# PREVALENCE OF MALARIA IN UNIVERSITY OF UYO HOSTEL IN UYO, AKWA IBOM STATE, NIGERIA.


## ABSTRACT

Malaria has so far been a life-threatening parasitic disease transmitted by the bite of infected female anopheles mosquitoes in Nigeria at large and among students of University of Uyo hostels as a case study. Despite the massive increase in public and private efforts, research, symposiums and conferences to curb malaria over the years, it remains one of the most salient global health concerns. This study was aimed to investigate the prevalence of malaria in University of Uyo hostel. Questionnaires were given to the participant for their consent and standard methods of blood analysis for malaria test were employed for this research. A total number of participant for this research were 105 students who resides in the school hostel. The result from this study revealed malaria disease to be 64%. Females recorded highest of 58.38% against male with 40.62%. Age group 23-26 recorded highest while lowest was recorded for 15-18. The percentages of students using and not using LLINs were 48.57% and 51.43% respectively. However, positive results recorded for both cases were 41.12% and 62.50% respectively. 96.19% 0f the students were knowledgeable of the control of malaria with the use of LLINs. Conclusively, based on this research; malaria is still a threat to the University of Uyo hostel residents. Based on these results, it is therefore pertinent for Students to be properly and regularly sensitized on malaria, its prevalence, control, treatment and preventive measures.



**Keywords: Prevalence, Malaria, University of Uyo Hostel, Akwa Ibom State, Nigeria.**


## 1. INTRODUCTION

"Malaria has so far been a life-threatening parasitic disease transmitted by the bite of female anopheles mosquitoes" (WHO, 2014). "Despite the massive increase in public and private efforts over the years, malaria remains one of the most salient global health concerns" (WHO. 2017). "About half of the world population is at risk of malaria infection, and around 250 million cases occur annually, leading to approximately 1 million deaths each year" (WHO, 2014). "The majority of the burden of disease caused by malaria is borne by the populations living in the highly endemic areas of sub-Saharan Africa. Within these areas, the populations at highest risk are pregnant women and infants" (Walter and John, 2022). "Malaria mortality in Nigeria accounted for about 30% of the world total, and its associated burden relates to approximately 60% of outpatient visits to health facilities" (WHO, 2017). "It is the most common Protozoan parasitic disease in the tropical and subtropical regions of the world" (Dawaki *et al.,* 2016). "Over the years, a lot of efforts have gone into controlling malaria in Nigeria and other African countries, the most affected by the disease, but the problem has not shown any sign of abating" (Fox *et al.,* 2022). "The reasons for the unusuccessful efforts to eradicate malaria disease in Nigeria includes lack of political will and commitment, low awareness of the magnitude of malaria problem, poor health practices by individuals and communities and resistance to drugs"

(Garley *et al.*, 2013). "Malaria is the most common occurring parasitic infectious disease in school hostels" (Erinleand Bada, 2023). In general, ignorance to controlling and preventing malaria is another major problem of Nigerians. Therefore, this study aimed to investigate the prevalence of malaria in University of Uyo hostel.

## 2.0. MATERIALS AND METHODOLOGY

### 2.1. Materials

"Microscopy is the main tool for laboratory diagnosis of malaria. The thick blood film and the thin blood film methods are employed. Field's stain A (A polychrome methylene blue, disodium hydrogen phosphate and potassium hydrogen phosphate) and Field's stain B (Eosin, disodium hydrogen phosphate and potassium hydrogen phosphate). Thin film is carried out following the examination of thick film to identify the particular species of the Plasmodium responsible for the infection; it is stained with commercially prepared Leishman stain. The materials employed in the study included a Leitz light microscope, EDTA (ethylene diamine tetra acetic acid) bottles, methylated spirit (methanol), cotton wool, tourniquet, syringes (5 mL) and needles (21 G)" (Epidi *et al.*, 2008).

### 2.2. The study area

This study was conducted at the hostel of the University of Uyo, Nigeria. Uyo is the capital city of Akwa Ibom State, Nigeria. It lies in the coastal zone of the tropical rainforest of Nigeria, within latitude 4°32' N and 5°33' N and longitude 7°25' E and 8°25' E. The area has two rainfall peaks in June and September. The relative humidity is about 77.20%. Based on reports of the last population census, Uyo has an estimated population of 222 841 (Atser and Udoh, 2015).

