**AWARENESS AND UTILIZATION OF INSECTICIDE-TREATED NETS FOR MALARIA PREVENTION IN ABRAKA COMMUNITY, DELTA STATE, NIGERIA**

**ABSTRACT**

There has been global attention on malaria over the past years with emphasis on the use of Insecticide Treated Nets (ITNs) and other preventive measures. However, awareness, ownership and utilization has not been well implemented leading to challenges in curbing malaria epidemic. Hence, this study on awareness and utilization of insecticide treated nets (ITNs) for malaria prevention Abraka community of Delta State, Nigeria for a period of six (6) months (January to June 2024). The study was a descriptive cross sectional study with a sample size of 195 respondents determined using the Cochrane formula. Multi-stage sampling was used for the distribution of well-structured questionnaire for collection of responses based on the key objectives. The results showed that a higher percentage of the respondents 171(87.7%) have heard about bed nets and insecticide treated nets at some point while 161(82.6%) of the respondents have seen ITNs. Also, from the respondents, 148(75.9%) stated that they have used bed nets / insecticide treated nets at some points. On the characteristics of ITNs in relation to sleeping areas showed that majority of the respondents 81(41.5%) had bed nets which have been in use for less than six months. Higher number of respondents agreed to the fact that use of ITN prevent bites from mosquitoes which causes malaria and other related diseases and also prevent malaria. The result from this study implies that there is a high level of ITNs awareness in the study area. Hence, awareness on the benefits of ITNs use should be emphasized among the members of the community.

**Keywords:** Malaria, insecticide treated nets (ITNs), preventive approach, rural communities

**INTRODUCTION**

Malaria episodes has gained global recognition and regarded as a global and long standing health problem due to the records of high mortality and morbidity across regions most especially the sub-Saharan region, with Nigeria bearing a high burden of these episodes (Adun *et al.,* 2023; Ahmmed and Nassar, 2024). Malaria, caused by various strains of the *Plasmodium* parasite with *falciparum* as the major strain vectored by the female *Anopheles* mosquito has caused significant and devastating challenges of public health importance in Nigeria, accounting for 80, 000 annual death and 53 million cases reported with rising number since 2020 (Ahmmed, 2024, World Health Organization, 2020).

Mosquito is abundantly distributed across different states with variations in species composition supported by variations in environmental and climatic factors (Yusuf, 2023). Mosquito vector is an important agent of the four major components that are involved in the transmission systems of the human malaria, with the protozoan parasite, human host, and environment being other agent of the transmission components (Djihinto *et al.,* 2022). Mosquito species, *Anopheles arabiensis, An. coluzzi, An. funestus, An. gambiae* and *An. stephensi* are the most important and dominant species in African countries (Coetzee *et al.,* 2013; Sinka *et al.,* 2020).

Nigeria has been rated a failed State due to its poor Human Development Index (HDI) of 0.548 which is a barometer for assessing national and global development trajectory (Ogwola and Onu, 2021). This is as a result of the poor infrastructural development, high prevalence of infectious diseases, income inequality and unrest (Anyanwu and Anyanwu, 2017). The poor and unprecedented approach to environmental management, rural development and non-functional health systems in the Nigerian states has resulted in the high rate of disease mortality and morbidity. Mosquito breeding sites, including bushes, tree holes, pot holes, stagnant water, blocked drainages, used and un-discarded plastics and tires (Oguche *et al.,* 2022) acting as water sources has been a major factor triggering the spread of malaria in Nigeria.

There has been major strides in the search for therapeutic approaches and insecticides for the prevention of malaria and reduction of mosquito vectors. Vector control have been the most effective measure in the prevention of malaria transmission, whose core aim is to reduce vectorial capacity of the vector population below the level required to maintain reproduction rate (RO) of greater than 1. With (RO regarded as number of cases recorded for human malaria within a certain population (Lobo *et al.,* 2018). However, there has been outright resistance to most conventional and locally available insecticides which is a threat to the success of vector control against malaria (Mekuriaw *et al.,* 2019).

Essentially, the use of insecticide treated nets (ITNs) are therefore the most essential, cost effective and environmental friendly approach for malaria vector control (Killeen *et al.,* 2014) due to the nocturnal nature and biting habits of mosquitoes which restrain them from taking blood meals from infected individual and subsequently stopping the transmission of the parasites to uninfected individuals. Several authors have demonstrated success in the use of insecticide treated nets (ITNs) as well as level of awareness and acceptability to ITNs within different communities across Nigeria. This include the studies Tula *et al.* (2023) in northeastern Nigeria, and Adebayo *et al.* (2014) in southwestern Nigeria and Ogomaka and Obeagu (2021) in Southeastern Nigeria. This study therefore aimed at providing information on malaria preventive approach using insecticide treated nets (ITNs) among rural community dwellers across some localities in Delta State.

