

Ownership and Use of Insecticide Treated Nets by Pregnant Women at Dworzark Community in Freetown, Sierra Leone

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Abstract

Background: Malaria remains a major public health problem in Sierra Leone. One contributory factor to the high malaria burden is the unavailability of Insecticide Treated Nets (ITN). This study assessed ownership and use of ITN by pregnant women.

Methodology: Cross sectional study design and multi-stage cluster sampling were employed to collect data from 333 eligible and consenting pregnant women. An Interviewer-administered, semi-structured questionnaire was used for data collection. Analyses was done using SPSS version 21. Mean, median and standard deviation were used to summarize quantitative variables and frequencies and proportions for qualitative variables. Association between demographic and pregnancy variables and ITN use was statistically tested. Level of significance for all tests was at 5%.

Result: The mean age of the surveyed pregnant women was 28.49 years. While only 30.3% of pregnant women owned ITN, 97.2% slept under bed net the night before the survey and, 79.2% slept under bed nets always in the 3 months preceding the survey. The ITN ownership by household was 35.4%. The sources of ITN include street traders (38%), mass campaign (25%), health facilities (18%) and shops (15%). The reasons for not sleeping under ITNs are unavailability (79.7%), heat (25.8%), odour (19%), use of other malaria preventive measures (12.1%), and cost, inconveniences and itching (13.8%). ITN use by pregnant women is statistically associated with their educational status, age and ownership of at least one ITN

Conclusion: Pregnant women should have access to ITN at all times as this may increase ITN use during pregnancy.

Keywords: Insecticide Treated Nets, Pregnant, Women, and Malaria.

Introduction

Globally, 212 million new cases of malaria were reported in 2015, 90% of which occurred in the WHO African Region¹. Malaria is thus a common infectious disease in sub Saharan Africa This region account for 92% of the global estimated 429,000 malaria related deaths¹

Malaria is one of the most serious public health problems in Sierra Leone^{2,3}. It is the most common cause of illness and death in the country, accounting for about 50% of outpatient visits and 38% of admissions³. Malaria-related illnesses contribute to 38% and 25% of child and all-ages mortality rates, respectively. The most vulnerable groups include children under five years and pregnant women³

Insecticide-treated nets are the cornerstone of malaria prevention efforts in Africa. Only 53% of the population at risk in sub-Saharan Africa slept under a treated net in 2015¹.

Pregnant women and children under five years old constitute 4.4%. *P. falciparum* is usually asymptomatic in pregnancy in high malaria transmission countries like Sierra Leone where levels of acquired immunity tend to be high. Yet, the parasites may be present in the placenta and contribute to maternal anaemia even in the absence of documented peripheral parasitaemia. These effects can lead to low birth weight, an important contributor to infant mortality⁴.

ITN use and ownership

A greater number of women in the reproductive age and children below 5 years are not sleeping under ITN.

ITN use among pregnant women in Sierra Leone is variable and also dependent on mass distribution of ITN. Based on previous studies about 27% of pregnant women in Sierra Leone slept under ITN⁵ and 77% slept under an LLIN the night before the survey⁶.

However, a household survey 6 months after distribution of over 3.2 million LLINs in the same year (2011) revealed that 87% of the household had at least one LLIN for every two household members, and 67% had more than one. It was further shown in this study that 87% of the household had at least one member sleeping under LLIN, and 77% of pregnant women slept under an LLIN the night before the survey⁶. A recent Sierra Leone National Malaria Indicator Survey showed an ITN household ownership of over 60 %⁷.

According to a study in Nigeria, ownership of at least one ITN/LLIN in a household was 67%, while the use was as low as 19% among all pregnant women⁸. Another Nigerian study showed an ownership of ITN of 43.1% by pregnant women with 90.5% sleeping under the nets during the index pregnancies; equivalent to 39.1% utilization rate among the women studied. 28.4% of these women use ITNs as the only means of vector control, while 10.7% used it in combination with other anti-vector measures⁹.

In an Ethiopian study, 65.5% of the surveyed households had at least one LLIN while 34.5% did not have any type of mosquito nets. The majority of LLIN owned households had either one or two LLINs irrespective of their household size¹⁰. In 33.5% of the households, at least one LLIN was used in previous night of the survey and members of the remaining households (66.5%) did not use ITN. Of the persons in the LLIN owned households, only 25.5% household members, including 46.6% of children under five and 37.2% pregnant women slept under LLIN¹⁰.

