



Awareness, Ownership and Utilization of Insecticide Treated Nets against Malaria Vectors among Pregnant Women Attending Antenatal Clinics in Awka Metropolis, Anambra State, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Aim: To determine the level, sources of awareness, ownership and utilization of Insecticide Treated Nets (ITNs) by pregnant women, according to age, parity, trimester, occupation and hospital attended.

Study Design: The study was a cross sectional survey of 577 randomly selected pregnant women who were attending antenatal clinic in different hospitals in Awka Metropolis, Anambra State, Nigeria.

Duration of Study: The study was conducted in February 2016.

Materials and Methods: A semi-structured questionnaire was used to obtain information from the study participants.

Results: Of a total of 577 respondents, 566(98.1%) had previous knowledge of ITNs while only 11(1.9%) had no prior knowledge. Also, 218(38.5%) had heard about ITNs from Radio, 184(32.5%) from Television, while 374(66.1%) from Antenatal clinics. A total of 217(46.2%) obtained at least

one net at antenatal clinic, 39(8.3%) purchased at least one of the ITNs owned, 49(10.4%) received the net at their Local Government Headquarters while 263(66.9%) received at least one by free distribution at other locations. Respondents from government owned Chukwuemeka Odumegwu Ojukwu University Teaching Hospital (COOUTH) had the highest ownership rate of 92.7%, while least 65.0% was observed at the privately owned Divine Hospital and Maternity. The ownership of ITNs was dependent on the hospital as there was a significant difference ($X^2=56.374$, $df=2$, $p < .05$). Age group 25–34 years had the highest ownership rate of 87.1% while the least 72.8% was in age group 15–24 years. Women in age group 35–44 years had the highest utilization rate of 52.3% while least usage rate was in age group 15-24 years and there was a significant difference ($X^2=7.042$, $df=2$, $p < .05$).

Conclusion: Public health educators, Doctors and Antenatal heads need to do more in sensitization on the importance of utilization of ITNs during pregnancy for protection against malaria vectors.

Keywords: ITNs; malaria; pregnant; insecticide; awareness; utilization.

1. INTRODUCTION

The use of ITNs to control malaria vectors is currently considered the most cost-effective method of malaria prevention in highly endemic areas [1]. However ITNs are not readily available for use especially for the most risked groups which are mainly pregnant women and children below 5 years. Several countries, especially in Africa, through the help of WHO have embarked on massive free distribution of nets through various means like in antenatal clinics, house-to-house distribution, markets, schools and in churches. With free distribution campaigns, many countries have seen dramatic increase in ITNs coverage [2]. World Health Organization has been at the forefront of sponsoring the distribution of insecticide treated nets in malaria endemic areas as one of the ways of combating malaria and achieving millennium development goals [3].

In Nigeria, net distribution is modelled as a routine distribution system through health facilities called ITNs Massive Promotion and Awareness Campaign (IMPAC). In this system, pregnant women attending antenatal clinics receive the insecticide treated nets at first attendance [1]. Also following Abuja Declaration, African Governments are working to improve ITNs availability through reduction or elimination of the tariffs and taxes imposed on mosquito nets, netting materials and insecticides in order to help lower retail price. The investment in this simple and effective intervention has been substantial. In 2010, there were enough ITNs primarily procured on the African continent to cover 73% of the at-risk population, yet achieving equitable distribution and sustaining supply remain a challenge [4].

The wide variation in ITNs awareness, ownership and utilization has been observed in different studies, although there has been an improvement in awareness and ownership. However, this has not reflected positively on the utilization of ITNs among pregnant women [5,6,7]. A survey on ITNs in sub-Saharan Africa found that although 96% of countries surveyed had a policy for ITNs coverage, the population of pregnant women with ITNs was only 17% [8]. This implies that irrespective of widespread rollout of policies and substantial financial inputs in ITNs distribution, coverage remains suboptimal in many regions particularly with respect to pregnant women. The aim of this study was to determine the level of awareness, ownership and utilization of ITNs by pregnant women attending antenatal in selected hospitals in Awka Metropolis.

2. MATERIALS AND METHODS

2.1 Study Area

The study was carried out in three hospitals in Awka Metropolis, Anambra State in February 2016. Awka is the capital city of Anambra State and it is located within geographical coordinates of latitude 6.1°N and longitude 7.0°E in the rainforest zone of Southeastern, Nigeria. The study area has two distinct seasons, dry season which occur from November to March while wet season, from April to October. The temperature of the area ranges from 22°C-30°C during wet season and 27°C-33°C during dry season. The area has relative humidity of 70% in dry season reaching up to 80% during wet season. The annual rainfall is about 2000-3000mm. The area has a population of 301,657 [9]. The residents are mainly civil servants, students, artisans,

traders and a few farmers. The environmental challenges in the area include bad drainage system which led to blocked gutters and water logging and resulted to formation of mosquitoes breeding sites in the area.

