

Insecticide Treated Net Usage and Its Predictors among HIV Patients Attending an Antiretroviral Therapy Clinic in Ebonyi State, Nigeria.

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Abstract

Background: Malaria prevention is important among HIV patients to mitigate its associated complications. This study explored the predictors of insecticide-treated net (ITN) usage among HIV patients attending an antiretroviral therapy (ART) clinic in Ebonyi state, Nigeria.

Methodology: It was a cross-sectional study that involved 297 patients who attended an ART clinic in Ebonyi State. An interviewer-administered questionnaire was used to collect relevant data which included perception of malaria prevention, ownership of ITN, condition of ITN, duration of use and ITN usage. The relationship between ITN usage and other variables was assessed using bivariate analysis and the predictors were determined using multivariate logistic regression.

Results: There were 64 (21.5%) males and 233(78.5%) females. Knowledge of the use of ITN (mean= 4.24 ±0.93) was rated better than knowledge of the use of mosquito repellent (mean = 3.79 ± 1.21) and knowledge of the use of protective clothes (mean= 3.86 ±1.26). 246 (83%) of the study population owned ITN. Only 48% (118) of those who had ITNs reported having optimal nets (nets without holes). 135 (45.5%) of the participants reported sleeping under the net every day in the past week. There was a significant relationship between ITN usage and knowledge of the use of ITN, ownership of ITN, duration of use and condition of nets. Predictors of usage of ITN were duration of use (AOR=0.386, 95% C.I for AOR=0.224-0.665) and condition of the nets (AOR=0.399, 95% C.I for AOR=0.226-0.706).

Conclusion: Perception of malaria prevention was high among the study group. Ownership of ITN was high although many of the ITNs were not in good condition. Usage of ITN was largely determined by duration of use and good condition of nets. Yearly assessment of the condition of ITNs and replacement exercise of ITNs (2-3 years) at ART clinics to replace old and worn-out nets among HIV patients are recommended.

Keywords - Insecticide Treated Nets, Ownership, Usage, HIV Patients, Nigeria

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Quick Response Code:



Introduction

Malaria and HIV are diseases of public health concern in sub-Saharan Africa (SSA). Malaria cases continued to rise in 2021 with a global tally of 247 million cases and 619,000 deaths with the majority of the deaths occurring in SSA.¹ SSA also has a huge burden of global HIV infection (approximately 70%).² The distribution of Malaria and HIV greatly overlaps in SSA hence malaria and HIV co-infection (MHC) is common in the region.

Because of the impact of the co-endemicity of malaria and HIV in SSA, much interest has been shown in the study of both diseases.³ There is significant evidence to prove that co-infection of Malaria and HIV results in remarkable adverse effects and negative impact on prognosis.⁴ Patients with HIV/AIDS have an increased risk of developing severe malaria with complications.⁵ A retrospective study conducted in Senegal revealed that malaria-related mortality was higher in HIV-infected patients than HIV-uninfected patients (58% vs 19%).⁶

Nigeria is situated between 4° and 13° Northern latitude hence it has a suitable climate for malaria transmission throughout the country.⁷ Protection against malaria is crucial, especially in endemic areas like Nigeria. Various measures are available in the country for malaria prevention. Commonly used means of malaria prevention include the use of insecticide-treated nets (ITNs), mosquito coils and insecticide sprays.

An ITN is a treated, safe net, effective in reducing human contact with mosquitoes. It is one of the most effective forms of vector control.⁸ Vector control encompasses the measures that are directed against a vector of disease, intended to limit its ability to transmit the disease by protecting areas that are known to be receptive to transmission.⁹ When properly used, ITNs can reduce malaria transmission by at least 60%.¹⁰⁻¹²

This study explored the perception of malaria prevention, ownership of ITN and predictors of the usage of ITN among HIV patients attending an antiretroviral clinic (ART) in Ebonyi state, Nigeria.

