www.ijarp.com ISSN 2456-9992 Page: 01-15

International Journal Advanced Research Publications

Research Article

Volume: 02
Issue: 08

UTILIZATION OF INSECTICIDE TREATED NETS IN BOWEN UNIVERSITY, IWO, OSUN STATE NIGERIA

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Article Received: 01 July 2026, Article Revised: 21 July 2026, Published on: 08 August 2026

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Doi: https://doi-doi.org/101555/ijarp.6006

ABSTRACT

This study examined the level of utilization of insecticide-treated nets (ITNs) among students and staff of Bowen University, Iwo, Osun State, Nigeria. A descriptive cross-sectional research design was adopted for the study. The study population comprised 250 students and staff of Bowen University. Data were collected using a 20-item structured questionnaire, while a stratified random sampling technique was employed to select respondents. Data were analyzed using descriptive statistics and logistic regression to identify factors influencing the utilization of insecticide-treated nets. The findings revealed that although a high proportion of respondents had heard about insecticide-treated nets and believed in their effectiveness, the overall utilization rate was only 35.6%. This level of utilization falls below the 60% coverage target recommended by the Roll Back Malaria Programme. Furthermore, lack of belief in the effectiveness of ITNs was found to be a significant predictor of non-utilization (β = −2.857, p *= 0.004, OR = 0.057, 95% CI = 0.008–0.391), indicating that respondents who did not believe in the effectiveness of ITNs were significantly less likely to use them than those who did.The study concludes that despite high awareness of insecticide-treated nets, their utilization remains inadequate among members of the Bowen University community. It concludes by recommending the use of insecticide-treated nets as a key strategy for malaria prevention because they have been shown to significantly reduce malaria-related morbidity and mortality, particularly among vulnerable populations.*

KEYWORDS: Malaria, Insecticide-Treated Nets (ITNs), ITN utilization, Malaria prevention, Bowen University, Malaria control, Nigeria, Public health, Vector control, Roll Back Malaria Programme.

1. INTRODUCTION

Malaria remains one of the most significant public health challenges worldwide, particularly in sub-Saharan Africa, where it accounts for substantial morbidity, mortality, and socioeconomic losses. Insecticide-treated nets (ITNs) have been recognized as one of the most effective malaria prevention interventions because they provide both physical and chemical protection against mosquito vectors. ITNs are bed nets treated with insecticides, primarily pyrethroids, which prevent mosquito bites and reduce malaria transmission. The World Health Organization (WHO) recommends the widespread use of ITNs as a key malaria control strategy, particularly among vulnerable populations such as pregnant women and children under five years of age (World Health Organization, 2019). Over the years, extensive evidence has demonstrated that increased ITN ownership and utilization contribute significantly to reductions in malaria incidence, malaria-related mortality, and overall disease burden.

Several studies have established the effectiveness of ITNs in reducing malaria transmission and improving health outcomes. A Cochrane systematic review by Lengeler (2004) reported that the consistent use of ITNs reduced the incidence of clinical malaria by approximately 50% and decreased all-cause child mortality by about 20%. ITNs provide dual protection by acting as a physical barrier that prevents mosquitoes from biting individuals during sleep while simultaneously killing or repelling mosquitoes through the insecticide coating. Furthermore, Noor et al. (2009) demonstrated that increased ITN coverage across Africa resulted in substantial reductions in malaria burden, emphasizing the importance of expanding access to these preventive tools. Similarly, Bhatt *et al.* (2015) showed that malaria control interventions, particularly ITNs, were responsible for a significant decline in *Plasmodium falciparum* malaria prevalence across Africa between 2000 and 2015. These findings underscore the critical role of ITNs in malaria prevention and support continued investments in improving their coverage and utilization.

Beyond their health benefits, ITNs possess substantial economic importance. Malaria imposes considerable direct and indirect costs through healthcare expenditures, hospitalization, reduced labour productivity, school absenteeism, and slower economic growth. By preventing malaria infections, ITNs reduce the demand for healthcare services

and minimize treatment costs while improving productivity and educational outcomes. Gallup and Sachs (2001) estimated that malaria reduces economic growth in sub-Saharan Africa by approximately 1.3% annually, highlighting the broader developmental consequences of the disease. Similarly, Yukich *et al*. (2008) demonstrated that ITN distribution programmes are highly cost-effective, with an estimated cost of only $16.27 per disability-adjusted life-year (DALY) averted. Consequently, investments in ITN distribution not only improve health outcomes but also contribute to poverty reduction, workforce productivity, and sustainable economic development.