2.2 Informed Consent

Approval for the study was obtained from the Chief Medical Directors and Head of Antenatal Units of each the hospitals used, using a letter of introduction from the Department of Parasitology and Entomology of Nnamdi Azikiwe University, Awka. The respondents who were randomly selected pregnant women were informed about the intent and processes of the study and their consents was obtained afterwards.

2.3 Study Population

The study population were 577 randomly selected pregnant women who were attending antenatal clinic in different hospitals in the study area. The number distribution of the women and the antenatal clinics they were attending are; Regina Caeli specialist hospital and maternity (111), Divine hospital and maternity (180) and COOUTH Amaku, Awka (286). The hospitals were selected for the study using simple random sampling technique.

2.4 Sample Size Determination

The sample size was calculated based on 95% confidence level and 5% marginal error. Sample size (n) was determined using a method previously described [10]. The minimum sample size was calculated as:

$$n = \frac{Z^2 P (1-P)}{D^2}$$

Where D is margin of error (0.05), n is the minimum sample size, P is the estimated prevalence (65%) and Z is the standard normal deviate that correspond to 95% confidence interval (1.96).

$$n = \frac{Z^2 P (1-P)}{D^2}$$

$$n = \frac{(1.96)^2 0.65 (1-0.65)}{(0.05)^2}$$

$$n = \frac{3.84 \times 0.65 \times 0.35}{0.0025}$$

$$n = 349$$

2.5 Data Collection

A semi-structured questionnaire was used to obtain information from the respondents. The questionnaires extracted information such as socio-demographic data of the respondents, status and stage of pregnancy, level of awareness on the use of ITNs for prevention of malaria, sources of awareness, ownership of ITNs and rate of usage. Also, questionnaire was used to obtain information on why some pregnant women were not using ITNs. The pregnant women ticked the reasons provided on the questionnaire and also added the ones not provided. Participants who could not read or write were assisted in completing the questionnaire after verbal questions were asked. The questionnaires were collected from the participants immediately after completion to ensure 100% return.

2.6 Statistical Analysis of Data

Data collected were presented using frequency tables, simple ratios, percentages and charts. Chi-square was used to test associations among variables at 95% level using SPSS version 17.0.

3. RESULTS

Of the 577 respondents, 566(98.1%) had a previous knowledge of ITNs and only 11(1.9%) had no prior knowledge (Fig 1). Also, of the total number of respondents, 218(38.5%) said they had heard about ITNs from Radio, 184(32.5%) through Television, while 374(66.1%) learnt about ITNs at Antenatal clinics. Also, 31(5.5%) and 56(9.9%) respondents learnt about ITNs through Newspaper or flyers and Family or friends respectively (Fig 2). Also, of the 577 study participants, 513(88.9%) knew that the usage of ITNs prevents malaria infection while 64(11.1%) were not aware. Of a total of 470 respondents that had at least one insecticide treated net, 217(46.2%) got at least one net at antenatal clinic or hospital, 39(8.3%) purchased at least one of the ITNs owned, 49(10.4%) received the nets at their Local Government Headquarters while 263(66.9%) received at least one by free distribution at other locations (Fig 3).

Among the 577 participants, 470(81.5%) has at least one ITN while only 107(18.5) has no ITNs (Table 1). Among the 470 owners of ITNs, 190(40.4%) has one ITN, 95(20.2%) has two ITNs and 185 (39.4%) has three or more ITNs. The overall ownership for the participants was 81.5%.

