, 161 are women. It does about 127 antenatal bookings per month and handles between 300-400 antenatal mothers. It looks after the wellbeing of children, nursing and expectant mothers. This clinic also offers prenatal and postnatal services such as prevention of mother to child transmission of HIV (Figure 1).

Study design

This was a cross sectional study that used a semi structured questionnaire to obtain information from suitable subjects.

Sample size

The following formula was used to determine the required sample size:

$n=z^{*}z\ (p(1-p)/e^{*}e)$

$n=1.96^{*}1.96\ (0.85(1-0.85)/0.05^{*}0.05)$

$n=3.8416\ (0.1275/0.0025)$

$n=195.9216$

$n=196$

Where n=sample size, z=95% (1.96) confidence level, E=0.05 (5%) margin of error, q=1−p and p=85%.

According to the formula the sample size is 196, however this shall be adjusted according to the respondents that will volunteer to take part in the study and to the available resources.

Sample procedure

A stratified random sampling procedure was used because not only does this technique give each participant an equal and independent chance of selection in the sample but it also enables the researcher to stratify the population in such a way that the sample population within a stratum is homogeneous with regard to the characteristic on the basis of which it is been stratified. Additionally, this method helps the researcher to avoid selection bias.

Inclusion criteria

- Pregnant women
- Anti-natal clinic attendee at Buchi clinic.
- Willing to participate and freely give consent.
- Is available for the research.

Exclusion criteria

- Not willing to give consent to participate in the research.

Data collection

Data collection involved the use of questionnaires and interviews. The questionnaire contained questions to determine the perception, knowledge and attitude about ITNs. Permission was obtained from the clinics sister in-charge to conduct the study from their clinic. In addition the participants were required to sign a written consent form with full explanation of the study objectives.

Data analysis

The data was checked, coded and categorized and then analyzed into SPSS version 26. Results were then presented using tables, pie charts and text.

Ethical considerations

Firstly, ethical clearance was obtained from the TDRC review ethics committee and further permission to conduct study was obtained from Kitwe district health office as well as the clinic. Participants were asked to take part in the study with full explanation of what the study was about and were also required to sign a consent form to ensure their safety and confidentiality. Names of the participants were not disclosed and the information provided was only used for the study.

Study limitations

The main study limitation was that the outcomes of our analysis might not fully be representative of other groups in the country.

Results

Sample characteristics

A total of 196 female participants that met the inclusion criteria were enrolled to participate in this study. The participants were of three groups, those below 20, between 20 and 35 and those above 35. Furthermore, majority of the participants a total of 185 (94.9%)

were Christian and the rest were Muslim accounting for 5.1% (Table 1).

		Frequency	Percentage
Age of participant	Below 20	51	26.2
	20-35	118	60.5
	Above 35	26	13.3
Marital status	Single	85	43.6
	Married	110	56.4
Religion	Christian	185	94.9
	Muslim	10	5.1

Table 1. Sample characteristics of the participants (n=195).

Knowledge

A total of six questions were administered to determine the knowledge that the participants had about ITNs. Table 2 and the scale outlined on page 9 were used to assess the levels of knowledge.

Variable		Frequency	Percentage
What ITN is	yes	153	78.1
	no	43	21.9
Source of information on ITNs	Health workers	108	55.1
	Tv/ Radio	24	12.2
	friends	21	10.7
	N/A	43	21.9
ITN harmfulness	yes	15	7.7
	no	138	70.4
	N/A	43	21.9
Reasons for ITN usage	Protect from malaria	99	50.5
	Prevent mosquito bites	38	19.4
	Prevents malaria and mosquito bites	40	20.4
	N/A	19	9.7
ITNs are the best malaria preventive method	Yes	155	79.1
	No	3	1.5
	Not sure, but it does help	38	19.4
It is useless to use INTs	No	179	91.3
	yes	17	8.7

Table 2. Variables that were used to assess the knowledge.

Out of the 192 participants in the study, 131 (67.2%) were determined to have good knowledge with regards to ITNs, while 38 (19.5%) had an average knowledge and finally 26 (13.3%). This is illustrated in the Figure below (Figure 2).

