Perceived Effectiveness of Insecticide-Treated Nets Use in the Prevention of Malaria among Students of a Tertiary Institution in Oyo State, Nigeria

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ABSTRACT

Introduction: Malaria fever has been found to be one of the major cause of morbidity and mortality especially in sub-Saharan African. However, malaria attacks can be prevented through consistent use of ITNs, but study had shown that its utilisation had been very low.

Objective: This study aim to examine the perceived effectiveness of the insecticide-treated nets in the prevention of malaria among students at the Oyo State College of Nursing Sciences, Eleyele, Ibadan, Nigeria.

Methods: The study utilised a descriptive cross-sectional design. The population size was 270 of the 200 and 300 levels of OYCNSE. Taro Yamane's formula was used to determine 177 sample size. Participants were selected using a random sampling (balloting) technique. A self-constructed questionnaire with Cronbach's Alpha Reliability Coefficient of 0.774 was used to collect data.

Results: The response rate was 100%, but 175 out of 177 questionnaires were analysed. Descriptive statistics was used to analyze the data using SPSS Version 26, and the results were presented with tables, frequencies, and simple percentages. The findings show that 169(96.6%) have heard about Insecticide treated nets before, and 139(79.4%) knew the primary purpose of ITNs use. 130(74.3%) owns ITNs, 106(81.5%) of those that owns ITNs use it, while only 75(42.9%) of them always sleep under ITNs. Most militating factors against ITNs use in the prevention of malaria are excessive heat production 147(84%), air flow reduction 134(76.6%), and chemical irritation and allergies 133(76%). However, 130 (74.3%) had a poor perception of the effectiveness of ITNs in preventing malaria. The Pearson chi-square test showed that no difference exist between level of education and utilisation of ITN ($X^2(2) = 0.581$, P=.748).

Conclusion/Recommendation: The findings highlight a clear gap between knowledge and practice, emphasizing the need for nursing education and public health interventions to move beyond awareness creation to practical, behaviour-centered approaches. Therefore, Nursing students in Oyo State College of Nursing Sciences, Eleyele must be equipped with skills to demonstrate correct ITN use, address misconceptions, and act as role models and advocates in malaria prevention.

Keywords: Awareness, Insecticide-treated Nets, Malaria, Perceived effectiveness, Utilisation,

INTRODUCTION

Malaria is a disease caused by the bites of Plasmodium Species, including P. vivax, P. falciparum, P. malariae, and P. ovale. Malaria if not properly treated, usually results in life-threatening complications. The spread

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occurs when an infected female anopheles mosquito bites an uninfected individual and releases sporozoites into the circulatory system (Musa et al, 2023). According to the WHO (2019), there were 229 million malaria cases and an estimated 409, 000 deaths worldwide in 2019. In 2020, the number increased to 241 million cases worldwide, which caused an estimated 627, 000 deaths, in which approximately 95% of cases and deaths occurred in sub-Saharan Africa. (WHO, 2021). Nigeria had the highest percentage (27%) of malaria cases and the highest number (23%) of deaths worldwide in the year 2019 (World Malaria Report, 2019). Also, the highest number of malaria are recorded annually, as 76% of its population lives in high-transmission areas (USAID, 2021). This calls for drastic measures to prevent the spread of the disease. One of the preventive means is the consistent use of Insecticide-Treated Nets (ITNs).

ITNs are a form of personal protection and mosquito control that reduces malaria illness, severe disease, and death due to malaria in endemic regions. The use of insecticide-treated nets (ITNs) is one of the preventive measures adopted by the World Health Organization. It serves as a protective barrier around people sleeping under them (Centre for Disease Prevention and Control, 2024). The insecticides used for treating bed nets kill and repel mosquitoes, reducing the number that enter the house and attempt to feed on people inside. ITNs have proven to be an effective, efficacious, and cost-effective means of controlling malaria fever if properly used. It has reduced malaria morbidity by 50-60% and mortality by 17%. It reduced the death of children under 5 years from all causes by about 20%. Also, a 50% reduction in new cases of uncomplicated malaria was recorded compared to settings that do not use ITNs, especially in high-endemic regions. (CDC, 2024). Free ITNs were distributed by the Nigerian government but there were reports of low utilisation. Ajegena & Oti, (2020), reported a relatively low use rate of 55% which did not meet the WHO target and recommendation.

Malaria fever is a predominant disease among the student nurses of the Oyo State College of Nursing Sciences, Eleyele, Ibadan, despite the fact that they own ITNs. Low utilization of Insecticide-treated nets may have been a contributory factor to the high prevalence of malaria among these students. Hence, there is a need to examine the perceived effectiveness of the insecticide-treated nets in the prevention of malaria at the Oyo State College of Nursing Sciences, Eleyele, Ibadan, Nigeria.

Aim of the Study

This study aim to examine the perceived effectiveness of the insecticide-treated nets in the prevention of malaria among students at the Oyo State College of Nursing Sciences, Eleyele, Ibadan, Nigeria.

H_O1: There is no significant difference between level of education and utilisation of ITN among the students at the Oyo State College of Nursing Sciences, Eleyele, Ibadan, Nigeria

Significance of the Study

The study aims to determine the perceived effectiveness of the insecticide-treated nets in the prevention of malaria among students at the Oyo State College of Nursing Sciences, Eleyele, Ibadan, Nigeria. Malaria is a prevalent disease that often affects students. Therefore, the findings would reduce the prevalence of malaria attacks among the students, thereby preventing unnecessary spending on malaria treatment. Absence from school will also be reduced to the barest minimum, thus enhancing the students' academic performances. Also, the findings of this study would assist the management of the institution to know the actual cause of malaria prevalence among the students so that lasting solutions can be proffered. The findings may also serve as a baseline for future researchers who might be interested in conducting a relevant study.

Literature/theoretical underpinning

Malaria is a protozoan disease that is caused by genus plasmodium parasites and transmitted to human through female anopheles mosquitoes' bites which usually result into various complications that can be life threatening if prompt medical attention is not given (Park, 2015; WHO, 2022) . It is an endemic disease that affect almost all countries of the world and the major causes of death especially in sub-Saharan Africa. This can be

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attributed to a very strong mosquito known as Anopheles gambiae complex that is rampant in the region, predominance of plasmodium falciparum that likely causes severe malaria attack and death, and the climate that favour transmission of the disease throughout the year (Muanya, 2022).