Only 64.2% of the total observed LLINs in this study were in good condition, without holes that could allow finger through it. The remaining 35.89% of LLINs were in bad conditions, and had holes that allow finger through it. The observation in the survey showed many LLINs were used for covering of household properties¹⁰.

A Southwestern Ethiopian study found an overall LLIN ownership among community people of 56.6%. About 41.8% of households reported having at least one LLIN while 31.1% reported owning only one LLIN and close to two-thirds of surveyed households bought their LLINs¹¹.

A Ugandan Survey post mass distribution of LLIN showed a 69% ownership of at least one ITN. However, prior to the mass distribution of LLIN, the ITN ownership was 22%. LLIN use among children less than five years increased from 11 to 51% post mass distribution¹¹. However, the proportion of households with at least one LLIN per two people was still low after the first campaign phase, increasing from 8.5 to 25.9%¹².

Another Ugandan study revealed a 72% ownership of ITN in pregnant women during their most recent pregnancy. Women reported acquiring an ITN either during the 2nd (57%) or the 3rd (43%) trimester of pregnancy. All of the women who acquired the net during pregnancy reported always sleeping under it for the remainder of their pregnancy¹³. Among ITN owners, 73% of women reported either always sleeping under the net during all trimesters of pregnancy, or always sleeping under the net after they acquired one during pregnancy¹¹.

A study of ITN use among pregnant women in Sudan showed a ITNs coverage of 58.7%. However, only 11.5% respondents used ITNs regularly. ITNs usage by respondents' other family members was 56.7%¹⁴.

In a study conducted by Breley et al in Ethiopia, a total of 58.4% of 481 pregnant women from households owning at least one ITN had slept under it during the previous night¹⁵. On the other hand, a study in a rural Nigerian community showed an ITN household ownership of 90.1% with only 69.3% of them slept under the nets a night before the survey¹⁶.

Factors that influence use of ITNs

Different factors influence the use of ITNs by pregnant women and their cohabitants. These factors vary from one community to another.

A Nigerian study in pregnant women revealed that marital status, age, length of time a woman owns a net, and the average number of nets owned in a household were not significantly related with ITN/LLIN use. But the higher the level of education, the more likelihood of ITN/LLN use⁸. This is further supported by findings from other Nigerian studies. A study in Enugu, Nigeria showed a strong association between ITN use and educational status and social class of the women⁹.

Other findings in other study also showed a similar trend in other parts of sub-Saharan Africa. An Ethiopian study revealed that low educational level of women, low awareness on malaria prevention, unavailability of separate sleeping room, LLIN color preference, and unavailability of enough LLINs to the household members were the main barriers to LLIN use¹⁰.

There were a number of other reasons for non-use of LLINs ranging from poor condition of the mosquito nets; unavailability of enough LLIN for the household members, use of fire place and sharing the same room with domestic animals, low perception on malaria prevention using mosquito nets, and using the nets for purposes other than for the intended purpose such as for covering of household properties and using as curtain¹⁰.

In a Ugandan study, it was shown that the primary reason for not always sleeping under the net was the heat (49%). In this study, women of Muslim religion were less likely to always use a net during pregnancy compared to those of Christian religions. Owning more than 1 net was associated with a slightly increased likelihood of always sleeping under a net during pregnancy¹². According to this study, the single most important influence over deciding to sleep under an ITN by women during pregnancy is advertisement on the radio/poster than being given an ITN free of charge. Paradoxically, women who always used their net during pregnancy were also slightly more likely to believe that sleeping under an ITN might be dangerous during pregnancy. The study showed no influence of pregnancy history, ANC use or socio-cultural factors and ITN use¹³.

In contrast, a study on pregnant women in Sudan, showed an inverse relationship with the increasing number of deliveries to the likelihood of ITNs usage¹⁴.

The characteristics of the head of a household has also shown to affect the ownership of ITN. The chance of having a bed net is positively associated with age of household heads; particularly the probability of having two or more was positively related to age of household heads. Those households with heads aged 60 years or above were nearly twice as likely to have one bed net and more than three-fold likely to have two or more, compared to families with head of household less than 30 years old. Families with head of household who were married were twice more likely to have two or more LLINs than those families whose heads were single, widowed or separated¹¹.

