

Assessment of the Utilization of Insecticide Treated nets (ITNs) in Calabar Metropolis, Cross River State, Nigeria

Eyong Abiodun Komomo *

Department of Pharmacy, University Medical Centre, University of Calabar – Nigeria, PO box 1111, Calabar, Nigeria

Rose Egena

Pharmacist, Department of Pharmacy, Federal psychiatric hospital – Nigeria, PO box 1111, Calabar, Nigeria

Chuku Irene

Pharmacist, Department of Pharmacy: University of Calabar Teaching Hospital – Nigeria, PO box 1111, Calabar, Nigeria

Akintoye Oluyemi Ayorinde

Department of Geography and Environmental Science, University of Calabar – Nigeria, PO box 1111, Calabar, Nigeria

Peter Okpe Agada

Pharmacist, University of Calabar Teaching Hospital, Calabar – Nigeria, PO box 1111, Calabar, Nigeria

Abstract

A study has been carried out to assess the level of utilization of Insecticide treated bed nets, within the Calabar Metropolis, Cross River State, Nigeria. 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 despite high rate of ownership of Insecticide Treated bed nets: overall utilization in the study area was 40.68%. This level of utilization 40.68% is still below the 60% standard recommended by the Roll back Malaria programme. Some of the factors affecting utilization of Insecticide Treated bed nets by the respondents were: not accessible 22.73%, lack of information 9.54%, non-availability 8.64%, lack of enough bed space 7.27%, not comfortable 5.91%, not-affordable 5.0% and no mosquitoes in the house 0.23%. There is a need to scale-up ITNs utilization, 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: Assessment, Utilization, and Insecticide-treated-bed-nets.

1. Introduction

Insecticide Treated Nets (ITNs) used for protection against mosquito bites has proven to be a practical, highly effective and cost effective intervention against malaria. The evidence of the public health impact of ITNs, supporting their wide-scale use in Africa, is drawn from areas of stable malaria transmission where *Plasmodium falciparum* infection is prevalent in a community is often over 40%(Lengeler, 2004).Current World Health Organization initiative in malaria control such as Roll Back Malaria programme emphasized the use of Insecticide Treated Nets as one of the key strategies for malaria prevention and control in sub-Saharan Africa (Jones, 2005).On April 25th, 2000, Roll Back Malaria programme and African Heads of State (AHS) established the Abuja targets which include Insecticide Treated Nets use by 60% of pregnant women and under five years. Insecticide Treated Nets coverage in Africa is currently only 3% with rates in Nigeria reflecting these regional figures (Blackburn *et al*, 2006). Tanzania has been on the fore front in the promotion of the use of Insecticides Treated Nets from research project in the 1980s and 1990s and validation in large field trials in early 2000 to a nationwide programme through a discount voucher scheme dwelled through a public private partnership approach (WHO, 2005).

Recent studies in Kenya have actually shown that expanding the use of the nets to all people in targeted areas enhances coverage and enhances the protection of the vulnerable group while protecting everyone. Also in Kenya, preliminary data from 2004-2006 showed a near tenfold increase in the number of children sleeping under Insecticide Treated Nets in targeted districts, with a resulting 44% fewer deaths than among the unprotected groups of children (WHO, 2005).Since 1993, one of the Malian National Malaria Control

Programme (NMCP) main objectives was to have 90% of net users in Mopti region treating their bed nets with insecticide, but it has only achieved 10-30% usage rate (Rhea *et al*, 2005). In Ghana Insecticide Treated Nets coverage is 73.9%. This high level of ITNs coverage and use was achieved and sustained by sequential community-based mass campaign-catch-up and clinical-based-keep up distribution (Grabowsky *et al*, 2007).