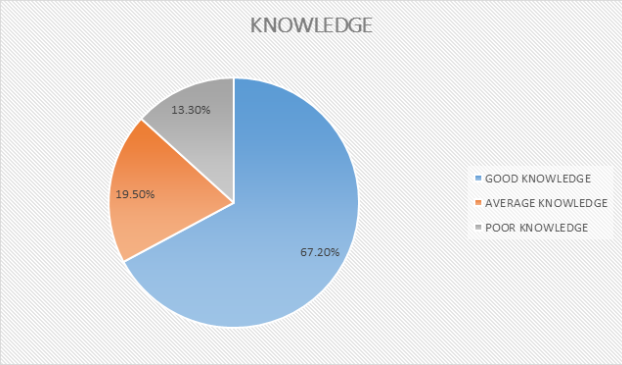

Figure 2. Level of knowledge that participants had on ITNs.

Attitude

Three questions were used to assess the attitude that the participants had towards the use of ITNS of the 195 it was determined that 139 totaling to 71.3% had good attitude while the remaining 56 (28.7%) participants had a bad attitude (Table 3). This was determined through a scoring system in which participants that scored below 2 had bad attitudes while those that scored 2 and above had a good attitude (Figure 3).

Variable		Frequency	Percentage
ITN usage	Yes	174	89.2
	No	21	10.8
Feeling when using the ITN	Okay	77	39.5
	Safe and comfortable	56	28.7
	Itchy	20	10.3
	Hot	26	13.3
	Hot and suffocated	12	6.1
	protected	4	2.1
Difficulty using net	No	131	67.2
	Yes	64	32.8

Table 3. Variables used to assess the attitude of the participants towards ITN use.

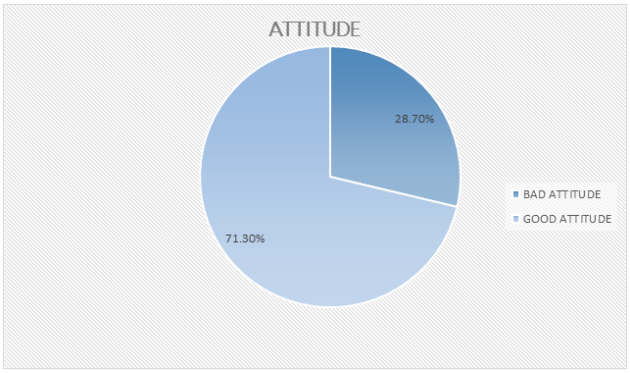

Figure 3. Attitudes of the participants towards ITN usage.

Discussion

This study showed the perceptions that pregnant women had towards ITNs and their usage. Participants were asked questions that would elicit their perceptions such as if they know what ITNs are of which 152 (77.6%) did know what they were while 43 participants (21.9%) did not. This shows that majority of the participants had heard of and did know what ITNs were. This is similar to study conducted in Sokoto, Nigeria by Ango which also indicated that a majority of 86% as well a study by Ikeako in Awkwa, Nigeria in 2017 in which a majority of 99.1% did know what ITNs were. The participants who did not know what ITNs were, did however state that they did know of the untreated nets and did not know there was a difference between ITNs and untreated nets [10,11].

Majority of the participants indicted health workers as their main source of information on ITNs which represented 54.6% while the minority stated that they learnt of ITNs from either the radio or from TV. This is similar to a study done in Sokoto, Nigeria by Ango in 2018 which highlighted that the majority of the participants (68.1%) in their study learnt of ITNs from health workers. The study also further stated:

Most of the respondents in studies conducted in Lagos, Nigeria, and Northern Uganda, also believed that use of ITNs is safe in pregnancy and protects mother and baby from malaria, a substantial proportion of the participants (42.6%) in a study conducted in Imo, Nigeria, believed that the chemicals in ITNs are dangerous on both mother and baby [12-15].

These findings were similar to the results in this study, as participants were asked if they thought the chemicals used to treat ITNs were harmful to use during pregnancy. 138 (70.4%) participants, thought they were safe to use while 7.7% thought they were completely safe to use. A few participants did think it wasn't safe but also stated:

"The mosquito nets are safe to use only after the net has been hung outside in the shed for a few hours. Also if they are hang in the sun the medicine used on the mosquito nets will not work like it should work."

Another participant also said:

"I am not sure if they are harmful or not but it is possible they could be harmful in pregnancy."