Materials and Methods

The study population included HIV-positive patients aged 16 years and above receiving antiretroviral therapy at an ART clinic. The patients routinely visited the ART clinic to collect their antiretroviral therapy free of charge. The study was carried out over 2 months and all consenting positive patients who visited the clinic during the study period were recruited for the study. Those who were severely ill and those who did not give consent were excluded from the study.

It was a cross-sectional study. It involved the use of an interviewer-administered questionnaire to assess the socio-demographic characteristics of the patients, their knowledge of malaria prevention, ownership of ITNs, methods of net acquisition, condition of nets and adherence to the use of ITNs.

Answers to questions on knowledge of malaria prevention were scored using the Likert scale¹³. Knowledge items were scored on a five-point Likert scale as follows: 5—extremely relevant, 4—very relevant, 3—relevant, 2—irrelevant, 1—very irrelevant. Operationally, the average score of 3 points and above in the domains evaluated was considered satisfactory while scores less than 3 points were dissatisfactory.

The condition of ITNs was assessed by the presence of holes in the ITNs; an optimal net was described as a net without holes. Duration of use was assessed in years. Duration of use of 2 years and below was

described as short duration while the duration of use more than 2 years was described as long duration. Usage of ITN was assessed by the number of days participants slept under the net in the previous week. Ethical clearance was obtained from the Ebonyi State University (EBSU) Research and Ethics Committee and informed consent was obtained from the participants after a detailed explanation of the study objectives and significance, the study procedure and the voluntary nature of the study.

Quantitative and qualitative data obtained were analysed using the Statistical Package and Service Solution {SPSS Inc, Chicago, IL) version 25 statistical software. Numerical variables were analysed with the test and categorical variables with chi-square. The relationship between ITN usage and other variables was assessed using bivariate analysis and the predictors were determined using multivariate logistic regression. A p-value of less than 0.05 was taken as statistically significant.

Results

A total of 297 HIV-positive patients participated in the study. They were all Nigerians.

Table 1: Demographic Characteristics of HIV Patients Attending ART Clinic, Mater Hospital, Afikpo.

Demographic characteristics	No of respondents (Percentage) N=297
Age of Respondent	
<20	24(8.1%)
21-25	35 (11.8%)
26-30	51 (17.2%)
31-35	45(15.1%)
36-40	47 (15.8%)
41-45	33 (11.1%)
46-50	40 (13.5%)
>50	22(7.4%)
Gender	
Male	64 (21.5%)
Female	233 (78.5%)
Marital status	
Married	168 (56.6%)
Single	88(29.6%)
Separated/Divorced	7 (2.4%)
Widower	34 (11.4%)
Highest Educational Level	
No formal education	19 (6.4%)
Primary level	80 (26.9%)
Secondary level	111 (37.4%)
Tertiary level	87(29.3%)
Occupation	
Business	135 (45.4%)
Civil servant	57 (19.2%)
Unemployed	43 (14.5%)
Student	62 (20.9%)

There were 233 females and 64 males who participated in the study. The majority of the study population (92.6%) were below 50 years. The socio-demographic characteristics of participants are presented in (Table 1).

Table 2:
Perception of Malaria Preventive Measures among HIV Patients Attending ART Clinic of Mater Hospital Afikpo

Parameter	Mean Score N=297
Perception of malaria prevention measures	
Knowledge of Malaria prevention	4.11±1.03
Importance of malaria prevention in PLWHA	4.53±0.79
Knowledge of the use of ITN	4.24±0.93
Knowledge of the use of mosquito repellents	3.79±1.21
Knowledge of the use of protective cloth	3.83±1.26
Mean Perception of Malaria Prevention Measures	4.13±0.65

Likert scale- minimum score=1, maximum score =5

The knowledge of malaria prevention was high among the study population (HIV patients) (mean=4.11±1.03) and they believed malaria prevention was important in people living with HIV (mean 4.53±0.79). The study population rated their knowledge of use of ITN (mean 4.24±0.93) higher than knowledge of use of mosquito repellent (mean = 3.79±1.21) and use of protective clothes was 3.83±1.26.(233 females and 64 males) participated in the study Mean score of perception of malaria preventive measures was 4.01 ± 0.69 (Table 2).