Promotion of insecticide treated nets can be a key approach towards the reduction of morbidity and mortality from malaria. A number of studies have demonstrated that, the use of Insecticide Treated Nets is effective in reducing malaria related morbidity and mortality. A 20% reduction in all cause mortality to children one to nine years of age was detected during the first of the Gambian National Bed net programme (Alonso *et al*, 1993). The use of Insecticide Treated Nets in Nigeria was last reported at 29.10 % in 2008, according to World Bank report published in 2009. In South-Western Nigeria, a study among health workers showed that 93.5% were aware of Insecticide Treated Nets, but only 20.9% had correct Knowledge and 22.5% were using it in their homes (WHO, 2005).

The National Malaria Control Strategic Plan (NMCS, 2011) in Nigeria includes universal access to Long Lasting Insecticide Nets, increased indoor residual spraying, and environmental management to decrease mosquito breeding places (The Global Malaria Coordination, 2011). The NMCS wishes to achieve a high coverage and utilization of Long Lasting Insecticide Nets to each household across the 36 states of the Federation including the Federal Capital territory (Ajiboye, 2010). The Long Lasting Insecticide Nets distribution strategy in Nigeria included a “scale-up phase” (2009-2010) of free Long Lasting Insecticide Nets distributions through mass campaigns (2 LLINs per household); and “a keep-up phase” of replacing torn or worn nets and providing Long Lasting Insecticide Nets to new households members and new families (National Malaria control programme). Mass distribution of Long Lasting Insecticide Nets started in Kano State in May 2009 (The World Bank, 2009) and more than 24 million Long Lasting Insecticide Nets were distributed in 14 out of the 36 States in Nigeria by August 2010 (The US Global Malaria Coordination, 2011). The scale-up phase Long Lasting Insecticide Nets distribution strategy was through stand-alone mass distribution campaigns led by the state in collaboration with partners, using common methodology and tools (Amajoh, 2011)

The National Malaria Control Programme, partners and stakeholders (governments at all levels, donors implementers etc) coordinate through Federal and State LLIN campaign coordination Networks (Amajoh, 2011 and Ajiboye, 2010). Under the networks were technical, demand creation and logistics teams to support the campaign operations in each state (Amajoh, 2011). Trained staff went out to the communities, registered each household and provided a net card that could be redeemed for two Long Lasting Insecticides Nets at a distribution point which were primary health centers, schools or homes of community leaders (Killian *et al*, 2010 and SFH, 2012). The campaigns supported by UNICEF were integrated with child health interventions. In these integrated campaigns, in addition to registering and providing nets cards to households, all children less than five years of age receiving polio immunization were also given the nets. (Killian *et al*, 2010).

Rapid short message service (SMS) based data collected and communication tool was used to monitor the distribution of LLINs in all States (Ajiboye, 2010). Lead partners responsible for LLIN distribution include: the World Bank in seven states (Akwa-Ibom], Anambra, Bauchi, Gombe, Jigawa, Kano and Rivers). UNICEF in 4 states (Adamawa, Sokoto, Kaduna, and Kebbi) and Global fund (through the society for family health and Yakubu Gowon Center) in three states (Niger, Ogun, and Ekiti) (WHO, 2010) and the US Global Malaria Coordination, 2011 and were completed by August 2010. In a separate initiative just before the start of the Universal Mass distribution campaigns in 14 states, USAID and the Canadian Red Cross delivered 676,877 LLINs to children aged less than years in Cross River State in late 2008 and early 2009 (The US Global Malaria Coordination, 2011).

According to the National Malaria Intervention Survey (NMIS) conducted between October and December 2010, 42% of households reported owning at least one ITN compared with 8% in the 2008 NDHS (NMCP, 2011 and National Population Commission 2008). The percentage of households owning at least one ITNs in the 14 campaign (72% in the World Bank Booster areas and 75% in other campaign areas) were more than three times that of households in areas with no campaigns (22%). Global effort in the control of malaria is geared towards utilization of Insecticide Treated Nets. Studies have shown that utilization of Insecticide Treated Nets is generally low in Nigeria among all categories of people (FMOH, 2005). In Plateau and Nassarawa States in North-Central Nigeria, despite a high prevalence of malaria recorded in the areas; Insecticide Treated Nets use is below 10%.