Awareness and knowledge on malaria prevention

Awareness and knowledge of malaria is also a significant factor that influence the use of ITNs and adoption other preventive measures necessary for malaria prevention and control by pregnant women.

In a Nigerian study, the perception of malaria as a serious illness by pregnant women was said to be 79%. However, there is low knowledge on other characteristics of malaria. Only 3% of pregnant women referred to malaria as a parasitic disease, 2% of respondents associated it with mosquito bites, while 15% had no knowledge of malaria¹⁷.

This contrast with another Nigerian study which showed that 92.6% pregnant women correctly attributed the cause of malaria to mosquito bites while 16.1% of them wrongly noted the cause of malaria to be from drinking infected water¹⁷. Most of these women knew that malaria was a preventable disease (95.5%). The use of ITN was the most common malaria preventive measure known to the respondents (74.9%). A total of 66.3% of the respondents agreed to keep the environment tidy, while 53.1% acknowledged the use of drugs as a malaria preventive measure¹⁸.

A Sudanese study also demonstrated a good knowledge (96%) of malaria causal factors¹⁸

Erroneous beliefs such as witchcraft, working hard under the sun and eating palm oil were reported to be the cause of malaria by 13.6%, 7.2% and 2.7% of the participants, respectively in some studies¹⁷. There was no statistically significant association between knowledge of malaria and parity. However, there was a statistically significant association between knowledge of malaria and educational level¹⁹.

The study further demonstrated that mothers and under-five caregivers with higher educational status, who were civil servants, with higher income, and married had good knowledge of malaria prevention including ITN use¹⁹.

In most studies, awareness of ITN is high in pregnant women. In a Nigerian study, for example, awareness of net is very high among studied pregnant women (92%). Eight out of every ten pregnant women were confident that they can use or hang a net, while almost four out of ten knew that the use of an ITN/LLIN can protect a pregnant woman from malaria⁸.

Another study showed that nearly 84% of pregnant women had heard of ITN, while almost 70% had good knowledge of the use of ITN in malaria prevention¹⁷. About 80% knew that ITN is useful in malaria prevention and over three-quarters understood that it could kill mosquito¹⁷

Knowledge on other preventive measures was also high in this study. For example, 85%, 82%, and 75% of pregnant women knew that malaria could be prevented through keeping the environment clean, clearing of bushes around houses and use of ITN on windows and doors respectively. However, approximately 77% and 82% of respondents felt taking native concoction and using malaria prophylaxis respectively could prevent the occurrence of malaria infection¹⁷

In a study of pregnant women in Sudan, 59.6% demonstrated good knowledge on the aim of ITNs usage but only 22.1% of respondents knew the proper usage of ITNs. Those with increased maternal age, income, gravidity, parity, abortion, and number of family members were more likely to use ITNs during pregnancy¹⁴

Other studies were able to show different preventive measures against malaria¹⁸. For example, herbs, chloroquine and pyrimethamine were shown as malaria preventive measure in 30%, 27% and 23% respectively. Blood tonic and paracetamol were also used as preventive measure in 12% and 5% respectively. Mosquito control measures adopted by pregnant women studied include use of insecticide spray, 48%, mosquito coils, 21%, bush clearing 6%, and mosquito screening on doors and windows (4%). Environmental cleanliness was mentioned by 6% of the women, while use of repellents was practiced by a mere 0.3% with no knowledge of malaria prevention by 2% of pregnant women¹⁸.

Sampling method

The study surveyed a total 333 pregnant women between February and March 2017 and employed a cross sectional study design. It was carried out at Dworzark community in Sierra Leone's capital which has a population of 1.4 million¹⁹. The respondents were selected by a multi-stage sampling technique using the map obtained from Statistics Sierra Leone which divided Dworzark Community into 10 zones. In the first stage, out of the ten zones, five zones were randomly selected. This was followed by random selection of five streets from each zone, thus 25 streets were included in the study. On each street, a house was randomly selected (using a spinning pen and the first house selected was the one where the tip of the pen points to). In an anticlockwise manner, households with consenting eligible pregnant women (permanent residents of the study area) on each sides of the street were sequentially surveyed.