Malaria mostly affects poor, marginalized people living in secluded rural zones who lack good malaria control measures and health care facilities. It was reported that malaria prevalence is vast in ethnic and tribal groups living in remote areas, the nomadic and travelers (Park, 2015; Eimieho, 2022). In Nigeria, the highest number of malaria cases are being recorded annually in which 76% of the population lived in high transmission areas (USAID, 2024). The world malaria report for 2020 showed that Nigeria had the highest percentage of malaria cases (27%) and highest number of deaths (23%) worldwide in the year 2019 (WHO, 2019; World Malaria Report, 2019), accounting for a third of global malaria deaths which increased by 4.7%, from 0.92% to 0.97% per 1000 of population at risk (World Malaria Report, 2022). In 2021, Nigeria accounted for 31.9% of global malaria mortality; this is approximately, 200,000 deaths. (Muanya, 2022).

Oyo state is located in the south-west geo-political zone of Nigeria. The malaria transmission is perennial and highest between April and September. The most common reason why people visits hospitals is malaria, its attacks cut across all age groups with the population having more than one episode per year, about 90% of the local governments of the state are predominantly affected. Though, there was dearth of recent study on malaria fever in the state, but a study conducted by Olugbade, et al., (2014), revealed that 372,010 suspected cases of malaria visit public health facilities among which 45% (166,650) fall within under 5, 55% (205,360) are above 5 years, in which 30% of under 5 and 49% of those above 5 years were later confirmed to be having uncomplicated malaria while 2% of under 5 and over 5 have severe malaria and malaria in pregnancy accounts for 6%. Furthermore, an appraise of vital malaria indicator between January and December, 2021 showed that 439, 637 individuals had fever, 296,825 were tested of positive of malaria parasite while 3088 were diagnosed of severe malaria, (Oguntola, 2022). There are series of malaria intervention programs embarked on by the state government such as distribution of ITNs, partnering with local and foreign Non-Governmental Organization (NGO) to ensure control and eradication of malaria parasites in the state.

In Oyo State College of Nursing Sciences, a substantial number of students often develop malaria attacks, which makes some seek medical care from the sick bay, and some are being referred to the government hospitals for medical care. 200(32.3%) out of 619 students had malaria in 2024, while in 2025, 400(43.6%) out of 918 students, which is 100% increase from the previous year.

Malaria, if not properly treated, can negatively impact the affected ones, leaving them with a series of complications such as cerebral malaria, haemolytic anaemia, may cause an inevitable abortion in pregnant women, and lastly, it can result in untimely death. Also, on the part of the students, malaria attacks can affect academic pursuits due to frequent absenteeism, which can also result into production of incompetent nurses, which can invariably affect the quality of care rendered to patients. Furthermore, malaria imposed substantial costs to both individuals and the Governments. An individual's cost ranges from treatment costs, absenteeism from work, irregular school attendance, and expenses on preventive measures, which can negatively impact the socio-economic status, quality of life, and life expectancy of the affected individual. On the Government side, costs include maintenance, fund and recruitment of health facilities; procurement of medications and materials; public health interventions against malaria, such as insecticide spraying or distribution of insecticide-treated bed nets; lost days of work with resulting loss of income; and lost chances for joint commercial projects and touristy (Center for Disease Control and Prevention, CDC, 2021). Direct costs such as illness, treatment, and premature death have been estimated to be at least US $12 billion annually, while the cost in economic growth is unquantifiable (CDC, 2022). This implies that malaria outbreaks need a drastic approach to avert these problems.

Prevention is not only cheaper but safer than a cure. Vector control is key to the prevention of malaria, this include consistent use of ITNs, which has been recognized globally as one of the most effective and efficient malaria control measures (WHO, 2022; Lindsay et al., 2021). It is a means of personal protection against mosquitoes' bite, thus preventing malaria attack, and has been shown to decrease the malaria-related morbidity and mortality rate from malaria, especially in highly transmission's areas. ITNs are fortified with insecticides

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such as pyrroles and pyrethroids that kill and repel mosquitoes but are harmless to human beings. Hence, its use as a protective measure is germane in reducing malaria diseases (CDC, 2019). Also, studies have shown that ITNs reduce the incidence of uncomplicated episodes of Plasmodium falciparum by almost a half and possibly reduce P. vivax. The prevalence of P. falciparum malaria was reduced by 17% compared to those groups with no net use, and severe malaria episodes were reduced in ITN users. Likewise, ITN has been shown to save 95% of every 1000 children. Between 2000 and 2015, an estimated 69% of 663 million malaria cases were averted by ITNs, severe malaria was reduced by 45%, and malaria-related death in children under 5 was reduced by 55% (Scott et al, 2021).

Despite the effectiveness of ITNs in malaria prevention its use has been reported to be low. A study conducted by Ajegena and Oti, (2020) in Kenya revealed a relatively low use rate of 55%, which did not meet the WHO target and recommendation. Moreover, Aung et al., (2022) reported in their findings that although people possessed ITNs, but there was poor utilization, as only about 1 in 5 (18.4%) slept under ITNs. Several factors had been identified to be the cause of poor utilization including hot weather, absence of visible mosquitoes, cost, inadequate number of rooms, unaffordability, insufficient knowledge of the causes of malaria, and a poor attitude towards use, discomfort, lack of experience in hanging nets, ineffective educational campaigns, and a scarcity of ITNs (Konlan et al., 2022; Teym et al., 2025). Therefore, there is an urgent need to find out the perceived effectiveness of ITNs in malaria prevention.

THEORETICAL FRAMEWORK

Health Belief Model

Perceived Susceptibility: Perceived susceptibility refers to subjective assessment of risk of developing a health problem. When the student nurses perceived the tendency to develop recurrent malaria by not sleeping under ITNs. They will engage in the preventive behaviour by using ITNs consistently. Those that have poor perception of the effectiveness of ITNs in preventing malaria attack may not use it while those with strong perception will adhere to its usage. Thus, higher perceived threat leads to a higher likelihood of consistent ITNs use.

Perceived Severity: Perceived severity refers to the subjective assessment of the severity of a health problem and its potential consequences. When the student reflect on the likelihood of developing severe malaria attack often when they don't sleep under ITNs and the resultant effects, including absenteeism from class, poor quality of life, poor socio-economic status and mortality. This will make them engage in the behaviour i.e. consistent ITNs use which will prevent malaria attacks and its consequences.

Perceived Benefits: Perceived benefits refer to an individual's assessment of the value or efficacy of engaging in a health-promoting behavior to decrease risk of disease. When the student nurses perceived that sleeping under ITNs consistently will prevent malaria attack, there is tendency to consistently use it irrespective of colleagues view and opinion about ITNs.

Perceived Barriers: Perceived barriers refer to an individual's assessment of the obstacles to behavior change. Barriers may prevent the students from using ITNs even having known that it can prevent Malaria episodes. Therefore, perceived benefit of ITNs use must outweigh the barriers such inaccessibility to ITNs, poor awareness, poor perception on effectiveness of ITNs in preventing malaria, peer pressure.