### 2.3. Study population and period of study

The population which served as models for this study comprised One hundred and five (105) healthy looking students (41 males and 64 females) residing in the Uniuyo hostel. This study was carried out for duration of three (3) weeks (May 28 –June 20). At least 5 samples and filled questionnaires were collected per day and were taken to the laboratory for tests.

### 2.4. Inclusion criteria

The criterion for participation in this study was strictly to the residents of the University of Uyo Hostel.

### 2.5. Exclusion criteria

Residents who had treated malaria at least two weeks before the commencement of the research.

### 2.6. Sample collection

The method of sample collection employed was venepuncture technique (Okocha *et al.,* 2005; Epidi*et al.,* 2008). Soft tubing tourniquet was fastened to the upper arm of the patient to enable the index finger feel a suitable vein. The puncture site was then cleansed with methylated spirit (methanol) and venepuncture made with the aid of a 21G needle attached to a 5mL syringe. When sufficient blood had been collected, the tourniquet was released and the needle removed immediately while the blood was transferred into an EDTA bottle (Epidi*et al.,* 2008).

## 2.8. Data collection

A structured questionnaire was designed and administered to the participants to obtain relevant demographic information and clinical characteristics.

## 2.9 Administration of Questionnaires

Well structured and approved questionnaires were given to randomly consented students that reside in Uniuyo hostels to provide information on their age, level (class), sex and their usage of ITNs. Confidentiality was maintained as no details related to participant's identity were used.

## 2.10. Laboratory Analysis

The collected blood samples were analyzed within 1 to 2 h of collection. Thick and thin blood films were prepared according to the technique outlined by Cheesebrough (2004) and described by Epidi*et al.,* (2008). A drop of each blood sample was placed in the center of a greasefree clean glass slide. Thereafter, the reverse side of the slide was cleaned with cotton wool and kept for air-drying and staining with field's stain. The slide was held with the dried thick film side facing downward and dipped in field's stain A (eosin) for 5 secs. It was washed off gently in clean water and then dipped in field's stain B (methyl azure) for 5 s and washed again in clean water. The back of the slide was cleaned with cotton wool and kept in the draining rack to air-dry for eventual examination under the microscope, using oil immersion at 100X magnification to observe for Plasmodium parasites. Presence of ring forms.

## 2.11. Identification

Positive specimens were identified on the basis of microscopy. Using standard methods (CDC, 2007), a trained laboratory technician at health centre interpreted the malaria blood slides. Prevalence of Plasmodium was calculated as the proportion of sampled persons with a positive result divided by the number of persons who provided blood samples. All point estimates were weighted, with empirically estimated standard errors used to account for prevalence.

## 2.12. Data analysis

Data obtained from this research were subjected to descriptive analysis. Chi-square test was also employed to ascertain the pattern of distribution of infection among the pregnant women examined, taking age and occupation into consideration. The statistical software used was SPSS version 20.

## 3.0. RESULTS AND DISCUSSION

### 3.1. Results

A total number of students random consented and selected for this study were 105 students. All the participated students reside in the Uniuyo hostel and had not treated malaria two weeks earlier before the commencement of this research. Microscopy results from the Uniuyo Health Services Department, were I carried out the study identified 64 (61.0%) malaria infections among the 105 (100.0%) students who had provided a blood sample. Presence of ring forms of *Plasmodium* and trophozoites of *Plasmodium* indicates positive results. The overall result is shown in Table 1.

Table 2 shows the sex related prevalence of parasites among students as the participation ratio of male (M) to female (F) were 41 (39.05%) and 64 (60.95%) respectively. Out of 41 males who participated in this study, 26 (63.41%) were positive and 15 (36.59%) were negative of Plasmodium. 38 (59.48%) positive and 26 (40.62) negative result was revealed for the total female students 64 (61.0%) that participated in this study.

Table 3 shows age related prevalence of Plasmodium among the students. It revealed that the age group 23-26 [43 (40.95%)] which had highest number of participant also had the highest prevalence as positive results of 26 (60.47%) and negative results of 15 (36.59%) students were recorded. 15-18 {26 (24.77%)] age group had the lowest in both positive and negative results of 15 (57.70%) and 11 (43.30%) respectively.

Table 4 indicates the sex related prevalence of malaria infection among students using Long Lasting Nets (LLINs) of which 7 (41.12%) and 10 (58.88%) of the male subjects tested positive and negative respectively. Out of 34 (56.63%) female subjects that were using LLINs, 15 (44.11%) and 19 (55.88%) students tested positive and negative respectively.

