

Prevention of Malaria Among Pregnant Women: The Perceived Effectiveness of Long Lasting Insecticidal Nets (LLINs) in Maamobi

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Abstract

The World Health Organization 2011 World Malaria Report demonstrates the enormity of the burden of malaria, with 216 million cases and 655,000 deaths attributable to this mosquito-transmitted parasite in 2010 alone. Sub-Saharan Africa has the largest burden of malarial disease, with over 90% of the world's malaria-related deaths occurring in this region. About 25 million pregnant women are currently at risk of malaria and according to the WHO, malaria accounts for over 10,000 maternal and 20,000 neonatal deaths per year (WHO, 2009b). The study was conducted at the Maamobi General Hospital. A purposive sampling was used to select the pregnant women but with regards to their ability and willingness to provide the type of information that was sought through each research instrument. Ethical clearance was obtained from the management of the Maamobi General Hospital before commencement of the study. Most of the respondents' knowledge about malaria was very high. The respondents in this study were able to enumerate several ways by which malaria could be prevented. However, the pregnant women's awareness on other means of preventing malaria apart from the use of LLINs, like good personal and clean environmental hygiene was relatively less. The study recommends that National education on LLIN should be intensified through the media to increase awareness on benefits and effectiveness of nets so as to enhance malaria prevention.

Keywords: Pregnant women, malaria, long lasting insecticidal nets (LLINs), Maamobi

1. INTRODUCTION

The World Health Organization (WHO) 2011 World Malaria Report demonstrates the enormity of the burden of malaria, with 216 million cases and 655,000 deaths attributable to this mosquito-transmitted parasite in 2010 alone. The burden is largely borne by Africa where 91% of deaths occurred, with pregnant women and children under five years of age most at risk of infection and adverse outcomes (WHO, 2011). Malaria is a parasitic infection caused by the four species of plasmodium that affects human: vivax, ovale, malariae and falciparum. Of these, plasmodium falciparum is the most deadly (WHO, 2009a). Malaria is a global health problem affecting nearly all young children and pregnant women. Malaria infection during pregnancy poses risk to the mother, her fetus and the neonate because pregnant women appear to be less capable of coping with the malaria infections. The malaria impact in pregnant women is largely due to the plasmodium falciparum (GHS/NMCP, 2005).

Sub-Saharan Africa has the largest burden of malarial disease, with over 90% of the world's malaria-related deaths occurring in this region. About 25 million pregnant women are currently at risk of malaria and according to the WHO, malaria accounts for over 10,000 maternal and 20,000 neonatal deaths per year (WHO, 2009b). Patterns of malaria transmission and disease vary markedly between regions and even within individual countries. This diversity results from variations between malaria parasites and mosquito vectors. Ecological conditions that affect malaria transmission and socio-economic factors such as poverty and access to effective health care and prevention services are also factors to consider.

Africa is particularly vulnerable to malaria for several reasons, including being exposed to the most severe forms of the disease, having inadequate resources to bear the economic burden of the consequences and having to cope with inadequate infrastructure to effectively treat cases (WHO, 2006). This makes the prevention of the disease important and the use of individual methods of protection are particularly important. Bed nets, window screens, house sprays, ceilings, closed eaves and in some cases, zoo prophylaxis can reduce the risk of malaria (Yamamoto, Louis, Sié and Sauerborn, 2009). ITN can reduce child mortality by 20%. The new technology of LLIN eliminates the need for retreatment and keeps net effective up to 5 years (WHO, 2015). Nets

may vary in size, shape, color, and material and/or insecticide treatment status. The treated bed net has proven to be very effective in reducing malaria morbidity and mortality in Sub-Saharan Africa. Sleeping under the treated mosquito net is the most effective method for preventing mosquito bites at night when people are asleep. About 60% of the cases of malaria worldwide, about 75% of global falciparum malaria cases and more than 80% of malaria deaths occur in sub-Saharan Africa. In endemic African countries, malaria accounts for 25-35% of all outpatient visits, 20-45% of hospital admissions and 15-35% of hospital deaths imposing a greater burden on already fragile health-care systems (WHO, 2005).

