

**Research Article****Awareness, Ownership and Utilization of Insecticide Treated Nets among Households in a Rural Community in Southern Nigeria****Johnson OE\*<sup>1</sup>, Inyang AC<sup>2</sup>, Etuknwa UI<sup>2</sup>, Ekanem UD<sup>2</sup>, Udo UO<sup>2</sup>, Ubom I<sup>2</sup>, Tommy DP<sup>2</sup>, Ichah ME<sup>2</sup>, Okeke OJ<sup>2</sup>, Ntukidem UB<sup>2</sup>**<sup>1</sup>Department of Community Health, University of Uyo Teaching Hospital, Uyo, Nigeria<sup>2</sup>Faculty of Clinical Sciences, University of Uyo, Nigeria**\*Corresponding author**

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**Abstract:** The use of Insecticidal Treated Nets (ITNs) is a key strategy for achieving a reduction in the malaria burden in Nigeria and other malaria endemic countries. This study was conducted to assess the awareness, ownership and utilization of ITNs in a rural community in southern Nigeria. It was a cross-sectional descriptive study. The instrument of data collection was an interviewer administered semi- structured questionnaire. Respondents were selected through multistage sampling method. Data was analyzed using SPSS version 18. A total of 269 respondents, each representing a household participated in the study. One hundred and twenty three, (45.7%) respondents were aged 21-30 years; 213 (79.2%) had at least secondary level of education and 253 (94%) were aware of ITNs. The main sources of information were radio/television, 139 (51.5%) and hospital 60 (22.3%). One hundred and twenty six (49.8%) owned ITNs out of which 90 (71.4%) obtained it from the health facility. Up to 46 (36.5%) had more than one, while 127(50.2%) did not own any. A total of 95(75.4%) of those who owned ITNs used them with 41 (43.2%) using them regularly. Pregnant women in only 17(33.3%) out of 51 households used ITN. Also, under five children in only 44 (37.6%) out of 117 households used ITNs. Though awareness of ITN was high, ownership and utilization were comparatively low. Efforts should be made by relevant stakeholders to increase ownership and usage of ITNs in order to reduce morbidity and mortality from malaria especially among pregnant women and under-five children in this community.**Keywords:** Malaria, Insecticide treated Nets, ownership, utilization, households

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**INTRODUCTION**

Malaria is a major public health problem and a potentially life threatening disease especially in endemic areas. In 2008, there was an estimated 243 million cases worldwide with a vast majority (85%) from the African region [1]. It accounted for an estimated 863,000 deaths, of which 89% were in the African region. Among children under the age of five, it accounted for 8% of mortality with maximum fatality from the African region (16%) [1].

In Nigeria, malaria accounts for almost 110 million clinically diagnosed cases per year, 60% of outpatient visits and 30% of hospitalizations. It has remained the highest contributor to high morbidity and mortality accounting for 25% of infant mortality, 30% of childhood mortality and is associated with 11% of maternal mortality [2, 3]. It also constitutes a serious economic and social burden on communities and the country at large, as about 660 million dollars is lost to malaria annually in the form of treatment cost, prevention and loss of work time [4].

Consequently, the National Malaria Control Strategic Plan (NMCSP) was developed to address national health and development priorities of which increased ownership and use of insecticide treated nets (ITNs) especially long lasting insecticidal nets (LLINs) was included. The ITNs have been shown to reduce the number of malaria cases by as much as 50% and childhood mortality by 20% [5]. Therefore promoting the use of ITN can be a key approach towards reduction of malaria morbidity and mortality.

In April, 2010, African Heads of state met in Abuja where a target of at least 60% of those at risk of malaria, particularly pregnant women and children under 5 years of age, were to benefit from suitable personal and community protective measures such as ITN, among other targets in the Roll Back Malaria Programme (RBM) [5]. Several studies since then have however reported low usage of ITN in different regions in Nigeria. A study done in 2011 on the determinants of ITN ownership and utilization among pregnant women in Nigeria, reported that only 28.8% owned ITN and as low 7.5% utilized the nets [2]. Furthermore, the utilization of ITNs by under-five children in Nigeria

reported in some studies was 1.7% and 26.1% respectively [3, 6].

