

Journal of Biological Research & Biotechnology

Bio-Research Vol. 20 No.3; pp. 1649-1658 (2022). ISSN (print):1596-7409; eISSN (online):2705-3822

The knowledge and use of insecticide treated nets (INTs) among rural dwellers in Ivo L.G.A, Ebonyi State, Nigeria

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Abstract

Effective uses of insecticide-treated nets (ITNs) are considered key to the elimination of malaria among vulnerable populations. Several studies have revealed that the degree of awareness, ownership, and consistent use of ITNs by rural dwellers differ from one area or region to the other. The aim of the study was to determine the awareness of ITNs and factors affecting their use among rural dwellers in Ivo L.G.A of Ebonyi State. Simple survey method was adopted for the study. Three hundred (300) questionnaires were given out to respondents; however, 276 respondents representing 92% of the sample size returned their questionnaires. The data generated was analyzed and represented in simple frequency table and simple bar chart using IBM SPSS statistical package. The result indicated that majority of the respondents in the study area had vast knowledge of ITNs. Relationship between educational level, age, occupation of respondents and knowledge of ITNs was observed. The result showed that age, educational status, and educational status of rural dwellers were significantly associated with their knowledge of ITNs in Ivo LGA. Majority (72.5%) of the respondents in the study area had vast knowledge about ITNs, while minority (27.5%) had little or no knowledge of ITNs. The knowledge of ITNs by rural dwellers in Ivo LGA was independent of gender of the rural dwellers. A study to assess the actual use and impact of utilization of ITNs among children, pregnant mothers, nursing mothers, the adolescents, and the aged in Ivo communities is recommended.

Keywords: Malaria, INTs, Knowledge, Rural Dwellers, Ivo, Ebonyi State

Received January 23, 2022; **Revised** July 14, 2022; **Accepted** August 31, 2022

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Journal Homepage: <http://www.bioresearch.com.ng>.

Publisher: *Faculty of Biological Sciences, University of Nigeria, Nsukka, Nigeria.*

INTRODUCTION

Malaria is a major infectious disease in most developing countries. Global Malaria Program organized by World Health Organization encouraged worldwide efforts to strengthen the effective use of Insecticide Treated Nets (ITNs) for the purpose of control and prevention of malaria. Effective use of ITNs is considered the most effective and safe way to eliminating malaria in the general population (Taremwa *et al.*, 2017). Malaria is caused by intra- erythrocytic protozoa of the genus plasmodium transmitted by the bite of an infective female Anopheles mosquito. Of the four plasmodium species that infect humans, *P. falciparum* is common in sub-Saharan Africa and causes severe and potentially fatal malaria (Inungu *et al.*, 2017). ITNs offer adequate barrier or hindrance between the host and parasite or other related insects thereby preventing against malaria infestation and transmission. The malaria incidence, across the globe is substantial, with an estimation of three hundred (300) million most likely cases each year of which about one million lives are lost (Edson and Kayombo, 2007). It was reported by Edson and Kayombo, (2007) that more than ninety percent (90%) of these deaths occur in Sub-Saharan Africa where young children are the most vulnerable population. The World malaria report according to WHO reported that 241 million cases of malaria occurred in 2020 compared to 227 million cases in 219 (WHO, 2021). The estimated number of malaria deaths stood at 627 000 in 2020. Malaria is one of the major public health problems in Sub-Sahara African. Accessibility to the tools in Africa that are needed for the prevention and treatment of malaria is not available to millions of vulnerable populations in the globe (Njumkeng *et al.*, 2019).

Various health authorities have made concerted efforts to promote the use of ITNs by rural dwellers, yet research has shown that the degree of awareness, ownership, and effective use of ITNs by these individuals has varied from one area or region to the other (Ezeigbo *et al.*, 2015, Sunday *et al.*, 2021). As the knowledge of use of ITNs has improved over time, a lot of factors still play against actual ownership and effective use of ITNs (Owoseni, 2018). The most effective and safe malaria control tool is INTs when used as directed. Despite all these, utilization and general acceptance is still low: only a small percentage (

3%) of African children are currently utilizing the tool and about 20% are sleeping under any other kind of net. Owoseni, (2018) reported that cases of malaria pandemic continue to be the leading cause of child mortality and morbidity

Problems of delivery, distribution, usage and even acceptability of this method in rural areas, has drastically reduced the success of malaria control using ITNs. In addition, public campaign and acceptance of insecticide-treated nets vary from community to community in states where this method of malaria control has been adopted (Steinhardt *et al.*, 2017). Owing to poor acceptability of ITNs, the public health consequences is that more work need to be done by both authorities in government and in health sectors at various level to raise the general knowledge on the use of ITNs. This can be done through extensive health education, reduction in constrain to accessibility and affordability of ITNs. Mass importation and subsidizing the price of ITNs may be the best approach to solving the problem. This will reduce the notion that most people have towards accepting the use of the treated nets in line with its efficacy. Some either neglect or ignore usage of bed nets based on the earlier stated odds.