Over the past decade, significant gains have been made in the implementation of malaria prevention measures in pregnancy in sub-Saharan Africa, including the distribution of insecticide-treated nets (ITNs). These have been shown to cause a reduction in the incidence of malaria and its consequences such as maternal anaemia, stillbirths and intrauterine growth restriction. Currently most nations in Africa have policies for distributing ITNs to pregnant women through various mechanisms, however coverage remains well below the targets (NetMark, 2004).

Malaria is hyper-endemic in Ghana and it is known to account for 44.5% of outpatient attendance, 36.9% of outpatient admissions. Again, four persons in Ghana die of malaria every hour. Malaria has been a major cause of poverty and low productivity accounting for about 3.2% of all OPD attendances and 4.8% of under five years admission in the country. In Ghana, among pregnant women malaria accounts for 13.8% of OPD attendance, 10.6% admissions and 19.4% deaths (The Global Fund, 2011).

Ghana is now implementing a malaria control program with a goal that generally aims at reducing deaths and illness due to malaria disease by 75% by the year 2015 in line with the attainment of the Millennium Development Goals (GHS 2012). Reports show that since 2010, malaria has been the number one leading disease of OPD attendance at the Maamobi General Hospital. The number of OPD cases recorded in 2013 is 19,949 and that of Inpatients are 1,464 (MGH, 2013). It is believed that Long Lasting Insecticide treated Nets (LLIN) is the most effective way of preventing malaria infections especially among pregnant women who are most vulnerable, yet the use of LLINs among Ghanaians is not encouraging. In 2003, only 12.2% household's use treated nets, 7.8% of the pregnant women sleep under treated net.

Malaria among pregnant women in the facility is still very high in spite of the various educational programs and distribution of insecticide treated bed nets use by the hospital. Since 2012 to date, treated nets have been sold and distributed to the population especially pregnant women. The study thus seeks to assess the perceived effectiveness of LLINs in the prevention of malaria among pregnant women in Maamobi General Hospital.

2. METHODOLOGY

2.1 Study Area

Maamobi General Hospital is situated in the Ayawaso Sub-metro in the Greater Accra Region. The sub-metro is a major part of the Accra Metropolis, and together with other districts, forms the Greater Accra Region. Communities under the Ayawaso sub-metro include Nima, Pig farm, Alajo, Roman Ridge, Airport Residential Area, Maamobi, Accra Newton, Kotobabi, Legon and Dzorwulu. As at 2011, the population of Ayawaso was 538,593 (MOH, 2014).

The occupation of the people of Ayawaso varies; the women are mostly petty traders, whilst the men are artisans (masons, carpenters, auto mechanics). Civil servants of low income group are found in places like Nima, Maamobi, Accra Newtown, Alajo and Kotobabi, while high income groups are found in places like Airport Residential, Roman Ridge, Kanda and Legon. Small scale farming activities are found around Alajo and Dzorwulu. Vegetables and cassava are cultivated; poultry farming and sheep rearing are undertaken in some residential homes. Cattle are occasionally found grazing in the area. There are Christians of all denominations, Muslims and people who practice Traditional African Religion. There are 2 government clinics, 1 government hospital, 2 Quasi-Government Hospitals, 10 Private Hospitals and 64 Private clinics including Dental clinics and Maternity homes (MOH, 2014).

Hundred (100) pregnant women patronizing the hospital for antenatal care formed the population of the study. A purposive sampling was used to select the pregnant women but with regards to their ability and willingness to provide the type of information that was sought through each research instrument.

Data sources can be categorized as primary or secondary. Primary methods used consisted of the questionnaire to gather facts, opinions and attitudes. Respondents were selected by the use of purposive sampling. The questions were straight forward and granted respondents the opportunity to reflect on them and answered within the period of six (6) hours.

