

## ORIGINAL ARTICLE

# Ownership and utilisation of insecticide-treated mosquito nets among caregivers of under-five children and pregnant women in a rural community in Southwest Nigeria

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## Key words

Ownership • Utilisation • Insecticide Treated Nets • Nigeria

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## Summary

**Introduction.** Malaria still constitutes a serious public health problem in Nigeria despite control efforts. The use of Insecticide Treated Net (ITN) has been proven to be an effective preventive modality in the control of malaria but its utilisation has been shown to be low. This study assessed the ownership and utilisation of ITN in Igbo-Ora, a rural community in Ibarapa Central Local Government Area (LGA) of Oyo State, Southwest Nigeria.

**Methods.** A descriptive cross-sectional survey among female caregivers of under-five children and pregnant women was conducted using semi-structured interviewer-administered questionnaire. Data were analyzed using SPSS version 16.

**Results.** Among 631 respondents that participated, 84.9% were caregivers of under-five children. Mean age was  $27.7 \pm 6.3$  years with

53.4% between 20-29 age group. Majority, 91.1% had at least primary education, 60.2% were traders and 69.7% were married. Most respondents, 71.8% had at least one type of mosquito nets. Among those that had, 85.4% had window/door net, 25.2% untreated mosquito net while only 15.5% had ITN. Overall, 11.1% of the respondents had ITN among which 78.6% had ever slept under an ITN. Among those that had ever slept under an ITN, slightly less than half, 49.1% slept under an ITN the previous night. Less educated respondents were five times more likely to use ITN (95% CI = 1.24-21.28).

**Conclusions.** This study revealed very low ownership and utilisation of ITNs. There is need to improve on the knowledge of community members of the relevance of ownership and utilisation of ITN in malaria prevention.

## Introduction

Malaria still constitutes a serious public health problem in Nigeria. Malaria is endemic in the poorest countries in the world, causing 400 to 900 million clinical cases and up to 2.7 million deaths each year [1]. More than 90% of malaria deaths occur in Sub-Saharan Africa, resulting in an estimated 3,000 deaths each day. Almost all the deaths are among children younger than five years of age. Other high-risk groups include women during pregnancy, non-immune travelers, refugees and other displaced persons, and people of all ages living in areas of unstable malaria transmission [2]. In highly endemic countries, malaria poses a serious danger to pregnant women and their unborn children. Malaria in pregnancy causes maternal anaemia, miscarriage, and low birth weight. In endemic countries, it is the leading cause of maternal mortality and one of the primary causes of neonatal deaths [1, 2].

In Nigeria, malaria is the leading cause of under-five mortality contributing 33% of childhood deaths and 25% infant mortality. As a child will typically be sick of malaria between 3-4 times in one year, the disease is a major cause of absenteeism in school aged children, thus impeding their educational and social development [3].

Several global and regional attempts have been made at controlling the disease in the past with little success as a result of ineffective strategies used and insufficient resources. However, the most recent launching of Roll Back Malaria initiative has generated a lot of resources for the control of the disease with simple and cost effective interventions, with special focus on the most at risk. At the malaria summit hosted by Nigeria in 2000, African Heads of States made a declaration to halve the burden of malaria by the year 2010. One of the targets set for the first five years was to ensure that 60% of the vulnerable groups, children under five years of age and pregnant women, have access to and sleep under insecticide treated nets (ITNs) [3, 4] and to have 80% of this group covered by ITNs by 2010 [5].

Insecticide treated nets reduce human contact with mosquitoes and are effective malaria prevention intervention. ITNs have been shown to reduce severe disease due to malaria in endemic regions and reduce all-cause mortality by approximately 20%. Studies of ITN effectiveness suggest a reduction in malaria episodes by 45 to 50% [6-10].

