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Prevalence and barriers to the use of insecticide treated nets among pregnant women attending ante-natal clinic at Specialist Hospital Sokoto, Nigeria

Awosan, K. J.[1]*, Ibrahim, M. T. O.[1], Alayande, M. O.[2], Isah, B. A.[1], Yunusa, E.[1] and Mahmud, M. B.[1]

[1]Department of Community Medicine, College of Health Sciences, Usmanu Danfodiyo University, Sokoto, Nigeria.
[2]Department of Veterinary Parasitology and Entomology, Faculty of Veterinary Medicine, Usmanu Danfodiyo University, Sokoto, Nigeria.

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Malaria is endemic and a major public health problem in Nigeria. In most malaria endemic areas, pregnant women are the main adult group at risk for the severe form of the disease. In the absence of effective vaccine for malaria prevention and development of unacceptable levels of resistance to one drug after another by the malaria parasite, prevention of mosquitoes bite through use of insecticide treated nets (ITNs) remains a very important strategy for malaria control. This study aimed to assess the prevalence and barriers to use of insecticide treated nets among pregnant women in Sokoto. This was a cross sectional descriptive study among 185 randomly selected pregnant women attending antenatal clinic (ANC) at Specialist Hospital Sokoto, in October, 2010. Data collection was done using a set of pretested, semi-structured questionnaires; descriptive statistics was used for analysis. Among the 179 (96.8%) respondents that were aware of ITNs out of the 185 participants, 154 (86.0%) had accurate knowledge of ITNs, 50 (27.6%) use ITNs (but this constitutes 74.6% of the 67 respondents that own an ITN). One hundred and eleven (84.7%) of the 131 respondents who did not sleep under an ITN the night before the survey, gave lack of ITNs as reason for not sleeping under the net. Utilization of ITNs was low despite high knowledge of the commodity among the respondents. Lack of ownership was the major barrier to its utilization. Educational level was statistically significantly associated with ownership and use of ITNs ($p < 0.001$). Women empowerment (through education and employment) and monitoring of ITNs distribution by the relevant government agencies were suggested as important interventions in improving availability, affordability and use of ITNs.

Key words: Insecticide treated nets, prevalence, barriers, pregnancy.

INTRODUCTION

In most countries of sub-Sahara Africa, malaria is highly endemic and a leading cause of morbidity and mortality (Federal Ministry of Health (FMoH), 2004). Due to repeated exposure to malaria infection (transmitted through the bite of infected female anopheles mosquito), people develop a certain degree of immunity to it during the first decade of life (Brabin, 2000). Despite this immunity, pregnant women, especially primigravidae,

*Corresponding author. E-mail: awosankj1@yahoo.com.

have a high susceptibility to *Plasmodium falciparum* infection, manifested by a high prevalence and intensity of parasitaemia (Steketee, 2005).

Every year, at least 30 million pregnancies occur among women in malarious areas of Africa, most of these women reside in areas of relatively stable malaria transmission. Nigeria is the most populous country in Africa, with an estimated population of over 168 million (World Bank, 2012). It therefore has the largest population of persons exposed to malaria infection in sub-Saharan Africa.

In areas of Africa with stable malaria transmission, *P. falciparum* infection during pregnancy is estimated to cause as many as 10,000 maternal deaths each year, 8 to 14% of low birth weight babies, and 3 to 8% of all infant deaths (Guyat and Snow, 2001).

Transmission of malaria disease is very high in Nigeria with an annual incidence of 31,913 per 100,000 population; it is the leading cause of death in children aged under 5 years accounting for 20% of deaths among this group, closely followed by pneumonia and diarrhea diseases that accounted for 17 and 11% of deaths, respectively. Among adults, it is the second leading cause of death with a cause specific mortality rate of 131 deaths per 100,000 population compared to 132 deaths per 100,000 population from human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS) (World Health Organization (WHO), 2013). Available record ranks Sokoto State (the study area) among those with very high morbidity and mortality from malaria in Nigeria in 2006 (National Bureau of Statistics (NBS), 2006).

In the absence of effective vaccine for malaria prevention and development of unacceptable levels of resistance to one drug after another by the malaria parasite, coupled with the development of resistance to insecticides by mosquitoes that transmit the disease; prevention of mosquitoes bite through the use of insecticide treated nets remains a very important strategy for malaria control (Lengeler and Snow, 2000; Ter Kuile et al., 2003). Insecticide treated nets (ITNs) have been shown to reduce severe disease and mortality due to malaria in endemic regions and reduce all cause mortality by about 20% (Centre for Disease Control (CDC), 2004).