Ownership of ITN among HIV Patients

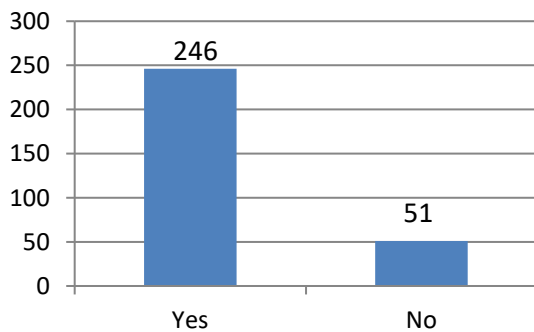


Figure 1: Ownership of ITN

246 (82.8%) of the HIV patients owned ITN while 51 (17.2%) of the study population did not own ITN (Figure 1).

Method of Acquisition of ITN among HIV Patients

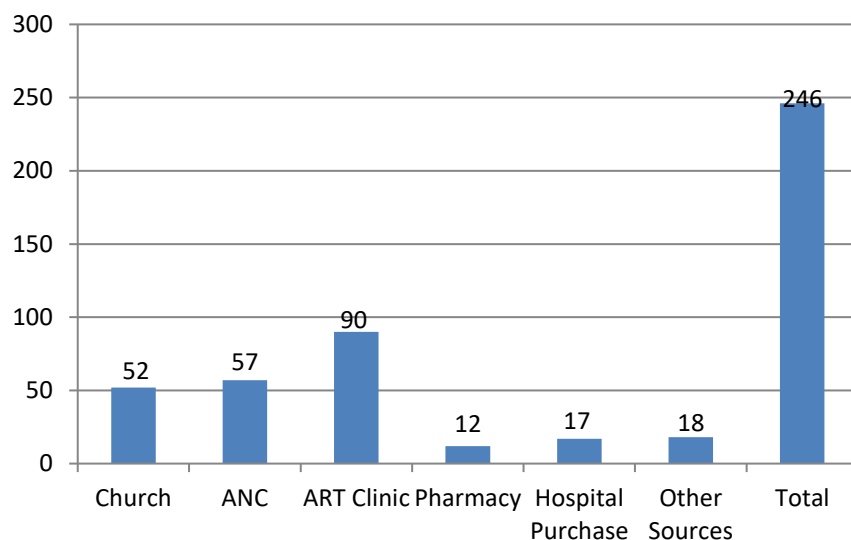


Figure 2: Method of Acquisition of ITN

The majority of those that owned ITN (199 out of 246 patients i.e. 80.9%) got the ITNs from free distributions – 52 (21.1%) from church, 90 (36.6%) from ART clinic and 57 (23.3%) from ANC. A small population purchased their ITNs from pharmacies and hospitals (Figure 2).

Table 3: Condition of ITNs among HIV Patients Attending ART Clinic, Mater Hospital, Afikpo

	N=Patients that owned ITN	Per cent
Duration of Use of ITNS (years)		
<1year	59	24.0
1-2	75	30.5
3-4	58	23.6
5-6	19	7.7
>6 years	35	14.2
Total	246	100.0%
Number of holes		
None	118	48.0
1-2	36	14.6
3-4	36	14.6
5-6	15	6.1
>6	41	16.1

Total	246	100.0
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The duration of ITN usage and the number of holes in the ITNs are presented in Table 3. These parameters were assessed in those that owned ITNs i.e. 246 patients. A total of 134 patients had used their nets for a short duration (≤ 2 years) while 112 patients had a long duration of use (more than 2 years). Only 118 (48%) of those who owned ITNs had optimal nets i.e. nets without holes.