The 2015 goal of the WHO Roll Back Malaria partnership is to reduce global malaria cases by 75% from year 2000 levels and reduce malaria deaths to near zero through universal coverage by effective prevention and treatment interventions [7]. WHO recommends the use of ITNs particularly LLINs which have been shown to be cost effective to reduce malaria episodes among children under the age of five years by approximately 50% and all cases of mortality by 17% [8]. Statistics in Nigeria on trends in the ownership and usage of ITNs from National Demographic and Health Survey (NDHS) 2008 showed that 16.9% of households owned any type of net, 8% owned an ITN, the proportion of children under the age of five years who slept under any mosquito net and ITN were 11.9% and 5.5% respectively while the same statistics for pregnant women were 11.8% and 4.8% respectively [9]. The 2013 NDHS reported a general increase in all the figures as 55.3% of households owned any type of net, 49.5% owned an ITN, the proportion of children under the age of five years who slept under any mosquito net and ITN were 18.2% and 16.6% respectively while the same statistics for pregnant women were 17.8% and 16.4% respectively [10].

This study was conducted to assess the awareness, ownership and utilization of ITNs in a rural community in southern Nigeria with the intention of determining the current ITNs use so as to communicate findings to relevant stakeholders.

## METHODOLOGY

This study was carried out in Ikot Ntuen, a community in Akwa Ibom State, southern Nigeria with a population of 2,433 [11]. The study population consisted of households in this community. This was a cross-sectional descriptive study carried out in September 2014. The sample size was estimated using the formula:

$$n = \frac{z^2 pq}{d^2}$$

Where, n = minimal sample size

z = standard normal deviate = 1.96

p = prevalence of utilization of insecticide treated nets among pregnant women in Enugu Nigeria, 20.7% [12].

$$q = (1 - p) = (1 - 0.207) = 0.793$$

d = precision or standard error, 0.05

$$\text{Thus, } n = \frac{(1.96)^2 \times 0.207 \times 0.793}{(0.05)^2}$$

$$= 252.2$$

$$= 252$$

Multi-stage probability sampling method was used. The local government area (LGA) was selected from 31 LGAs in the State by simple random sampling. The total number of villages in the LGA was listed and Ikot Ntuen was selected by simple random sampling method. Alternate households were enlisted in the study

until the required sample size was achieved. Only one member of each household was interviewed. The research instrument was an interviewer-administered semi-structured questionnaire. The questionnaire consisted of three sections which reviewed the socio-demographic data, awareness, ownership and utilization of ITNs and utilization of ITNs by pregnant women and under-five children. The questions were asked in languages the respondents could understand (English and the local dialect) and the responses circled appropriately on the questionnaires by the interviewers. The authors made up the research team. Data collection lasted two days. Data collected was analyzed using SPSS version 18.0

## Ethical considerations

Prior to the collection of data, consent was sought and gotten from the village head. Informed consent was also obtained from the heads of the households and the specific individuals who participated in the study. In order to maintain confidentiality, names and addresses of the respondents were not utilized.

## Limitations of the study

Some of the household members were uncooperative as they felt they would not benefit from the data collection. Such households were not included in the study. The findings of this study were solely based on the respondents' responses which were purely subjective.

## RESULTS

A total of 269 respondents participated in the study. Each respondent represented a household. One hundred and twenty three, (45.7%) respondents were aged 21-30 years; 213 (79.2%) had at least secondary level of education (Table 1) and 253 (94%) of them were aware of ITNs. The main sources of information on ITN were radio/television, 139 (51.5%) and hospital 60 (22.3%). One hundred and twenty six (49.8%) respondents owned ITNs out of which 90 (71.4%) obtained it from the health facility. Up to 46 (36.5%) had more than one, while 127(50.2%) did not own any ITN. Most people, 120 (95.2%), up to 5 (10.4%) of the men however bought their ITN (Table 2).