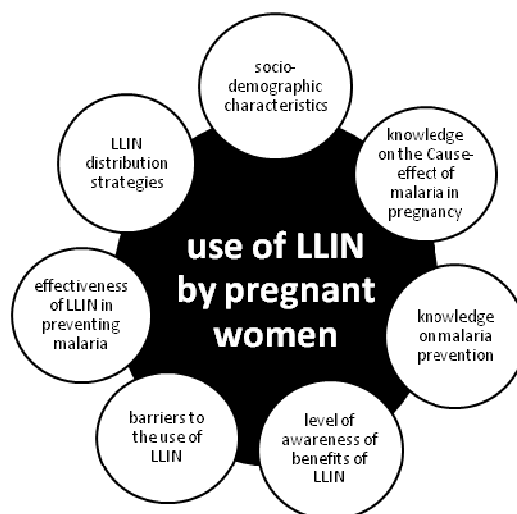
Data analysis is the process of evaluating data using analytical and logical reasoning to examine each component of data provided (Business dictionary.com). After gathering all the completed questionnaires from the respondents, total responses from each item were coded and analyzed, and variables were created out of the questionnaire. The Statistical Package for Social Sciences (SPSS) was used in the analysis of data collected as

the study required both quantitative and qualitative analysis of data.

2.1 Conceptual Framework

The conceptual framework below outlines the channels through which use of LLIN could be understood better. The use of LLIN depends on the socio-demographic characteristics of the woman (e.g. whether she is educated or not, her socio-economic status, etc), knowledge of LLIN, knowledge about effectiveness of LLIN in preventing malaria, barriers to use such as cost or accessibility, and also knowledge of the appropriate use of the net. Drawing from existing literature, the researchers conceptualized that socio-demographic factors, knowledge about the appropriate use of LLIN as well as its effectiveness in preventing malaria and barriers to the use of LLIN would be contributing factors to the eventual use of LLIN among pregnant women. In a similar vein, Otchere (2011) conducted a study to assess the coverage and consistent use of insecticide treated bed nets (ITNS) in the prevention of malaria among pregnant women in the Nkoranza South District in the Brong Ahafo region of Ghana. In his study, he classified factors such as affordability, ownership, socio-cultural beliefs, education on ITNs and acceptance of ITN as factors influencing the use of ITN by pregnant women.

Figure 1: Conceptual Framework



2.2 Ethical clearance

Ethical clearance was obtained from the management of the Maamobi General Hospital before commencement of the study. Consent was also obtained from the head of maternity Department of Maamobi General Hospital. The rationale for the study was explained to prospective respondents and they were at liberty to either participate or not. Informed consent was obtained from each pregnant woman who participated in this study.

3. RESULTS

3.1 Socio-Demography characteristics

In all, 100 pregnant women were given questionnaires out of which 12% were between the ages of 15-19 years, 16% between the ages of 20-24. Those between 25-29 years was 20%, 16% between 30-34 years, 13% between 35-39 years, 12% between 40-44 years and 6% between 45-49 years.

On marital status, 56% of the respondents were married, 35% were single, and 7% were widowed while 2% were divorced. Respondents who had no children was 17%, 54% had between 1-3 children, 24% had between 4-6 children and 5% between 7-9 children.

The people who had primary education was 8%, those who attained JHS/Middle school was 24%. Secondary, tertiary and no education were 32%, 23% and 13% respectively.

3.2 Knowledge on the Cause-effect of malaria in pregnancy

The pregnant women who knew that high temperature and headache indicates someone has malaria were 67% whereas 1%, 14% and 18% knew that yellow eyes, vomiting and shivering were respectively the signs indicating malaria. Respondents who said overwork causes malaria was 1%, those who said mosquito bite causes malaria were 97% while the remaining 2% attributed the cause of malaria to exposure to sun/heat.