Sample size

The required sample size was calculated using the Leslie Kish sample size calculation formula for estimating single proportion studies. With coefficient interval@ 95% (1.96), a margin of error of 0.05, a proportion of 0.27⁵ of pregnant women that use ITN and correction for anticipated non response rate of 0.1, the sample size was estimated at 333 pregnant women.

Ethical consideration

The study was performed in accordance with the declaration of Helsinki. Ethical approval was obtained from the Ethics Review and Scientific Committee of the Ministry of Health and Sanitation, Government of Sierra Leone. Confidentiality of the study respondents and data collected from them was ensured. The assigned study serial numbers to each respondent were the only identifier used. The informed consent form was translated into the Krio local language and back translated to ensure soundness of the translation. It explicitly stated the right of the participants to refuse to give consent or withdraw from the study at any point. The recruitment of respondents was strictly voluntary and their refusal to participate did not affect their relationship with the research team.

Data collection method and instruments

Quantitative data was collected from the respondents using an interview administered semi-structured questionnaires formulated from findings of previous studies on ITN use. The study proforma contained information on socio-demographic characteristics including types of religion (traditional religion defined as beliefs in spirit veneration of the dead or a supreme creator), ITN ownership and factors that influence their utilization. It was translated into the Krio language and back translated to ensure soundness of the translation process. Three young doctors that are familiar with the study area assisted in the data collection after a thorough practical training.

Pre-testing: The questionnaire was pretested at an area different from the study area (Brookfields Community, Freetown) on 30 pregnant women. The questionnaire was edited in line with the objectives of the study and the internal consistencies of its items were assessed using the Cronbach's alpha.

Limitations

Some women that are not permanent resident of the study area where pretending to be permanent resident. This is due to the thought of having financial or some benefits by their involvement in the study. This was circumvented by thorough explanation of the study purpose and involvement of community authorities

The study was to also assess the nature of ITN owned by pregnant women through visual inspection. But most women refused. I had to leave it out as the response rate was low.

The study area is mountainous. Some areas are hard to reach but with the perseverance of data collection team, we were able to survey all the randomly selected locations

Data management and analysis

Data generated from this study was entered, stored and analyzed using Statistical Package for Social Sciences version 21 (SPSS Inc, Chicago, IL, IBM Version). The data entry was carried out by an experienced data operator. The questionnaires were edited on a daily basis during data collection. Further cleaning of data was done before analysis. Frequency distribution of each variable was produced and examined for implausible entries. Summary statistics such as means, median and standard deviation was used to summarize quantitative variables and frequencies and proportions for qualitative variables. Association between demographic characteristics (educational status, occupation, religion and marital status, gravidarity) and ITN ownership by respondents was tested using appropriate tests. Multiple logistic regression analysis was used to identify variables independently associated with clinical outcomes. Level of significance for all tests was at 5%.

Results

Socio-demographic characteristics of the study population

A total of 500 households were visited between February and March 2017 to identify 333 eligible women. Only eligible women participated in the survey.

The mean age of the respondents was 28.49 years (range=17 to 40 years) with a predominant (55%, n=183) age group of 20-29 years with only 5.1 % (n=17) being teenagers. Most (72.4%, n=241) of the respondents were single/never married. Over three quarter (75.3%, n=251) of the respondents have some form of education. The predominant religion (60.7%, n=202) of the respondents is Islam. About half (52.3%, n=174) belongs to the Temne ethnic group (**Table 1**)

Pregnancy and household characteristics

As shown in **Table 2**, over a quarter (27.3%, n=91) of the respondents are primigravida and most (64.0%, n=213) of the respondents were in their second trimester at the time of survey. Majority (83.5%, n=278) of the respondents have made at least one antenatal care visit at the

Ownership and use of ITN

Only 101 (30.3%, 95% CI: 25.4 – 35.6%) of the pregnant women owned ITN. Majority 98(97.0 %) of pregnant women that acquire bed nets do so at the second trimester of their pregnancy. Out of 333 household surveyed, only 118(35.4%) of them own ITNs. The educational status of respondents is statistically associated with their ownership of ITN (P=0.039). Majority (89%, n=105) of the household that owned ITN, owned only one ITN. Of the household surveyed, 41(12.3%) own ITNs other than the ones used by pregnant women. The ITN ownership by household was 118(35.4%). Most (97%, n=98) of the pregnant women that owned ITN acquired them during their second trimester of pregnancy (**Table 3**)

Over one third of pregnant women studied acquired their ITN by buying them from street traders (38%). Other surveyed pregnant women acquired their ITN during mass campaign distribution by the government (25%) and healthcare facilities (18%). Other sources include buying from shops (15%). A very small number of people could not ascertain their sources of ITN (**Figure 2**).