The purpose of this research paper is to carry-out an assessment of the utilization of Insecticide Treated-bed Nets (ITNs) within the Calabar Metropolis, Cross River State, Nigeria.

2. Literature Review

2.1 Ownership and use of ITNs

Insecticide Treated Net ownership and use remain low among different socio-economic groups in sub-Saharan Africa particularly in Nigeria. Several strategies have been proposed to increase ownership and use and reduce

inequality of Insecticide Treated Nets in Nigeria, including free distribution campaigns recently conducted by the Federal Government of Nigeria (Grabowsky *et al*, 2007).

The National Malarial Control Strategic Plan (NMCSP), the RBM and the MDGS set up priorities to reduce malaria related morbidity and mortality through an increased ownership and use of ITNs and LLINs (This Day Newspaper, 2010). Morbidity and mortality in 44 countries in Africa with large population at risk for malaria. Insecticide Treated Nets ownership has increased from an average of 2.2% at-risk population in 1999 to 32.8% in 2008. Use of Insecticide Treated Nets by children under five years was 1.5% on average in 1999 and had increased to 26.6% in 2008. Both ownership and use were uniformly low among the 44 countries in 1999 (FMOH, 2007). Nigeria Demography and Health survey (NDHS, 2008) reports that, 17 % of households in Nigeria own a mosquito net. The percentage that own at least one ITNs was 8%, while 3% own more than one ITNs. The average number of ITNs per household is however less than one, meaning that high majority of Nigeria households are not effectively covered with the usage of ITNs. The RBM African summit held in Abuja, Nigeria on April 25th, 60% of pregnant women use of ITNs was promoted. Nigeria has promoted ITNs use since the Abuja summit but levels of ITNs 2000, set a target of having at least 60% of children under five years of age and utilization has remained low (FMOH, 2007).

2.2 Insecticide treated nets distribution in Nigeria

Insecticide Treated Nets were recently added as a malaria control policy in Nigeria and the government wishes to scale-up the use of Insecticide Treated Nets. The determination of distribution mechanisms that will assure high coverage with the Insecticide Treated Nets especially in rural areas, remains a topical issue in Nigeria and many sub-Saharan African countries (FMOH, 2001). Nigeria is currently engaged in free mass distribution of long-lasting insecticide Nets (LLINs), a type of Insecticide Treated Nets that is factory-treated and designed to maintain efficacy against mosquito vector for at least three years. The National Malaria Control Strategy Plan (NMPCSP) calls for the distribution of 63 million new LLINs by the end of 2010 and for at least 80% of these nets to be put into use (FMOH, 2009).

Netmark worked closely with the commercial sector to identify and overcome the barriers to the creation of commercially viable markets for ITNs in some African countries including Nigeria commercial markets for high and affordable ITNs to serve those who are able to pay and prefer the convenience and choice of market place.

In Nigeria, Netmark in conjunction with FMOH, Ministry of Finance and Nigeria Customs Service had joint forces to ensure that taxes and tariffs issues as related to ITNs and treatment kit imports are given priority in order not to discourage partner investment. Netmark partnered with community project to conduct a targeted subsidy programme in seven local government areas in Nassarawa State to increase uptake of vaccines and DPT3 immunization by children by providing discount vouchers for Insecticide Treated Nets to the families of immunized children. This was able to boost under five ownership and usage of ITNs within the seven local government areas. Netmark distributed 673,000 LLINs donated by USAID and the Canadian Government in 18 LGAs in Cross River State during the integrated measles campaign in 2005 (P-PSM, 2009). In 2009, the USAID, World Bank Malaria Consortium summit for National and Malaria Programme (SUNMAP), joined forces for providing four million ITNs to Kano State Government in May and July, households with less than nine members received one voucher for two LLINs and those with more members received two vouchers (Noor *et al*, 2007).

