ORIGINAL ARTICLE

Awareness, accessibility and use of insecticide treated nets: a cross-sectional survey of ante-natal clinic attendees in a tertiary hospital in South-East Nigeria

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ABSTRACT

Background: The use of insecticide treated net (ITN) for protection against malarial vectors has remained a cost effective and highly effective tool in global and national malarial control policies. Despite this effort towards reducing the intolerable burden of malaria, the disease continues to be a major public health problem in Nigeria.
Objective: To determine the awareness, accessibility and use of ITN among women attending antenatal clinic (ANC) in a tertiary hospital in South-East Nigeria.
Methodology: A cross-sectional study of 400 women attending ANC in Nnamdi Azikiwe University Teaching Hospital (NAUTH) Nnewi was done. Data was collected using pre-tested semi-structured interviewer administered questionnaires and analyzed using Epi-info version 3.5.1 software. Tests of statistical significance were carried out using chi square tests for proportions. A p-value of <0.05 was considered significant.
Result: The age range of the respondents was between 20 and 39 years. All the respondents were married. Out of the 400 women studied, 384 (96.0%) were aware that malaria is transmitted by the mosquito, 212 (64.6%) reported that their source of awareness of ITN was the hospital campaigns. A total of 312 (79.6%) of the respondents use ITN out of which 176 (56.4%), claimed to be using it on all nights. Educational status did not influence affordability (*p 0.421*)
Conclusion: The accessibility and the use of ITN by pregnant women attending ANC in NAUTH was relatively good. However, there is need for this to be sustained through continued health education on the role of ITN in malaria control.

Keywords: *Affordability, ante-natal clinic, malaria, mosquito, NAUTH Nnewi, pregnant women*

INTRODUCTION

Malaria is an ancient disease of public health importance. Its clinical features and some of its associated complications have been documented by Hippocrates since 500 BC.[1] Malaria remains the most devastating human parasitic infection in the world today.[2] Currently, it is estimated that 1-2 billion people live in areas at risk for malarial infection, and each year up to 500 million

people contract the disease, out of which 1.7 to 2.7 million people die.[3,4] Reports indicate that more than 90% of these casualties are from Sub-Saharan Africa where the most virulent species of the parasite, *Plasmodium falciparum*, thrives.[5,6]

Every year, about 19-25 million women in malaria endemic areas of Africa become pregnant and are at risk of malaria during pregnancy.[5] Malaria infection during pregnancy poses substantial risk to the mother, her fetus or the newborn.[7] In Nigeria, available evidence indicates that malaria, which is highly endemic, accounts for 11% of maternal mortality, and is the most common cause of hospital attendance in all age groups (constituting 60% of overall outpatient visit to the hospital).[8] Its economic impact in Nigeria is enormous with about 132 billion naira lost annually in form of prevention, and loss of man hours.[8]

Antimalarial drugs (primaquine, chloroquine, proguanil and pyrimethamine) were initially used in the treatment and prevention of malaria in pregnancy. Currently, intermittent preventive treatment with sulfadoxine / pyrimethamine is in use, but the development of the drug-resistant strains of falciparum have greatly undermined the use of the earlier mentioned drugs in malaria treatment and prevention. Sleeping under ITN can reduce the risk of a pregnant woman being infected with malaria and is an effective malaria prevention intervention as ITN reduces human contact with mosquitoes.[9]

Studies examining ITN effectiveness report a reduction in malaria episodes by 48 to 50%.[10] These nets have also been shown to reduce the severity and mortality due to malaria in endemic regions as well as all-cause mortality by approximately 20%.[11] Therefore, the World Health Organization (WHO) strongly recommends the large scale use of ITN for malaria control.[8] The Roll Back Malaria (RBM) campaign of the WHO and its partners has as a major aim, to have 80% of pregnant women and children (under the age of 5years) covered by ITN by 2010.[9] This derived from the fact that ITN use offers an indirect, protective benefit for the community at large.[12]

Despite the knowledge that ITN is effective in preventing malaria, there are known barriers to ITN ownership and use. Some of the difficulties encountered or experienced by respondents using these nets are the scarcity of new nets, difficulty in getting chemicals for re-treatment of nets, non-availability of quality ITN for purchase, high cost of nets, preference for insectcide sprays, the individual perception that ITN is not necessary as they had mosquito nets fixed on their doors and windows already, discomfort when sleeping under ITN, none use of ITN in pregnancy and the individual experiences of some respondents that hardly come down with malaria.[13,14]