Among the 101 pregnant women that owned ITNs, almost all (97.2%, n=98) slept under a bed net the night before the survey and over three quarter 80(79.2%) slept under bed nets always in the last 3 months preceding the survey. All the pregnant women that acquired bed nets during the trimester of pregnancy start to sleep under ITN during the same trimester (Table 3).

Majority of pregnant women reportedly always sleep under ITN. The reasons given by pregnant women for not sleeping under ITNs are majorly unavailability (79.7%, n=185) followed by heat (25.8%, n=60), dislike of their odour (19%, n=44) and use of other malaria preventive measures (12.1%, n=28). About 32(13.8%) sited cost, inconveniences and itching as the reason for not using ITN (**Figure 3**)

Factors that influence use ITN

Certain factors influence the use of ITN by the surveyed pregnant population. Demographic factors such as educational status ($X^2=12.45$, $p=0.006$) and age ($X^2=9.551$, $p=0.023$) was shown to be statistically associated with the use of ITNs by the respondents. In addition, ownership of at least one ITN has a significant statistical association ($X^2=240.43$, $p=0.000$) with use of ITN by pregnant women at Dworzark community. The presence of a child below 5 years in a household has also has a significant statistical association ($X^2= 4.731$, $p= 0.030$) with use of ITN by the study population. (**Table 4**)

However, factors such as marital status ($X^2=2.232$, $p= 0.526$) and religion ($X^2= 0.657$, $p= 0.841$) are not statistically associated with ownership and use of ITNs. Parity ($X^2=3.348$, $p= 0.069$) and episodes of at least one febrile illness($X^2= 3.790$, $p= 0.052$) have no statistical association with the use of ITN by pregnant women (**Table 4**).

Finally, gestational age influences ownership of ITN ($X^2=0.596$, $p= 0.01$) but not their use ($X^2 =3.586$, $p=0.058$). ANC visit does not influence ITN ownership($X^2=10.625$, $p=0.101$) and has no statistical relationship with ITN use ($X^2= 12.541$, $p=0.051$) (**Table 4**).

Discussions

This survey showed that the ownership of ITN among the pregnant population studied is 30.3%. This is below the ITN ownership by pregnant women in other countries. The proportion of pregnant women in a Nigerian study that own ITN was 43.1%⁸. A Ugandan study revealed a 72% ownership of ITN by pregnant women during their most recent pregnancy⁹. In addition, a study of ITN use among pregnant women in Sudan showed ITN coverage of 58.7 %¹³.

Most (97%) of women that owned ITN acquire them during the second trimester of pregnancy. This is in consonance with a Ugandan study that showed that over half (57%) of pregnant women acquired their ITNs during the second trimester of pregnancy⁹.

Ownership of more than one ITN by a household as surveyed in our study was 35.4%. This is different from other studies. A recent Sierra Leone National Malaria Indicator Survey showed an ITN household ownership of over 60 %^A. This difference could be due to the sample size involved in the study. Our study surveyed only 333 household in one community unlike the Malaria Indicator Survey that targeted the whole country and surveyed 6,720 households. However, a household survey 6 months after distribution of LLINs in Sierra Leone showed that 87% of the household had at least one LLIN for every two household members, and 67% had more than one⁶. This large difference could be explained from the mass distribution of ITN carried out in 2011 prior to the survey. Prior to our own study, mass distribution of ITN occurred far back in 2014. Furthermore, a Nigerian study showed an ITN ownership of at least one ITN/LLIN in a household was 67 %⁷.