3.3 Knowledge on malaria prevention

All the respondents had some knowledge on how malaria can be prevented. Out of the 100 respondents, 95% indicated that sleeping under LLINs can prevent malaria. Respondents who knew that malaria could be

prevented by clean environment was 73%. There were some flawed measures mentioned by the respondents which included; not eating oily food. Those who indicated that by avoiding excessive heat was 3%, good personal hygiene constitute 10%. To avoid sitting next to infected person was also 10% and 4% said eating balanced diet could prevent malaria.

3.4 Level of awareness of benefits of LLIN

Ninety eight (98) of them have heard of LLINs. Among the Ninety eight (98), fifty one (51) of the women heard about LLIN from health facilities. Twenty (20) heard about LLIN from friends, eighteen (18) indicated that they heard about it from their family members, 11 heard it from community meetings. Coupled with the various sources of information, ninety two (92) of the respondents heard about LLIN from the media (radio, television the newspapers).

Regarding the best health messages, majority of the respondents (54) could remember that, pregnant women must sleep under LLIN every day, 31 could remember that the use of LLIN protect against malaria infection. 12 of the women could remember that LLIN is safe to be used by the whole family, and only a few (3) of them could not remember anything about the LLIN health messages.

3.5 Barriers to the Use of LLIN

Out of the 100 respondents who mentioned some barriers, thirty (30) women perceived LLIN as being expensive (about GH¢10.00) and thus unaffordable and 52 perceived it as being harmful to the pregnant woman. The rest of the respondents perceived it as both expensive and harmful to the pregnant woman. Socio-cultural and behavioural practices also go a long way to determine the extent to which people own, retain and use LLINs. Understanding the socio-cultural dimension and behavioural changes of a particular region or group of people is central to achieving effective use of the LLIN and building a strong and robust communication and advocacy system. Regardless of the fact that several factors have direct or indirect influence on the correct knowledge and use of insecticide bed nets, the main challenge is how to subdue the negative influences, foster positive factors and generally motivate the promotion of bed nets use, especially as a long term prevention tool for malaria.

3.6 Effectiveness of the use of LLIN in malaria prevention

With regards to washing of nets, 41% of pregnant women said they had washed their nets once, 23% had washed it two times, 13% had washed three times and 23% had done it four times and more. After washing the nets, 40% said the net was effective, 34% of them indicated that the nets became less effective after washing, 5% said it was not effective after washing and 21% indicated it was still the same.

The women (13%) said they sleep under LLIN during rainy seasons, 39% said they sleep under the net all year round and the remaining 49% said they sleep under it during pregnancy only. Skin rashes was some of the problems encountered while using the net by 10% of pregnant women, 49% indicated the nets generates heat. Only 1% said they still experience insect bite and 37% of them responded others which covered being uncomfortable and none of the parameters.

For opinion about a pregnant women who do not sleep under a treated net, 55% said they will be anaemic and it will result in child mortality, only 2% think they will be healthy, the opinion of 5% is that they will sleep well and 38% responded others such as she will get malaria and she will be weak.

The respondents who said they get malaria weekly since they started using the net was 2%, those who have malaria monthly was 10%, annually was 55% and those who responded none, indicating they do not get malaria at all was 33%.

3.7 LLIN Distribution Strategies

The study revealed that there are a number of channels through which the LLINs are distributed. 57% of the respondents indicated that they were given or bought (subsidized rate) the nets when they went for antenatal visit to the hospital. 30% said they were given the nets when they went to the hospital for postnatal visits and 13% said they got the net from some non-governmental organisation (NGO).