Prevalence of malaria vectors at late evening when people have not yet gone under their bed nets, presents an opportunity to transmit the disease (Adebayo *et al.*, 2015). Sleeping outside is very common among students and this increases the chance of a mosquito bite and fast transmission of the infectious *plasmodium*. Therefore, individuals who sleep outdoors are exposed to mosquito bites and are prone to malaria. These problems are most often encountered and are common among young persons. The result of a study conducted to determine the prevalence of malaria across the Local Governments of Ebonyi State, show that among the Local Government Areas, Ivo had the highest prevalence rate. The results further showed that malaria was endemic in Ebonyi state and was a major health problem for school children (Ani, 2008). Ebonyi state is one of the south-eastern states in Nigeria. The State is located between longitude 7° 30' E and 8° 30' and between latitude 5° 40' and 6° 54' (Ani, 2008). Ebonyi lies entirely in the Cross River plains with frequent floods during the rainy season, resulting from poor drainage systems, stagnant streams

and ponds that predispose the state to menace of mosquito infestations and malaria endemicity (Joseph *et al.*, 2017).

Therefore, the aim of this investigation is to assess the knowledge of insecticide treated nets (ITNs) and factors affecting its usage among rural dwellers in Ivo L.G.A of Ebonyi State. Specifically the study sort to find out the extent of awareness of Insecticide Treated Nets (ITNs) in Ivo L.G.A of Ebonyi State, estimate the number of rural dwellers sleeping under ITNs in the L.G.A, propose possible factors affecting the use of insecticide treated nets among rural dwellers in the L.G.A and assess whether source and availability of ITNs affects its use by rural dwellers in Ivo L.G.A of Ebonyi State.

The objective of the work includes the determination of demographic data among the rural dwellers, and their responses on the following subjects; proportion of rural dwellers sleeping under ITNs, factors affecting the use of ITNs among rural dwellers, responses on whether source and availability of ITNs influence their use by rural dwellers in Ivo L.G.A of Ebonyi State and finally determine whether demographical subjects age, gender, occupation, educational status affects their knowledge of ITNs.

This research work has both theoretical and practical significance. On a theoretical aspect, the study shall be a source of secondary data collection for future researchers on similar topic. It shall serve as a relevant contribution to knowledge and a source of reference. It will enrich the pool of existing literature in the subject area and will be of immense help for policy formulation by present government and NGOs to offer possible solution in preventing transmission of malaria on rural dwellers. Practically, the study will be of immense importance to the policy makers, policy implementers, decision takers and other stakeholders involved in making policies for on rural development. The issues raised in this study also helped to enhance understanding for better rural development programmes to be established, and as a result, the rural dwellers will benefit fully in such grassroots development programmes.

MATERIALS AND METHODS

Population

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The population for the study was 1000 people among rural dwellers in Ivo Local Government Area. (PHCD, Ivo L.G.A, 2019).

Area of the Study

This study was carried out in Ivo L.G.A Ebonyi State, Nigeria.

Study Design and Sampling Technique

The researcher adopted the simple survey method for this study. The focus of this method was to enable the researcher to obtain the views on the use of insecticide treated net and factors affecting their use among rural dwellers in Ivo L.G.A Ebonyi State, Nigeria. Again, the questionnaire was designed to help in the collection of relevant data. Moreover, the questionnaire was used because of its relative merit of wide coverage for less expenses and some degree of anonymity of the respondents. The questionnaire contained ten close ended questions and three open ended questions.

Instrument/Method of Data Collection

The research involved questionnaire as the only instrument in this study. The total sample used was three hundred (300) questionnaires distributed to the rural dwellers representing 30% of the total population for the study from the 18 electoral wards in Ivo L.G.A Ebonyi State, Nigeria.