Most (51%) ITNs owned by the pregnant population surveyed were bought either from street traders or from shops

Among the 101 pregnant women that owned an ITN, almost all (97.2%) slept under a bed net the night before the survey and over three quarter 79.2% slept under ITN always in the last 3 months preceding the survey. This result is similar to the Sierra Leone MIS survey and a post mass distribution household survey that showed that 75% and 77% of pregnant women slept under an LLIN the night before the survey (20, 7). A similar finding was also shown by a Central Ugandan study that showed that 73% of women reported either always sleeping under the ITN during all trimesters of pregnancy or always sleeping under the net after they acquired one during pregnancy⁹. However, some studies showed a different trend on ITN use. The 2011 Sierra Leone service availability and readiness assessment reported that 27% of pregnant women slept under ITNs⁵ and a Nigerian study showed ITN use as low as 19% among pregnant women⁷. A study of ITN use among pregnant women in Sudan showed only 11.5% respondents used ITNs regularly.¹³

In this study, it was shown that all the pregnant women that acquired bed nets during the trimesters of pregnancy start to sleep under ITN during the same trimester. This is in consonance with a Nigerian study that showed that 90.5% of pregnant women sleep under the nets during the index pregnancies⁸.

Several factors were shown to influence ITN use among the studied pregnant population at Dworzark community. There is statistical significant relationship between educational status, age, presence of children below 5 years in the household of respondents, ownership of ITN and use of ITN. A Nigerian study is in agreement with our findings in which educational status had a statistically significant association with use of ITN even though age and ITN ownership has no significant relationship with ITN use in their study⁷. Another study in Enugu, Nigeria showed a strong association between ITN use and educational status of the studied pregnant population⁸. In a Ugandan study, owning more than 1 net was associated with a slightly increased likelihood of always sleeping under a net during pregnancy⁹. Ajibola et al study in rural Nigeria showed that women with no formal education had significantly lesser odds of ITN use compared to those with tertiary education¹⁵

However, our study showed that other demographic characteristics like religion, occupation, ANC visits have no statistical association with ITN use. This is in agreements with other studies in sub-Saharan Africa. A Nigerian study in pregnant women revealed that marital status, length of time a woman owns a net was not statistically associated with ITN use⁸. Other findings in other study also showed a similar

trend in other parts of sub-Saharan Africa. An Ethiopian study revealed that low educational level of women, low awareness on malaria prevention and unavailability of enough LLINs to the household members were the main barriers to LLIN use¹⁰

In contrast, a study on pregnant women in Sudan showed an inverse relationship with the increasing number of deliveries to the likelihood of ITNs usage¹³

A number of reasons were given by pregnant women for not sleeping under ITNs ranging from unavailability (79.7%) followed by heat (25.8%), dislike of their odour (19%), use of other malaria preventive measures (12.1%) to cost, inconvenience and itching(13.8%)

This is in consonance with other studies. In a Nigerian study, reasons for not using ITNs were their poor conditions, unavailability of enough LLIN for the household members¹⁰.

In a Ugandan study, it was shown that the primary reason for not always sleeping under the net was the heat (49%)⁹.

Conclusion

ITN ownership by pregnant women at one of the communities in Freetown, Sierra Leone's capital is found to be low. Though ITN ownership is low, the use of ITN by pregnant women that owned them is very high. It is encouraging to see pregnant women that own ITN always sleeping under these commodities. Since availability is the main factor that prevents pregnant women from using ITN, the government of Sierra Leone should continue their drive on the distribution of ITN. Other factors that prevent the pregnant population from using ITN can be addressed through continuous education and raising awareness. There is need for the government through National Malaria Control Programme to engage the people of these communities on the need to acquire and continuously sleeping under ITN. Government should partner with various stakeholders including community leaders, religious people, media houses etc on the need to improve on interventions on malaria prevention.

Educational status has been shown by this study to be a strong factor that influences the use of ITN by pregnant population at the community. Thus, there is need for the government of Sierra Leone to continue its drive on the girl child education as this will improve utilization of health services.

Age was also a strong predictor of ITN use. Even though teenage pregnant women were found to constitute about 5% of all pregnant population studied, there is need for us to educate the girl child on health related issues of teenage pregnancy.

We are recommending for studies to be carried out on the outcomes of pregnancy by pregnant women not using ITN.