Cues to Action: A trigger is necessary for prompt engagement in health-promoting behaviours and can be internal or external. Internal include personal experience with frequent malaria attacks and willingness to be healthy while external triggers include, health education on ITNs effectiveness in preventing malaria through social media, hand bill, posters**,** awareness campaigns, and even ITNs distributions.

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Self-Efficacy: Self-efficacy refers to an individual's perception of his or her competence to successfully perform a behaviour. This is the ability of the student nurse to engage in constant use of ITNs to prevent malaria without defaulting.

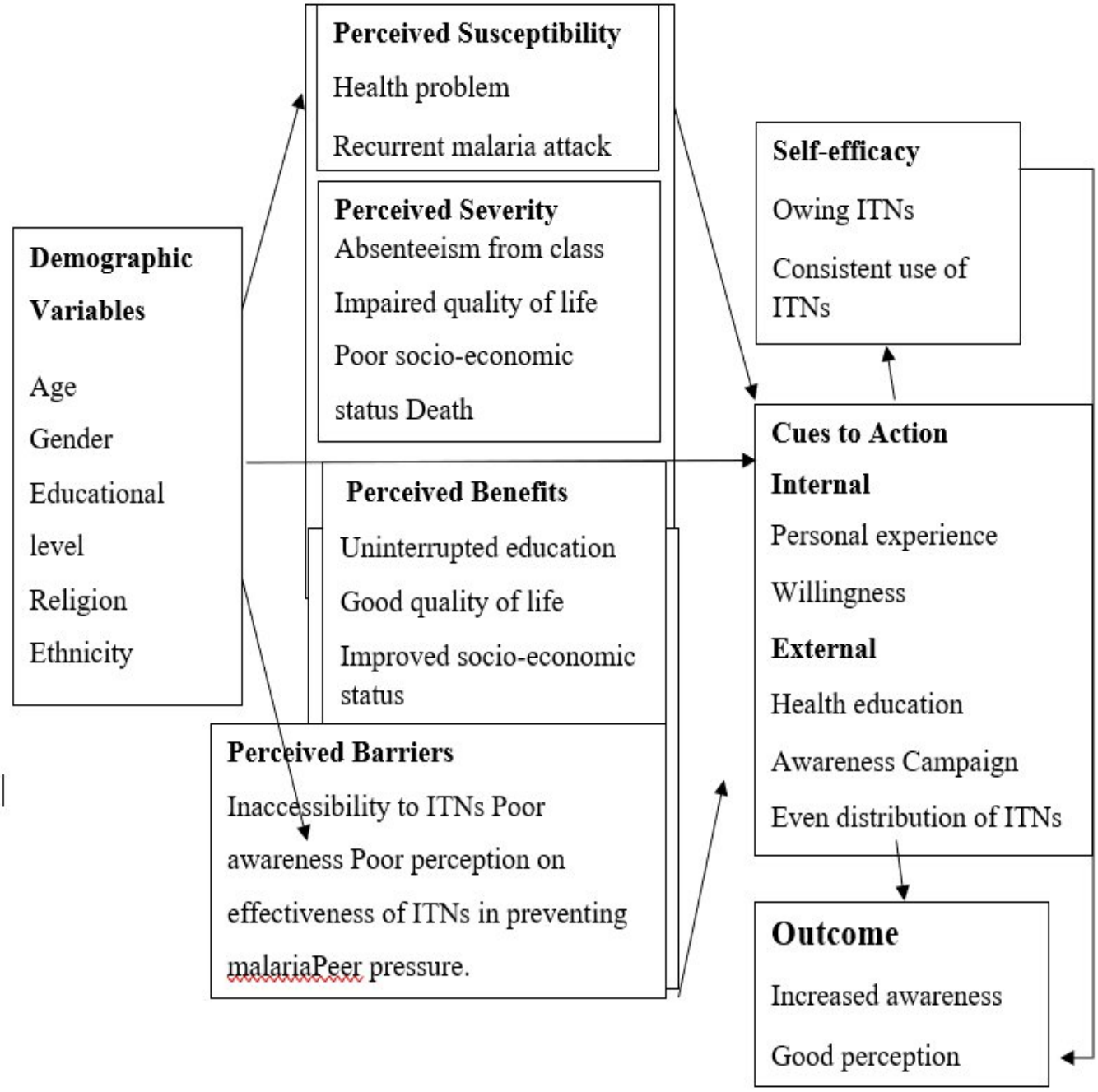

Fig. 1: Conceptual Framework Adapted from Health Belief Model (Rosenstock, et al., 1950

METHODOLOGY

Research Design

The study utilised a descriptive cross-sectional design to determine the perceived effectiveness of the insecticide-treated nets in the prevention of malaria among students of the Oyo State College of Nursing Sciences, Eleyele, Ibadan, Nigeria.

The study setting

The study setting is the Oyo State College of Nursing Sciences, Eleyele, Ibadan, Nigeria.

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Study Population

This comprises all the second and three hundred level students of the college.

Inclusive and exclusive criteria

The participants were all 200 and 300 level students who were available at the time of data collection and gave their consent, while those who were in the 100 level were excluded from the study because they have just resumed in less than 3-months.

Sample size determination

Taro Yamane's formula was used to calculate the sample size since the population size was known (270). The sample size used for the study was 177 participants.

Sample size: 177, 200-level students were 94, and 300 level, 83.

Sampling Procedure: A Simple random sampling technique (balloting) was used to select the participants.

Data collection tools

The instrument for data collection was a self-constructed and validated questionnaire. It was used to collect information on the awareness, utilisation of ITNs, Factors militating against the use of ITNs use, and the perceived effects of ITNs in malaria prevention.

Validity of the Instrument

The questionnaire was reviewed using face and content validity. The instrument was reviewed by an expert in research and research methodology. The instrument was subjected to face validity for clarification and evaluation of the questions, and content validity to ensure appropriateness of the questionnaire.

Reliability of the Instrument

Reliability of the instrument was determined using the internal consistency method with 10% of the sample size (18) of the Community Nursing Students. The alpha coefficient reliability was 0.774

Data Collection Procedure: A self-developed questionnaire was used to elicit information from the participants on the awareness, utilisation of ITNs, Factors militating against ITNs use, and the perceived effects of ITNs in malaria prevention. The collection procedure had five (5) sections (A-E).

Measurements of Variables

Section A: Socio-Demographic data of the respondent.

This section consists of 5 items, which were used to elicit information on demographic data of the respondents, which includes: Gender, Age, Level of Education, Religion, and Tribe.

Section B: Awareness of Insecticide-Treated Nets in Preventing Malaria.

This section obtained information on the awareness of insecticide-treated nets in preventing malaria. It comprises 7 items, which warrant the respondent to answer Yes or No. The correct answer was awarded 1 mark, and the wrong answer was awarded 0. The total score was 7 marks. The maximum obtainable score was 7 marks, and the minimum score was 1 mark. The score was classified into 3 (poor, moderate, and good awareness), in which 1-2 was regarded as poor awareness, 3-4 regarded as moderate awareness, and 5-7 regarded as good awareness.