Despite the knowledge that ITNs are effective in the prevention of malaria, ITN coverage and utilisation still

remain low in many African countries [11]. Fewer than 10% of children and pregnant women regularly sleep under ITNs in most malaria endemic regions [12, 13]. In Uganda Demographic and Health Survey (UDHS), it was estimated that only 13% of households in Uganda owned a mosquito net and 8% of under-fives usually used them [14].

The 2003 National Demographic Health Survey in Nigeria reported a 12% household ownership of any net and 2% of ITN; under-five children's utilisation of ITN was 1.2% while 5.9% of them used any net. Netmark [15], a United States Agency for International Development (USAID) funded project, reported overall household ownership of any net of 12% in 2000 and 27% in 2004 while ITN ownership increased from 0 to 9%. Similar finding was also reported by Oresanya et al [3] with overall ownership of any net of 23.9% and 10.1% ownership of ITN.

Few studies have documented household net coverage and utilisation in Nigeria. Most of the published studies available were conducted in other malaria endemic countries in Sub-Saharan Africa and the few published studies in Nigeria were from the urban centres of other states. This study therefore aimed at assessing ownership and utilisation of ITN among under-5 caregivers in a rural community in Southwest Nigeria.

## Methods

The study was conducted at Igbo-Ora, a rural community and headquarters of Ibarapa Central Local Government Area of Oyo State, Southwest Nigeria. It has a population of about 60,000 and it is located about 80 Km west of Ibadan, approximately 20km east of Eruwa, 32 Km from Abeokuta and 128km from Lagos. Igbo-Ora is divided into six census areas with each census area subdivided into enumeration areas (a total of 62), each with an average population of 600 people. Individual enumeration area is further divided into compounds; each compound has about 100 women in the reproductive age group.

The study population comprised of female caregivers of under-five children and pregnant women in their reproductive age (15-49 years), who have been resident in the community for a minimum of one year.

A descriptive community based cross-sectional survey was conducted using multistage cluster sampling technique was used to select participants. A minimum sample size of 126 was estimated using Leslie and Kish formula for estimating sample size for cross sectional study at 10.1% prevalence for ITN ownership [3], 95% confidence interval, 90% power, 5% precision and 10% non-response rate; this was adjusted by a factor of two for clustering effect. Three enumeration areas were selected by balloting from each of the six census areas. Two compounds were then selected from each of these enumeration areas by balloting. All the eligible and consenting caregivers of under-five children and pregnant women in the households within the selected compounds were subsequently interviewed.

A semi-structured interviewer-administered questionnaire consisting of five sections was used to obtain information on socio-demographic characteristics and ownership and utilisation of ITN. The questionnaire was translated to Yoruba, the predominant local language in the community, in order to enable proper understanding by respondents and back-translated to English to ensure that the original meaning was retained. This questionnaire was pre-tested among caregivers of under-five children and pregnant women in Idere, the second town in Ibarapa Central LGA. The questionnaires were administered by four trained research assistants.

Data obtained was entered, cleaned and analyzed using the Statistical Package for Social Sciences (SPSS version 16). Frequency tables were generated. Mean and standard deviation were computed. Univariate analysis between dependent variables and independent variables was also explored. Associations between variables were tested with Chi-square and Fischer's Exact test for qualitative variables. Level of statistical significance of 5% was used. Multivariate logistic regression analysis was done to identify factors predicting adequate use of ITN in malaria prevention in the study population.

Ethical clearance and approval was obtained from the Oyo State Ethical Review Committee. Informed verbal consent was also obtained from individual research participant during data collection. The respondents were given the right to refuse to take part in the study as well as to withdraw any time during the interview. Privacy and confidentiality were maintained throughout the study. Participants were made to understand that their participation in the study will contribute towards future policy making and assist in the design of programmes that will help to improve utilisation of ITN in Nigeria.