Table 5 shows the sex related prevalence of malaria infection among students not using Long lasting nets(ITN). The result reveals that, out of 24 (58.55%) male students that were not using the LLINs, 15 (62.50%) were found positive and 9 (37.50%) were found negative and 21 (70.00%) and 9 (30.0%) of female students that did not use the LLINs were tested positive and negative respectively.

Table 6 reveals their level of knowledge on the use of LLINs, though did not justify their understanding on its effectiveness in the control of malaria.

**Table 1: Showing the overall prevalence of malaria among students of the Uniuyo residential hostel**

| S/N | Sex | Age | Status | Use of LLINs | Knowledge on the use of LLINs to control malaria |
|---|---|---|---|---|---|
| 1 | M | 16 | + | N | N |

| | | | | | |
|---|---|---|---|---|---|
| 2 | F | 20 | - | Y | Y |
| 3 | F | 19 | + | Y | Y |
| 4 | F | 20 | + | N | Y |
| 5 | F | 17 | - | Y | Y |
| 6 | F | 25 | - | Y | Y |
| 7 | M | 22 | + | Y | Y |
| 8 | M | 23 | + | N | Y |
| 9 | F | 19 | - | N | Y |
| 10 | F | 18 | + | N | Y |
| 11 | M | 20 | + | Y | Y |
| 12 | F | 23 | + | N | Y |
| 13 | M | 22 | - | N | Y |
| 14 | M | 22 | + | Y | Y |
| 15 | F | 26 | - | N | Y |
| 16 | F | 26 | + | N | Y |
| 17 | F | 24 | + | Y | Y |
| 18 | F | 24 | + | Y | Y |
| 19 | F | 25 | - | N | Y |
| 20 | F | 22 | + | Y | Y |
| 21 | M | 22 | + | N | Y |
| 22 | M | 26 | - | N | Y |
| 23 | F | 26 | + | N | Y |
| 24 | F | 24 | - | Y | Y |
| 25 | M | 24 | - | Y | Y |
| 26 | M | 25 | + | Y | Y |
| 27 | F | 18 | + | N | Y |
| 28 | F | 19 | + | Y | Y |
| 29 | F | 20 | + | Y | Y |
| 30 | F | 26 | + | N | Y |
| 31 | F | 21 | - | Y | Y |
| 32 | F | 20 | + | Y | Y |
| 33 | M | 23 | + | N | Y |
| 34 | M | 24 | - | Y | Y |
| 35 | F | 23 | + | N | Y |
| 36 | F | 19 | - | N | Y |
| 37 | M | 15 | + | Y | N |
| 38 | F | 18 | - | Y | Y |
| 39 | M | 20 | + | Y | Y |
| 40 | F | 23 | - | N | Y |
| 41 | F | 24 | + | Y | Y |
| 42 | F | 23 | + | N | Y |
| 43 | F | 22 | + | N | Y |
| 44 | F | 21 | - | Y | Y |
| 45 | M | 19 | + | N | Y |

| | | | | | |
|---|---|---|---|---|---|
| 46 | M | 25 | + | N | Y |
| 47 | F | 23 | + | Y | Y |
| 48 | M | 15 | - | N | Y |
| 49 | F | 16 | + | Y | Y |
| 50 | F | 18 | + | Y | Y |
| 51 | F | 18 | + | N | Y |
| 52 | M | 17 | + | Y | Y |
| 53 | F | 16 | - | Y | Y |
| 54 | F | 15 | + | Y | Y |
| 55 | M | 20 | + | N | Y |
| 56 | F | 23 | + | N | Y |
| 57 | M | 22 | + | N | Y |
| 58 | F | 22 | + | N | Y |
| 59 | F | 26 | + | Y | Y |
| 60 | F | 26 | - | N | Y |
| 61 | M | 24 | + | Y | Y |
| 62 | F | 24 | + | N | Y |
| 63 | F | 25 | + | Y | Y |
| 64 | M | 18 | - | Y | Y |
| 65 | F | 19 | - | N | Y |
| 66 | F | 20 | - | Y | Y |
| 67 | F | 26 | + | Y | Y |
| 68 | M | 21 | + | N | Y |
| 69 | F | 20 | - | Y | Y |
| 70 | F | 23 | - | Y | Y |
| 71 | M | 24 | + | N | Y |
| 72 | M | 23 | + | Y | Y |
| 73 | F | 23 | - | Y | Y |
| 74 | M | 24 | - | Y | Y |
| 75 | M | 25 | - | N | Y |
| 76 | M | 18 | + | Y | Y |
| 77 | F | 19 | + | N | Y |
| 78 | F | 17 | + | N | Y |
| 79 | M | 16 | + | N | N |
| 80 | F | 16 | + | N | Y |
| 81 | M | 17 | - | Y | N |
| 82 | F | 18 | - | Y | Y |
| 83 | M | 17 | - | Y | Y |
| 84 | F | 18 | + | N | Y |
| 85 | M | 19 | - | N | Y |
| 86 | F | 20 | + | N | Y |
| 87 | F | 26 | - | Y | Y |
| 88 | M | 17 | - | N | Y |
| 89 | F | 16 | + | N | Y |