In the summer of 2010, the people of Japan provided 150,000 insecticide treated bed nets to Lere community in Kaduna State so that all the under five and pregnant women in its 124,000 households could sleep safe from mosquitoes (Njoku, 2010). Abia, Delta, Edo, Imo, Kogi, Osun and Oyo were among the 34 states that received 48 million LLINs distributed by NMCP in 2012. According to Dr Festus Okon, programme assistant, National Malaria control Programme (NMCP), 64 million nets were targeted for distribution. (Blogspot, 2013).

2.3 Factors affecting utilization of ITNs

The use of ITNs is always low during the hottest season because it restricts air flow and makes sleeping under a net inconvenient. On the other hand, coldness can also interfere with the use of ITNs in some low income groups because some lack blankets and use the net instead. Some households use the ITNs to protect against mosquito bites instead of malaria infection, they stopped using ITNs when they feel mosquitoes infestations become minimal (Leaker, 1996). Lin and Aung (2000) identified some factors that affect the use of ITNs, such as small houses in village which are inconvenient (stuffy) during the hot season, ITNs usage is incompatible with sleeping around a fire in cold season, rejection to the insecticide used in treating the net, Net never been used before (not a habit), Fear of side effects of the chemical.

Other factors identified are, absence of biting nuisance of mosquitoes, Lack of fear for malaria (in highly immune people) and Non-belief in the benefit of disease prevention. (Aliyu & Alti-Muazu, 1996), said the most prominent barriers to ITNs ownership is cost of ITNs. The average annual income in sub-Saharan Africa is estimated to be one Dollar per day per person. Matom *et al* (2009), assert that Knowledge and overall beliefs about Population census beliefs about ITNs are considerable barriers to ITNs use. Distance and accessibility to ITNs distribution points also serves as factor that affects ownership as access to distribution posts still remains

scarce in many Countries and communities. The likelihood of ITNs purchase is inversely related to the distance from a ITNs distribution Point (Eisele *et al*, 2009).

Socio-economic factors such as wealth, access to health care and education have been shown to be important predictors of Insecticide Treated Nets ownership and use (Lengeler, 2000). Ethnicity has also been reported as an important factor, as people with pastoralist and semi –nomadic lifestyles may be less likely to own and use an ITNs as compared to settled agricultural communities. Some research suggests that gender may influence the use of ITN within households, as different roles dictate different sleeping patterns for men and women. Additionally, it seems that the main purpose of bed net usage is to prevent a mosquito bites rather than to prevent malaria (Aliyu and Alti-muazu *et al*, 1996). The underlying belief in this attitude often undermines the inconsistent use of bed nets during the dry season when mosquitoes are less noticeable (Adongo *et al*, 2005). However, nets should be used all year –round in malaria endemic regions of sub -Saharan Africa, because there can be a substantial risk of transmission even when the vector density is low (Craig *et al*, 2009). Then lack of availability ,and failure in the distribution systems of ITNs have been identified by RBM programme as the main limitations (Other than cost) of large scale implementation of large –sscale implementation of ITNs use (Craig *et al*, 2009).

2.4 *Quality of control of insecticide treated nets*

Nigeria has adopted the quality control of insecticide treated nets as a measure to prevent the incidence of malaria in the country. Since 2002, NAFDAC has incorporated into their programme, the monitoring and regulation of the manufacturing, importation and sales of ITNs this monitoring and regulation was adapted after various surveys and research of samples sold in the market. (FMOH, 2005a). It was found that 60% of ITNs sold in the market had no insecticide effect on mosquito. About 80% nets were sub standard and were not treated with insecticide. These sub-standard Insecticide Treated Nets does not last long and develop holes which allow entry of mosquitoes. WHO pesticide Evaluation Schemes (WHOPES) has approved six insecticide products for use by FMOH in Nigeria. All approved ITNs have been registered with the government regulatory authority (WHO, 2005).

The participation of Non-governmental organizations (NGOs) and community based organizations in promoting the use of quality ITNs has helped a lot in the RBM initiatives. Most programmes of the NGO working in the area of malaria control focus more on the use of approved Insecticide ITNs in the country. The National Malaria Control Programme of the department of Public Health, Federal Ministry of Health has advised Non Government Organizations to increase their coverage at the grass root level and bring about behavioural change in the community through communication. Public awareness campaign has been carried out in schools, hospitals and markets. Most community based organization has taken the responsibility to distribute the standard nets free in community Health Centers. (FMOH, 2005b).