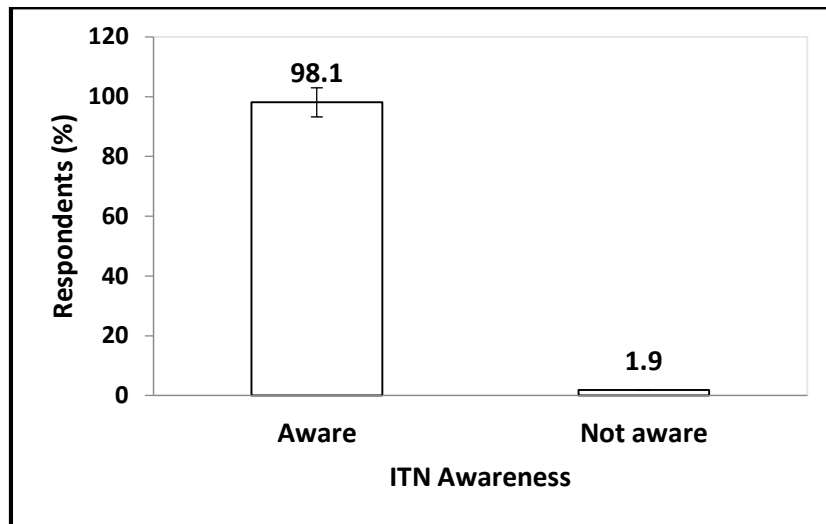


Fig. 1. Pregnant Women’s Rate of Insecticide Treated Nets Awareness

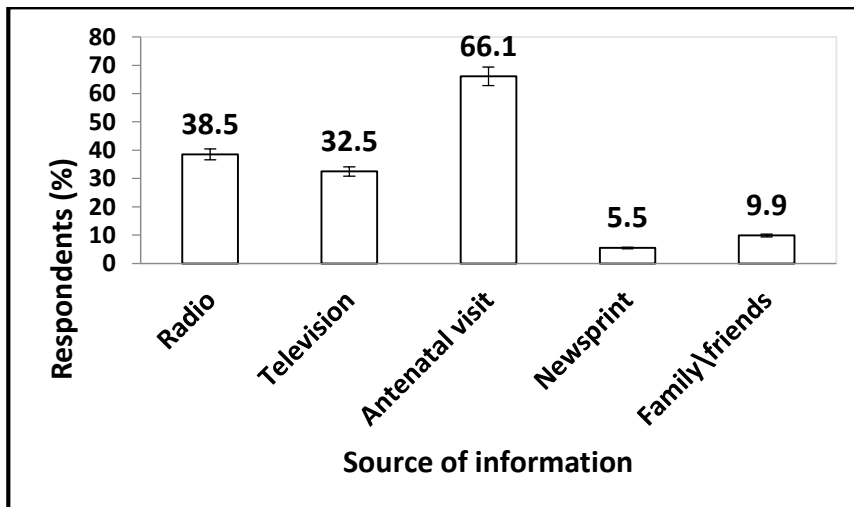


Fig. 2. Pregnant Women’s Source of Awareness of Insecticide Treated Nets

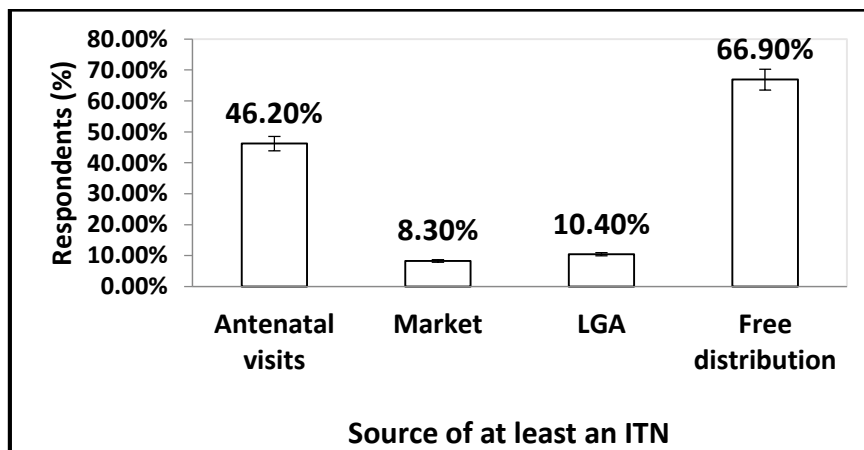


Fig. 3. Pregnant women’s sources of at least one Insecticide Treated Nets owned

Table 1. Pregnant women’s ownership of ITNs

| | Response | Frequency (f) | Percentage (%) |
|----------------------------|-----------------|---------------|----------------|
| Ownership of ITNs | Owned ITN | 470 | 81.5 |
| | Did not own ITN | 107 | 18.5 |
| Number of ITN owned | 1 | 190 | 40.4 |
| | 2 | 95 | 20.2 |
| | ≥3 | 185 | 39.4 |
| Total | | 470 | 100 |

Respondents from government owned COOUTH had the highest (92.7%) ownership rate, followed by Regina Caeli hospital (79.3%). The least (65.0%) was at Divine Hospital and Maternity. The observed difference was significant ($X^2=56.374$, $df=2$, $p < .05$). The age group 25–34 years had the highest ownership rate (87.1%) followed by 25–34 years (82.1%) while the least (72.8%) was among age group 15–24 years. The observed difference was not significant ($X^2=5.786$, $df=2$, $p > .05$). Ownership of ITNs was highest (87.8%) among secundigravidae while the least (77.4%) was among primigravidae. Multigravidae had ownership rate of 85.5% (Table 2). The observed difference was significant ($X^2=7.760$, $df=2$, $p < .05$).