DISCUSSION

Knowledge on malaria is very important for promoting positive behavioural tendencies towards its prevention. In Ghana, the level of knowledge on malaria is known to be high. The high level of knowledge about malaria found in this study shows that most of the respondents knew that high temperature and headache are indicators of malaria and a great majority of the respondents were aware that malaria was caused through the bite of mosquitoes is consistent with similar assertion by the GSS, NMIMR, ORC Macro and GDHS (2003) and also reaffirms how similar people living in hyper endemic areas of the diseases, such as Ghana are very familiar with the disease. Actually, it is a vital pointer and an enabling factor that could be taken advantaged of in programme design and management. Various studies undertaken in most countries on knowledge of women on the cause and

effect of malaria revealed some level of knowledge; various misconceptions among the pregnant women were also reported. Some mentioned eating of cold food, playing in rain, cold weather, and eating mango as causes of malaria (Legesse et al 2009). In Ghana, it has been reported that malaria is presumed to occur as a result of excessive heat and eating oily or starchy food (Ahorlu, Dunyo, Afari, Koram, and Nkrumah 2007; Agyepong and Manderson 2004).

According to CDC (2010), pregnant women are more susceptible than the general population to malaria: they are more likely to become infected, suffer a recurrence, and develop severe complications and die from the disease. Malaria contributes very significantly to maternal and fetal mortality-with at least 10,000 maternal deaths per annum attributable in sub-Saharan Africa.

The ability of the respondents to enumerate several ways by which malaria could be prevented is a good sign and it is also consistent with World Bank (2005) statement that knowledge about malaria prevention measures, especially, knowledge about the use of ITN reduces human contact with mosquitoes leading to a significant reduction in incidence of malaria. The high level of awareness on malaria coupled with exposure to LLIN from the hospital where LLINs had been supplied to the pregnant women who attend antenatal care in the Maamobi General Hospital since July 2014 has been beneficial to the women and their unborn babies. However, the pregnant women's awareness on other means of preventing malaria apart from the use of LLINs, like good personal and environmental hygiene was relatively less. Also, respondents' ability to know the group of people at risk as pregnant mothers and children below 5 years was high and this is similar to Guyatt, Noor, Ochola, and Snow (2004) findings which asserted that, malaria affects mainly young children especially those less than five years and pregnant mothers.

This study shows a disturbing gap between knowledge and practice. Although most of the women were aware of the protective nature of LLINs, it was observed that very few of them were actually using these LLINs. This finding is consistent with other reports from south-west Nigeria which showed that the majority of the people used screens and sprays to protect against malaria while the use of LLINs was poor. It has been proposed that since the cost of the net is often not affordable by the group particularly vulnerable to malaria and its deleterious effects i.e. very young children and pregnant women, it may be ideal for the Government to make LLINs available at a highly subsidized rate.

Socio-cultural and behavioural practices go a long way to determine the extent to which people own, retain and use LLINs. Understanding the socio-cultural dimension and behavioural changes of a particular group of people is central to achieving effective use of the LLINs and building a strong and healthy communication and advocacy system. Despite the fact that several factors have direct or indirect influence on the correct knowledge and use of LLINs, the main challenge is how to subdue the negative influences, foster positive factors and generally motivate the promotion of bed nets use, especially as a long term prevention tool for malaria.

Majority of the pregnant women interviewed agreed that LLIN prevents insect bite and this is in line with the findings of Bogale (2007) that LLIN prevents human contact with mosquito leading to a significant reduction in the incidence of malaria. This supports the WHO's assertion that maternal malaria increases the risk of spontaneous abortion, still birth; a leading cause of child mortality. This equally agrees with WHO (2005) that, the use of LLIN is one of the cheapest and most effective interventions against malaria.

Some of the respondents washed their nets once while others had washed it about four times and more. This may be due to ignorance of users about the number of times the net can be washed. However, analysis of the findings shows that the nets were still effective after washing. This agrees with the statement of Lengler (2004) which says that the duration of protective efficacy of LLINs is at least 5 years under recommended conditions of use.

A good number of the women sleeping in the net during pregnancy could be due to the fact that they do not want to be disturbed by mosquitoes and have malaria, which they know is a threat to them and their unborn babies. They also believe that when the pregnant woman gets malaria, she could become anaemic. This is in line with the WHO Report, 2012 which states that the major adverse effect of malaria in pregnancy is anaemia. Ensuring proper use of the LLINs continue to pose a challenge to the use of LLINs. It contributes to the low number of people sleeping under LLINs even though those owning ITNs are high. It is highly possible that possessing LLINs do not necessarily translate into appropriate usage. Nevertheless, little attention has been paid to designing and implementing locally appropriate communication strategies to accompany LLIN distribution, to inform communities of the importance of LLINs and of how to hang, use and maintain them properly. As a result, many people who received LLINs did not sleep under them, some re-sold the LLINs, and they sometimes reduced their efficacy through inappropriate washing practices, or even failed to replace them when they became damaged.