## Results

A total of 631 respondents were interviewed. Among these, majority, 536 (84.9%) were caregivers of under-five children. The mean age of respondents was  $27.7 \pm 6.3$  years with a little above half, 53.4%, between 20-29 years age. Majority (96.8%) was of Yoruba ethnic group and more than half, 57.6%, were Muslims. Most respondents, 69.7%, were married and living with their spouses. A larger proportion, 71.9%, of those that were married was in a monogamous relationship. Overwhelming majority, 91.1%, have at least primary education while trading 60.2% formed the largest occupation group. The median average income was ₦5,000. Most respondents, 64.7%, earned less than ₦10,000 monthly. Only 8.4% earned ₦30,000 and above (Tab. I).

Tab. II shows respondent ownership of mosquito nets and by type. Most respondents, 71.8%, had mosquito nets and most of them, 75.1%, had only one. Among those that had, 85.4% had window/door net, 25.2% ordinary mosquito net while only 15.5% had ITN.

Overall, 70 (11.1%) of the respondents had ITN among which 55 (78.6%) had ever slept under an ITN. Among those that had ever slept under an ITN, slightly less than

Tab. I. Socio-demographic characteristics of the respondents (N = 631).

Socio-demographic Characteristics	Number (n)	Percentage (%)
<b>Respondent</b>		
Pregnant	65	10.3
Under-five caregiver	536	84.9
Both	30	4.8
<b>Age group</b>		
< 20	36	5.7
20-29	337	53.4
30-39	230	36.5
≥ 40	28	4.4
<b>Religion</b>		
Christianity	268	42.5
Islam	363	57.6
<b>Ethnic group</b>		
Yoruba	611	96.8
Igbo	7	1.1
Hausa	5	0.8
Others	8	1.3
<b>Marital status</b>		
Single	30	4.8
Co-habiting	85	13.5
Married, living together	440	69.7
Married, living alone	67	10.6
Separated	8	1.3
Divorced	1	0.2
<b>Family type</b>		
Monogamous	454	71.9
Polygamous	177	28.1
<b>Level of education</b>		
No formal education	56	8.9
Primary	206	32.6
Secondary	275	43.6
Tertiary	94	14.9
<b>Occupation</b>		
Trading	380	60.2
Civil servant	78	12.4
Farming	15	2.4
<b>Monthly income (₦)*</b>		
< 10000	408	64.7
10000-19999	107	17.0
20000-29999	63	10.0
≥ 30000	53	8.4

\*As at the time of data collection, ₦1= ₦150.

half, 49.1% slept under an ITN the previous night. Also, among the respondents that owned ITN, 92.9% reported that their under-five children had ever slept under an ITN while 43.1% of them stated that their under-five children slept under it the previous night. See Tabs. II and III.

Tab. IV shows respondents' socio-demographic characteristics and utilisation of ITN at least once. Significantly higher proportion, 75%, of respondents with low level of education utilized ITN compared with 35.9% with high level ( $p < 0.05$ ). There was no significant association between utilisation of ITN and age group, marital status, family type, occupation, average income, total number of children as well as under-five children. The knowledge of cause of malaria was statistically significant with utilisation of ITN. Higher proportion, 63% of respondents with good knowledge of cause of malaria

used ITN last night compared with 32.1% with poor knowledge ( $p < 0.05$ ). Higher proportion of those with good knowledge of ITN in malaria prevention also used ITN compared to respondents with poor knowledge but was not statistically significant ( $p > 0.05$ ).

Tab. V shows predictors of utilisation of ITN. The model included age, educational level and knowledge of cause of malaria. Only the level of education was found to be a significant predictor of ITN utilisation. Respondents with low educational status were significantly more likely (OR = 5.00; 95% CI = 1.24-21.28;  $P = 0.02$ ) to use ITN. Respondents < 30 years of age were more likely (OR = 3.13; 95% CI = 0.92-10.87;  $P = 0.07$ ) to use ITN compared to those of ≥ 30 years, but the association was not statistically significant.

Tab. II. Respondents' ownership of mosquito nets by type.