Section C: Utilisation of ITNs in the Prevention of Malaria

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This section was used to elicit information on the utilisation of ITNs in the prevention of malaria. It contains 7 items which warrant the respondent to answer Yes or No and also to pick correct answer from options provided. Correct answer was awarded 1 mark and the wrong answer was awarded 0. The total score was 7 marks. The maximum obtainable score was 19 marks because some questions has applicable options where respondents picks as it applies to them, and the minimum score was 1 marks. The score was classified into 2 (poor, and good utilisation) in which 1-10 was regarded as poor utilisation, and 11-19 was regarded as good utilisation.

Section D: Factors militating the use of ITNs in Preventing Malaria.

This section obtained information on factors militating the use of ITNs in preventing malaria. It was measured on Likert scale of 4; strongly disagree, disagree, agree, and strongly agree. The items were 15. The score ranged from 0-3 in which strongly disagree was awarded 0, disagree was awarded 1, agree was awarded 2, and strongly agree was awarded 3marks, making the total obtainable score to be 45.

Section E: Perceived effect of ITNs Use in Preventing Malaria Disease.

This section obtained information on the perceived effect of ITNs use in preventing malaria disease. It was measured on Likert scale of 4; strongly disagree, disagree, agree, and strongly agree. The items were 7. The score ranged from 0-3. The total obtainable score was 21 marks. The score of 3-15 (<75%) was considered poor perception, and the score of 16-21 (>75) was considered good perception.

Data Processing and Analysis: The data collected were coded, cleaned and exported into SPSS version 25 for statistical analysis. The descriptive statistics were generated and results were presented in tables and charts. Also, Pearson Chi-square was used to test the hypothesis at 0.05 level of significance.

Ethical Considerations: This study was approved by the ethical review committee of the College of Nursing Sciences, Eleyele, Ibadan, Oyo State, Nigeria. An official letter of permission was provided to the administrative office of the institution. The respondents were informed about the purpose of the study and written informed consent was obtained from each study participants. They were also informed that they are free to withdraw at any stage if they are not comfortable with the questions. Information obtained was kept anonymous.

Results/Findings

Table 1: Socio-Demographic Characteristics of the Respondents (N=175)

Variable	Category	Freq.	Percent	Cumulative Percent
Gender	Male	29	16.6	16.6
	Female	146	83.4	100.0
Age in Years	15-20 Years	111	63.4	63.4
	21-25 Years	56	32.1	95.5
	26-30 Years	6	3.4	98.9
	30 Years and Above	2	1.1	100.0
Level of Education	200 Level	93	53.1	53.1
	300 Level	82	46.9	100.0
Religion	Christianity	124	70.9	70.9
	Islam	50	28.5	99.4
	Traditional	1	.6	100.0
Tribe	Yoruba	163	93.1	93.1
	Igbo	2	1.1	94.3
	Hausa/Fulani	1	.6	94.9
	Others	9	5.1	100.0

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The findings revealed that substantial number 146(83.4%) were female while 29(16.6%) were male. The age range of respondents shows that 111(63.4%) were between 15-20 years, 56(32.1%) were 21-25 years, 6(3.4%) were 26-30 years while only 2 (1.1%) were 30 years and above. The result of level of education shows that 93(53.1%) were at 200 level while 300 level were 82(46.9%). Greater percentage 124 (70.9%) of the respondents were Christian, 50(28.5%) were Muslim while only 1(0.6%) was a traditional worshiper. Majority 163(93.1%) of the respondents were of Yoruba ethnics, 2(1.1%) were Igbo, 1 (0.6%) was of Hausa/Fulani origin, while 9(5.1%) were from other tribes.

Table 2a: Level of Awareness of ITNs Use in prevention of Malaria (N=175)

Question	Response	Freq.	Percent	Cumulative Percent
Awareness of malaria-causative parasite	No	4	2.3	2.3
	Yes	171	97.7	100.0
If yes, Source of information	Lecturer	122	69.7	69.7
	Social Media	14	8.0	77.7
	Friends	4	2.3	80.0
	Parents	33	18.9	98.9
	Other	2	1.1	100.0
Previous awareness of Insecticide-Treated Nets	No	6	3.4	3.4
	Yes	169	96.6	100.0
If yes, Source of information	Lecturer	35	20.0	20.0
	Social Media	32	18.3	38.3
	Friends	3	1.7	40.0
	Parents	103	58.9	98.9
	Other	2	1.1	100.0
The primary purpose of using an ITN	prevent mosquito bites & Malaria	139	79.4	79.4
	(Others)	36	20.6	100.0
Insecticide-Treated Nets has an integral part of everyday use	No	34	19.4	19.4
	Yes	14	80.6	100.0
ITNs prevent malaria episodes	No	18	10.3	10.3
	Yes	157	89.7	100.0
ITNs contain chemicals that kill or inactivate mosquito	No	21	12.0	12.0
	Yes	154	88.0	100.0

The findings shows that almost all 171 (97.7%) have heard about malaria causative parasite, in which majority 122 (69.7%) heard from lecturers, 33(18.9%) heard from their parents, 14(8%) from social media, 4(2.3%) heard from friends while 2(1.1%) heard it from other sources. Substantial number 169(96.6%) have heard about Insecticide treated nets before. Greater percentage 103(58.9%) heard from parents, 35(20%) from lecturer, 32(18.3%) from social media. Majority 139(79.4%) knew that the primary purpose of ITN use is to prevent mosquito bites and malaria. 141(80.6%) knew that ITNs is an integral part of everyday use while 34(19.4%) did not. Also, 157 (89.7%) knew that ITNs use can prevent malaria episode while 18(10.3%) did not Substantial number 154(88%) knew that ITNs contain chemicals that kill or inactivate mosquito, 21(12%) did not.

Table 2b: Level of Awareness of ITNs in the Prevention of Malaria (N=175)

Score	Freq. (n)	Percentage	Grade

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1-6	6	3.4	Poor awareness
7-10	92	52.6	Moderate awareness
11-14	77	44.0	Good awareness
	175	100.0	

The finding shows that a little above half of the respondents (52%) had moderate level of awareness of ITNs in malaria prevention, 44% had good awareness while handful 3.4% had poor awareness.