Although substantial progress has been made in increasing ITN ownership, utilization remains inconsistent in many settings. Ownership alone does not guarantee regular use, and several factors continue to limit effective utilization. Limited knowledge regarding the proper use and maintenance of ITNs, misconceptions about their effectiveness, socioeconomic constraints, cultural beliefs, household sleeping arrangements, and individual preferences all influence utilization patterns. Furthermore, individuals who lack confidence in the effectiveness of ITNs or perceive them as uncomfortable are less likely to use them consistently. These challenges reduce the overall impact of ITN distribution programmes and hinder progress toward malaria elimination goals.

Understanding the factors influencing ITN utilization is therefore essential for designing effective interventions that promote consistent use. Research investigating the barriers and facilitators of ITN utilization provides valuable evidence for policymakers and public health practitioners to develop targeted strategies that improve uptake and sustained utilization. Such studies also enhance understanding of how contextual factors, including socioeconomic characteristics, behavioural practices, and cultural beliefs, influence malaria prevention behaviours within specific populations. Furthermore, evaluating ITN utilization helps assess the effectiveness of existing malaria control interventions and informs future policies regarding ITN distribution, health education, behavioural change communication, and programme implementation.

Despite numerous studies conducted in community and household settings, evidence on ITN utilization within university communities remains limited. University environments comprise diverse populations with varying socioeconomic backgrounds, educational levels, and behavioural practices that may influence ITN ownership and utilization differently from the general population. Bowen University, Iwo, provides an important setting for examining these factors among both students and staff. Understanding the level of ITN utilization and the determinants influencing its use within this academic community will contribute valuable

evidence for designing context-specific malaria prevention interventions and strengthening institutional health promotion programmes.

Therefore, the aim of this study is to identify the barriers and challenges affecting the utilization of insecticide-treated nets among members of Bowen University, Iwo. Specifically, the study seeks to assess the level of ITN utilization; identify barriers to ITN utilization; examine factors that facilitate ITN use; explore the socioeconomic and demographic determinants of ITN utilization; assess the impact of ITN utilization on malaria outcomes; and identify strategies for improving the utilization of insecticide-treated nets within the study population.

2. METHODOLOGY

Research Design

The study is a cross sectional descriptive survey to determine the utilization of insecticide treated bed nets as a preventive tool in malaria prevention.

Population of the study

The study population comprises of 250 individuals within Bowen University. The individuals are made up of both student and staff of the university.

Sample and sampling techniques

The study setting is Bowen University, Iwo. The institution operates a Modified Collegiate System with Seven (7) fully operational colleges viz College of Postgraduate Studies, College of Computing and Communication Studies, College of Health Sciences, College of Liberal Studies, College of Law, College of Agriculture, Engineering and Sciences and College of Social and Management Sciences. The University has a staff strength of Eight Hundred and Twenty-Six (826) and student population of Four Thousand, Seven Hundred and Fifty-One (4,751) as of April 2023. Her products spreads across all regions of the world doing excellently well in their chosen areas of calling. Stratified random sampling was the procedure used to divide the population of individuals termed respondents. Students and staffs were the primary individuals that the questionnaires were distributed to.

Stratified random sampling is a sampling technique that involves dividing the population into distinct subgroups or strata based on specific characteristics and then randomly selecting samples from each stratum. This method ensures that each subgroup is adequately represented in the sample, allowing for more precise analysis within each stratum.

Data Collection

Structured questionnaire was used for data collection. This comprises of 20 items or questions divided into two sections. Section A had questions on socio demographic variables and Section B had questions on the usage, level of awareness and ownership of ITNs.

Data Analysis Procedure

Questionnaires were administered to the respondents and data generated. Data were further subjected to analysis using the Statistics package for social sciences (SPSS).