Households are the delivery target for the LLINs. The form of delivery can be public, private or a mixture of public-private partnership arrangement. However, delivery of LLINs through antenatal care services and immunization programmes allows advantage to be taken of existing health services to reach both pregnant women and children under the age of 1 year. Delivery of LLINs to pregnant women through antenatal care was

the practice in the study area. This finding is in line with a WHO assertion that national malaria control programmes (NMCPs) indicate that mass campaigns were the main channel for ITN distribution. Antenatal care clinics, immunization clinics and other channels were also very relevant distribution strategies.

4. CONCLUSION

Most of the respondents' knowledge about malaria was very high. They have knowledge about the cause and symptoms. The respondents in this study were able to enumerate several ways by which malaria could be prevented. Most of the respondents identified LLIN as a preventive tool. However, the pregnant women's awareness on other means of preventing malaria apart from the use of LLINs, like good personal and clean environmental hygiene was relatively less. The respondents' were also able to identify the group of people at risk of getting malaria as pregnant mothers and children below 5 years was high in this study.

The study showed that 81% knew LLIN prevents insects bite and it reduces child mortality. They indicated that LLIN is cost effective and also agreed it prevents pregnant mothers from becoming anaemic. The respondents' (23%) indicated they had washed their nets four times and more, 40% indicated the net was effective after washing. It can be concluded that, the respondents were ignorant about the fact that the net loses its efficacy after 20 standard washings.

Out of the 100 respondents, 49% only use their nets when they are pregnant while some of them used it all year round and few (13%) only used it during the raining season. This was a positive sign on net usage to reduce malaria in pregnancy.

5. POLICY RECOMMENDATIONS

Studies on the use of LLIN have shown that LLIN has proven to be very effective in the prevention of malaria morbidity and mortality in Africa. To prevent malaria by the use of LLIN, the following measures are recommended for implementation by all stakeholders. This would eventually reduce malaria morbidity and mortality in pregnant women.

- ❖ National education on LLIN should be intensified through the media (television and radio stations) to increase awareness on benefits and effectiveness of nets so as to enhance malaria prevention.
- ❖ The ministry of health should make available more conical nets (they are easy to use) for all community members, especially pregnant women.
- ❖ The Government through the ministry of health, Ghana health service, ministry of local government and the ministry of education should intensify environmental campaign to educate the public on the value of keeping the environment clean and free from mosquitoes; since this is the only way the malaria vector could be controlled in order to eradicate malaria from the country.
- ❖ Nets should not be sold and shared through antenatal centres only but every community under Maamobi zone should have an outlet through community health workers where community members can easily have access to them.
- ❖ Education through churches, mosques, health promotion programmes, pregnancy school and schools could be looked at as a means of educating the public. Education through churches and mosques will serve as a recipe for sharing information with the co-operation of the religious leaders. School children could also be used as a means of reaching parents who may be difficult to meet.
- ❖ Education to educate clients especially mothers in their reproductive age on the importance, use and maintenance of the LLINs. The health personnel should take the net with them during such health talks for sale so that it would be more accessible to the target population.
- ❖ Husbands should be very much concerned with providing treated nets to their pregnant wives. They should also encourage everybody in the family to sleep under a net in order to minimise the burden of malaria in their families.
- ❖ There is need for awareness creation among pregnant women to know that mosquito is a vector for malaria parasite that causes malaria so that all these misconceptions are addressed. People's perceptions and understandings about the perceived cause and transmission of malaria have strong implications on the preventive measures.

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