Current use of malaria preventive measures during pregnancy in Nigeria was found to be low despite the burden of the disease in the country (National Population Commission (NPC) and ICF Macro, 2009). Review on community acceptance of bed nets in other places has shown that various factors influence the use of bed nets, including; cultural, behavioral and demographic factors, ethnicity, accessibility, gender relations and seasonality of malaria (Heggenhougen et al., 2003). This study was conducted to determine the prevalence and barriers to the use of ITNs among pregnant women in Sokoto.

MATERIALS AND METHODS

This was a cross sectional descriptive study carried out in Specialist Hospital, Sokoto State, Nigeria in October, 2010. The hospital is a tertiary healthcare facility located in Sokoto metropolis with a bed capacity of 270. The metropolitan city of Sokoto is the capital of Sokoto State; it lies between longitude 05° 11' to 13° 03' East and latitude 13° 00' to 13° 06' North and covers an area of 60.33 square km. The area has an annual mean rainfall ranging between 500 to 1,300 mm. Dry season starts from October and lasts up to May, and wet season begins in May and last up to October every year.

The study population consisted of pregnant women attending antenatal care (ANC) clinic, in the Obstetrics and Gynaecology Department of the hospital. The department runs the ANC clinic thrice a week, seeing an average of 150 patients per day. Fresh attendees presenting for booking are seen on Wednesdays, while those presenting for revisits are seen on Tuesdays and Thursdays.

The sample size was estimated at 185 based on a prevalence of 13% from a previous national survey (NPC and ICF Macro, 2009), precision level of 5% and an anticipated response rate of 95%. The study subjects were randomly selected by systematic sampling technique; this was done after explaining the objectives of the study to them. One in every four pregnant women presenting for revisits at the ANC clinic of the hospital was recruited over a 4 day period (consecutive Tuesdays and Thursdays in two consecutive weeks) until the required sample size of 185 was obtained. A standardized semi-structured, interviewer-administered questionnaire was developed to obtain the required data. The questionnaire sought information on socio-demographic variables, knowledge of difference between an ordinary net and an insecticide treated nets (ITNs), ownership and source of ITNs, use and barriers to use of ITNs and prevalence of malaria attacks. It was reviewed by senior colleagues in the Department of Community Medicine and Department of Veterinary Parasitology and Entomology of the Usmanu Danfodiyo University, Sokoto. The necessary correction was made based on their inputs to ascertain content validity. The questionnaire was pre-tested in a pilot study among 14 pregnant women presenting for ANC revisit at the maternal and child health unit of Primary Healthcare Centre, Yar- Akija, Sokoto in September, 2010. It was re-administered after a 2 week interval to 10 of the 14 respondents that complied with their follow-up appointment. The instrument shows good internal consistency (Cronbach's alpha = 0.83) and test-retest correlation coefficient was 0.79. Five student midwives assisted in questionnaire administration after pre-training on conduct of survey research, the objectives of the study, selection of study subjects and questionnaire administration. Ethical permission to carry out the study was obtained from the management of the hospital, and informed written consent was also obtained from the study subjects before questionnaire administration.

Data was analyzed using the statistical package for social sciences (SPSS) version 17 computer statistical software package. Frequency distribution tables were constructed; cross tabulations were done to examine relationship between categorical variables. The Chi-square test was used to compare differences between proportions; statistical significance was set at $p < 0.05$.

RESULTS

The study subjects comprised of 185 pregnant women between the ages of 18 and 45 years (Mean = 29.9; standard deviation (SD) = 5.75). Ninety four (50.8%) of

Table 1. Socio-demographic profile of respondents

Socio-demographic profile	Frequency (%)
Age groups (in years)	
18-25	42 (22.7)
26-33	94 (50.8)
34-41	47 (25.4)
42 and above	2 (1.1)
Marital status	
Married	180 (98.4)
Divorced	1 (0.5)
Widowed	2 (1.1)
Tribe	
Hausa/Fulani	140 (77.8)
Igbo	18 (10.1)
Yoruba	20 (11.1)
Other tribes	2 (1.1)
Education	
None	14 (7.6)
Qurranic only	37 (20.0)
Primary	22 (11.9)
Secondary	69 (37.3)
Tertiary	43 (23.2)
Religion	
Christianity	29 (15.7)
Islam	156 (84.3)
Occupation	
Housewife	124 (67.0)
Petty trader	17 (9.2)
Businesswoman	17 (9.2)
Civil servant	22 (11.9)
Professional	3 (1.6)

the 185 respondents were in the 26 to 33 years age group, 180 (98.4%) were married, 140 (77.8%) were Hausa/Fulani, 69 (37.3%) had secondary education, 43 (23.2%) had tertiary education, 156 (84.3%) were Moslems and 124 (67.0%) were housewives (Table 1).