3. RESULTS AND DATA

Table 1: **Socio-demographics of the Respondents.**

Demographic variables	No. of Respondents	Percentage (%)
Sex		
Male	142	56.8
Female	108	43.2
Total	250	100.0
Age (Months)		
0-5	10	4.0
11-15	9	3.6
16-25	140	56.0
26-30	27	10.8
Greater than 30	64	25.6
Total	250	100.0
Occupation		
Students	159	63.6
Civil servants	65	26.0
Self employed	15	6.0
Trading	11	4.4
Total	250	100.0

Source, Field Survey, 2026

Table 1 presents the socio-demographics of the respondents. Result indicates that 56.8% of the respondents were male and 43.2% were female meaning that the majority of the respondents were male (56.8%). The distribution of their ages reveals that 4% were between 0-5 months, 3.6% between 11-15 years, 56.0% were between 16-25 years while 10.8% and 25.6% of the respondents were between 26-30 years and greater than 30 years respectively. In terms of their occupation, the majority of the respondents were students (63.6%).

Table 2: Malaria outcome among the respondents.

Variables	No. of Respondents	Percentage (%)
When last do you have malaria		
1-2 months	80	32.0
3-6 months	73	29.2
7-12 months	97	38.8
Total	250	100.0
How frequent do you have malaria		
Once a month	54	21.6
Once in 3 months	52	20.8
Once in 6 months	81	32.4
Once a year	63	25.2
Total	250	100.0
Test for malaria when malaria is suspected before taken antimalaria		
Yes	136	54.4
No	114	45.6
Total	250	100.0
Have you taken antimalarial before		
Yes	236	94.4
No	14	5.6
Total	250	100.0

Result in Table 2 reveals that 32.0% of the respondents had malaria 1-2 months ago, 29.2% had malaria 3-6 months ago while 38.8% of the respondents reported that they had malaria 7-12 months ago. This result implies that most of the respondents had malaria 7-12 months ago (38.8%). Results also shows that in terms of frequency of malaria, most of them had malaria once in 6 months (32.4%) while less than half of the respondents do undergo test before taken antimalarial (45.6%). Two hundred and thirty-six respondents (236) representing 94.4% of the respondents have taken antimalarial before (Table 2). The distribution of the types of antimalarial taken is shown in Figure 1. Figure 1 shows that antimalarial taken by the majority of the respondent was ACTs (36.0%) closely followed by Artesunate (30.0%) while Amiodaquine (0.4%) and SP (0.4%) were taken by only very few of the respondents.

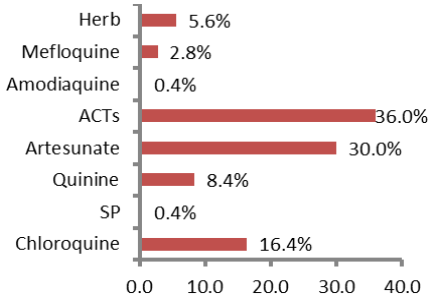

Figure 1: Types of antimalaria used by the respondents.

Utilization of Insecticide Treated Net

Table 3: Utilization of Insecticide Treated Net.

Variables	No. of Respondents	Percentage (%)
Do you believe in ITNs effectiveness		
Yes	198	79.2
No	52	20.8
Total	250	100.0
Have you had about insecticides treated bed net before		
Yes	237	94.8
No	13	5.2
Total	250	100.0
Do you sleep under insecticides treated bed nets		
Yes	89	35.6
No	161	64.4
Total	250	100.0

Source, Field Survey, 2026

Result of the utilization of ITN is presented in Table 3. Result reveals that 79.2% of the respondent believes in ITN effectiveness while only 20.8% do not believe in ITN. Result also shows that more than half of the respondents have heard about ITN (94.8%) with only 35.6% of the respondents have been able to utilize it. Result indicates that only 35.6% have utilized ITN while more than half of the respondents have not utilized it (64.4%) (Figure 2).

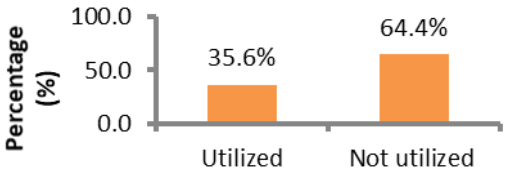

Figure 2: Level of utilisation of the Insecticide Treated Net (ITN).

Table 4: Summary of multiple logistic regression showing factors that hinders or promotes the use of ITN (Odd ratios and 95% confidence interval).