2.5 *Justification*

Malaria morbidity exerts a significant health and economic burden. According to the statistics of the National Malaria Control Programme ,it is responsible for 60% of out- patients visits to health facilities, 30% of children deaths and 11% of maternal death and an estimated annual loss of 132 billion naira in the form of treatment and prevention costs and loss of man hours amongst other losses (FMOH, 2009a). Although an integrated management approach is said to be the best for malaria control, the insecticide -treated net is however considered as the most efficacious of all the currently feasible interventions for malarial control in Africa (Lengeler, 2000). This explains the current efforts at providing free Insecticide Treated Nets to vulnerable Groups as part of the attainment of the Millennium Development Goals (MDGs), and the recognition by the Nigerian government that access to Insecticide Treated Nets to all vulnerable Nigerians is important (FMOH, 2009). However, several studies have revealed that the net ownership does not always translate to use with factors such as low mosquito bite and high night temperature capable of reducing the use to as low as 20% (Ordinioha *et al*, 2004).

The African Malaria report shows that many countries are quite far from reaching the target of 60% Insecticide Treated Nets coverage in Sub-Saharan African countries by the year 2015 which was set in Abuja by the African Heads of State. This determination of distribution mechanisms that will ensure high coverage with Insecticide Treated Nets especially in rural areas, remain a topical issue in Nigeria Commercial sector.

3.0 **Research 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 seasons. Rainy season 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.

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.

3.4 Study population

The study population comprises all households in the study area.

3.5 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.

3.6 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 one method was used to arrive at the sample required for the study. The steps to be taken are;

4. 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.
5. 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.
6. Selection of houses in the street was 10 houses per streets using simple random sampling methods as above. A total number of 440 houses were 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.

3.7 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.

3.8 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.

3.9 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.

3.10 Data collection procedure

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

3.11 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).

4.0 Results

Table 1. Household Ownership of Bednets/ITNs by Ward in Calabar Municipality

Type of net owned \ Ward	2	3	8	9	10	Total	%
Household owning untreated bednet	3	16	4	2	14	39	8.66
Household owning *LLIN	9	13	12	7	12	53	12.04
Household owning individual treated bednet	9	5	2	20	6	42	9.55
Total no. of bednet owned	21	31	18	29	32	13.4	30.45
% of bednet owned	4.77	7.05	4.09	6.59	7.27	30.45%	-

*LLIN- Long Lasting Insecticide Net

This table is a representation of the number of households in the study area, Calabar Municipality LGA that owed at least one type of bed net.

Table 2. Household Ownership of Bednets/ITNs by Ward in Calabar South L.G.A

Wards \ Ward	1	4	7	10	11	12	Total	%
Household owning untreated bednet	6	5	3	-	5	6	25	5.68
Household owning *LLIN	21	5	16	4	8	9	63	14.32
Household owning individual treated bednet	3	2	4	-	11	10	30	6.82
Total no. of bednet owned	30	12	23	4	24	25	118	26.82
% of bednet owned	6.22	2.73	5.23	0.91	5.45	5.68	26.82%	

This table is a representation of the number of households in the study area, Calabar South LGA that owed at least one type of bed net.