**METHODOLOGY**

**Study Location**

The study was conducted across different localities within two major cities (Abraka and Asaba) in Delta State, Nigeria. Abraka, an emerging urban area housing the popular Delta State University main campus lies between latitude 50 45` and 50 50` North of the equator and longitude 60 and 60 15` East and comprised mainly of indigenous inhabitants, traders, civil servants and students which hold the larger make-up of the estimated population (Ilondu and Nweke, 2016; Lemy and Egwunyenga, 2017).

**Study design and instrument**

The study adopted the survey research survey design. This procedure can cover a broad area of observation using a selected sample. This research design is applied in this study due to its viability in using a sample drawn to represent the different elements within Delta State. The instrument used for the study was a well-structured questionnaire which was adopted from previous studies (Adum *et al.,* 2023).

**Sample Size**

The study adopted the Cochran for sample size determination using the formula;

$$n= \frac{p\left(1-p\right)z^{2}}{e^{2}}$$

$$n= \frac{(1.0)\left(1-0.1\right)(2.58)^{2}}{0.05^{2}}=240$$

Where:

*n* = sample size

*p* = proportion of the population (*p* = 0.1)

*e* = acceptable error (e = 0.05)

A total sample of two hundred and forty (240) respondents were chosen for the study. From the observation of returned questionnaire one hundred and ninety five (195) respondents completely filled the research instrument which formed the basis of the total 195 respondents used for this study. The researcher chose this sample size because it allows for economic considerations in carrying out a research work of this magnitude.

**Sampling Technique**

The multi stage sampling technique was used to select households to be interviewed.

STEP 1; involved a selection of 3 wards from the list of wards using simple balloting. This was done to uniformly obtain response from community dwellers within the same area, receiving similar attention from ward heads/councilors.

STEP 2; selection of houses to be studied; the total houses in the wards were listed and 48 houses were selected from each of the wards using simple random sampling technique by balloting starting from the eldest man's house and then moving in clockwise direction until the required sample for each ward was completed. This was done to account for uniformity in sample collection across the wards.

STEP 3; in each house where there are more than one household, random selection was used to obtain respondent to participate in the study.

**Inclusion and exclusion criteria**

Inhabitants who have live within the area for the past four years and age 18 and above were included in the study. Those who were new in the area, visitors and those below the age of 18 years were excluded in the study.

**Data Collection and Analysis**

Data was collected using interviewer administered semi-structured questionnaires, which was used to collect both socio demographic data, and data about awareness, attitude and utilization of ITNs. Most of the visits took place in the evenings when the household heads would have returned from the day's work. Research assistants were recruited for the collection of data and were trained and closely monitored. These assistants were volunteer health workers who understood the local language. Data cleaning and editing was done manually and by use of computer Software. Data was analyzed using Microsoft Office Excel Version 16. Results were presented in form of tables and charts.

**RESULTS**

**Socio-Demographic Characteristics of Respondents**

The results obtained from the analysis of responses based on socio-demographic characteristics of the respondents are presented in Table 1 below. The results showed that majority of the respondents 63(32.3%) were within the age range of 31 – 40 years. This was followed by age range 21 – 30 accounting for 51(26.2%) and >40 with 47(24.1%) while age range <21 accounted for the least with 34(17.4%) respectively. There were more of female 128(65.6%) respondents in this study compared to men 67(34.4%).

Majority of the respondents 69(35.1%) had secondary education, followed by those with primary education accounting for 53(27.2%). This was followed by those with tertiary education, accounting for 42(21.5%). Fewer number of respondents 31(15.9%) had no form of education. Also, higher number of the respondents 131(67.2%) were observed to be married with 49(25.1%) being single, 12(6.2%) as divorced while 3(1.5%) was recorded for widow/widower. Similarly, Christianity accounted for the highest in terms of religion 161(82.6%) followed by Islam 23(11.8%) and traditional worshipers 11(5.6%) (Table 1).