The highest ITNs ownership rate (84.6%) was observed among tertiary education group while the least (63.6%) was among those that had only primary education. Women without any formal education and others with secondary education had ownership rate of 66.7% and 77.5% respectively (Table 2). The observed difference was not significant ($X^2=7.604$, $df=3$, $p > .05$). Pregnant women who are civil servants had the highest ownership rate (92.7%), followed by traders (84.2%). Artisans and unemployed pregnant women had 81.8% and 77.2% respectively. The lowest ownership rate was among students (59.3%). The difference in ownership of ITNs between various occupations was significant. ($X^2=45.500$, $df=5$, $p < .05$).

The pregnant women attending COOUTH had the highest utilization rate (45.1%), followed by Regina Caeli hospital (42.3%). The lowest was at Divine Hospital and Maternity (28.3%). The difference in utilization of ITNs at the three hospitals was significant ($X^2=13.540$, $df=2$, $p < .05$). Pregnant women in age group 35–44 years had the highest utilization rate (52.3%) followed by 25-34 years (39.0%). The least (30.1%) was in age group 15-24 years (Table 3). The difference in utilization rate among different age groups was significant ($X^2 = 7.042$, $df= 2$, $p <$

.05). Utilization of ITNs was highest among multigravidae (47.3%). Primigravidae had 36.6% while the lowest was among women in their second pregnancy (34.7%). The observed difference was significant ($X^2=6.208$, $df=2$, $p < .05$).

In education status, utilization was highest among pregnant women with tertiary education (43.0%) while secondary education group had 33.8%. Primary education group had utilization rate of 36.4% while the lowest was observed among those with no formal education (16.7%). There was no relationship between educational status and utilization of ITN ($X^2=5.909$, $df=3$, $p > .05$). Utilization of ITNs was highest among artisans (45.5%), followed by unemployed group (44.7%). Others were civil servants (38.5%), students (26.7%) while farmers (23.1%) was the least (Table 3). There was no association between utilization of insecticide treated nets and occupation of respondents ($X^2=10.143$, $df=5$, $p > .05$).

The major reason given by the respondents for not using ITNs was excessive heat (54.0%). Other reasons were discomfort while sleeping (43.4%), fear of chemicals on the net (4.2%), difficulty in mounting the ITNs (18.3%) and fear of rashes (3.7%). Some respondents (20.0%) were not using the ITNs because their doors and window were already fitted with nets, while others (20.9%) were using insecticide against the vectors. A few of them (5.1%) claim they were not using ITNs because of its high market price while some others (27.7%) were not using ITNs because they do not possess one (Table 4).

4. DISCUSSION

A high proportion of respondents, 98.1% who had heard of ITNs before the study and the 88.9% who were aware that ITNs usage prevents malaria transmission showed that the massive awareness campaign by government and health workers in the study area is yielding positive results. The findings here is an improvement

compared to previous study at Bakin ladi, Plateau State which reported an awareness of 59.2% [11], and also in Southwest Nigeria where only 48.9% awareness rate was reported [12]. Also, the current observation compares favourably with another [13] who reported 95.9% awareness of ITNs among pregnant women in Azare, Northeast Nigeria.

The sources which were identified as the means of knowledge about ITNs and malaria prevention in the study further highlights the role of mass media in dissemination of health information. Although antenatal clinic (66.1%) was the main source of knowledge on malaria and ITNs, radio and television amongst others were also identified as a common source of knowledge. Previous studies had pointed to these sources as the main avenue for getting ITNs information [14-16].

The ownership rate in this study was higher than 60% reported in three different cities in Anambra

state [17]. This shows that ownership of ITNs among pregnant women has increased in the area. A study observed 79.4% utilization rate in Onitsha [18]. The findings in the current study was also higher than 29.3% recorded at Ado-odo, Ogun state [19], and 64.6% from a wider assessment in 18 states in Nigeria [20]. Pregnant women attending government owned hospital has ownership rate quite higher than mission and privately owned hospitals. This may be because the government owned hospital provides free ITNs at the antenatal clinic while private hospitals do not.