A total of 95 (75.4%) of those who owned an ITN used it with 41 (43.2%) using it regularly. However, 30 (31.6%) did not use it properly. Usage was higher among the females as 62 (79.5%) of them reported using ITN compared to 33 (68.8%) of the males. The difference however was not significant (Table 3).

Pregnant women in only 17(33.3%) out of 51 households used ITN. Also, under five children in only 44 (37.6%) out of 117 households used ITNs (Table 4).

Lack of money was reported by 24.7% of the respondents as reason for not having ITN. Up to 25.8% of those who owned the net identified feeling of heat as a serious contributory factor to non usage (Fig. 1). In

77.3% of the cases the responsibility of ensuring that mothers.  
the under 5 children slept under ITNs rested on the

**Table 1: Socio demographic characteristics of respondents**

Variable	Sex		Total n (%) (N=269)	Statistical indices
	Male (N=111)	Female (N=158)		
<b>Age</b>				
20- and below	11 (9.9)	33 (20.9)	44 (16.4)	p value= 0.016* $\chi^2=12.1516$
21-30	50 (45.1)	73 (46.2)	123 (45.7)	
31-40	29 (26.1)	35 (22.2)	64 (23.8)	
41-50	10 (9.0)	3 (1.9)	13 (4.8)	
Above 50	11 (9.9)	14 (8.9)	25 (9.3)	
<b>Marital Status</b>				
Single	65 (58.6)	77 (48.7)	142 (52.8)	p value= 0.334+
Married	43 (38.7)	73 (46.2)	116 (43.1)	
Divorced	0 (0.0)	1 (0.6)	1 (0.4)	
Widowed	3 (2.7)	7 (4.4)	10 (3.7)	
<b>Occupation</b>				
Civil servant	21 (18.9)	25 (15.8)	46 (17.1)	p value= 0.026* $\chi^2=9.2361$
Farming	8 (7.2)	8 (5.1)	16 (6.0)	
Trading	20 (18.0)	55 (34.8)	75 (27.9)	
Others	62 (55.9)	70 (44.3)	132 (49.1)	
<b>Level of education</b>				
Non formal	4 (3.6)	10 (6.3)	14 (5.2)	p value= 0.131+
Primary	16 (14.4)	26 (16.5)	42 (15.6)	
Secondary	39 (35.1)	70 (44.3)	109 (40.5)	
Tertiary	52 (46.9)	52 (32.9)	104 (38.7)	

+ Fischer's exact test \* significant p value

**Table 2: Awareness and ownership of ITNS among respondents**

Variables	Sex n (%)		Total (N=269)	Statistical indices
	Male (N=111)	Female (N=158)		
<b>Awareness</b>				
Yes	104 (93.7)	149 (94.3)	253 (94.1)	p value= 0.835 $\chi^2=0.0432$
No	7 (6.3)	9 (5.7)	16 (6.0)	
<b>Source of information</b>				
Radio/TV	59 (53.2)	80 (50.6)	139 (51.7)	p value= 0.065+
Books/magazine	6 (5.4)	2 (1.3)	8 (3.0)	
Hospital	17 (15.3)	43 (27.2)	60 (22.3)	
Internet	0 (0.0)	1 (0.6)	1 (0.4)	
Family/friend	22 (19.8)	23 (14.6)	45 (16.7)	
Not aware	7 (6.3)	9 (5.7)	16 (6.0)	
<b>Owned ITN</b>				
Yes	48 (46.2)	78 (52.3)	126 (49.8)	p value= 0.332 $\chi^2=0.9406$
No	56 (53.5)	71 (47.7)	127 (50.2)	
<b>Source</b>	<b>n = 48</b>	<b>n = 78</b>	<b>n =126</b>	
Market	5 (10.4)	2 (2.6)	7 (5.6)	p value= 0.133+
Health facility	29(60.4)	61 (78.2)	90 (71.4)	
Family/friend	6 (12.5)	9 (11.5)	15 (11.9)	
Others	8 (16.7)	6 (7.7)	14 (11.1)	
<b>Cost</b>				
Free	43 (89.6)	77 (98.7)	120 (95.2)	p value= 0.030+*
Purchased	5 (10.4)	1 (1.3)	6 (4.8)	
<b>Number of ITNs</b>				
1	34 (70.8)	46 (59.0)	80 (63.5)	p value =0.367 $\chi^2=2.0728$
2	8 (16.7)	21 (26.9)	29 (23.0)	
3 and above	6 (12.5)	11 (14.1)	17 (13.5)	