Sample size is calculated thus:

The sample size (n) was calculated using the formular

$$n = \frac{2(Z_{\alpha} + Z_{1-\beta})^2 \sigma^2}{\Delta^2}$$

where Z_{α} , Z is a constant (set by convention according to the accepted α error)

$Z_{1-\beta}$, Z is a constant set by convention according to power of the study

σ = standard deviation

Δ = estimated effect size

A total of 300 questionnaires were given out to respondents on the course of this survey of which 276 respondents representing 92% of the sample size returned their questionnaires, while 8% of the respondents could not return theirs. The questionnaire was pretested in a nearby tertiary health facility for clarity and content validity. It was distributed by four research assistants with good medical and research knowledge who are fluent in English and Igbo languages. On collection from respondents, each questionnaire was checked for completeness and where incomplete research assistants returned to the respondent to collect missing information. Following satisfactory filling of questionnaires, they were stored in a file cabinet designated for this purpose.

Data analysis

IBM SPSS software **Version 25** was used for analysis of data obtained through administration of questionnaire. The responses from the

respondents were analyzed and represented in simple frequency tables, percentages, and simple bar charts (Owoseni, 2018).

Ethical consideration

The consent of the subjects was sought through verbal introduction of self and explanation of what the study entails before the administration of the structured questionnaires to obtain their responses. The respondent's confidentiality of the information provided in the questionnaires were guaranteed.

RESULT

In table1, 200 respondents (72.5 percent) of the sample size were male, while 76 respondents (27.5 percent) were female.

Table 1: Distribution of respondents' gender

Gender	Frequency	Percentage (%)
Male	200	72.5
Female	76	27.5
Total	276	100%

Table 2 shows that 25 respondents representing 9% are in the age bracket of 18-27 years; 50 respondents representing 18.2% are in the age bracket of 28-37 years; 121 respondents representing 43.8% are in the age bracket of 38-47 years; while 80 respondents representing 29% are in the age bracket of 48 years and above.

Table 3 shows that 75 respondents representing 27% of those sampled are single; 150 respondents representing 54.6% are married; 25 respondents representing 9% are divorced/ separated, while 26 respondents representing 9.4% are widowed.

Table 4 shows that 20 respondents representing 7.2% have FSLC, 100 respondents representing 36.3% have WACE/SSCE; 75 respondents representing 27.2% have HND/ B.Sc; 61 respondents representing 22.1% have M.A/ M.Sc; while 20 respondents representing 7.2% have more than the listed qualifications above.

Table 5 shows that 76 respondents representing 27.5% were farmers, 50 respondents representing 18% were traders/ artisan, 120 respondents representing 43.5% were health workers, 30 respondents representing 11% were unemployed. This shows that majority of the respondents are health workers.

Table 6 indicates that, 230 respondents representing 83% are Christians, 5 respondents representing 3% are Muslims and 41 respondents representing 14% are traditional worshippers.

From Table 7 below, it is evidently clear that majority of the respondents in the study area have a vast knowledge about Insecticide Treated Nets (ITNs) having 200 (72.5%) of the respondents in agreement, while few of the respondents 76 (27.5%) have little or no knowledge of ITNs.

Table 2: Age distribution for the respondents

Age bracket (years)	Frequency	Percent (%)
18-27	25	9
28-37	50	18.2
38-47	121	43.8
48 and above	80	29
Total	276	100

Table 3: Marital status of respondents

Marital status	Frequency	Percent (%)
Single	75	27
Married	150	54.6
Divorced/ Separated	25	9
Widowed	26	9.4
Total	276	100

Table 4: Educational qualification of respondents

Qualification	Frequency	Percent (%)
FSLC	20	7.2
WASC/SSCE	100	36.3
HND/ B.Sc	75	27.2
MA/ M.Sc	61	22.1
Others	20	7.2
Total	276	100

Table 5: Occupational distribution of respondents

Occupation	Frequency	Percent (%)
Farmer	76	27.5
Traders/ Artisan	50	18
Health worker	120	43.5
Unemployed	30	11
Total	276	100

Table 6: Religion of the respondents in the study area.

Religion	Frequency	Percent (%)
Christianity	230	83
Islam	5	3
Traditional Religion	41	14
Total	276	100

Table 7: Response of the respondents on knowledge of the ITNs in the study area.

Option	Frequency	Percentage (%)
Yes	200	72.5
No	76	27.5
Total	276	100

Table 8 shows that 98 respondents representing 35.5% of respondents agreed that every pregnant in Ivo Local Government Area of Ebonyi state sleeps under the Insecticide Treated Nets (ITNs); 78 respondents representing 28.3% of the respondents said that women who refused to sleep under Insecticide Treated Nets are always exposed to mosquito that causes malaria in the study area; 50 respondents representing 18.1% of the respondents said that sleeping under ITNs is the best way to prevent malaria; Furthermore, 30 respondents representing 10.9% of the respondents insisted that all the women in their area support the use of ITNs, finally, 20 respondents representing 7.3% of the respondents said that since they started sleeping under Insecticide Treated Nets, they no longer suffer from malaria. This shows that all the respondents in the study area were sensitized enough on the use of Insecticide Treated Nets.