The result also showed a significant association between ownership of ITNs with parity and occupation. This is probably because higher parity pregnant women has increased possibility of having a mosquito net because they have attended antenatal clinic more than primigravids, as antenatal clinic was a common source of obtaining insecticide treated nets. Free ITNs

Table 2. Pregnant women’s ownership of ITNs according to hospital attended, age, parity, trimester and occupation

| Hospitals attended | Respondents | | ITN owners | | Non-ITN owners | |
|------------------------------------|-------------|-----|------------|-----|----------------|--|
| | No. | No. | % | No. | % | |
| | 577 | 470 | 81.5 | 107 | 18.5 | |
| COOUTH | 286 | 265 | 92.7 | 21 | 7.3 | |
| Divine Hospital | 180 | 117 | 65.0 | 63 | 35.0 | |
| Regina Caeli Hospital | 111 | 88 | 79.3 | 23 | 20.7 | |
| $\chi^2 = 56.374, df = 2, p < .05$ | | | | | | |
| Age group (years) | | | | | | |
| 15-24 | 81 | 59 | 72.8 | 22 | 27.2 | |
| 25-34 | 431 | 354 | 82.1 | 77 | 17.9 | |
| 35-44 | 65 | 57 | 87.8 | 8 | 12.2 | |
| $\chi^2 = 5.786, df = 2, p > .05$ | | | | | | |
| Parity | | | | | | |
| Primigravidae | 314 | 243 | 77.4 | 71 | 22.6 | |
| Secundiagravidae | 98 | 86 | 87.8 | 12 | 12.8 | |
| Multigravidae | 165 | 141 | 85.5 | 24 | 14.5 | |
| $\chi^2 = 7.760, df = 2, p < .05$ | | | | | | |
| Educational status | | | | | | |
| Primary | 11 | 7 | 63.6 | 4 | 36.4 | |
| Secondary | 204 | 158 | 77.5 | 46 | 22.5 | |
| Tertiary | 356 | 301 | 84.6 | 55 | 15.5 | |
| Informal | 6 | 4 | 66.7 | 2 | 33.3 | |
| $\chi^2 = 7.604, df = 3, p > .05$ | | | | | | |
| Occupation | | | | | | |
| Unemployed | 123 | 95 | 77.2 | 28 | 22.8 | |
| Public service | 179 | 166 | 92.7 | 13 | 7.3 | |
| Trading | 165 | 139 | 84.2 | 26 | 15.8 | |
| Student | 86 | 51 | 59.3 | 35 | 40.7 | |
| Artisan | 11 | 9 | 81.8 | 2 | 18.2 | |
| Farming | 13 | 10 | 76.9 | 3 | 23.1 | |
| $\chi^2 = 45.500, df = 5, p < .05$ | | | | | | |

Table 3. Pregnant women’s utilization of ITN according to hospital attended, age, parity, trimester and educational status

| Hospitals attended | Respondents | | ITN users | | Non-ITN users | |
|------------------------------------|-------------|--|-----------|------|---------------|------|
| | No. | | No. | % | No. | % |
| | 577 | | 227 | 39.3 | 350 | 60.7 |
| COOUTH | 286 | | 129 | 45.1 | 157 | 54.9 |
| Divine Hospital | 180 | | 51 | 28.3 | 129 | 71.7 |
| Regina Caeli Hospital | 111 | | 47 | 42.3 | 64 | 57.7 |
| $\chi^2 = 13.540, df = 2, p < .05$ | | | | | | |
| Age group (years) | | | | | | |
| 15-24 | 81 | | 25 | 30.1 | 56 | 69.9 |
| 25-34 | 431 | | 168 | 39.0 | 263 | 60.0 |
| 35-44 | 65 | | 34 | 52.3 | 31 | 47.7 |
| $\chi^2 = 7.042, df = 5, p < .05$ | | | | | | |
| Parity | | | | | | |
| Primigravidae | 314 | | 115 | 36.6 | 199 | 63.4 |
| Secundiagravidae | 98 | | 34 | 34.7 | 64 | 65.3 |
| Multigravidae | 165 | | 78 | 47.3 | 87 | 52.7 |
| $\chi^2 = 6.208, df = 2, p < .05$ | | | | | | |
| Educational status | | | | | | |
| Primary | 11 | | 4 | 36.4 | 7 | 63.6 |
| Secondary | 204 | | 69 | 33.8 | 135 | 66.2 |
| Tertiary | 356 | | 153 | 43.0 | 203 | 57.0 |
| Informal | 6 | | 1 | 16.7 | 5 | 83.3 |
| $\chi^2 = 5.909, df = 3, p > .05$ | | | | | | |
| Occupation | | | | | | |
| Unemployed | 123 | | 55 | 44.7 | 68 | 55.3 |
| Public service | 179 | | 69 | 38.5 | 110 | 61.5 |
| Trading | 165 | | 72 | 43.6 | 93 | 56.4 |
| Student | 86 | | 23 | 26.7 | 63 | 73.3 |
| Artisan | 11 | | 5 | 45.5 | 6 | 54.5 |
| Farming | 13 | | 3 | 23.1 | 10 | 76.9 |
| $\chi^2 = 10.143, df = 5, p > .05$ | | | | | | |