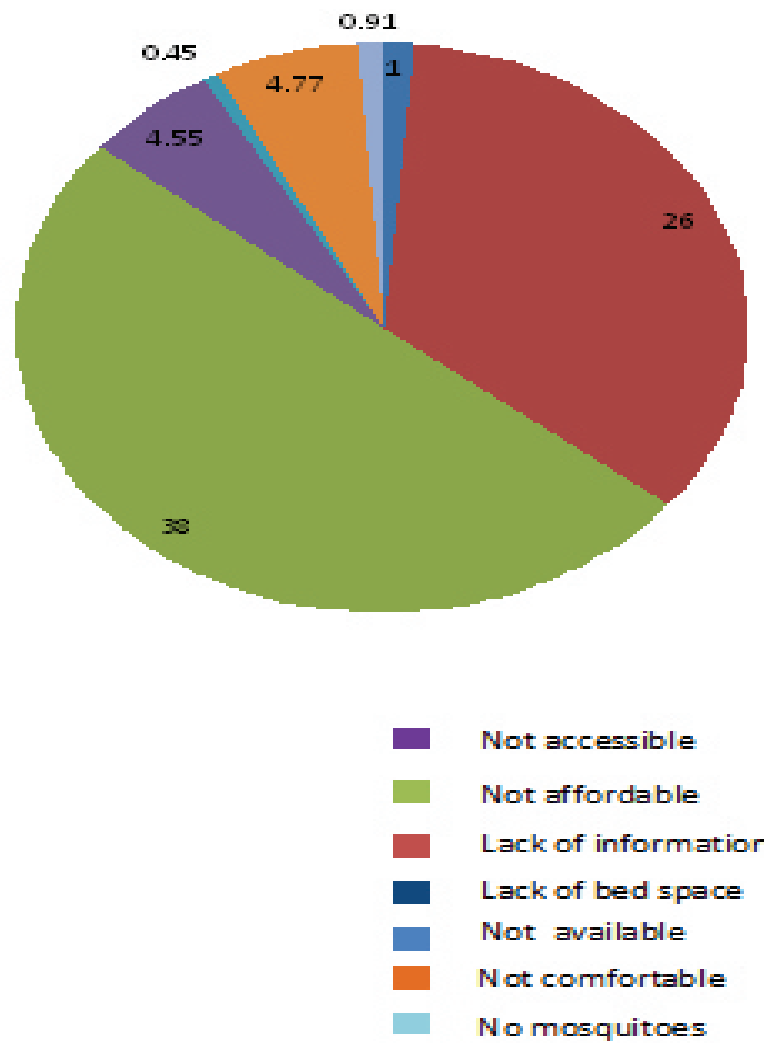


Figure 1. Factors affecting utilization of ITNs among Respondents
The bar chart is a distribution of the factors that affect the use of ITNs.4.55% of the respondents could not access ITNs.4.77% Of the respondents were not comfortable using ITNs.

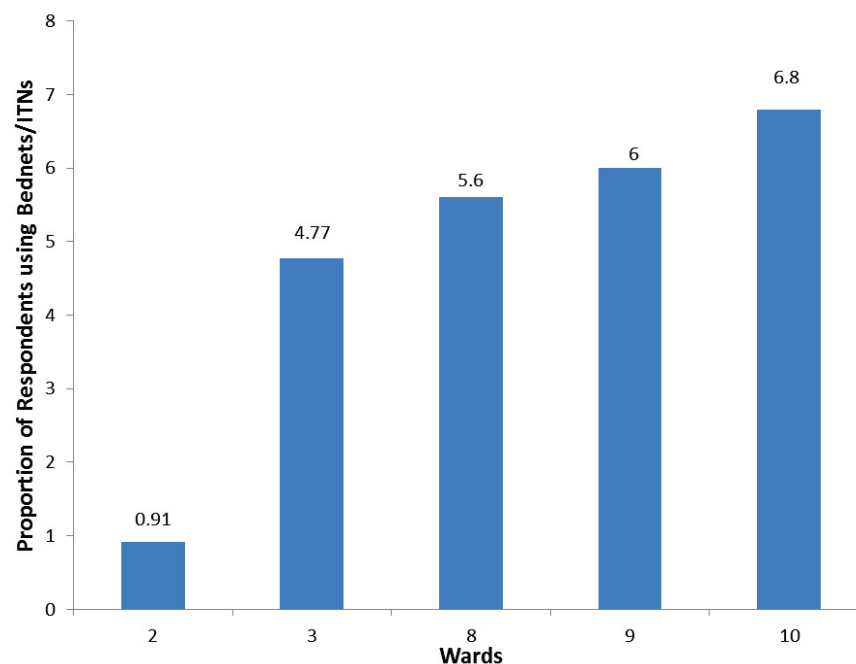


Figure 2. Proportion of Respondents Utilizing Bednets/ITNs by Ward

The bar chart is a distribution of the respondents who are using ITNs in Calabar Municipality LGA Ward 10 has the highest rate of usage at 6.8%.

