Journal of Health, Medicine and Nursing
ISSN 2422-8419 An International Peer-reviewed Journal
Vol.26, 2016

Utilization of Insecticide Treated Nets by the Under-Five-Years Children and Pregnant Women in Calabar, Nigeria

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Abstract

A study has been carried out to determine the utilization of Insecticide Treated Nets (ITNs) by the under five years and pregnant women in the Calabar Metropolis. 34 item structured questionnaires was the instrument for data collection. The study population consisted of 440 households. The sampling technique used was multi-stage technique. Results from the study showed that under five years utilization of Insecticide Treated bed nets was 49.12%. About 55% of pregnant women in the study area utilized Insecticide Treated bed nets. Overall utilization of Insecticide Treated bed nets in the study area was 40.68%. Sources of Insecticides Treated bed nets distribution to pregnant women in the study area were ante -natal clinic 59.52%, NGO 20.24% and self purchase 20.24%. There is a need to scale-up ITNs distribution, if the targets of the World Health Organization general assembly target of zero death from malaria and complete eradication of malaria in 2030 have to be achieved, and 60% coverage of the use of insecticide treated bed nets by 2015.

Keywords: Malaria, Mosquitoes, Pregnant women, Under-five-years.

1. Introduction

Maternal mortality in Nigeria is among the highest in the world; with a mortality ratio exceeding 80 per 100,000 live births in most zones of the country (FMOH, 2007). Malaria discreetly accounts for about 11% of all maternal deaths and indirectly contributes to additional 11% of all maternal deaths, mainly indirectly being a leading cause of anemia in pregnancy. Malaria infection in pregnancy affects both mother and her unborn child. This explains why national efforts to reduce the high maternal and infant mortality place high premium on effective control of malaria in pregnancy (FMOH, 2009a). In line with the recommendation of the WHO, the Nigeria National Strategy for Malaria Control in Pregnancy focuses on three approaches: effective treatment; use of insecticide treated nets; and intermittent preventative treatment (IPT) with sulphadoxine-pyrimethamine (WHO, 2004).

Consistent use of ITNs in pregnancy has been shown by several studies to produce beeficial maternal and infant outcomes (Gamble *et al,* 2006). Nigeria has promoted ITNs use in pregnancy for malaria control since the Abuja Malaria summit but levels of ITNs utilization by pregnant women and other vulnerable population groups have remain low (WHO, 2010). The 2008 Nigerian demographic and health survey (NDHS) reports that pregnant women who slept under Insecticide Treated Nets were only 3% in the south-west of Nigeria. A study carried out in 2012 to determine the demographic factors associated with Insecticide Treated Nets use among Nigerian women and children revealed that, sleeping under Insecticide Treated Nets among Nigerian women was associated with places of residence, geopolitical Zones, education and the wealth quintile of households. The use

of ITNs among pregnant women was associated with the level of education and wealth quintile, are most likely to use an ITN than those with less education and wealth (Asa, 2012).
This research work aims at finding the utilization of ITNs by pregnant women and under five year's children in Calabar Metropolis, Southern Nigeria.

2. Literature Review

2.1 Effectiveness of insecticide treated nets

ITNs are estimated to be the twice as effective as untreated net and offer greater than 70% protection as compared with no net (Bachon *et al,*2006). These nets are dip-treated using a synthetic pyrethroid insecticide such asdeltamethrin or permethrin which will double the protection over a non-treated net by killing and repelling mosquitoes. To obtain maximum effectiveness, ITNs are re-impregnated with insecticide every six months. The distribution of mosquito nets impregnated with insecticide has been shown to be extremely effective method of malaria prevention and it is also one of the most cost effective methods of prevention.
Use of Insecticides Treated bed nets is part of World Health Organizations' Millennium Development Goals (WHO, 2011).Insecticide Treated Nets protects people sleeping under it and simultaneously kills mosquitoes that contact the net. Some protection is provided to others by this method, including people sleeping in the same room but not under the net. However, disease transmission may be exacerbated after the bed nets have lost their insecticide properties under certain circumstance. Although, Insecticides Treated Nets are still protected by physical barrier of the netting, non –users could experience an increased rate of bites as mosquitoes are deflected away from the non-lethal bed-nets users. (Yakob *et al*, 2009).ITNs protects the individuals or households that use it and also protect people in the surrounding community in one of two ways (Maxwell *et al,* 2002):

1. ITNs kills' adult mosquitoes infected with malaria parasite directly which increases their mortality rate and can therefore decrease the frequency in which persons in the community are bitten by an infected anopheles mosquito (Killen and Smith, 2007).
2. Certain, malaria parasites require days to develop in the salivary glands of the vector (mosquito). *Plasmodium falciparium* for example the parasite that is responsible for the majority of death due to malaria infections, takes 8 days to mature and therefore malaria transmission to humans does not place until approximately the 10^{th} day, although it would require blood meals at intervals of 2-5days (Smith and Mcknzie, 2004). By killing the mosquitoes before maturation of the malaria parasite, ITNs can reduce the number of encounters of infected mosquito with humans (Killeen and Smith, 2007).