+ Fischer' exact test \* significant p-value

**Table 3: Use of ITNs by respondents**

Variables	Sex n (%)		Total (N=126)	Statistical indices
	Male (N=48)	Female (N=78)		
<b>Use ITN</b>				
Yes	33 (68.8)	62 (79.5)	95 (75.4)	P value=- 0.174 $\chi^2=1.8464$
No	15 (31.3)	16 (20.5)	31 (24.6)	
<b>Method of use</b>	<b>n =33</b>	<b>n =62</b>	<b>n =95</b>	p value= 0.0381 $\chi^2=6.5616$
Hanging over the bed	23 (69.6)	42 (67.9)	65 (68.4)	
On doors and windows	4 (12.1)	16 (25.6)	20 (21.1)	
Using it on the farm	6 (18.1)	4 (6.4)	10 (10.5)	
<b>Frequency of use</b>				p value=0.992 $\chi^2=0.0158$
Always	13 (39.4)	28 (45.2)	41 (43.2)	
Sometimes	9 (27.3)	19 (30.6)	28 (29.5)	
Never	11 (33.3)	15 (24.2)	26 (27.3)	
<b>No of people using ITN</b>				p value= 0.075 $\chi^2=6.9047$
1	9 (27.3)	13 (21.0)	22 (23.2)	
2	9 (27.3)	12 (19.4)	21 (22.1)	
3	9 (27.3)	14 (22.6)	23 (24.2)	
4 and above	6 (14.1)	23 (37.0)	29 (30.5)	

**Table 4: Pregnant women and under 5 children using ITN within the households**

Variables	Frequency N=269 n(%)
<b>Any pregnant woman</b>	
Yes	51 (19.0)
No	218 (81.0)
<b>No. of pregnant women</b>	<b>N =51</b>
1	37 (72.6)
2	9 (17.6)
3 and above	5 (9.8)
<b>No. of pregnant women using ITN</b>	
None	34 (66.7)
1	13 (25.5)
2	3 (5.9)
3 and above	1 (1.9)
<b>Do you have under 5 children?</b>	<b>N=269</b>
Yes	117(43.4)
No	152(56.6)
<b>Number of under 5</b>	<b>N =117</b>
1	57 (48.7)
2	32 (27.4)
3 and above	28 (23.9)
<b>Number of U5 using ITN</b>	
1	26 (22.2)
2	7 (6.0)
3	11 (9.4)
None	73 (62.4)

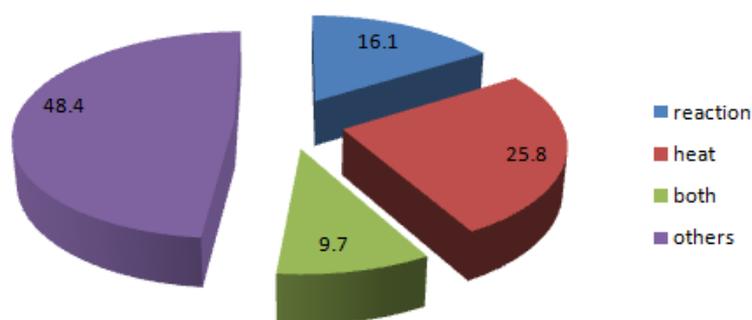


Fig. 1: Reasons for non-use of ITN

## DISCUSSION

This study assessed the level of awareness, ownership and utilization of ITNs among households in a rural community in southern Nigeria. Findings from this study showed that almost half of the study population was within the age range of 21-30 years. Malaria attack if it occurred would greatly affect productivity in terms of income generation as this is a very active age group. Since over three quarters of the respondents attained secondary level of education, they were literate enough to assimilate any form of health education that may be given to them. A greater proportion of the respondents were aware of ITN compared to a study done in a northern Nigerian State where only 36% awareness was recorded [13]. Also, a study done in 2008 on benefits of awareness, ownership and use of ITNs in four West African countries which included Nigeria, Senegal, Uganda and Zambia, reported that four to six years after the introduction of ITNs, awareness rose from 7% to 60% in Nigeria [14]. Awareness levels of 69% and 80% were recorded among mothers in studies in Edo State and Enugu respectively [15, 16]. This study suggested an increase in awareness over the years.