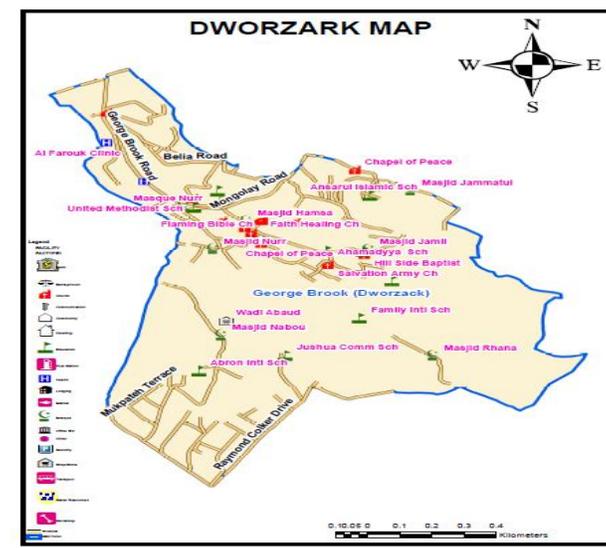


Figure 1. Map of dworzack communit

Table 1. Socio-demographic characteristics

Characteristics	Frequency (%) N=333
Age	
<20	17(5.1)
20-29	183(55.0)
30-39	125(37.5)
≥40	8(2.4)
Mean +/-SD	28.49+/-5.04
Religion	
Islam	202(60.7)
Christianity	129(38.7)
Traditional	2(0.6)
Educational Status	
Never been to school	82(24.6)
Primary	54(16.2)
Secondary	137(41.1)
Tertiary	60 (18.0)
Marital Status	
Married	90 (27.0)
Single	241(72.4)
Separated	1(0.3)
Divorce	1(0.3)
Monogamous Marriage type of	84(93.3) married respondents
Polygamous	6(6.7)
Ethnicity	
Temne	174 (52.3)
Mende	97 (29.3)
Limba	43(12.9)
Others	19 (5.7)

Table 2. Pregnancy and household characteristics

Variable	Number (%)
Parity	
Primigravida	91(27.3%)
Multigravida	242(72.7%)
Gestational age at the time of Survey	
< 12 weeks	2(0.6)
12-24 weeks	213(64.0)
>24 weeks	118 (35.4)
Number of ANC visits	
0	55(16.5)
01-Mar	253 (76.0)
0.4	25(7.5)
Febrile illness during current pregnancy	
Yes	187(56%)
No	146(44%)

Number of rooms of households	
1	272(81.7)
2	56(16.8)
0.3	5(1.5)
Age of household head	
20-29	18(5.4)
30-39	170(51.1)
40-49	106 (31.8)
0.5	39(11.7)
Number of occupants in a household	
01-Jul	318(95.5)
07-Oct	8(2.4)
>10	7(2.1)
Educational Status of household head	
Never been to school	43(12.9)
Primary	74(22.2)
Secondary	147(44.2)
Tertiary	69(20.7)
No. of households with children < 5 years	
Yes	120(36.0)
No	213(64.0)

Table 3. Ownership and use of ITN by pregnant women

Variable	Number (%)
Pregnant women that owns a bed net	
Yes	101(30.3)
No	232(69.7)
Gestational age at ITN ownership	
First trimester	2(2.0)
Second trimester	98(97)
Third trimester	1(1.0)
ITN ownership by household	
Yes	118(35.4)
No	215(64.6)
Number of ITN owned by households	
One ITN	105(89.0)
Two ITN	12(10.2)
Three ITN	1(0.8)
Women that sleep under ITN the night before the survey	
Yes	98(97.0)
No	4(3.0)

Frequency of use of ITN	
Once weekly	1(0.9)
Twice weekly	15(14.9)
Always	80(79.2)
Don't know	5(5.0)
ITN ownership by different age group	
< 20 years	2(10.5%)
20-29 years	53(52.5%)
30-39 years	46(45.5%)
≥40 year	0(0.00%)
ITN ownership by gestational age	
Primigrvida	18(17.8%)
Multigravida	83(82.2%)
Knowledge on the uses of ITN by pregnant women	
Malaria prevention	327(98.2%)
Fishing	1(0.3%)
Bathing	5(1.5%)