Table 2 shows the distribution of respondents' knowledge of ITNs, ownership and use of ITNs by level of education. One hundred and seventy nine (96.8%) of the 185 respondents have ever heard of ITNs. Among the 179 respondents that were aware of ITNs, 124 (69.3%) reported health workers, 28 (15.6%) reported radio/television, 24 (13.4%) reported friends/relatives, 2 (1.1%) reported newspaper/magazines and 1 (0.6%) reported church/mosque as their source of information on ITNs. One hundred and fifty four (86.0%) of the 179 respondents that were aware of ITNs had accurate knowledge that ITNs differ from ordinary nets by containing chemicals that kill mosquitoes in addition to preventing mosquito bite. There was statistically significant association between educational level of respondents and their knowledge of difference between an ordinary net and an ITN, $x^2 = 120.481$, $p < 0.001$.

While 126 (68.1%) of the 185 respondents own a bed net (either ordinary or insecticide treated), only 67 (36.2%) own an insecticide treated net. Ownership of ITNs increased statistically significantly from 7.7% among those with no education, to 13.5% among those with qurranic education, 30% among those with primary education, 37.7% among those with secondary education, and 69.1% among those with tertiary education, $x^2 = 31.138$, $p < 0.001$. Thirty four (50.7%) of the 67 respondents that had ITNs bought them at the market, 17 (25.4%) obtained their nets free at the ANC clinic, 8 (11.9%) bought their nets at the hospital, 5 (7.5%) obtained their nets as donation by Non-Governmental Organizations (NGOs) and 3 (4.5%) obtained their nets as donation by friends/relatives.

One hundred (54.1%) of the 185 respondents slept under a bed-net (either ordinary or an ITN) the night before the survey; only 181 of the 185 participants responded to the question on use of ITN the night before the survey. Fifty (27.6%) of the 181 participants that responded to the question on use of ITNs slept under an ITN the night before the survey (but this constitutes 74.6% of the 67 respondents that own an ITN). Among the 50 respondents that slept under an ITN the night before the survey, 25 (50.0%) had tertiary education, 20 (40.0%) had secondary education, while the remaining 5 (10%) had primary education and below. The proportion of respondents that slept under ITNs rose statistically significantly from 0% among those with no education, to 5.4% among those with qurranic education, 15.0% among those with primary education, 29.0% among those with secondary education, and 59.5% among those with tertiary education, $x^2 = 37.133$, $p < 0.001$.

One hundred and thirty one of the remaining 135 participants that did not report sleeping under an ITN the night before the survey responded to the question on reasons for not sleeping under it. Of the 131 respondents who gave reasons for not sleeping under an ITN the night before the survey, 111 (84.7%) reported lack of ITNs, 10 (7.6%) and 2 (1.5%) reported excessive heat and seasonality of malaria, respectively as reasons for not sleeping under the net among other reasons (Table 3).

Only 36 (19.5%) of the 185 respondents reported no attack of malaria fever in the past 1 year, 74 (40%) reported one or two attacks of malaria fever, while 75

Table 2. Distribution of respondents' occupation, knowledge of ITNs, ownership and use of ITNs by level of education.