Also in the present study, approximately half of the respondents owned an ITN which is comparable to findings of a study done in 2012 in Cross-River State, southern Nigeria, where ownership of at least one net was reported in 48.2% of the households and 2013 NDHS report net ownership of 49.5% [17, 10]. These findings were much higher than the 9.3% reported in the Edo State study in 2010 and 17% in the 2008 National Demographic Health survey (NDHS) report in Nigeria [15,9]. There seemed to be an upward trend in ownership over the years.

Ownership of ITN generally does not necessarily translate to usage. In the present study, three quarters of those who owned nets used them. A study done in Cote d'Ivoire reported that though a third of the households possessed nets (34.2%), only 3.2% reported actual use [18]. Another study in Kenya reported ownership of 71% and usage of 56.3% [19]. Up to a quarter of those who had nets but did not use gave heat as a reason compared to a study done at Enugu where

reasons for non use included inconvenience to spread (13.2%) [16]. These reasons would not have been strong enough to prevent usage if the respondents fully understood the advantages of using the nets.

In our study, the most important source of ITN was the health facility and 95.2% were gotten free in contrast to a similar study done in Cross River State where only 34.43% obtained ITNs free from government and institutions, while 43.96% bought their ITNs from the social market [17]. It was to be expected therefore, that many more people should have owned nets in the present study compared to the Cross River study but there was only a marginal increase in ownership. This implied that there were other factors which contributed to ownership of nets apart from cost though about one quarter of those who did not own ITN in the present study gave lack of money as a reason. About one fifth however said it was due to not knowing where to get the commodity. Lack of adequate information on where to get the nets seemed to have been the main reason for not owning the nets rather than lack of money as majority of those who got nets in this study got them free. However, in situations where nets were not provided free to users, financial ability has been reported to influence purchase. A study carried out in eastern Nigeria reported that the poorest socio-economic group was less likely to own an untreated net, purchase an ITN and stated a lower willingness to pay for an ITN [20].

Studies performed in Kenya, Tanzania and Uganda have also revealed poverty as an impediment to the purchase of mosquito nets (treated and untreated) [21-24].

A fifth of the respondents in this study had at least one pregnant woman in their households, out of which a third used ITN. This was not good enough but was higher than findings in a study done in 2011 which put the utilization rate among pregnant women as 7.5% and NDHS 2013 which reported utilization of 16.4% [6, 10]. Also, out of 43.4% who had at least one under-five in their household in the present study, only about a third had an under-five using ITNs. Worse findings were however reported in a study done in Western

Nigeria which stated the utilization rate of ITN among under-five as 1.7% and NDHS 2013 where utilization of 16.6% was reported [2, 10].

Benefits of use of ITN in reducing morbidity and mortality from malaria especially among pregnant women and under 5 children abound. A study carried out among children under the age of 5 years in a community in Imo State, Nigeria reported that the use of ITNs was found to be 84.1% more effective in reducing marked level of parasitaemia compared to the traditional nets [25].

### CONCLUSION

This study has shown that though awareness of ITN was high, ownership and utilization were comparatively low. Efforts should be made by relevant stakeholders to increase ownership and usage of ITNs in order to reduce morbidity and mortality from malaria especially among pregnant women and under-five children in this community.