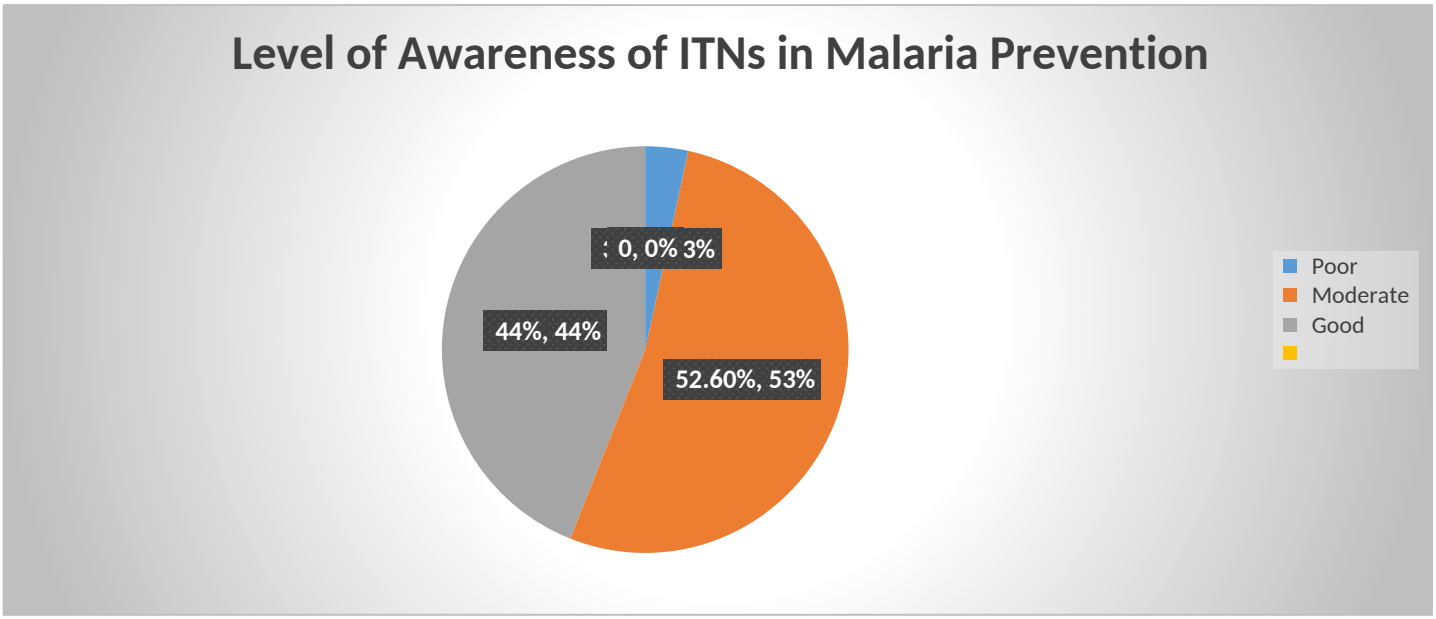

Fig 1: The level of awareness of ITNs in Malaria Prevention

Table 3: Utilisation of ITNs in Malaria Prevention (N=175)

Questions	Response	Freq.	Percent (%)	Cumulative percent
ITNs ownership	No	45	25.7	25.7
	Yes	130	74.3	100.0
Use of ITNs	No	24	18.5	18.5
	Yes	106	81.5	100.0
Frequency of ITNs Use	Always	75	42.9	42.9
	Often	17	9.7	52.6
	Sometimes	42	24.0	76.6
	Never	41	23.4	100.0
Sleep under ITN a night before the Study	No	96	54.9	54.9
	Yes	79	45.1	100.0
Frequency of ITN Use	Throughout the year	44	25.7	25.7
	Only rainy season	45	25.1	50.8
	Once in a while	80	45.8	96.6
	None	6	3.4	100.0
Placement of ITN when sleep under it	Hanging it over the bed	89	50.9	50.9
	Tucked under the mattress	36	20.5	71.4
	Hanging it over windows/doors	7	4.0	75.4
	Others	43	24.6	100.0
Frequency of ITNs washing	Weekly	45	25.7	25.7
	Monthly	63	36.0	61.7
	Rarely	52	29.7	91.4
	Other	15	8.6	100.0

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Table 3 shows that substantial number 130(74.3%) owns ITNs, while few 45(25.7%) did not. Larger percentage 106(81.5%) of those that owns ITNs use it, while 24(18.5%) did not. Majority 75(42.9%) of the respondents always sleep under ITNs, Handful 17(9.7%) often sleep under ITN, 42(24%) sometimes do while 41(23.4%) had never slept under ITN. Less than half 79(45.1%) slept under ITNs a night prior the study while substantial number 96(54.9%) did not. The result also revealed that minority 44(25.1%) uses ITNs throughout the year, 45(25.7%) use it during rainy season, majority 80(45.8%) use it once in a while, and 6(3.4%) do not use it at all. Majority 89(50.9%) of the respondents hang ITNs over the bed 36(20.6%) tucked it under the mattress, 7(4%) hangs it over windows/doors, while 43 (24.6%) do otherwise. Majority 63(36%) washes ITNs monthly, 45(25.7%) does weekly, 52(29.7%) rarely does and 15(8.6%) do not.

Table 3b: Level of utilisation of ITNs among the Respondents

Score	Frequency (n)	Percentage (%)	Grade
1-10	120	68.6	Poor utilisation
11-19	55	31.4	Good utilisation