In a study by Pettifor, *et al*, cost of nets was reported as the reason for not owning a net by 48% of women who did not own one.[15] Studies suggest mosquito nuisance, perceived malaria risk, malaria knowledge, and socio-demographic factors, including education and household income, as important determinants of ITN ownership and use.[16,17,18] Other ddeterminants such as seasonality, age, household size, and expenditure on other malaria prevention products have been reported as affecting ITN ownership and usage.[18,19,20,21] Women with low income were found to be less likely to use ITN.[22] It has been reported that those with more malaria knowledge and higher education and socioeconomic status are more likely to own an ITN.[17,19] In multivariable analyses, women who had secondary school or higher education were 3.4 times more likely to own a net and 2.8 times more likely to have used a net compared to women with less education.[15]

However, knowledge of the benefits of ITN and net ownership does not necessarily imply use. The study done in Nigeria by Musa, to determine the awareness, accessibility and use of ITN by pregnant women attending ante-natal clinic at the primary health care

level in a northern state in Nigeria, showed that about one-third of the respondents were aware of the role of ITN in malaria prevention, but less than a third had ever used it.[13]

In many African countries, ITN coverage is relatively low.[18,21] Distribution practices vary ranging from sale to free distribution. Even in areas where the cost is subsidized, access by those of low socio economic status, who are often at the higher risk for malaria remain poor.[22] Several authors have reported that providing nets free of charge to pregnant women is an effective, low-cost malaria prevention strategy.[22,23] However, some others oppose free distribution of ITN.[24,25]

According to the study conducted in Ethiopia on the coverage of ITN among pregnant women, it was established that out of 815 pregnant women studied, 481 admitted having at least one ITN.[26] The study went further to conclude that the number of ITN owned by the women was not adequate to give enough protection against mosquito bites. A study carried out in Niger showed high coverage and use rates.[27] This was associated with high level of awareness and public health education among the respondents.

It has equally been reported that the frequency of malaria attack among respondents using ITN was lower than in those not using it.[13] The use of mosquito nets offers protection and is a useful predictor of epidemiological impact.[20] If usage rates are low, it is important to know the reasons and the appropriate intervention strategies put in place to check it.[20]

This study examined the awareness, accessibility and use of ITN among pregnant women attending ante-natal clinic in Nnamdi Azikiwe University Teaching Hospital (NAUTH) Nnewi.

METHODOLOGY

This was a cross-sectional survey of pregnant women attending ante-natal clinic in NAUTH Nnewi, Anambra State, Nigeria. The centre is a tertiary health institution owned by the Federal Government of Nigeria and has specialist departments such as Community Medicine, Family Medicine, Internal Medicine, Obstetrics and Gynaecology, Surgery, etc. It is located in one of the commercial nerve centres of Anambra State in South-East Nigeria, and has a catchment area that spans all through Anambra State and neighbouring States – Imo, Abia, Delta, Enugu, Ebonyi and Kogi States.

Using the sample size determination formula for descriptive study, $\mathbf{n= z^2pq/d^2}$, a total of 400 consecutive ANC attendees were enrolled into the study.[28] Pretested, semi-structured interviewer administered questionnaires were used to collect data from the respondents. Information collected include: socio-demographic data of respondents, knowledge on malaria transmission and prevention, household possession of nets and use of ITN. All data collected were analyzed using Epi Info 2008 epidemiological software.[29]

Ethical Consideration

The research proposal was approved by Community Medicine Department, Nnamdi Azikiwe University Nnewi Anambra State, Nigeria. Permission to carry out the study was obtained from the NAUTH Ethical Committee. Informed consent was obtained from individual respondents.

RESULTS

A total of 400 women attending the ante-natal clinic were enrolled in the study. The age range of the respondents was 20 to 39 years. All the participants were married. Majority of them had secondary level of education 192 (48.0%). Similarly, the highest educational status of majority of study respondents' husbands was secondary level 264 (66.0%), see Table 1.

Out of the 400 women studied, 384 (96.0%) were aware of the transmission of malaria by

mosquitoes, 16 (4.0%) associated it with other causes.