When a large number of Insecticide Treated Nets are distributed in one residential area, their chemical additive help reduce the number of mosquitoes in the environment. With fewer mosquitoes in the environment, the chances of malaria infection for recipients and non - recipients are significantly reduced. In other words, importance of the physical barrier effect of Insecticide Treated Nets decrease relative to the positive externality effect of the nets in creating a mosquito- free environment when ITNs are highly concentrated in one residential cluster or community (Erlanger *et al*, 2004).

2.2 Safety of insecticide treated nets

The WHO and National Agency for Food And Drug Administration and Control (NAFDAC) approved the following insecticides for the National Malaria And Vector Control Programme for treatment and re-treatment of nets: Alphalcypermethrin, Etafeprox, Permethrin, Deltamethrin, Cyfluthrin and Lambdacyhalothrin (FMOH, 2005). ITNs are nets that have been treated with any of the approved insecticide by WHO and NAFDAC. These insecticide to a very large extent, replaced DichloroDiphenylTrichloroethane (DDT) which was widely used in the past. As confirmed, DDT is very poisonous and does great harm to people and animals, causing cancer and birth defects.DDT can travel great distances in the air and water, and stays in the environment for many years, becoming dangerous over time. It is for these very reasons that less toxic insecticides such as those mentioned above are now recommended by WHO. Though relatively safe, those approved insecticides pose some forms of dangers if not safely handled.
The greatest danger from ITNs is when they are dipped in insecticide which leads to exposure through the skin. Dangers also result from children sucking or chewing on the treated nets, which of course leads to exposure through swallowing .When these nets are washed and the waste water is not properly disposed, the insecticide can poison water sources and harm aquatic lives as well as other animals, insects and people who rely on such polluted water sources for their basic needs (Jones, 2005).
In recent times in Nigeria, tens of millions of insecticide treated nets have been distributed under the highly celebrated Roll Back Malaria programme of the Federal Ministry Of Health in partnership with local and international Aids and donor agencies, political groups, NGOs and civil society organizations, While these efforts are laudable, the concept of community education on the safe handling of these nets remains unattended to. People are ignorant of how to make efficient and effective use of Insecticide Treated Nets. They remain ill –informed that the insecticides are very toxic and could be dangerous in cases of uncontrolled exposure, inhaling,

swallowing and if it gets into water sources. It is quite amazing that some of these nets remain in use even when they have holes or tear, due to lack of awareness. It is needful that people should be given proper orientations as regards how to keep the nets in good conditions, when and how to reapply insecticide and direction for use. For the ITNs distribution success is a means of controlling malaria scourge, community education on safe handling of the nets must be taken seriously. Insecticide treated nets prevent the penetration of insects such as mosquitoes but reports recorded that ,the Insecticide Treated Nets generate intensive heat that result to discomfort to most users and therefore they prefer to store the ITNs than use it appropriately. Most children cry at night because of the insecticide used for the treatment of the net (Netmark, 2006).

3. Methodology

3.1 Brief description of the study area

The study setting is Calabar Metropolis which comprises two local government areas namely: Calabar Municipal council and Calabar South with a total population of 371,022 based on 2006 National. It is bounded in the north by Odukpani LGA, in the south by swamps and creeks, east by the Great Kwa River and Akimbo River Politically, Calabar Metropolis comprises of 22 wards, 10 in Calabar Municipal council and 12 in Calabar South LGA.Calabar Metropolis has two main seasons – the rainy and the dry season's .Rainy seasons starts from April to October and dry season from November to March. Rainfall is usually heavy approximating 320 millimeters; the main vegetation is mangrove swamp forest. The study area has both urban and rural areas. The rural areas are surrounded with swamps which are water logged and constitute mosquito breeding sites.

3.2 Scope of the study

The study covers the assessment of the utilization of Insecticide Treated Nets as a preventive tool against malaria especially for pregnant women and the under five years children.

3.3 Study design

The study is a cross-sectional descriptive survey to determine the utilization of Insecticide treated bed nets as a preventive tool in malaria prevention for pregnant women and the under five years children.

3.4 Study population

The study population comprises all households in the study area.