Variables	B	Odd ratios	95% Confidence interval	P-value
Believe in ITN effectiveness				
No	-2.857	.057	.008- .391	.004**
Yes	1.00			
Heard about ITN				
Yes	-1.654	.191	.021-1.761	.191

No	-	1.00 (Reference)		
Mosquito net treated with insecticides				
Yes	2.431	11.369	4.028-32.085	0.000**
No	1.00			
Was your ITN free or sold				
Free				
Sold	- 1.136	.321	.083-1.238	.099
Number of ITN				.000**
One	.430	1.537	.160- 14.768	.710
Two	2.743	15.528	3.897-61.875	0.000**
More than two	1.00	1.00 (Reference)	-	-
Number of people that sleep under ITN				0.000**
One	6.387	593.888	46.734- 7547.110	.000**
Two	2.919	18.526	2.190- 156.723	.007**
Three	2.662	14.332	2.286-89.847	.004**
More than three		1.00 (Reference)	1.00 (Reference)	-
Do you have complain about sleeping under ITN				
Yes	.078	1.081	0.423- 2.765	.871
No	1.00	1.00 (Reference)	-	

**Significant at 1%(p<.01), *Significant at 5%(p<.05).

Table 4 presents summary of multiple logistic regression for factors that hinder or promote the use of ITN among the respondents. Result shows that lack of believe in the effectiveness of the ITB (β = -2.857, p = 0.004, p<.05, OR = 0.057, C.I = 008- .391) with a significant reduced odds of utilization among those that do not believe in its effectiveness than those that believe in its effectiveness. Result also shows that there is a significant increase odd of ITN utilization among those whose ITN were treated with insecticides compared those whose mosquito nets were not treated (β = 2.431, p = 0.000, p<.05, OR = 11.369, C.I = 4.028-32.085). The likelihood of its utilization was more than 11 times higher among those using ITN treated with insecticides than those using whose mosquito net were not treated. The number of people sleeping under the ITN and the number of ITN (p <.05) were found to have a significant influence on their utilization. In the case, utilization was higher among those with two ITN compared with those that have one while utilization was also significantly

higher for among those with one person sleeping under the ITN compared with those that have more than three persons (Table 4).

Socio-economic and demographic determinants of the use of ITN

Table 4 presents socio-economic and demographic determinants of the use of ITN and the result shows that gender (p = 0.011, p<0.05), age (p =0.000, p<.05) and occupation (p = 0.000, p<.05) were significant determinant of the ITN utilization. The utilization of ITN were higher among female than male (44.4% versus 28.9%), among age 0-5 (100%) and civil servants (53.8%).

Amongst the reasons advanced by the participants for not using their ITNs, 'Allergic to ITNs, feel heat in' and no mosquitoes were the most frequent reasons. This finding is consistent with previous reports when the reason for non utilization of ITNs were analyzed. (

Table 5: Socio-economic and demographic determinants of the use of ITN.

Factors	Utilized (n =89)	Not utilized	Total	Chi-Square statistic	p-value
Gender					
Male	41 (28.9%)	101(71.1%)	101	6.488	0.011*
Female	48(44.4%)	60(55.6%)	108		
Age					
0-5	10(100.0%)	0(0.0%)	10	29.429	0.000**
11-15	0(0.0%)	9(100.0%)	9		
16-25	43(30.7%)	97(69.3%)	140		
26-30	15(55.6%)	12(44.4%)	27		
Greater than 30	21(32.8%)	43(67.2%)	64		
Occupation					
Students	53(33.3%)	106(66.7%)	159	21.353	0.000**
Civil servants	35(53.8%)	30(46.2%)	65		
Self employed	1(6.7%)	14(93.3%)	15		
Trading	0(0.0%)	11(100.0%)	11		

**Significant at 1%(p<.01), *Significant at 5%(p<.05).

Table 5 presents the impact of ITN utilization on malaria outcome. Result reveals that the utilization of ITN was significantly associated with the last time the respondents had malaria (p =0.000, p<.05) as well as the frequency of malaria (p =0.001, p<.05).