Variable	Educational level				
	None No. (%)	Qurranic only No. (%)	Primary No. (%)	Secondary No. (%)	Tertiary No. (%)
Knowledge of ITN					
Accurate	1 (9.1)	25 (73.5)	16 (71.4)	69 (100.0)	43 (100.0)
Not accurate	10 (90.9)	9 (26.5)	6 (28.6)	0 (0)	0 (0)
N = 179, x^2 = 37.133, p < 0.001					
Own an ITN					
Yes	1 (7.7)	5 (13.5)	6 (30.0)	26 (37.7)	29 (69.1)
No	12 (92.3)	32 (86.5)	14 (70.4)	43 (62.3)	14 (30.9)
N = 181, x^2 = 31.138, p < 0.001					
Slept under an ITN					
Yes	0 (0)	2 (5.4)	3 (15.0)	20 (29.0)	25 (59.5)
No	13 (100.0)	37 (94.6)	17 (85.0)	49 (71.0)	17 (40.5)
N = 181, x^2 = 37.133, p < 0.001					

Table 3. Reasons for not sleeping under an insecticide treated net (ITN)

Reasons for not sleeping under an ITN (N=131)	Frequency (%)
Excessive heat at night	10 (7.6)
Causes suffocation at night	3 (2.3)
Prevent free movement on the bed	5 (3.8)
Do not have ITN	111 (84.7)
Malaria fever is only seasonal	2 (1.5)

Table 4. Distribution of number of malaria attacks in the past 1 year by use of ITN.

No of malaria attacks in the past 1 year	Used an insecticide treated net	
	Yes frequency (%)	No frequency (%)
None	13 (26.0)	23 (17.6)
One to two	25 (50.0)	48 (36.7)
Three and above	12 (24.0)	60 (45.8)

x^2 = 12.178, p = 0.016.

(40.5%) reported three or more attacks of malaria fever in the past 1 year. Among the 181 participants that responded to the question on use of ITN, prevalence of three or more attacks of malaria fever in the past 1 year was 45.8% among those that did not use an ITN compared to 24.0% among those that used an ITN, and the difference was statistically significant, x^2 = 12.178, p = 0.016 (Table 4). Educational level (secondary/tertiary education) was the only variable that predicted no attack or only one attack of malaria fever in the past I year (OR = 6.349, p < 0.001, 95% CI = 0.594 to 0.313).

DISCUSSION

High level of awareness (96.8%) and knowledge of the

importance of ITNs in killing mosquitoes and preventing mosquito bites by majority (86.0%) of the respondents was demonstrated in this study. A statistically significant association between educational level of respondents and knowledge of ITNs was also observed (x^2 = 120.481, p < 0.001). This is contrary to the findings in a study in Ogun State, Western Nigeria that reported poor awareness (48.9%) and knowledge (31.2%) of the importance of ITNs among pregnant mothers. However, similar to the findings in this study, it also reported a statistically significant association between educational level and knowledge of ITNs (Runsewe-Abiodun et al., 2012).

A low prevalence (27.6%) of ITNs use was reported by the respondents in this study, despite the high level of awareness and knowledge of the commodity. Contrary to the findings in this study, a study in Owerri, Nigeria reported high awareness and usage of ITNs among pregnant women (Iwu et al., 2010). The major barrier to ITNs use was non-availability as only 36.2% of the respondents in this study own an ITN. However, use of ITNs was high (74.6%) among the respondents that own an ITN. A statistically significant association between educational level and ownership (x^2 = 31.138, p < 0.001) as well as use of ITNs (x^2 = 37.133, p < 0.001) was recorded in this study.

While ITNs ownership (36.2%) in this study was lower than that reported in a study among pregnant women by Belay and Deressa (2008) who reported ITNs ownership of 59.0%, use of ITNs among the respondents that own ITNs in this study (74.6%) was higher than the ITNs usage of 52.1% reported by Deressa et al. (2011). Majority 34 (50.7%) of the respondents that own ITNs in this study bought their nets at the market, 8 (11.9%) bought their nets at the hospital, while 17 (25.4%) got theirs free at the antenatal clinic. This is in contrast to the findings in the study by Njoroge et al. (2009) that reported free/subsidized supply by government as the main source of ITNs by 54.6% of the respondents, 24.6% purchased theirs from the health facility, and none of the respondents bought theirs at the market. This highlights the probability of diversion of the ITNs from the health facilities to the market in the study area.

Conclusion

Utilization of ITNs was low despite high knowledge of the commodity among the respondents. Lack of ownership was the major barrier to its utilization (as utilization of ITN was high among the few that have it). Educational level was a major determinant of ownership and utilization of ITN; this could be due to its strong association with occupation and by extension purchasing power (as most of the respondents bought their ITNs at the market). Women empowerment through education and employment should be promoted to enable them access and use the commodity. Distribution of ITNs should be monitored by the relevant government agencies to make the commodity available in the health facilities and prevent illegal diversion.

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