In Table 9, 90 respondents representing 32.6% of the respondents were of the opinion that chemicals used in producing the Insecticide Treated Nets (ITNs) are dangerous for them and their fetus; 86 respondents representing 31.2% of the respondents said that during heat period, it is always very hot to sleep under the Insecticide Treated Net; 40 respondents representing 14.5% of the respondents said that ITNs prevents proper ventilation; 35 respondents representing 12.7%

of the respondents insisted that they cannot sleep under ITNs except when there is power supply to curb heat; 25 respondents representing 9.1% of the respondents said that Insecticide Treated Nets causes cough. From the responses above, one can deduced that there are factors affecting the use of Insecticide Treated Nets among rural dwellers in IVO Local Government Area of Ebonyi State.

Table 10 shows that 91 respondents representing 32.9% of respondents agreed that it was always expensive to buy ITNs in Ivo Local Government Area of Ebonyi state; 85 respondents representing 30.8% of the respondents said that they were given in the health centres but was not enough for their family; 41 respondents representing 14.9% of the respondents said that some health centres do sell the ITNs given to them share among pregnant women, thereby discouraging them from using it; 36 respondents representing 13% of the respondents insisted that it's always unavailable at the health centres; 23 respondents representing 8.3% of the respondents said that people in the rural areas are short changed in terms of the accessibility. This means that Source and availability of ITNs influence their use by rural dwellers in Ivo L.G.A of Ebonyi State.

Table 8: Respondents Response on Proportion of rural dwellers sleeping under ITNs in Ivo L.G.A

Option	Frequency	Percentage
Every pregnant women in Ivo sleeps under ITNs	98	35.5
Women who refuse to sleep under ITNs, are always exposed to mosquito that causes malaria	78	28.3
Sleeping under ITNs is the best way to prevent malaria	50	18.1
All the women in my area support the use of ITNs	30	10.9
Since I started sleeping under ITNs, I no longer suffer from malaria	20	7.3
Total	276	100

Table 9: Respondents Response on Factors affecting the use of insecticide treated nets among rural dwellers in Ivo L.G.A of Ebonyi State

Option	Frequency	Percentage
Chemicals used are dangerous to me / my fetus	90	32.6
During the heat period, it is always very hot to sleep under ITNs	86	31.2
ITNs prevents proper ventilation	40	14.5
I cannot sleep under ITNs except when there is power supply to curb the heat	35	12.7
It causes cough	25	9.1
Total	276	100

Table 10: Respondents Response on the Source and availability of ITNs influence their use by rural dwellers in Ivo L.G.A of Ebonyi State

Option	Frequency	Percentage (%)
It is always expensive to buy ITNs	91	32.9
I was given in the health centre but was not adequate for my family	85	30.8
Some health centres do sell the ITNs given to them share among pregnant women, thereby discouraging them from using it.	41	14.9
It's always unavailable at the health centres.	36	13.0
People in the rural areas are short changed in terms of the accessibility	23	8.3
Total	276	100

DISCUSSION

The knowledge and Use of Insecticide treated nets in rural communities where there is high incidence of malaria is vital for malaria vector control and prevention (Ezeigbo *et al.*, 2015) and Nigerian population mostly rural dwellers stand the risk of having malaria. This study provides data on the knowledge and use of insecticide treated nets among rural dwellers of Ivo local government in Ebonyi State. Result of this study will serve as important guides for policy makers and decision-making in malaria control programmes in Ebonyi State.

In the study, the awareness of INTs among the rural dwellers in Ivo communities of Ebonyi State was shown in table 7. Greater number of the respondents had vast knowledge about Insecticide Treated Nets (ITNs) having 200 (72.5%) of the respondents in agreement, while few of the respondents 76 (27.5%) have little or no knowledge of ITNs. However, it was further observed that high proportions of the

respondents in the study area were sensitized enough on the use of Insecticide Treated Nets (table 8). This finding was in contrary with a study conducted by Sunday *et al* (2021) which established that knowledge and awareness of insecticide treated bed nets use among the rural dwellers in the Ebonyi State was poor. The differences in the findings could be attributed to intensify effort to roll-back malaria in the mosquito endemic area such as the study area by government and nongovernmental agencies in recent times. Public campaign is a vital approach to comb the menace and rate of malaria infestation especially in the rural areas. Adequate provision of ITNs through the Health facilities is also a good measure.