Sample size determination

The sample size is determined using the formula

$$N = \frac{z^2 \times p \times q}{d^2}$$

Where:

N= sample size

Z= 1.96 which is 95% confidence limit

P=0.5 which is probability of the event occurring

q=1-p =0.5 which is the probability of the event not occurring.

d= 0.05 which is the acceptable margin of error.

Substituting in the formula;

$$= \frac{1.96^2 \times 0.5 \times 0.5}{0.05^2}$$

= 384.16

For this study, the sample size was rationed to 440.

3.5 Sampling procedure

Multi-stage sampling method was used to select the wards and the streets from the two LGAs making up Calabar Metropolis. This sampling technique was used because more than on method was one sampling method was used to arrive at the sample required for the study. The steps to be taken are;

1. The number/name of each ward was written on a piece of paper, folded and put in a small basket, shaken to mix them up. This was done for each of the two LGA out of the.five wards to be selected from Calabar Municipality and six wards from Calabar South LGA for each representative sample.
2. The second stage was the selection of streets of streets in the ward selected. Four streets were selected in each ward using the above procedure.
3. Selection of houses in the street was 10 houses per streets using simple random sampling methods as above. A total number of 440 houses was selected in the two LGA.

Respondents for the studies were household heads: either male or female. The female respondents were those of reproductive age, who were mothers or guardians of children under five years of age.

3.6 Instruments for data collection

Structured questionnaire was used for data collection. This comprises of 34 items or questions divided into seven sections. Section A had questions on socio- demographic variables, section B had questions on level of

awareness of ITNs and section C had questions on household ownership of ITNs.

3.7 Pre-test of questionnaire

The questionnaires were pretested, in Akampa in Akampa Local government area of Cross River state for validity and reliability. Reliability refers to the degree of consistency by which an instrument measures the item that it is supposed "to measure" over time.The reliability of the instrument was determined by a trial testing during the pretest. This involved administering the instrument to twenty respondents (Households), who are not involved in the main study. This was to determine the relevance of questions to variables under measurement, remove ambiguity where it existed, improve on sequencing of questions, train field assistants on how best to capture sensitive questions and estimate maximum time for completion of questionnaire.

The validation of the instrument was done by the scrutiny of experts in the area of malaria/epidemiology, and others in the area of educational measurement and evaluation. The experts were concerned with the relevance of the items in relation to objectives of the study. Observations and suggestions of the experts were applied in revising refining the research instrument.

3.8 Ethical consideration

The study was preceded by obtaining ethical clearance from clinical Governance Committee of the Ministry of Health Calabar, Cross River State. The informed consent was obtained in addition to parental consent for under aged children (Below 18 years of age), willing to be part of the study. Respondents' confidentiality was assured by using codes rather `than respondents name during data collection.

3.9 Data collection procedure

The researcher with the help of 10 trained field assistants administered the questionnaire to the respondents.

3.10 Data analysis

Data generated were collated and verified to ensure completeness and accurate documentation of findings. Data were presented in percentages, tables and figures. The data generated were subjected to descriptive and inferential statistical analysis using statistical package for social sciences (SPSS).

4. Results

In all, 440 households were surveyed in the course of this research in the Metropolis. Calabar Metropolis comprises Calabar Municipality and Calabar South Local Government Areas (LGAs). Out of the households surveyed in the Metropolis, 285 households had under five year (U5) children. 138 of the households was from Calabar Municipality LGA and 147 households was from Calabar South LGA.

Table 1 shows Proportion of U5 children utilizing bednets/ITNs by ward in Calabar Municipality LGA. Table 2 shows Proportion of U5 children utilizing Bednets/ITNs by ward in Calabar South. Figure 1 shows Proportion of pregnant women (PW) utilizing ITN by ward in Calabar Municipality LGA. Figure 4 shows Proportion of pregnant women (PW) utilizing ITN by ward in Calabar South LGA. Table 3 shows Source of ITN Distribution to PW in Calabar Metropolis.

Table 1. Proportion of U5 children utilizing bednets/ITNs by ward in Calabar Municipality LGA (no. of HH=138)

Ward	No HH having U5	%	No of U5 utilizing Bednets/ITNs	%
2	30	10.53	17	5.96
3	24	8.42	13	4.56
8	22	7.72	6	2.11
9	36	12.63	24	8.42
10	26	9.12	14	4.91
Total	138	48.42	74	25.96

HH - Household

This table is a distribution of the respondents, under 5 years (U5) old that are using the ITNs as a prevention tool against malaria in Calabar Municipality LGA.