| | | | | | |
|---|---|---|---|---|---|
| 90 | M | 15 | + | N | N |
| 91 | M | 20 | - | Y | Y |
| 92 | F | 23 | + | N | Y |
| 93 | M | 22 | - | Y | Y |
| 94 | F | 22 | - | Y | Y |
| 95 | M | 26 | + | N | Y |
| 96 | F | 26 | - | Y | Y |
| 97 | F | 24 | - | Y | Y |
| 98 | M | 24 | + | N | Y |
| 99 | M | 25 | + | N | Y |
| 100 | F | 20 | + | N | Y |
| 101 | F | 21 | - | Y | Y |
| 102 | F | 25 | - | Y | Y |
| 103 | M | 19 | + | N | Y |
| 104 | F | 18 | + | N | Y |
| 105 | M | 20 | + | N | Y |

**Keys: "F" = Female, "M" = Male, "Y" = Yes, "N" = No, "LLINs" = Long lasting insecticide nets, "+" = Positive, "-" = Negative**

**Table 2: Sex related prevalence of Malaria parasites among students**

| Sex | No. of students (%) | Positive (+) (%) | Negative (-) (%) |
|---|---|---|---|
| M | 41 (39.05) | 26 (40.62) | 15 (36.59) |
| F | 64 (60.95) | 38 (59.38) | 26 (63.41) |
| Total | 105 | 64 (60.95) | 41 (39.05) |

**Table 3:Age related prevalence of Malaria parasites among students**

| Age group | No. of students (%) | Positive (+) (%) | Negative (-) (%) |
|---|---|---|---|
| 15-18 | 26 (24.77) | 15 (57.70) | 11 (43.30) |
| 19-22 | 36 (34.28) | 22 (61.11) | 14 (38.89) |
| 23-26 | 43 (40.95) | 26 (60.47) | 17 (39.53) |

**Table 4: Sex related prevalence of malaria infection among students using insecticide treated nets (LLINs)**

| Sex | No. of students using (LLINs) | Positive (+) (%) | Negative (-) (%) |
|---|---|---|---|
| Male | 17 (41.45) | 7 (41.12) | 10 (58.88) |
| Female | 34 (56.63) | 15 (44.11) | 19 (55.88) |
| Total | 51 (48.57) | 22 (20.95) | 29 (27.61) |

**Table 5: Sex related prevalence of malaria infection among students not using Long Lasting Insecticide Nets (LLINs)**

| Sex | No. of students NOT using (ITN) | Positive (+) (%) | Negative (-) (%) |
|---|---|---|---|
| Male | 24 (58.55) | 15 (62.50) | 9 (37.50) |
| Female | 30 (46.87) | 21 (70.00) | 9 (30.00) |
| Total | 54 (51.43) | 36 (34.28) | 18 (17.14) |

**Table 6: Knowledge of the use of LLINs in the control of mosquitoes.**

| Sex | | Yes | No |
|---|---|---|---|
| Male | 41 (39.05) | 37 (62.50) | 4 (37.50) |
| Female | 64 (60.95) | 64 (100) | 0 (0.00) |
| Total | 105 | 101 (96.19) | 4 (3.81) |

### 3.2. Discussion

Malaria occurs almost exclusively in the tropics and subtropics (WHO, 2011) and approximately, 40% of the world's population, mostly those living in the world's poorest countries, are at risk of malaria (Bhatt *et al*., 2015). "Every year, more than 500 million people become severely ill with malaria in most cases and deaths occur within sub-Saharan Africa" (WHO, 2021).