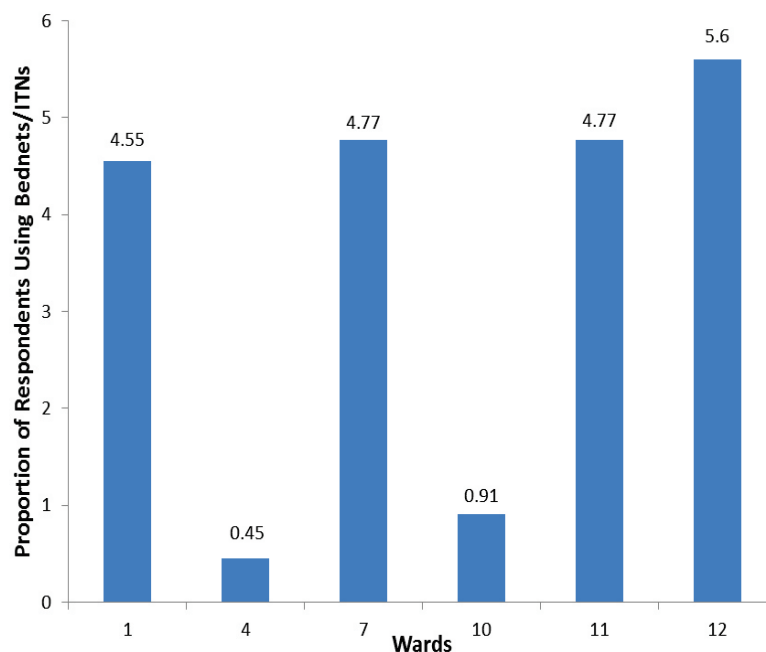


Figure 3. Distribution of respondents using bednets/ITNs by ward in Calabar

This bar graph shows the respondents in Calabar South LGA using ITNs. Ward 12 had the highest number (5.6%) of respondents using ITNs as a malaria prevention tool.

7. Discussion

Utilization of ITNs recorded in the study is similar with the study carried out by Blackburn *et al.*(2006) on Nigeria, which showed that despite high rates of household ownership of ITNs, only 43% had their nets hanging above their sleeping space and 15% of the surveyed persons slept under an ITNs the previous night. Similar low result had been reported in Niger Republic in 2005 whereby only 20.3% of all the households reported using ITNs the preceding night (CDC, 2006). Various reasons given by respondents without nets in this

study were; non-accessibility 22.73%, lack of information 9.54%, non -availability 8.64%, lack of enough bed space 7.27%, not comfortable 5.01%, not affordable 5% and no mosquitoes in the household 0.23%.

8. Conclusion

Utilization of ITNs among the respondents in general: (40.68%) remains low which is still below the 60% standard recommended by the Roll back Malaria programme. 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. Factors affecting the utilization of ITNs were mainly lack of information (9.54%), non availability (8.64%) and lack of enough bed spaces (7.27%). Public health education should be encouraged at the community level about the importance of ITNs and encourage the people to live in spacious houses, so that they can effectively use the ITNs.

Based on findings of this study, the following recommendations are made;

1. Health education campaigns on ITN programmes should re-enforced the message that pregnant women and under five children are at risk of severe malaria and death for not utilizing ITNs.
2. Free ITN distribution should be extended to pregnant women using service of traditional birth attendants (TBAs)
3. Insecticide-treated bed nets should be manufactured for use as window and door screen in house.
4. Community – based distribution of ITNs should be added to existing distribution strategies so that can penetrate the rural areas.

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