Table 4: Usage of ITN in the Previous Week among HIV patients

Usage of ITN	Frequency	Per cent
Never	81	27.2
Rarely (1-2 days in a week)	15	5.1
Sometimes (3-4 days)	32	10.8
Most Times (5-6 days)	34	11.4
Always (Everyday)	135	45.5
Total	297	100.0

The frequency of ITN usage is presented in Table 4. A total of 135(45.5%) patients reported sleeping under the net every day in the previous week while 81(27.2%) never used ITN in the previous week. A total of 201 patients reported using ITN on 3 or more days in the previous week.

Table 5: Relationship between demographic variables and usage of ITN (bivariate analysis)

Demographic	Usage of ITN		χ^2	P-value
	No (n=96)	Yes (n=201)		
Age (years)				
≤ 40	63(31.2%)	139(68.8%)	0.372	0.542
>40	33(34.7%)	62 (65.3%)		
Gender				
Male	22(34.4%)	42 (65.6%)	0.145	0.692
Female	74(31.8%)	159(68.2%)		
Owned an ITN				
Yes	45(18.3%)	201(81.7%)	128.919	<0.001
No	51(100%)	0 (0.0%)		
Level of education				
Below secondary	32(32.3%)	67 (67.7%)	0.000	1.000
Secondary & Above	64(32.3%)	134(67.7%)		
Duration status				
Short /new (≤ 2 years)	26(19.4%)	108(80.6%)	18.632	<0.001
Long/old (>2 years)	70(42.9%)	93 (57.1%)		
Holes status				
Absent	22(18.6%)	96 (81.4%)	16.748	<0.001
Present	74(41.3%)	105(58.7%)		
Knowledge of ITN usage				
Good	47(19.1%)	199 (80.9%)	21.231	<0.001
Poor	49(96.1%)	2(9.4%)		

Relationship between demographic variables and usage of ITN

There is a significant relationship between the usage of ITN and some demographic variables of the respondents ($P < 0.05$) using bivariate analysis. The significant demographic variables included ownership of ITN, duration of use, holes status of ITN and knowledge of use of ITN. This implies that 81.7% of the respondents who had ITN and 80.9% of those who had good knowledge of ITN usage were using it. Also, 80.6% of the new users of the ITN were using it, while only 57.1% of the old users of ITN were using it. Furthermore, 81.4% of the respondents without holes in their ITN were using it, while only 58.7% of the respondents with holes in their ITN were using it (Table 5).

Table 6: Predictors of ITN usage (multivariate logistic regression)

Demographic	B	P-value	AOR	95% C.I for AOR
Duration status				
New (<i>ref.</i>)			1	
Old	-0.953	0.001	0.386	0.224-0.665
Holes status				
Absent (<i>ref.</i>)			1	
Present	-0.918	0.002	0.399	0.226-0.706

Predictors of ITN usage

Using multivariate logistic regression, both duration of use and hole status were the predictors of ITN usage in the study ($P < 0.05$). This implies that the old users of ITN were 2.6 times less likely to use ITN than new users (AOR=0.386, 95% C.I for AOR=0.224-0.665). Also, those who had holes present in their ITN were 2.5 times less likely to use ITN than those who had holes absent in their ITN (AOR=0.399, 95% C.I for AOR=0.226-0.706)(Table 6).

Discussion

The findings from this study showed that most of the participants had good knowledge about malaria prevention and the use of bed nets. This is in keeping with other studies in other parts of Nigeria¹⁴ and other malaria-endemic countries¹⁵⁻¹⁸. In a study done in Kano, Northern Nigeria, 90.6% of the respondents had adequate knowledge of malaria prevention¹⁴. However, a study among pregnant women in Abuja showed that only 56% had adequate knowledge¹⁹. Exposure to public health information may account for differences in the level of knowledge of malaria prevention in different study groups. A good perception of malaria preventive measures has the potential to improve their willingness to engage in preventive practices.