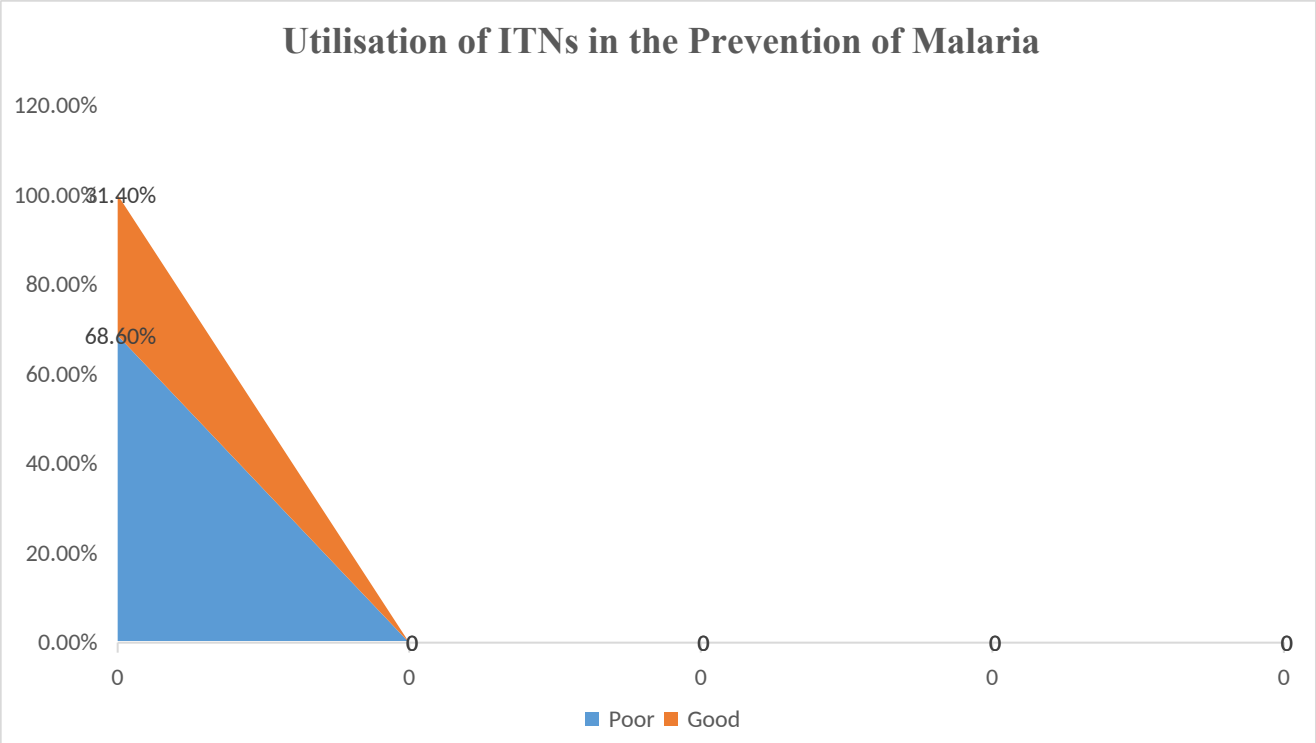

Fig 2: The level of ITNs utilisation among the Respondents

Table 4: Factors Militating ITN Use in Malaria Prevention (N=175)

Items	Disagreed		Agreed	
	Freq.	%	Freq.	%
Insecticide-Treated Nets cannot prevent malaria attacks.	79	45.1	96	54.9
Herbal medicine can prevent malaria attacks than ITN.	70	40	105	60
Wearing long sleeves can prevent malaria fever more than ITN.	64	36.6	111	63.4
ITN produces excessive heat.	28	16	147	84
ITN is not convenient for use.	30	17.1	145	82.9
ITN produces chemical irritation/allergies.	42	24	133	76
ITN restricts my movements in bed.	37	21.2	138	78.8
Lack of accommodation prevents ITN use.	51	29.1	124	70.9
ITN reduces air flow.	41	23.4	134	76.6

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ITN can suffocate.	43	24.6	132	75.4
ITNs cause breathing difficulties.	47	26.8	128	73.2
Overcrowding in the room prevent ITN use.	61	34.9	114	65.1
Lack of facilities (hooks, strings, bed space) to hang the ITN.	58	33.1	117	66.9
ITN usually disturb sleep.	51	29.1	124	70.9
Insecticides are more effective than ITN.	56	32	119	68

The findings shows that the most militating factors against ITN use in the prevention of malaria are excessive heat production 147(84%), followed by air flow reduction 134(76.6%) and chemical irritation and allergies 133(76%). Moreover, most of the respondent had erroneous belief about the use of ITN in preventing malaria as 145(82.9%) claimed ITN is inconvenient, 138(78.8%) said it restrict movements in bed, 132(75.4%) are of the opinion that it can suffocate, 128(73.2%) belief ITN causes breathing difficulties, 124(70.9%) accommodation problem and sleep disturbances. Furthermore, 119(68%) belief that Insecticides are more effective than ITN, 117(66.9%) are of the opinion that lack of facilities such as hooks, strings, bed space etc. 114(65.1%) can prevent ITN use. 111(63.4%) claimed that wearing of long sleeves is more effective than ITN use and 105(60%) belief that herbal medicine can better prevent malaria attacks more than ITN.

Table 5a: Perceived Effectiveness of ITNs in Malaria Prevention (N=175)

Items	**Disagreed**		**Agreed**	
	Freq.	**%**	**Freq.**	**%**
Untreated and treated nets are equally effective in preventing malaria disease.	55	31.4	120	68.6
ITNs are only effective in preventing malaria in non-endemic region.	36	20.6	139	79.4
ITNs alone can prevent malaria disease episode.	34	19.4	141	79.6
The prevalence of Malaria disease is high among the ITNs users.	69	39.2	106	60.8
Malaria disease is not preventable, there is no need of using ITNs.	105	60	70	40
ITN is only effective when combined with prophylactic medications.	50	28.6	125	71.4
ITN chemical usually incapacitate mosquito thereby prevent it from biting.	71	40.6	104	59.4

The findings of the study show that the majority 130(74.3%), had a poor perception of the effectiveness of ITN in the prevention of malaria, while the minority, 45(25.7%), had a good perception. 141(79.6%) of the respondents correctly identified that ITNs' use can prevent malaria disease episodes. 105(60%) knew that malaria is preventable, 104(59.4%) rightfully claimed ITNs chemicals usually incapacitate mosquito thereby prevent it from biting. Meanwhile, the majority 139(79.4%) wrongly claimed that ITNs are only effective in preventing malaria in non-endemic region. 125(71.4%) claimed ITNs is only effective when combined with prophylactic medications. 120(68.6%) claimed Untreated and treated nets are equally effective in preventing malaria disease. 106(60.8%) wrongfully claimed that the prevalence of Malaria disease is high among the ITNs users and minority 70(40%) claimed that Malaria disease is not preventable, there is no need of using ITNs.

Table 5b: Perceived effectiveness of ITNs in the Prevention of Malaria

Score	**Frequency (n)**	**Percentage (%)**	**Grade**
3-15	130	74.3%	Poor Perception
16-21	45	25.7%	Good perception