On factors affecting the use of INTs (table 9 and Table 10), it can be deduced that there are factors affecting the use of Insecticide Treated Nets among rural dwellers in IVO Local Government Area of Ebonyi State. Among such factors which includes the weather condition, the chemical composition of the Net, the cost and accessibility

of the net. The rural dwellers were on the opinion that it is always expensive to buy ITNs, while those rural dwellers who received ITNs from the health centre complained that the number of nets they received was not adequate for their family use. Those hindrances can be overcome by proper education on the merits of using ITNs in the mosquito endemic zone. Infant mortality and rate of anemia in pregnancy will be minimized.

This study found no association ($\chi^2=0.001$, $p=0.983$) between knowledge of ITNs usage and gender. This was in line with work of Njumkeng *et al.*, 2009. According to Njumkeng *et al.*, 2019, the finding could be explained partially by the fact that malaria control strategies in the past, more attention was given to the vulnerable groups such as children below five years and pregnant women. The public health awareness campaign had educated people more on the benefits of using insecticide treated nets as a tool of malaria prevention. However, the recent move for universal coverage which has been improved and strengthened through repeated massive distribution of insecticide treated nets may have minimized these discrepancies.

A statistically significant association of knowledge of ITNs with Age ($\chi^2=33.218$, $p<0.001$) was observed. This suggests that adults use ITNs more than young ones. This is also similar to the study of Ndjinga and Minakawa, 2010; Graves *et al.*, 2010, which established that ITNs knowledge/usage is associated with age. A statistically significant relationship between educational level of respondents and knowledge of ITNs was observed ($\chi^2=112.322$, $p<0.001$). This is in agreement to the findings in Ekiti State, where Owoseni reported greater awareness and use of ITNs (98%) and knowledge among mothers and caregivers of children attending the clinic at health centre in Emure Local Government Ekiti State (Owoseni, 2018). However, this was contrary to the findings in Ogun State, Nigeria, where poor awareness (48.9%) and knowledge (31.2%) of the importance of ITNs/LLIN among pregnant mothers was reported (Abiodun *et al.*, 2012). Previous studies have also shown that ITNs knowledge/usage was associated with level of education, (Tchinda *et al.*, 2012, Pettifor *et al.*, 2008).

Occupation is one of the means households meet to their daily needs. Occupation suggests

whether the level of income of the household will be able to sustain and consequently meet to the household's needs. In this study, 76 respondents representing 27.5% are farmers, 50 respondents representing 18% are traders/artisan, 120 respondents representing 43.5% are health workers, and 30 respondents representing 11% are unemployed. This shows that majority of the respondents are health workers. A significant association between occupational status of respondents and knowledge of ITNs was also observed ($\chi^2=105.658$, $p<0.001$). It was recorded that 98% of health workers had knowledge of ITNs. This is also similar to a work done by Ugwu *et al.*, (2013) where a significant association was also observed between occupational status and Utilization of Insecticide Treated Nets among Pregnant Women in Enugu.

CONCLUSION

The finding of this study shows that age, educational status, and educational status of rural dwellers were significantly associated with their knowledge of insecticide-treated net in Ivo LGA, Ebonyi State, Nigeria. Majority (72.5%) of the respondents in the study area had a vast knowledge about Insecticide Treated Nets (ITNs) while minority (27.5%) had little or no knowledge of ITNs. The knowledge of insecticide-treated net by the villagers in Ivo LGA was independent of gender of the rural dwellers. A study to assess the actual use and impact of utilization of ITNs among children, pregnant mothers, nursing mothers, the adolescents, and the aged in Ivo communities should be undertaken. Health education of the prevention of malaria attacks should be intensified; other strategies for preventing transmission of malaria should be put concurrently in place with the ITN project.

Mobility was a challenge to this study due to lack of access road in the chosen area. Limited health facilities in the area restricted mass mobilization of Health worker for this study. Language barrier was encountered since some of the target subjects were illiterate. Also, the survey questionnaire was not translated into local languages; the interviewers interpreted them to the respondents who did not understand English. It is possible for interviewers to misinterpret questions or introduce personal preferences. However, because they were all trained and the hypothesis of this study was generated after data

collection, this should probably not have biased the study in a significant way.

Conflict of interest

The authors declare that they have no competing interests

Author contribution

UEN and OCA conceived the study and provided direction. UEN designed the experiment. OCA carried out the implementation and administration of the questionnaire. APO and GKO analysed the data and the performed the calculations. UEN and GKO wrote the manuscript with inputs from all authors.

Acknowledgement

Authors wish to appreciate their students that diligently distributed the research tool and ensure its effective recovery in the study area. We appreciate Health workers in the study area for their assistance to reach out with the target subjects.

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