In this study, the presence of ring forms of *Plasmodium* and Trophozoites of *Plasmodium* indicate positive results and it absence indicate negative results. Results from this study showed the overall prevalence of *Plasmodium* to be 61.0% in the University of Uyo hostel. This differ from the overall prevalence of 81.5% reported in a study by Okonko *et al.,* (2005) among participants in Abeokuta, Ogun State, Nigeria, 51.5% reported by Epidi *et al*., (2008) among blood donors in Abakaliki, Ebonyi State, Nigeria and 80.6% prevalence amongst students of a southwest Nigerian Federal University (Erinle and Bada, 2023).

Malaria can affect all the ages, humans groups and both male and female sexes. Studies have also shown seasonal variations in the rate of infections and differences in the types of malaria parasite in sex depending on the geographical conditions (Gething *et al.,* 2011). This study shows that malaria parasite was higher in females 38 (59.38%) than in male 26 (40.62%) of the total number [64 (60.95%)] of infected students. This is in agreement with the findings Okonko *et al.,* (2009) in the Southwestern, Nigeria, but disagrees with Autino *et al*. (2012) and (Abubakar *et al.*, 2022) who reported infection rate to be higher among adult male students [176 (73.64%)] than female students [63 (29.36%)] in Pakistan and Bauchi State University Gadau, Bauchi State, Nigeria which recorded 283 (70.7%) and 177 (29.3%) among male and female students respectively.

The age group 15-18 shows the lowest prevalence of malaria parasites among students. This result is attributed to their levels; students of ages 15-18 were mostly the new students (level 100) that newly resumed and moved in to the hostel with LLINs from their homes as a requirement for residents, while age group 23-26 showed the highest prevalence of malaria. Some students in this age group reported that they stopped using their LLINs because they were worn out, while others gave theirs to younger students. This, agrees with Olusegun-Joseph *et al.,* (2016) that reported that age group 15-20 had 80 (20%) and 21-25 had 140 (35%) prevalence of malaria in University of Lagos, Nigeria but disagrees with Mgbemena *et al.,* (2016) that reported

that; out of 40 students, ages 16-22 had higher prevalence of 28 (70%) over ages 23-29 that recorded 12 (30%).

In the age comparison of malaria parasites prevalence, the study reveals that the students between ages 19-22 (61.11%) is almost comparable to that of the students between the ages of 23 – 26 (60.47%) and also comparable to a study which had 70% for students of FUTO, Imo State, Nigeria of ages 16 – 22 (Mgbemena *et al.*, 2016).

This study also reveals the prevalence of malaria parasites among students that uses and does not use LLINs amidst this research. Out of 41 male students, 17 (41.45%) were using LLINs and 7 (41.12%) recorded positive for malaria. 24 male students were not using the LLINs and 15 (62.50%) were recorded positive for malaria. The ratio of female students (64) that did and did not use the LLINs was 34 (56.63%) and 30 (46.87%) respectively. Among the 34 female students that used the LLINs, 15 (44.11%) recorded positive and 19 (55.88%) recorded negative. The 30 female students that did not use the LLINs recorded 21 (70.00%) and 9 (30.00%). This was as a result of their inconsistency in using the LLINs, mostly in the day. Yhdego *et al.*, (2022) reported that out of 76 people, the prevalence of malaria with the use of LLINs in Maygaba town, Ethiopia was 24 (31.58%) positive results. This research also reveals that a good number of them are knowledgeable of the use of LLINs, though does not reflect their understanding on the importance of its usage as it is one of the cheapest measure to fight malaria by avoiding direct contact to the body especially while at night as they are nocturnal in nature

The transmission of malaria parasites in this study could be influenced by socio-economic and cultural factors when considering the hostel location and its structures which possibly play a vital role in influencing susceptibility to infection. The prevalence of the malaria among these subjects could also be attributed to the effect of climatic features on vector breeding and transmission as wet season usually promote mosquito breeding, hence the justification, because this study was carried out during the rainy season (May-June).

The fact that females were more infected than males in this study could be due to the sample size difference. Also, female students in the southern states tends to expose their bodies with short skirts/shorts and even sleeveless shirt thus the contradiction in Abubakar *et al.*, (2022) result that reported higher prevalence in female student in Bauchi (a Muslim state) were generally, their females wear their hijabs that covers almost all part of their body and even at home, therefore disallowing direct contact with mosquitoes. This is also supported by Garley *et al*., (2013) that reported the general gender ratio of LLINs usage is 57.2% and 48.8% in female and males respectfully. However, male students generally, prefer to sleep outside LLINs, hence the chances of being bitten by the mosquito vector increases. Males in some settings use health care services less than females because they pay less priorities to their health, making them hesitant to go long distances to health centers even when malaria is suspected (Murray*et al.*, 2012), thus the higher prevalence in male (Yhdego *et al.*, 2022; Erinle and Bada, 2023).