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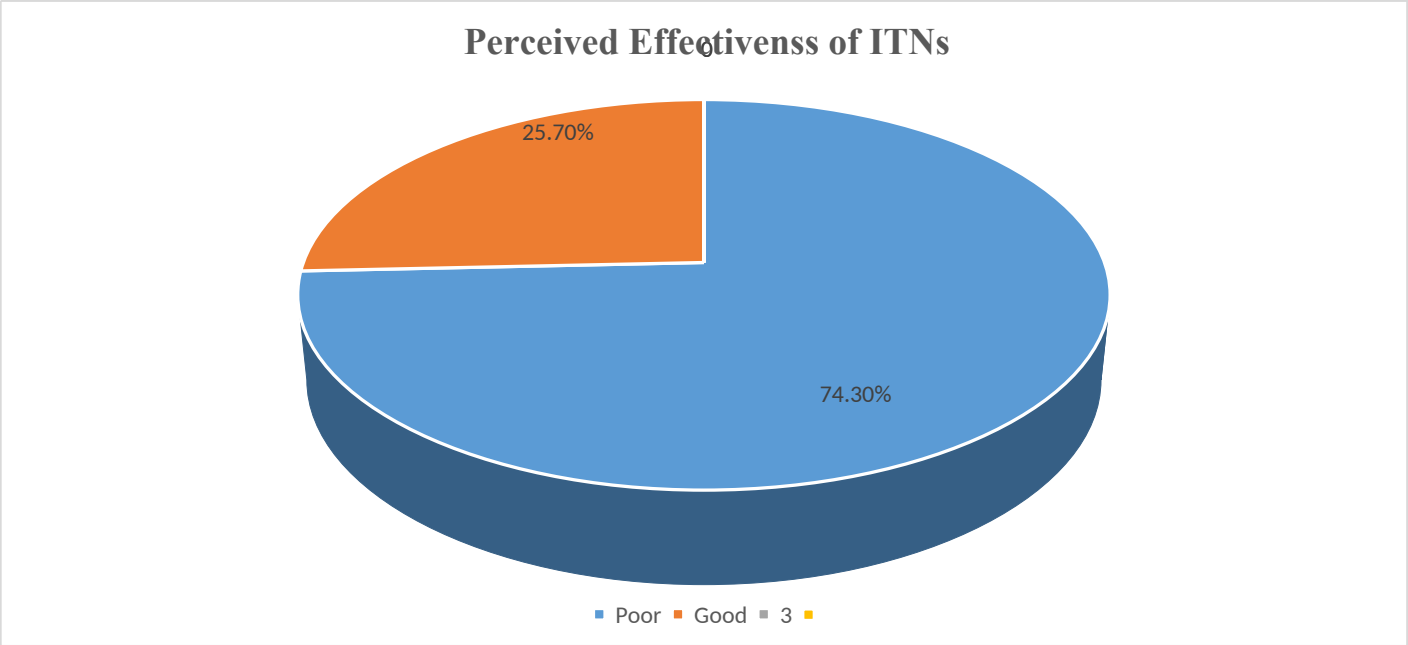

Fig 3: The Perceived Effectiveness of ITNs among the Respondents.

Hypothesis: There is no significant difference between level of education and utilisation of ITN among the students at the Oyo State College of Nursing Sciences, Eleyele, Ibadan, Nigeria.

		utilisation measured on a 19-point reference scale					
		.00	1.00	2.00	3.00	4.00	5.00
Level of Education	200 LEVEL	3	12	5	1	2	1
	300 LEVEL	0	7	6	0	0	1
Total		3	19	11	1	2	2

Level of Education * utilisation measured on a 19-point reference scale Crosstabulation							
Count							
		utilisation measured on a 19-point reference scale					
		6.00	7.00	8.00	9.00	10.00	11.00
Level of Education	200 LEVEL	3	6	5	11	18	17
	300 LEVEL	0	5	4	8	22	20
Total		3	11	9	19	40	37

Level of Education * utilisation measured on a 19-point reference scale Crosstabulation				
Count				
		utilisation measured on a 19-point reference scale		
		12.00	13.00	
Level of Education	200 LEVEL	6	3	93
	300 LEVEL	7	2	82
Total		13	5	175

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	11.356[a]	13	.581
Likelihood Ratio	14.808	13	.320
Linear-by-Linear Association	3.128	1	.077
N of Valid Cases	175		

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a. 14 cells (50.0%) have expected count less than

5. The minimum expected count is .47.

The hypothesis results shows that the p- value of 0.581 is greater than 0.05 ($X^2(2) = 0.581$, P=.748). Therefore, the null hypothesis which states that there is no significant difference between level of education and utilisation of ITN in the prevention of malaria among 200 level and 300 level of the Oyo State College of Nursing Sciences is accepted.

DISCUSSION

Socio-demographic Characteristics of the Respondents

The study comprised 177 respondents with 100% response rate, but 2 of the questionnaire were eliminated due to inappropriate fillings. Therefore, 175 of the questionnaires were analysed. The mean (± SD) age of respondents was 1.83. The majority of the participants 146 (83.4%) were female, this may be attributed to the proliferation of females in nursing profession. Majority 111(63.4%) were between age range of 15-20 years, this shows that most of them are teenagers who gained admission shortly after school certificate completion. This is consistent with Musa et al., (2023), where high number 343 (76.1%) of the respondent were aged 16–25 years. Also, substantial number 124(70.9) practiced Christianity and 163(93.1%) were Yoruba ethnic.

Awareness of ITNs use in Malaria Prevention

A Substantial number 169(96.6%) have heard about Insecticide-treated nets before. This is consistent with Eleazar et al., (2022) findings, where most (96.6 %) of respondents were aware of ITNs. Large proportion 139(79.4%), knew that the primary purpose of ITN use is to prevent mosquito bites, and 157(89.7%) understand that ITNs use can prevent malaria episodes. This is in tandem with findings of Ekeleme et al., (2023) where (59.67%) understand that the primary purpose of ITNs was prevention of mosquito bites, and 74% believed that ITNs could effectively prevent malaria. These findings might be related to adequate awareness of ITNs through public health campaigns and programmes, also, government and policy makers' effort through campaigns using social media and postal especially in malaria endemic areas like Oyo state.

Utilisation of ITNs in Malaria Prevention

The findings show that most 130(73.4%) of the respondents owned ITN, more than half 106(81.5%) of 130 respondents that owns ITNs use it. This might be related to increased government efforts in free distribution of ITNs to every household. This was similar to the report by Merga, et al., (2024), where 583 (92.1%), of the respondents received ITNs free from local NGOs and governments, and only a handful, 50 (7.9%) obtained them from markets. Awareness of ITNs as a means of preventing malaria is germane as 96.6% of respondents had heard about ITNs before the study, which influences the ITN use. Similarly, Ekeleme, et al., (2023), reported high usage of ITN, with 93% of respondents possessing ITNs in their households. 49% predominantly obtained it through free distribution while 29.67% procure it. This is consistent with the findings of Eleazar et al., (2022), where 180 (57.0%) owned an ITN. Also, the report of previous studies by Merga, et al., (2024), showed that ITN use was 78.4% in Congo, 91.1% in western Uganda, 84.5% in Rwanda North, 88.3% in West Ethiopia, and 91.9% in Kola Diba. In contrast to these reports, Otuomasiri et al., (2025) reported that although 87.6% of the respondents owned ITNs, the usage was sub-optimal.

Also, findings of this study revealed that the majority, 42.9% of the respondents, often sleep under ITN, 25.1% uses ITN throughout the year, while 25.7% use it only during the rainy season. This shows inconsistent use of ITN by the respondents. This is similar to the report of Gyaase, et al., (2023), where only 28% of participants used ITN regularly. Furthermore, Handful 17(9.7%) often sleep under ITN, 42(24%) sometimes use it, while 41(23.4%) had never slept under ITN, and less than half 79(45.1%) slept under ITNs a night prior to the study. This is consistent with Merga, et al., (2024) findings, where out of the total 633 respondents, only 69.2%,

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claimed that they slept under a bed net prior the study. Musa, et al., (2023) also, reported that 236 (90.42%) used the ITN the night before the administration of the questionnaire.