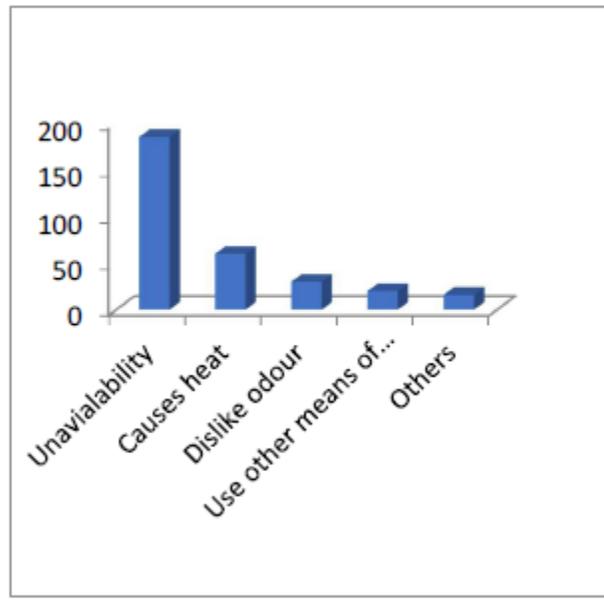


Figure 2. Mode of acquisition of ITN by pregnant women* (Multiple responses were allowed)

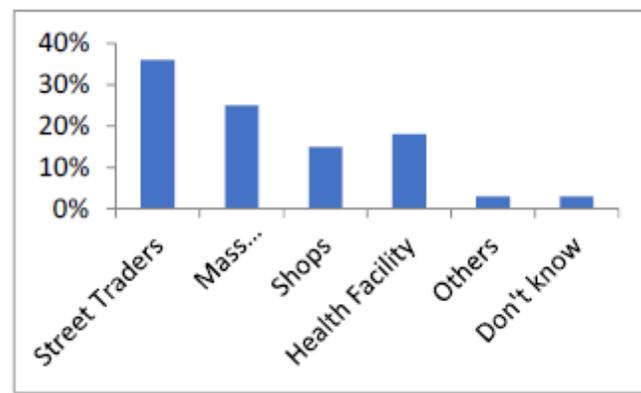


Figure 3. Reasons for not sleeping under ITN by pregnant women (Multiple choices were allowed)

Table 4. Factors influencing use of ITN by pregnant women

Variable	ITN ownership		X2	P value
	Yes N (%)	No N (%)		
Religion				
Christianity	38(38.8%)	91(38.7%)	0.657	0.841
Islam	60(61.2%)	142(60.4%)		
Traditional	0(0.0%)	2(0.90%)		
Age				
< 20	2(2.0%)	15(6.4%)	9.551	0.023
20-29	50(51.0%)	130(56.6%)		
30-39	46(47.0%)	79(34.0%)		
≥40	0(0.00%)	8(3.0%)		
Educational Status				
Never been to school	31(31.6%)	51(21.7%)	12.45	0.006
Primary	8(8.2%)	46(19.6%)		
Secondary	35(35.7%)	102(43.4%)		
Tertiary	24(24.5%)	36(15.3%)		
Marital status				
Married	31(31.6%)	59(25.1%)	2.232	0.526
Single	67(68.4%)	174(74.1%)		
Separated	0(0.0%)	1(0.4%)		
Divorced	0 (0.0%)	1(0.4%)		
Occupation				
Unemployed	34(34.7%)	109(46.4%)		
Trader	22(22.4%)	59(25.1%)		
Student	32(32.7%)	46(19.6%)		
Civil servants	6(6.1%)	19(8.1%)		
Others	4(4.1%)	2(0.8%)		
Parity				
Primigravida	20(20.4%)	71(30.2%)	3.348	0.069
Multigravida	78(79.6%)	164(69.8%)		
Children below 5				

years				
Yes	44 (44.9%)	76(32.3%)	4.731	0.03
No	54 (55.1%)	159(67.7%)		
Ownership of ITN				
Yes	89(90.8%)	12(5.1%)	240.43	0
No	9(9.2)	223(94.9%)		
Febrile illness				
Yes	47(48%)	140(59.6%)	3.79	0.052
No	51(52.0%)	95(40.4%)		

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