Table 1. Socio-demographic data of respondents

Socio-demographic Chracteristics	N=400	%
Age Group (in years)		
20-24	56	14
25-29	72	18
30-34	160	40
35-39	112	28
Marital Status		
Married	400	100
Never married	0	0
Highest Educational Status of Respondents		
Nil formal	0	0
Primary	32	8
Secondary	192	48
Tertiary	176	44
Highest Educational Status of Husbands of Respondents		
Nil formal	8	2
Primary	56	14
Secondary	264	66
Tertiary	72	18
Occupation		
Petty trader	144	36
Civil servant	96	24
Artisan	88	22
Housewife	72	18

Three hundred and ninety-two (98.0%) respondents knew the symptoms of malaria, while a total of 328 (82.0%) respondents were aware of the complications of malaria. Out of the 200 respondents enrolled in the study, 328 (82.0%) were aware of ITN, whereas 72 (18.0%) were not, see Table 2.

Out of the 136 (43.6%) respondents that admitted using ITN on some nights and not every night, the reasons given were: 24 (17.6%) did not think that it completely prevents mosquito bites, 88 (70.6%) did not find it comfortable sleeping under ITN, while 8 (5.9%) of them claimed it makes them feel too hot, see Figure 1.

A total of 312 (79.6%) of the study respondents use ITN, while 80 (20.4%) do not use ITN, see Table 3. Out of the 312 respondents that admitted using ITN, 176 (56.4%) respondents claimed to be using it on all nights while 136 (43.6%) admitted using it only on some nights.

A total of 212 (64.6%) of respondents reported that their source of awareness of ITN was from hospital campaigns, 76 (23.2%) from radio/mass media, 24 (7.3%) from churches and other religious bodies, while 16 (4.9%) heard of it from friends, see Table 2.

Table 2. Knowledge of malaria and ITN among the respondents

Knowledge of Malaria and ITN	N=400	%
Mentioned correctly the tansmission of malaria by mosquito	384	96
Mentioned wrong causes of malaria	16	4
Mentioned correctly at least two features of malaria	392	98
Mentioned wrongly / DNK features of malaria	8	2
Mentioned correctly at least two complications of malaria	164	82
Mentioned wrongly/ DNK complications of malaria	36	18
Aware that ITN protects from malaria vectors	328	82
Not aware that ITN protects from malaria vectors	72	18
Sources of Information on ITN	**n =328**	**%**
Hospitals	212	64.6
Radio/ mass media	76	23.2
Churches and other religious bodies	24	7.3
Friends	16	4.9

Table 3. Use of ITN by respondents

Use of ITN by Respondents	N=200	%
Ever used ITN	312	79.6
Never used ITN	88	20.4
Use ITN all nights	176	56.4
Use ITN some nights	136	43.6

Figure 1. Reasons for not using ITN all night by respondents

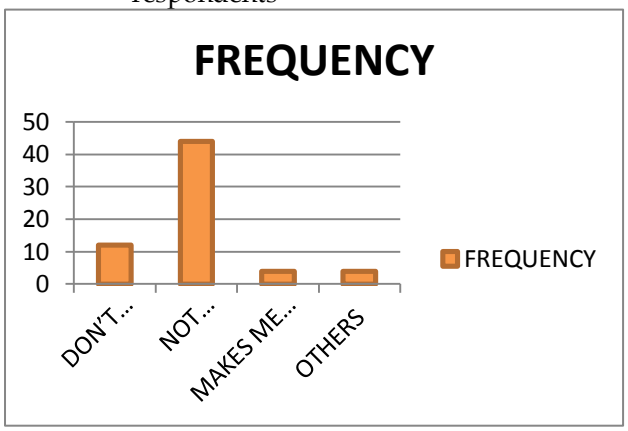

Table 3. Use of ITN by respondents

Use of ITN by Respondents	N=200	%
Ever used ITNs	312	79.6
Never used ITNs	88	20.4
Use ITNs all nights	176	56.4
Use ITNs some nights	136	43.6

A total of 224 (56.0%) of respondents admitted that they could afford ITN while 152 (38.0%) claimed they could not afford it. However, 24 (6.0%) did not give any response. Of the 76 respondents that reported they could not afford ITN, 64 (42.2%) reported it was because ITNs are too expensive; 56 (36.8%) claimed ITNs are not regularly available; 24 (15.8%) attributed it to the distance from distribution point and the remainder 8 (5.3%) reported difficulty in obtaining ITN.