Table 6: **Impact of ITN utilization on malaria outcome.**

Malaria outcomes	Utilized (n =89)	Not utilized	Total	Chi-Square statistic	p-value
Last time have malaria					
1-2 months ago	43(53.8%)	37(46.2%)	80	35.281	0.000**

3-6 months ago	33(45.2%)	40(54.8%)	73		
7-12 months ago	13(13.4%)	84(86.6%)	97		
How frequent you have malaria					
Once a month	18(33.3%)	36(66.7%)	54	15.453	0.001**
Once in 3 months	28(53.8%)	24(46.2%)	52		
Once in 6 months	31(38.3%)	50(61.7%)	81		
Once a year	12(19.0%)	51(81.0%)	63		

**Significant at 1%(p<.01), *Significant at 5%(p<.05).

DISCUSSION OF FINDINGS

This study examined the utilization of insecticide-treated nets (ITNs) and the factors associated with their use among residents of Bowen University, Iwo, Osun State, Nigeria. The findings revealed that awareness of ITNs was very high, with 94.8% of respondents reporting that they had heard about ITNs, while 79.2% believed that ITNs are effective in preventing malaria. Despite this high level of awareness and positive perception, only 35.6% of respondents reported using ITNs, indicating a substantial gap between knowledge and actual utilization. This utilization rate is considerably below the national and Roll Back Malaria Programme target for ITN coverage. The study identified belief in the effectiveness of ITNs as a significant predictor of utilization. Respondents who did not believe in the effectiveness of ITNs were significantly less likely to use them ($\beta = -2.857$, $p = 0.004$; OR = 0.057; 95% CI = 0.008–0.391). In contrast, respondents whose mosquito nets were treated with insecticides were over eleven times more likely to use them than those using untreated nets ($\beta = 2.431$, $p < 0.001$; OR = 11.369; 95% CI = 4.028–32.085). In addition, ownership of more than one ITN and fewer persons sharing a net significantly increased the likelihood of utilization.

Socio-demographic characteristics also influenced ITN utilization. Female respondents demonstrated higher utilization than males (44.4% versus 28.9%), while occupation was significantly associated with use, with civil servants recording the highest utilization. These findings are consistent with previous studies that reported significant associations between ITN utilization and demographic factors such as gender, age, and educational status (Njumkeng et al., 2019).

Furthermore, ITN utilization was significantly associated with malaria outcomes. Respondents who consistently used ITNs reported a longer interval since their last malaria episode and experienced malaria less frequently, supporting evidence that regular ITN use is an effective malaria prevention strategy.

CONCLUSION

This study assessed the level of utilization of insecticide-treated nets (ITNs) among students and staff of Bowen University, Iwo, Osun State, Nigeria. The findings revealed that although awareness of ITNs and knowledge of their effectiveness were generally high among respondents, the overall utilization rate was only 35.6%, which is considerably below the 60% coverage target recommended by the Roll Back Malaria Programme. This suggests that awareness alone does not necessarily translate into consistent utilization. The study further established that belief in the effectiveness of insecticide-treated nets was a significant determinant of utilization. Respondents who did not believe that ITNs were effective in preventing malaria were significantly less likely to use them. This indicates that behavioral and attitudinal factors play an important role in influencing the adoption of malaria preventive measures.

The low utilization of ITNs among members of the Bowen University community remains a public health concern, as inadequate use of this proven malaria prevention strategy may contribute to continued malaria transmission and associated health and economic burdens. Therefore, increasing ITN utilization through sustained health education, behavioral change communication, and improved access is essential for achieving national malaria control objectives and supporting the World Health Organization's goal of malaria elimination.

Recommendations

Based on the findings of this study, the following recommendations are made:

1. Strengthen health education programmes: Bowen University management, healthcare providers, and public health agencies should intensify health education campaigns to improve knowledge of the benefits and proper use of insecticide-treated nets, while addressing misconceptions about their effectiveness.
2. Promote behavioural change interventions: Regular awareness programmes, seminars, and community outreach activities should be organized to encourage positive attitudes toward the consistent use of ITNs among students and staff.
3. Improve access to insecticide-treated nets: University authorities, in collaboration with government and non-governmental organizations, should ensure that insecticide-treated nets are readily available and affordable, or preferably distributed free of charge to students and staff.

4. Integrate malaria prevention into campus health services: The university health centre should routinely educate patients on malaria prevention, demonstrate the correct use and maintenance of ITNs, and encourage their regular utilization.

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