Table 4. Factors influencing utilization of ITNs among the pregnant women

| Reasons for not using ITN | Number | Percentage (%) |
|--|--------|----------------|
| Causes excessive heat | 189 | 54.0 |
| cannot afford the price | 18 | 5.1 |
| Difficulty in mounting the net | 64 | 8.3 |
| Discomfort | 152 | 43.4 |
| It causes rashes | 13 | 3.7 |
| I use other insecticides | 73 | 20.9 |
| my doors and windows are already fitted with net | 70 | 20.0 |
| Afraid of chemicals in the net | 15 | 4.2 |
| I do not have ITN | 97 | 27.7 |

distribution and ITNs distributed at antenatal clinic were the major source of ITNs owned by the respondents. This is a clear indication that free net distribution campaign is yielding positive results considering the fact that 39.4% of the ITNs owners has 3 or more ITNs. The utilization rate recorded was higher than 17.3% recorded earlier in Onitsha [21] but lower compared to a more recent study in the same area where

utilization rate of 79.4% was reported among pregnant women [18]. But the result compares favourably with 39.1% reported in Enugu State [7]. Higher utilization has been reported in other African countries. Utilization rate of 73% was reported at Jinga Uganda [22] while another work reported a usage rate of 70.5% in Kilifi District, Kenya [23]. The low utilization in this study is of utmost concern considering the high awareness

and ownership rate recorded. This implies that high awareness rate and ownership of ITNs did not translate to utilization of ITNs. The low utilization in the study may be because the study was conducted in earlier dry season when the heat at night was much which will prevent many pregnant women from using the ITNs.

Age was shown to influence utilization of ITNs among the respondents as utilization rate increased as age increased. This is different from finding which noted that age of pregnant women has no relationship with utilization of ITNs [24]. Ownership of ITNs in the current study may have been higher in older pregnant women because they might have understood the relevance of ITNs in prevention of malaria usually taught at antenatal clinics. Parity had a significant influence in the utilization of ITNs. This is consistent with a study in Northeast Nigeria where parity of the pregnant women had a significant influence in utilization of ITNs [13]. A low utilization of ITNs among primigravidae, when compared to multigravidae has also been reported [25]. Educational status and occupation has no association with utilization of ITNs. This agrees with a report where educational status had no significant influence on the utilization of ITNs [18] but disagrees with others where educational status were shown to influence the use of ITNs [15, 20].

Heat was the major reason for some not using ITNs. Difficulty in mounting the net, rashes and price of the net were also identified as the reasons for not using the net. Others responded that they were not using the ITNs because their doors and windows were already fitted with net while some were using other insecticidal materials for malaria prevention. A finding reported similar reasons in Lagos state, Nigeria [26]. Similar observation has also been made in Enugu municipal area [27]. But the reasons contrasts another [28] where lack of awareness and lack of ITNs were the main reasons for not using of ITNs.

5. CONCLUSIONS

This study has revealed that ownership and distribution of ITNs was not the same at different hospitals, highlighting lack of free ITNs for pregnant women in non-public hospitals. There is need for extension of sponsored free or subsidized ITNs at private and mission hospitals. It is important to note that lack of ITNs was a common reason for not using the ITNs among

pregnant women attending these hospitals. So ownership of ITNs may actually increase the possibility of its usage. Quality health education at antenatal clinics on the dangers of malaria, risk of susceptibility during pregnancy and the importance of utilization of insecticide treated nets especially during pregnancy for protection against mosquito bites should be advocated.

CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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