Variable	Number (n)	Percentage (%)
<b>Owned any mosquito net (N = 631)</b>		
Yes	453	71.8
No	178	28.2
<b>Number of mosquito nets owned (N = 453)</b>		
1	340	75.1
2	105	23.2
3	8	1.8
<b>Types owned* (N = 453)</b>		
Window/door net(s)	387	85.4
Ordinary mosquito net(s) (Untreated)	114	25.2
ITN(s)	70	15.5

\*Multiple response

Tab. III. Ownership, source and utilisation of ITN.

Variable	Number (n)	Percentage (%)
<b>Owned ITN (N = 631)</b>		
Yes	70	11.1
No	561	88.9
<b>Number of ITN owned (N = 70)</b>		
1	63	90.0
2	6	8.6
3	1	1.4
<b>Source of ITN (N = 70)</b>		
Bought	22	31.4
Given free	47	67.2
Both	1	1.4
<b>Ever slept under ITN (N = 70)</b>		
Yes	55	78.6
No	15	21.4
<b>Slept under ITN last night (N = 55)</b>		
Yes	26	49.1
No	29	50.9
<b>Reasons for non-use last night (N = 29)</b>		
Discomfort	5	17.2
Difficult to hang	7	24.2
Waiting for delivery	5	17.2
No reason	12	41.4
<b>If no, last time slept under ITN (N = 29)</b>		
≤ 7 days	5	17.2
8 – 29 days	4	13.8
≥ 30 days	20	69.0
<b>Under-five children ever slept under ITN (N = 70)</b>		
Yes	65	92.9
No	5	7.1
<b>Under-five children slept under ITN last night (N = 65)</b>		
Yes	28	43.1
No	37	56.9

## Discussion

This study evaluated the ownership and utilisation of ITN among caregivers of under-five children and pregnant women in Ibarapa Central Local Government Area (LGA) of Oyo State.

Over three quarters of the respondents in the study were

of the opinion that ITN was useful in malaria prevention and majority thought ITN was useful in preventing mosquito bites and killing mosquitoes. The observed ITN awareness level in the study is similar to that found in other parts of the continent [16, 17]. However, a Ugandan knowledge, attitude and practice survey reported a very low level of awareness [18]. The sources of ITN

Tab. IV. Association between socio-demographic characteristics and utilisation of ITN.

Respondents' socio-demographic characteristics and other factors	Utilisation of ITN		X <sup>2</sup>	p-value
	Yes, n (%)	No, n (%)		
<b>Age group</b>				
< 30 years	15 (60.0)	10 (40.0)	2.98	0.08
≥ 30 years	11 (36.7)	19 (63.3)		
<b>Marital Status</b>			Fischer's Exact test = 1.00	
Never married	2 (50.0)	2 (50.0)		
Ever married	24 (47.1)	27 (52.9)		
<b>Family type</b>			0.30	0.58
Monogamous	18 (45.0)	22 (55.0)		
Polygamous	8 (53.3)	7 (46.7)		
<b>Level of education</b>			6.96	0.01
Below secondary (Low)	12 (75.0)	4 (25.0)		
Secondary (high)	14 (35.9)	25 (64.1)		
<b>Occupation</b>			Fischer's Exact test = 0.09	
Employed	21 (42.9)	28 (57.1)		
Unemployed	5 (83.3)	1 (16.7)		
<b>Average income</b>			3.11	0.21
< 10000	16 (59.3)	11 (40.7)		
10000-19999	4 (33.3)	8 (66.7)		
≥ 20000	6 (37.5)	10 (62.5)		
<b>No. of children</b>			4.49	0.49
< 3	11 (42.3)	15 (57.7)		
≥ 3	15 (51.7)	14 (48.3)		
<b>No. of under-fives</b>			0.78	0.38
< 2	14 (42.4)	19 (57.6)		
≥ 2	12 (54.5)	10 (45.5)		
<b>Knowledge of cause of malaria</b>			5.24	0.02
Poor	9 (32.1)	19 (67.9)		
Good	17 (63.0)	10 (37.0)		
<b>Knowledge of prevention of malaria</b>			0.20	0.66
Poor	15 (50.0)	15 (50.0)		
Good	11 (44.0)	14 (56.0)		
<b>Knowledge of ITN in malaria prevention</b>			Fischer's Exact test = 0.26	
Poor	2 (25.0)	6 (75.0)		
Good	24 (51.1)	23 (48.9)		