Table 1: Socio-Demographic Characteristics of Respondents

|  |  |
| --- | --- |
| Variables | Frequency (%) N=195 |
| **No. of Respondents** | **Percentage (%)** |
| Age of Respondents |
| < 21 | 34 | 17.4 |
| 21 – 30 | 51 | 26.2 |
| 31 – 40 | 63 | 32.3 |
| > 40 | 47 | 24.1 |
| Sex of Respondents |
| Male | 67 | 34.4 |
| Female | 128 | 65.6 |
| Educational Levels of Respondents |
| None | 31 | 15.9 |
| Primary | 53 | 27.2 |
| Secondary | 69 | 35.4 |
| Tertiary | 42 | 21.5 |
| Marital Status of Respondents |
| Single | 49 | 25.1 |
| Married | 131 | 67.2 |
| Divorced /Separated | 12 | 6.2 |
| Widow/Widower | 3 | 1.5 |
| Religious Status of Respondents |
| Christianity | 161 | 82.6 |
| Islam | 23 | 11.8 |
| Traditional | 11 | 5.6 |

**Awareness, Acquisition / Ownership and Utilization of Insecticides Treated Nets / Bed Nets**

The level of awareness of the availability of ITNs as observed from responses among the respondents sampled for the study are presented in Table 2 below. Based on the results obtained, it was observed that a higher percentage of the respondents 171(87.7%) have heard about bed nets and insecticide treated nets at some point while 161(82.6%) of the respondents have seen ITNs. Also, from the respondents, 148(75.9%) stated that they have used bed nets / insecticide treated nets at some points. Similarly, 172(88.2%) of the respondents have neighbors who use ITNs while 171(87.7%) of the respondents stated that there have been campaigns and distribution of ITNs within their localities (Table 2).

Table 2: Awareness of Insecticides Treated Nets / Bed Nets

|  |  |
| --- | --- |
| Variables | Frequency (%) N=195 |
| **Yes (%)** | **No (%)** |
| Have you heard of Insecticide Treated Nets (ITNs) / Bed Nets? | 171(87.7) | 24(12.3) |
| Have you seen Insecticide Treated Nets (ITNs) / Bed Nets? | 161(82.6) | 34(17.4) |
| Have you used Insecticide Treated Nets (ITNs) / Bed Nets? | 148(75.9) | 47(24.1) |
| Do you have neighbors who have / use (ITNs) / Bed Nets? | 172(88.2) | 23(11.8) |
| Have there been any campaign on ITNs / Bed Nets usage in you locality? | 171(87.7) | 24(12.3) |
| Do hospitals / primary health centers distribute ITNs / Bed Nets in your locality? | 171(87.7) | 24(12.3) |

**Characteristics of Bed Nets / ITNs and Sleeping Area**

The response from the respondents on the characteristics of their ITNs in relation to sleeping areas showed that majority of the respondents 81(41.5%) had bed nets which have been in use for less than six months, this was followed by those who have used their for more than six months accounting for 71(36.4%). Majority of the respondents 131(67.2%) stated that they had bed nets of single bed frame size while others had nets of double and king sizes. However, some respondents were unable to account for or give accurate information of the sizes and duration of use of their bed nets. In terms of maintenance, higher number of respondents stated that they do not wash their nets, rather they only subject it to sunlight at some points which is not a frequent occurrence.

**Perception of Respondents on Utilization of Insecticide Treated Nets**

The responses retrieved from the respondents based on their perception on the use of ITNs in relation to malaria prevention and other insect bites and diseases are presented in Table 3 below. The response showed that higher number of respondents agreed to the fact that use of ITN prevent bites from mosquitoes which causes malaria and other related diseases and also prevent malaria. Also, higher number of respondents also agreed that the use of ITN reduces mosquitoes within home environment which is achieved by the presence of chemicals used for treating ITNs. Furthermore, the response also agreed that the use of treated bed nets prevent bites and contacts from other insects including bed bugs, cockroaches and flies within the household. Subsequently, it was justified from the response of higher number of respondents that the use of treated bed nets helps it user to sleep more comfortable. However, higher number of the respondents disagreed to the fact that the use of ITNs protects against animals such as snakes and rats in the homes.

Table 3: Perception of respondents on utilization of insecticide treated nets for mosquito control