Table 4. Affordability of ITN by respondents

Affordability	N= 400	%
Can afford ITN	224	56.0
Cannot afford ITN	152	38.0
No response	24	6.0
Reasons for not having access	**n= 152**	**%**
Distance from distribution point	24	15.8
Difficult to obtain	8	5.3
Not regularly available	56	36.8
Too expensive	64	42.1

Majority of the respondents that could afford it attained tertiary level of education 120 (53.6%); this was followed by the respondents that attained secondary level of education 96 (42.9%). Respondents that attained primary level of education were the least, 8 (3.6%). Educational status did not influence afforrdability (p=0.421), see Table 5.

Table 5. Affordability of ITN compared with respondent's educational status

ITNAffordability / Educational Status	1^0	2^0	3^0	Total	X^2	p value
YES	8 (3.6%)	96(42.0%)	120(53.6%)	224	3.95	0.421
NO	16 (10.5%)	88 (57.0%)	8(31.6%)	152		

Key
1^0 – Primary level of education
2^0 – Secondary level of education
3^0 - Tertiary level of education

DISCUSSION

The use of ITN has been established from different studies to be an effective and cheap way of preventing malaria.[9,10,13] However, the use of ITN for prevention of malaria has been associated with a lot of difficulties ranging from lack of awareness and knowledge of its role in malaria prevention, to its accessibility, availability and affordability.[13,14,15,16,17,18,19,20, 21 ,22]

The findings of this study showed that knowledge about the transmission of malaria and the use of ITN in the prevention of malaria among pregnant women attending ante-natal clinic at NAUTH Nnewi was relatively good. Ninety-six percent of respondents were aware of the transmission of malaria by mosquito, 98.0% knew features of malaria. Eighty-two percent of respondents were aware of the complications of malaria. Also, eighty-two percent of respondents were aware of ITN. This result is contrary to the finding in a study in Niger where about one-third of the respondents were aware of the role of ITN in malaria prevention. It is, however, in keeping with the finding in a Kenyan study where more than 80% were aware that bed nets protected from malaria.[17] Awareness of ITN in our study has been

reported by respondents to be mainly from the hospital staff who educate the pregnant women on the importance of procuring ITN and how to use it. Other sources of awareness as were noted in our study were information through the electronic and print media, the churches, as well as friends.

About 8 out of every 10 respondents in our study used ITN while the 79.9% ITN coverage rate among the respondents meets the target of 80% ITN coverage among pregnant women by 2005, in malaria endemic areas of Africa set by the roll-back-malaria initiative.[9] The possible reason for the high percentage of ITN usage in the present study was due to the free distribution of ITN in the area during the study period. This could have also been accounted for by the high level of awareness and health education among the respondents.These agree with the findings of other studies.[15,25,26]

It is noteworthy in our study, that despite the awareness that ITN is effective in preventing malaria, its use is being inhibited by a lot of factors. These factors include the feeling of discomfort, lack of conviction in its effectiveness in preventing mosquito bites and claim that it causes a lot of heat sensation.[13.14.15]

About one quarter of the respondents reported that they could not have access to ITN, and the reasons given included high cost, irregularly availability, long distance from distribution point and other difficulties encountered in obtaining ITN, similar to the reasons given in other studies for poor ITN accessibility.[13,14,14]

Majority of respondents that could afford ITN had tertiary level of education. This was followed by the respondents that attained secondary level of education, whereas respondents that attained primary level of education were the least. However, educational status did not influence affordability (*p 0.421*). This finding differs from those of other studies where higher educational status was associated with the increased use and affordability of ITN among the pregnant women studied, who reported a better knowledge about the use and benefits of ITN.[15,16,17,18,19]

CONCLUSION

The accessibility, knowledge and use of ITN by pregnant women attending ante-natal clinic at the NAUTH Nnewi is satisfactory, though, there is every need for this to be sustained through continued health education on the role of ITN in malaria control. This measure will go a long way in ensuring universal coverage, as well as protection, against mosquito bites.

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COMPETING INTERESTS

The authors declare that there is NONE.