The difference in the studies is that the participants that believed ITNs to be harmful was significantly higher in the study by Ango.

Additionally, most of the participants (50%) stated that ITNs are used to protect people from malaria, while 20.4% thought not only do they protect from malaria they also help to prevent mosquito bites. A study done in Enugu State, Nigeria by Onyeneho also had participants that stated:

They are used for preventing mosquito bites and of course malaria infections. According to a grandmother in an FDG session in Enugu North, the bednets are, "to prevent mosquito from biting them and stop malaria.

Another study done in by Boene, et al. among Mozambican pregnant women in 2014 also showed that ITNs reduce the burden of mosquito bites:

Again, convenience factors offered by ITNs, *i.e.*, providing a physical barrier against the high burden mosquito bites.

However, while the participants in this study only associated ITNs with the prevention of malaria and mosquito bites, participants in a study in Ethiopia by Yirsaw participants also highlighted that the ITNs can be used for other purposes such as for donkey loads, straw strips, camshaft, straw assembly and straw storage, and vegetable spinning rather than malaria prevention.

Majority of the participants accounting for 79.1% also believed that the use of ITNs was the best preventive measure against malaria. And a further 90.8% of the participants believed they are very useful against malaria while 8.7% believed it was useless to use mosquito nets because a person can get malaria even while using the ITNs.

Therefore, majority of the participants of 67.2% had good knowledge and perception of ITNs.

In this study majority (71.3%) of the participants also exhibited good attitude towards ITNs. This is also similar to the findings in the study conducted in pregnant women in Awka, Nigeria in which they established that majority (98.3) of the respondents considered ITNs useful, also majority (81.3%) of the respondents were willing to buy ITNs.

Majority of the participants in this study also showed willingness to utilize ITNs as 88.8% of the participants were using mosquito nets. This is however unlike the study conducted in Sokoto, Nigeria in which utilization of ITNs was low (33.9%) among the respondents: even among the respondents that own an ITN in this study, only about two-thirds (64.2%) use it; and of these, a much lower proportion (26.0%) do so consistently, with the main reason for not using ITN being that it causes excessive heat at night.

Despite the differences in utilization among respondents, the reasons as to why the respondents are similar in that the respondents in this study also stated excessive heat at night as a reason to not using ITN.

"I do not use mosquito nets because when I do I feel very hot and suffocated". Pregnant woman, ID 15.

Another respondent indicated that her skin feels itchy when she uses a mosquito net. Other reasons for lack of use of mosquito nets included, lack of a proper hanging space for the ITNs as well the belief that mosquitos as well as malaria are seasonal.

"I don't use mosquito nets in the dry season because there are no mosquitos then". Pregnant woman, ID 73.

This is also similar to a finding in a study done Ethiopia:

"The most common barriers to ITN utilization in the community are: they believe that bed nets produce and gather bugs; they think the bed nets are hot; there is no malaria at this time and most people think that malaria occurs in summer.

Another study by Singh highlighted: discomfort (heat/ sweat/ breathing), not enough room/place to tie/ burdensome to tie, low mosquito activity/ seasonal; among other reasons as reasons why people do not use ITNs.

Conclusion

This study aimed to establish the perceptions that pregnant woman had towards ITNs as well as assess the knowledge and attitudes. It also aimed at documenting reasons for non-usage of ITNs among the woman who possess them. Majority of the participants in this study had good perception, good knowledge and good attitudes towards ITNs. The findings of this study are similar to the findings in many studies conducted on this subject by other researchers in other countries and populations.

Recommendations

Based on this study, we recommend firstly, healthcare workers should re-invigorate and sustain education of pregnant women on the benefits and safety of use of ITNs. Furthermore, government can institute interventions to improve the usage of ITNs even further based on the reasons for non-usage of ITNs.

Declaration

I, Mwiza Mweembe Alibuzwi, Sin 16101898, hereby declare that this proposal is a product of my own work. It has not been submitted to another university in part or wholly for any study program.

Acknowledgement

I express my profound gratitude to god for his unmistakable providences in the entire process of developing this proposal. I would like to express my sincere gratitude to Mr. Njunju for his robust advice and valuable time employed in supervising me and for being such a great pillar in this work. I am deeply thankful to all my friends and family for their help throughout my work.

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