|  |  |
| --- | --- |
| *Please indicate how strongly you agree or disagree with the following statements:* | Response |
|  |
| Please tick only one box for each question | **Strongly Agree** | **Agree** | **Disagree** | **Strongly Disagree** | **Don’t Know** |
| Treated bed nets prevent mosquito bites | 97 | 77 | 11 | 0 | 7 |
| Treated bed nets reduce mosquitoes | 75 | 77 | 28 | 5 | 9 |
| Treated bed nets kill mosquitoes | 47 | 52 | 57 | 20 | 19 |
| Treated bed nets reduce malaria | 64 | 96 | 21 | 6 | 8 |
| Treated bed nets prevent malaria | 57 | 74 | 35 | 8 | 16 |
| Treated bed nets prevent other diseases | 28 | 32 | 71 | 24 | 33 |
| Treated bed nets reduce other insects (such as bedbugs, cockroaches, houseflies) | 37 | 43 | 64 | 21 | 28 |
| Treated bed nets kill other insects | 30 | 30 | 70 | 23 | 39 |
| Treated bed nets protect against animals (such as rats, snakes) | 24 | 34 | 62 | 35 | 30 |
| Treated bed nets make your home beautiful | 13 | 34 | 89 | 46 | 12 |
| Treated bed nets prevent dirt falling on your bed | 14 | 108 | 48 | 19 | 13 |
| Treated bed nets help you sleep better | 17 | 77 | 57 | 30 | 12 |
| Treated bed nets provide privacy | 31 | 79 | 59 | 19 | 12 |
| Bed nets can be treated with insecticide | 28 | 63 | 37 | 14 | 9 |
| Treated bed nets get dirty easily | 54 | 84 | 43 | 8 | 22 |
| Treated bed nets are too short | 10 | 72 | 72 | 18 | 21 |
| Treated bed nets stay tucked in during the night | 50 | 68 | 47 | 9 | 18 |
| Treated bed nets smell badly when new | 87 | 54 | 31 | 8 | 19 |
| Insecticide may make treated bed nets unfit for young children | 71 | 64 | 17 | 11 | 31 |
| A child can suffocate under a treated bed net | 57 | 49 | 31 | 6 | 44 |

**DISCUSSION**

A high level of awareness (87.7%) of the use of Insecticide treated Nets (ITNs) in prevention and control of malaria was found in this study. This finding was higher than that reported in Enugu, Southeast Nigeria at 11.4% (Obinna *et al.,* 2012), Northern Nigeria among pregnant women at 36% and also that found in a multi-country study in Gambia, Senegal and Nigeria which stood at 38% (Carol and Celeste, 2008). It was lower than the level of awareness found in both the urban and rural areas of Anambra state which stood at 95.7% (Ubajaka and Adugo, 2008).

This high level of awareness could be attributed to the increasing nationwide awareness programs about ITN use from both governmental and Non-governmental organizations, and also the higher number of respondents with secondary level of education (35.1%). This is a good news in that if ITN is properly used, malaria burden is likely to be reduced in these communities (Okoh *et al.,* 2013). This is in line with the report of the World Health Organization (2008) and Federal Ministry of Health (2000) claims that when the required coverage is attained and ITN is properly used, it can reduce malaria transmission by at least 60% and child mortality by 20%.

A total of 171 (87.7%) respondents claimed to have heard about ITNs, but on further inspection of households that claimed to have seen ITNs was 161(82.6%). Subsequently, ownership stands at 148(75.9%). This appears to be higher than the previously reported data about ownership observed in a multi-state survey carried out in Nigeria which stood at l0.0% (Olusola *et al.,* 2008). This increased level of ownership may be attributed to the impact of awareness campaigns conducted in the past by several awareness campaign teams e.g. IMPAC, and also due to free distribution of ITNs to vulnerable groups.

On further review, ownership of ITNs reduces with increase in number of ITN in a household. This could be as a result of funds needed to provide ITN for many children in a household and this is not encouraging in that under-fives and pregnant women are more prone to malaria complications and therefore need to sleep under ITNs. One hundred and forty eight of respondents had used ITNs in the past while 95 (38.0%) of respondents currently sleep under ITNs, this is higher than twenty seven percent reported in a study in Northern Nigerian (Okoh *et al.,* 2013).

This may be attributed to increased awareness over the past years. One hundred and one (77.1 %) of households having under 5 children had at least one under 5year child sleeping under ITN. This percentage utilization is higher than the current national Under 5 utilization of 5.5% reported by FMOH in 2010.

**CONCLUSION**

The study has shown the level of awareness, acquisition and utilization of insecticide treated nets (ITNs) among community dwellers in Abraka and environs with results showing that the awareness of ITNs in the prevention of malaria appears to be on the increase with ownership and utilization of ITNs. This implies that the various malaria programmes by state and federal government agencies have made impact in creating awareness. However, there is a need to increase awareness about the benefits of ITN use among community dwellers. Free distribution of ITNs to target population should be sustained, with other members of the community included in the supply chain. This study therefore recommends the need for further strategies including vector control and environmental hygiene to eliminate breeding sites and other factors capable of enabling mosquito breeding sites.

**Ethical Approval**

Permission was obtained from the locals and heads of communities. On entry into each household the concept of the study was carefully explained to the household heads, and approval was then obtained before commencing the interview.

**Disclaimer (Artificial intelligence)**

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

Option 2:

Author(s) hereby declare that generative AI technologies such as Large Language Models, etc have been used during writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology

Details of the AI usage are given below:

1.

2.

3.

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