information were health education sessions from health workers and radio programs similar results were obtained in Ethiopia [19]. Another study carried out in the central part of Nigeria by Blackburn et al. [20] identified traditional birth attendants as the major source of information about ITN. This may be because level of education in this part of the country is lower than that in the southern part of the country where our study was carried out.

Despite the high level of awareness documented in this study, ownership of ITN was extremely low. Among the few that possess ITNs, less than half of the mothers and children slept under the ITN the previous night. Reasons given for non-use include discomfort due to heat, difficulty in hanging up the nets and among the pregnant respondents some said they were waiting to deliver before they started using the nets as they felt it will be more beneficial to the newborn. Similar results were documented by Baume et al. [21] for Nigeria in his study of the use of bed nets in various parts of Africa and Oresanya et al. [3] in his study on utilisation of ITNs by under-five children in Nigeria.

This study reported that those with low education are significantly more likely to use ITN, suggesting that ed-

ucation does not necessarily translate to utilisation. This may be because of the perceived vulnerability which is higher among the poor or those with little or no education. Such may be compelled to use ITN because of the limited options left to them when the child gets sick. So it is likely that community with low income and education as documented in this study will sleep under an ITN once it is available to them. However, this finding did not support an Ethiopian study [22] where higher education was reported to be significantly associated with use of ITN. This may be due to the fact that the Ethiopian study was conducted in an urban area.

Reasons given for the use of ITN in the study include keeping mosquitoes and flies away, malaria prevention, to keep rodents away and for fishing. Other advantages mentioned include protection against other bugs and avoiding roof debris falling on the bed and provision of warmth during the cold season. Similar findings were documented in a study carried out in Ghana [17]. In the study, majority of the respondents said they would like to sleep under the ITN and that it was comfortable and there were no cultural limitations to its use. Respondents' perceived disadvantages of bed nets include dis-

**Tab. V.** Adjusted Odds Ratio of predictors of ITN utilization.

Variables	Odds	95% CI	p-value
<b>Age</b> < 30 ≥ 30	3.13	0.92-10.87	0.07
<b>Level of education</b> Below secondary Secondary and above	5.00	1.24-21.28	0.02
<b>Knowledge of cause of malaria</b> Poor Good	0.35	0.10-1.17	0.09

comfort due to heat, chemical smell, and the need to mount the nets daily. Similar results were obtained by Blackburn [20] in a study carried out in the central part of Nigeria.

Less than a third of the respondents felt that ITNs were available. This may grossly affects utilisation of ITN. In a study conducted in selected malaria prone area in Ethiopia, utilisation of ITN was high because of free distribution of ITNs by the Ministry of Health to community members. The resultant mean utilisation rate of ITNs based on the history of sleeping under nets in the previous night was 81.6% [23].

Among respondents who had ITN, more than half were given free of charge at ANC and infant welfare clinics. This is higher than what was reported by Yared et al [22] who stated that only 3.8% of the respondents obtained their ITN free of charge in a study done in Western Ethiopia. Several other studies focusing on who uses the household net were intervention studies where nets were given free and it was documented that adults were slightly more likely than young children to use an ITN. Similarly, Baume et al, in a multi-country study, identified the health facility as the major source from where ITNs were obtained [21].

## Conclusions

This study has generated information on ownership and utilisation of ITN in a rural community in Southwest Nigeria where ownership and utilisation were found to be very low among the respondents. There is need to improve on the knowledge of community members with regards to the importance of ITN in malaria prevention and enhance ownership and utilisation. This could be done through free ITN distribution to community members in order to achieve the MDG goals relating to malaria control especially among the vulnerable groups.

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