From this study, as also supported by Natama *et al.*, (2018) malaria transmission is not homogenous through an endemic area but spotty and depends on two primary factors; location of the breeding sites and clustering of human habitations where people are serving as reservoirs of

malaria parasites. It could also be as a result of poor or inadequate drainage system. Also in the school hostels, there is overpopulation of over 10 students per room thus making use of mosquito net as preventive measure cumbersome, which is not the standard of room allocation in Univeristy of Uyo hostel.

Additionally, a substantial number (51.43%) of the respondents did not possess LLINs due to two main reasons; some of theirs were worn-out while other gave theirs out to junior colleagues. This result indicated that there was an imbalanced and unsustainable possession of the use of LLINs of the students in the study area. Therefore, timely replacements of the worn out LLINs via malaria campaigns are important for effective prevention and control of malaria in this study area. On other hand, the effectiveness of LLINs depends on regular and consistent use, and people's perception towards its utilization (WHO, 2020; Biadgilign *et al.,* 2012). In our study 101 (96.19%) students had the knowledge towards the use of LLINs. Nevertheless, only 51 (48.57%) of them were using LLINs. This finding is higher than similar studies conducted in Raya Azebo and Arsi zone, Ethiopia (Tesfay *et al.,* 2019; Ragasa *et al.,* 2019) but lower than the reports of other settings in Ethiopia (Shiferaw *et al.,* 2018). The rest of the respondents did not use LLINs while sleeping; this might be due to a negative attitude towards LLINs because of various reasons as mentioned by Taremwa *et al* (2017). Furthermore, the use of LLINs were associated with several factors such as being carefree about their health, knowledge of malaria, insignificant level of campaign by public and private bodies and the socio-economic status of the school (Singh *et al.,* 2013).

"The high prevalence of malaria parasites obtained in this study is worrisome because high-density urban African populations are not often considered particularly vulnerable to malaria infection. In other West African urban areas, malaria prevalence rates from 2% to 16% have been reported with large variation between communities" (Sabot *et al.,* 2010). According to Raghavendra *et al*. (2011), the observed low level of sensitivity of microscopy for identifying *Plasmodium* infections is similar to findings observed elsewhere (Jimenez-Ruiz*et al*., 2016). This could be attributable to 2 factors: (1) many of the infections likely occurred at low parasite densities, and (2) the laboratory technician was responsible for reading a large number of slides with low parasite prevalence over a relatively short period.

In general, the findings of this study may help to suggest possible solutions to most African countries and other malaria endemic regions of the world particularly to school hostels by providing first-hand information about malaria prevalence and community awareness towards the cause, transmission, prevention and control of malaria and use of LLINs.

## 4.0. CONCLUSION AND RECOMMENDATIONS

### 4.1. Conclusion

The result of this study has shown that a large proportion of the targeted population do not have the LLINs and usage is poor among studied population unless the sociocultural issues as well as

individual factors surrounding knowledge and correct use of the LLINs are resolved malaria would continue to threaten students and the entire Nigerian society. There is therefore the need to intensify awareness on how to use LLINs and making them available to the population most at risk in the endemic rural areas.

### 4.2. Recommendations

To curb the prevalence of malaria in University of Uyo hostel, the following are recommended:

- Students should be properly and regularly sensitized on malaria, its prevalence, control, treatment and prevention.
- Students should be properly and regularly sensitized on the effectiveness on the use of LLINs; as it is the cheapest preventive and control measure.
- School management should join the fight against malaria in Africa by providing LLINs to new and returning students and also checkmating their usage through the welfare committee of the school.
- Schools should partner with interested government and private bodies to provide sufficient LLINs for students.
- School management should impose the necessity of LLINs as a requirement for procurement of hostel space.
- Furthermore, it would be important for policy makers and malaria supporting partners to take appropriate measures for the effective prevention and control of malaria in developing nations like Nigeria.

Ethical clearance

Ethical approval was obtained from the Department of Animal and Environmental Biology, University of Uyo.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the first author (INW) upon request.

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

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Details of the AI usage are given below:

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