Table 2. Proportion of U5 children utilizing Bednets/ITNs by ward in Calabar South (no. of HH =147)

Ward	No HH having U5	%	No of utilizing Bednets/ITNs	%
1	26	9.2	14	4.91
4	31	10.88	4	1.4
7	29	10.18	16	5.61
10	19	6.67	3	1.05
11	20	7.02	15	5.26
12	22	7.72	14	4..91
Total	147	51.58	66	23.14

HH - Household

This table is a distribution of the respondents, under 5 years of age that are using the ITNs as a prevention tool against malaria in Calabar South LGA.

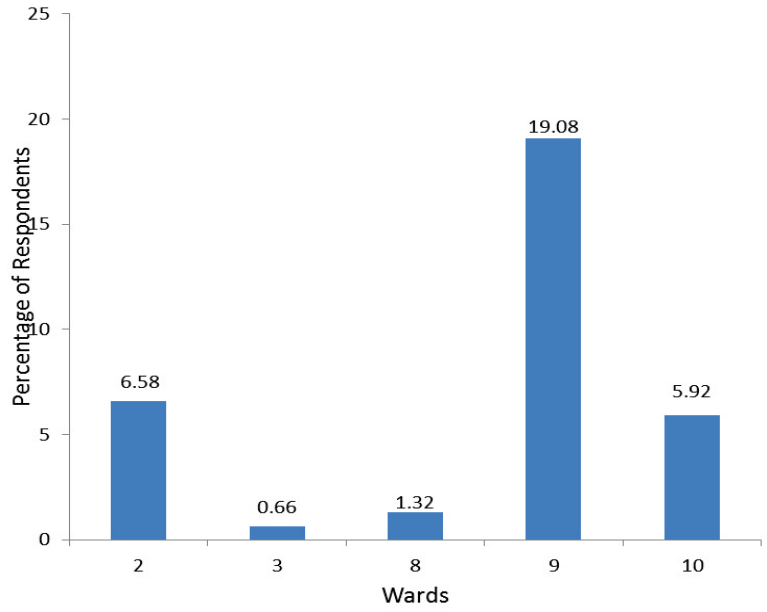

Figure 1. Proportion of pregnant women (PW) utilizing ITN by ward in Calabar Municipality LGA

This bar chart in figure 3 is a representation of the number of pregnant women in Calabar Municipality LGA that use ITNs. 19.08% of the respondents in ward 9 use ITNs.

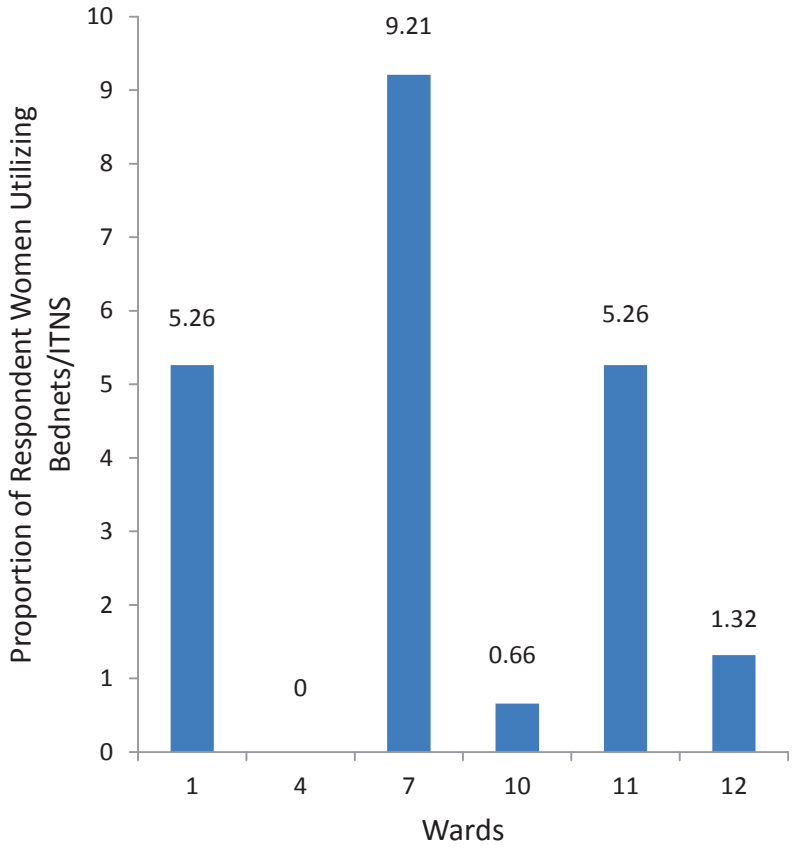

Figure 2. Proportion of pregnant women (PW) utilizing ITN by ward in Calabar South LGA

This table is a distribution of the pregnant women respondents that are using the ITNs as a prevention tool against malaria in Calabar South LGA.