Perception of the use of ITN for malaria prevention was higher than perception of the use of mosquito repellents and wearing protective clothes. This also agrees with other findings from studies in Nigeria¹⁴. There is a need for education on these complementary measures for malaria prevention.

Ownership of ITN was high (82%) in this study. Most nets were gotten through free distribution. This is similar to findings in previous studies²⁰. The effort to roll back the malaria program in Nigeria is highly commendable in this regard. Impressive benefits in awareness, ownership and utilization of ITNs were also demonstrated in Ghana, Senegal, Uganda and Zambia due to free distribution or reduction in prices¹⁸. In Nigeria, the free distribution of ITNs has bridged the inequality gap in net distribution and ownership across socioeconomic groups²⁰.

Free distribution at antenatal clinics and churches was a common means of acquiring ITNs among the HIV patients in this study. Only a third of the patients got their nets from ART clinics. There has been a

large-scale distribution of ITNs through antenatal clinics, immunization clinics and community venues to increase net coverage in Nigeria. This effort is highly commendable; however, persons infected with HIV should be adequately targeted for ITN distribution at ART clinics in malaria preventive efforts. In Malawi, a pilot project demonstrated the feasibility of integrating ITN provision/ distribution to patients attending ART clinics²¹.

There was a large gap between ownership and utilization of ITN in this study. Ownership ITN may not translate into usage. Previous studies in Nigeria reported reduced utilization despite ownership of ITNs.²² Another study in western Kenya showed that despite high mosquito net ownership, actual usage is still remarkably low, with different seasons showing remarkable variations.²³ This study reported usage in the past week rather than the previous night only¹⁸; hence the usage rate was observed to be lower as only 53% used their nets every day in the past one week.

There was a relationship between the usage of ITN and ITN ownership in this study. A similar study carried out among pregnant women in Ghana revealed that the determinants of ITN use included ownership, good maternal knowledge of the risk of malaria in pregnancy and more antenatal care (ANC) contacts.¹⁸

This study showed a relationship between the usage of ITN and good knowledge of the use of ITN. Previous studies also demonstrated a positive relationship between the usage of ITN and good knowledge of the use of ITN.^{24,25} There was no relationship between the usage of ITN and the socio-demographic characteristics. Some previous studies found no relationship between ITN usage and educational status.^{26,27} There was no relationship between marital status and usage of ITN in this study however marital status was found to contribute significantly to the usage of ITN by some previous authors showing the importance of marital support.^{12, 18, 26}

About 58% of the patients reported the presence of holes in the nets (only 42% had optimal nets). Although these proportions of patients had nets, the poor condition of the nets cannot proffer adequate protection against mosquito bites¹⁴. In this study, the condition of nets was a predictor of the usage of ITNs. In a study among HIV patients in Kenya, 34.5% owned an optimal net and consistent use of a net was high among those who owned optimal nets²⁸. The poor condition of nets negatively influenced the use among this vulnerable group. It is crucial to educate the patients on how to care for the nets and mend them to ensure effectiveness and maximum benefit in malaria prevention.

The long duration of use (more than 2 years) of ITN was reported by most participants in this study. In this study, duration of use was one of the predictors of usage of ITNs. Participants that reported long duration of use were likely to own old and worn-out nets which discouraged them from using the nets.

Conclusions and Recommendations

Knowledge of malaria prevention was high among the study group. Although ownership of ITN was high, many of the nets were not optimal. There was a significant gap between ownership of nets and their usage. Usage of ITN was largely determined by the duration of use and the condition of the nets. Provision of ITNs to HIV patients, education of HIV patients on how to care for the nets, assessment of the condition of ITNs through mini-surveys, and replacement of old and worn-out nets should be done at ART clinics.

Conflicts of Interest

The authors declare no conflicts of interest regarding this study.

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