### REFERENCES

1. WHO; World malaria report, Geneva, 2008.
2. Olusola BO, Hoshen M, Olayemi TS; Utilization of ITN by under five children in Nigeria: Assessing progress towards the Abuja targets. *Malar J.*, 2008; 7: 145-147
3. Ankomah A, Adebayo SB, Arogundade ED, Anyanti J et al. Determinant of insecticide treated nets ownership and utilization among pregnant women in Nigeria. *Malar J.*, 2011; 10: 170
4. Federal Ministry of Health and National Malaria Control Programme, 2009
5. WHO; Nigeria distributes 10 million ITNs in 5 years, WHO bulletin. 2007. Available from <http://www.alliance-hpsr.org/en>.
6. Federal Ministry of Health; Burden of Malaria in Nigeria, Nigeria Demographic & Health Survey 2003
7. World Health Organization; World malaria report, 2010.
8. Global Strategic Plan: Roll Back Malaria 2005-2015, Geneva roll back malaria partnership
9. Federal Republic of Nigeria; National Demographic and Health Survey, 2008.
10. Federal Republic of Nigeria; National Demographic and Health Survey, 2013.
11. National Population Commission of Nigeria, 2006.
12. Adogu P, Ijemba C; Insecticide treatment nets possession and utilization among pregnant women in Enugu, Nigeria: A descriptive cross-sectional study. *Journal of Natural Sciences Research*, 2013; 3(15): 40-47
13. Akande TM, Musa IO; Epidemiology of Malaria in Africa. *African Journal Clinical and Experimental Microbiology*, 2005; 6(2): 107-111.
14. Baume CA, Marin C; Gains in awareness, ownership and use of insecticide treated nets in Nigeria, Senegal, Uganda, and Zambia. *Malar J.*, 2008; 7: 153.
15. Wabgatsoma VA, Aigbe EE; ITN utilization among pregnant women attending ANC in Etsako West L.G.A Edo State, Nigeria. *Niger J Clin Pract.*, 2010; 13(2): 144-148.
16. Edelu BO, Ikefuna AN, Emodi JI, Adimora GN; Awareness and use of Insecticide Treated Nets among children attending outpatient clinic at UNTH, Enugu State. *Afr Health Sci.*, 2010; 10(2): 117-119.
17. Ibor UW, Aigbe GO, Iwara AI, Okongor OE, Okino II; Ownership and utilization of Insecticide Treated Nets in Cross River State, Nigeria, *J Med Sci.*, 2012; 12(7): 198-206
18. Koudou BG, Ghattas H, Esse C, Nsanzabana C, Rohner F, Utzinger J *et al.*; The use of insecticide treated nets for reducing malaria morbidity among children aged 6-59 months in an area of high malaria transmission in central Cote d'Ivoire. *Parasit Vectors*, 2010; 3: 91
19. Atieli HE, Zhou G, Afrane Y, Lee M, Mwanzo I, Githeko AK *et al.*; Insecticide treated net (ITN) ownership, usage and malaria transmission in the highlands of western Kenya. *Parasit Vectors*, 2011; 4: 113.
20. Onwujekwe O, Hanson K, Fox-Rushby J; Inequalities in purchase of mosquito net and willingness to pay for insecticides treated nets in Nigeria. *Challenges for Malaria Control Intervention*. *Malar J.*, 2004; 3: 6
21. Guyatt HL, Ochola SA, RW S; Too poor to pay: charging for insecticide-treated bed nets in highland Kenya. *Trop Med Int Health*, 2002; 7: 846-850.
22. Hanson K, Jones C; Social Marketing of Insecticide Treated Mosquito Nets, Tanzania: End of Project Social and Economic Analysis. Malaria Consortium, London School of Hygiene and Tropical Medicine, London, 2000.
23. Nuwaha F; Factors influencing the use of bed nets in Mbarara municipality of Uganda. *Am J Trop Med Hyg* 2001; 65:877- 882.
24. Kikumbih N; Economic analysis of social marketing and commercial sector insecticide treated net delivery models in rural communities of Tanzania. PhD Thesis, University of London, 2002.
25. Osondu NB, Okafor JO; Effectiveness of Insecticide Treated Bed Nets(ITN) in malaria prevention among children aged 6 months to 5 years in a rural community in Imo State, Nigeria *Int J Trop Med.*, 2009; 4(1): 41-49.