However, the utilisation rate in this study is higher than previous findings in Northwest Ethiopia where 69.2% in Uganda and Ghana (66.1%), Burkina Faso (70%), Eastern Ethiopia (65%), and North-Western Ethiopia 70.8% used ITN. The difference might be related to ineffectiveness of malaria control programs, availability and accessibility of ITNs, poor awareness, socio-cultural factors, and attitude toward ITN use, which may vary across regions.

Factors militating against the use of ITNs in Malaria Prevention

The findings revealed that out of 175 respondents, only 45.1% believe that ITNs can effectively prevent malaria. A substantial portion 106(60%) of the respondents believe that herbal medicines are more effective in preventing malaria than ITNs. However, the most significant factors militating against the use of ITNs for malaria prevention are excessive heat production (147 [84%]), air flow reduction (134 [76.6%]), chemical irritation and allergies (133 [76%]), 145 (82.9%) claiming ITN is inconvenient, 138 (78.8%) saying it restricts their movements in bed, 132 (75.4%) believing it can suffocate, 128 (73.2%) believing ITN causes breathing difficulties, 124 (70.9%) reporting accommodation problems and sleep disturbances. Lack of facilities such as hooks, strings, and bed space (114 [65.1%]) can prevent ITN use. This is consistent with previous findings, which indicate that knowledge of ITNs, beliefs about ITNs' effectiveness and safety; phobia for chemicals, lack of space and difficulty in hanging nets; belief in traditional herbs; inconveniences; skin rashes and heat intolerance; the number of occupants per room; the structure of the room; unaffordability; insufficient knowledge of the causes of malaria; a poor attitude towards use; discomfort; lack of experience in hanging nets; ineffective educational campaigns; and a scarcity of ITNs militate against the use of ITNs (Ekeleme, et al., 2023; Ajegena, & Oti, 2020; Otuomasiri, et al., 2025; Gyaase, et al., 2023; Konlan, et al., 2022; Teym, et al., 2025). This shows that many of the factors impeding the use of ITNs in malaria prevention are not peculiar to a region but cut across all regions. This calls for universal efforts by different organizations, both governmental and non-governmental, to speed up actions in the dissemination of information to correct misconceptions and erroneous beliefs about ITNs.

Perceived Effectiveness of ITNs

The findings of the study show that the larger proportion 130 (73.5%) had a poor perception of the effectiveness of ITNs in the prevention of malaria, while few 45(25.4%) had a good perception. This was contrary whth a study conducted by Ekeleme, et al., (2023) findings shows that only 74% of the participants believed that ITNs could effectively prevent malaria and just 66% considered ITNs safe for use. Also, Tula, et al., (2023) reported in their findings that a substantial number (90.24%) of their respondents agreed that regular sleeping in ITNs helps to prevent malaria, while only 9.76% had contrary opinion. This was supported by the findings of Aliyu and Yaro (2018) that only 7.2% of those in intervention group had malaria, while 15.4% in control group developed malaria. The result revealed that, ITNs were effective in malaria control and prevention of malaria. Likewise, Orji, et al., (2018) in their findings, penned that 62.8% of participants believe that ITN is more effective in reducing febrile episodes and 84.1% more effective in reducing marked levels of malaria parasitemia in the cohort that used it. This was confirmed as the least number of participants requires antimalarial monthly for febrile episodes for their under-fives among regular users of ITN. A significant relationship was observed between ITN usage and frequency of antimalaria for febrile episodes.

Limitation of the Study

The small sample size, drawn exclusively from 200-level and 300-level students, limits the generalizability of the findings to the broader target population and other contexts. Reliance on self-reported data may have introduced social desirability bias, with participants possibly providing responses deemed socially acceptable rather than accurate reflections of their actual practices.

Implications to Research and Practice

1. Nursing students must bridge the gap between knowledge and practice, serving as role models.

2. Nursing education should integrate hands-on training on proper ITN hanging, maintenance, and solutions to common barriers (heat, space, discomfort).
3. Students need culturally sensitive communication skills to correct misconceptions, such as herbal medicines being more effective than ITNs.
4. Clinical postings and community health programs should include practical demonstrations of ITN use to patients and households.
5. Nursing students can act as peer educators and advocates, leading malaria prevention campaigns on campus and in communities.
6. The College should collaborate with the government/Non-Governmental Organizations to ensure access to free or affordable ITNs for students and the surrounding communities.
7. By strengthening education, practice, and advocacy, nurses can reduce the malaria burden and promote sustainable prevention behaviors.

CONCLUSION

This study on the perceived effectiveness of Insecticide-Treated Nets (ITNs) among students of Oyo State College of Nursing Sciences revealed that while awareness and ownership of ITNs were high, consistent utilization remained low, with less than half of respondents sleeping under ITNs the night before the study. Barriers such as heat discomfort, breathing difficulties, inconvenience, and cultural beliefs about herbal medicines limited regular use. These findings highlight a clear gap between knowledge and practice, emphasizing the need for nursing education and public health interventions to move beyond awareness creation to practical, behaviour-centered approaches. Nursing students, as future healthcare providers, must be equipped with skills to demonstrate correct ITN use, address misconceptions, and act as role models and advocates in malaria prevention. Strengthening nursing involvement in malaria control programs will not only protect students' health but also enhance community-wide efforts to reduce malaria morbidity and mortality in Nigeria.

Future Research

1. Exploring Behavioral Change Interventions to Improve Consistent ITN Use among Nursing Students in Nigeria.
2. Impact of Culturally Tailored Health Education on Misconceptions and Utilization of ITNs among Undergraduate Health Science Students.
3. Assessment of Environmental and Structural Barriers (heat, space, bed design) Affecting ITN Use in Tertiary Institutions in Nigeria.
4. Comparative Study of ITN Utilization between Nursing Students and Non-Health Science Students in Malaria-Endemic Regions.
5. Effectiveness of Peer-Led Malaria Prevention Programs in Promoting ITN Use among Students in Nigerian Colleges of Nursing.
6. Knowledge, Attitude, and Practices of ITN Use among Healthcare Students: A Multi-Center Study in Southwest Nigeria.
7. Evaluation of Government and NGO-Supported ITN Distribution Programs on Long-Term Usage among Students in Tertiary Institutions.
8. Influence of Gender and Socio-Cultural Beliefs on ITN Acceptance and Use among Nursing Students in Nigeria.
9. Assessment of the Relationship between ITN Use and Incidence of Malaria among Students in Malaria-Endemic States.
10. Design and Testing of Innovative, Heat-Reducing ITN Materials for Improved Comfort and Acceptance in Tropical Regions.

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