Table 3. Source of ITN Distribution to PW in Calabar Metropolis

Source of ITN	No. of Respondents	%
Antenatal clinic (ANC)	50	59.52
Non–Governmental Organization (NGO)	17	20.24
Self – purchase	17	20.24
Total	87	100

This table represents the various sources, from which the respondents obtained their ITNs. The ante-natal clinic provided the highest number of ITNs to the respondents (59.52%).

Figure 1 is utilization of bed nets/ITNs by pregnant women by ward in Calabar Municipality. Figure 2 shows pregnant women utilizing bednets/ITNs by ward in Calabar South LGA. Pregnant women in ward 9, Calabar Municipality utilized more bed nets/ITNs (19.08%) than other wards studied. Pregnant women in ward 4 Calabar South LGA did not utilize ITN.

5.0 Discussion

In the study, 64.77% (285) of the respondents had under 5 children but only (49.12%) 140 households had their under 5 years children utilizing bed nets/ITNs. The proportion of under five children using bednets is low. The proportion of under five children sleeping under nets is higher in Calabar Municipality (25.96%) than in Calabar South (23.14%). Although the figure 49.12% recorded in this study is higher than previously reported data in other studies, (e.g. NDHS, 2003 reported 1.2% for ITNs and 5.9% for other bednets. Netmark, 2006 reported ITN utilization by under five to be 3.3%, the proportion of under 5 utilizing ITN is fairly low considering the 60% target set by the Abuja target. Many reasons for not utilizing ITNs for the under five years children were: not accessible (29.12%), not enough bed space (13.33%), not convenient (6.32 %,), not affordable (1.75%) and not available (0.35%). The crucial goal of the malaria control programme is to achieve consistent ITN use by the vulnerable group to prevent malaria. They should be given priority for sleeping under the net. The increased proportion of under five years children sleeping under ITN in the study reflected the mass free distribution of ITN to children under five years children, level of advocacy carried out by health caregivers and also the season of the year in which the study was carried out. This study took place during the rainy season, when malaria transmission peaks and net utilisation supposedly is high. The findings of this study supported Binkaa & Adongo, (1997) who established that the time of the year during which nets are given, distributed or delivered affects utilization. Greater percentage of net recipients (99%) was found to use the nets during rainy season while only 20% used ITNs during the dry season in Northern Ghana.

Pregnant women were found in 152 (34.55%) households of the study population. Pregnant women using ITN were found only in 84 (55.25%) households. Calabar Municipality had more households with pregnant women (18.41%) than Calabar South LGA (16.14%). Large increase in the number of pregnant women sleeping under ITNs has been reported in many countries in Africa. Baume *et al,* (2008) reported an increase from 7% to 14% in Nigeria between 2000-2004 of pregnant women sleeping under any net and an increase of 0.5% for ITNs. Other countries reported were Senegal (22%-42%) for any net, (5%-31%) for ITNs and Uganda (17% - 30%) for any net and (1%-13%) for ITN. Blackburn *et al* (2006) on the other hand reported 37% of pregnant women were sleeping under ITN in Nigeria. Sources of ITNs amongst the under five children and pregnant women include Antenatal clinic (59.52%), Non-Governmental Organization (20.24) and Self-purchase (20.24%).

6.0 Conclusion

The findings of this study supports the idea that giving out ITNs free through government health care services could be a key component to scaling - up and sustaining ITNs distribution systems in the study area and Nigeria in general. About 80% of pregnant women utilizing ITNs had them free. Provision of free ITNs through antenatal care services to all pregnant women would significantly contribute to reduction in the rate of maternal morbidity, malaria in pregnancy and low birth weight (LBW) in children and consequently reduce maternal and infant mortality. The continued increase of free ITNs distribution in the existing government health care programmes together with other methods of ITNs distribution will increase coverage and utilization of ITNs thereby decreasing the number of years required to reach global coverage goals and ultimately decrease malaria

morbidity and mortality sooner.

Utilization of ITNs among the respondents in general was 40.68% and the vulnerable groups: the under five (49.12%) and pregnant women (55%) still remains low. More is needed to be done, if we are to achieve the Abuja and global target of 60% coverage of the use of ITNs by 2015, and also meeting up with the World Health Organization general assembly target of zero death from malaria in 2030. Sources of ITNs amongst the under five children and pregnant women include Antenatal clinic (59.52%), Non-Governmental Organization (20.24) and Self-purchase (20.24%).

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