



Knowledge, Attitude and Perception of Malaria Among the Undergraduate Students of University of Abuja, Nigeria

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Abstract:

Objectives: The objective of this study was to evaluate the knowledge of causes and management of malaria by students of university of Abuja, with an aim to addressing the disease contribution to the failure rates and absenteeism on the campus.

Methods: Close-ended questionnaire were prepared and distributed to the 373 eligible undergraduate students of the University to determine their knowledge and management of malaria infection.

Results: Approximately 362 (97%) of the respondents perceived mosquitoes as agent of transmission of malaria parasite. Fever as a primary symptom of malaria, was strongly agreed to by 87.4%. Approximately 88.7% and 83.9% participants believed that the university health facility respectively lacked sufficient drugs and doctors to treat malaria.

Conclusion: This study has shown that the undergraduate students of University of Abuja, Nigeria possessed moderate knowledge but poor management of malaria. This may be contributing to high morbidity and reservoir population on the campus. We advise on sustained and diversified public health education on the subject matter in the university.

Keywords: Malaria; Knowledge; Attitude; Perception; Undergraduate students; Preventive health.

1 Introduction

Malaria is a life-threatening disease of immense public health importance that is caused by *Plasmodium* parasite of the Apicomplexa family. It is transmissible from person to person through the bite of female *Anopheles* mosquitoes (Buck and Finnigan, 2023). Climatic elements of high temperature, rainfall and humidity found in the tropics, subtropics and other warm regions of the world provide conducive environment for the preservation of the female *Anopheles* mosquitoes which transmit *Plasmodium* parasites through bites (Ramdzan et al., 2020).

Plasmodium is a vector-borne protozoan parasite belonging to the genus *Plasmodium* that has many species including *Plasmodium malariae*, *Plasmodium falciparum*, *Plasmodium ovale*, *Plasmodium vivax*, and *Plasmodium knowlesi* that can infect humans (Sato, 2021).

In 2022, Nigeria was rated as having the world's greatest malaria burden with an annual 51 million cases, 207,000 deaths and 76 % of the population living in endemic areas (Omojuyigbe et al., 2023). Nigeria was reported to constitute 95% of the global malaria burden with 96% deaths and children accounting for 80% of the cases in a documentation for African region in the global malaria statistics (Oladipo et al., 2022). Currently, Nigeria is reported to account for 27 % global cases of malaria, 31% of global malaria deaths and nearly 40% of worldwide malaria deaths in children under five (World Malaria Report, 2024).

Malaria is a disease of significant public health challenges affecting all persons without discrimination of sex, age, or marital status (CDC, 2024). The disease is one of the causes of high students hospital admission rates, absenteeism from classes and low academic performance in Nigeria (Omojuyigbe et al., 2023).

The disease is reported to make a significant contribution to hospital admissions in the various geo-political zones of Nigeria (Adeyemo et al., 2022). Studies have reported that the prevalence of malaria infection among students is very high but many of the students are misinformed about the predisposing factors or its management (Adeyemo et al., 2022; Okwa, 2022). Mismanagement and misconceptions about malaria exist even in high schools. Malaria has been reported to impairing on cognitive ability thereby contributing to poor school performance and underdevelopment in endemic countries (Okwa, 2022).

Experts posited that malaria constitute a significant threat to education and socio-economic

development of Nigeria and advised against undermining its effect on education as low class attendance and academic performance are largely attributed to the disease (Alao et al., 2025).

Many previous studies had reported on the prevalence, knowledge, attitude and practices (KAP) associated with malaria and predisposing risk factors among students (Flatie and Munshea, 2021; Afolayon et al., 2022). They were reported to hold different perceptions and myths about malaria due largely to their inadequate knowledge of the disease (Flatie and Munshea, 2021). This knowledge gap and poor perception of the management and its mode of transmission, may be responsible for the persistence of the disease among the students of universities. The endemic nature of the disease on the campus may be contributing to high hospital-bed admission in the school, high rate of students' absenteeism from lectures and exams and increased exam failures. According to healthformnigeria (2025), school absenteeism due to malaria among Nigerian students was as high as 70% with an estimated annual loss of 3-12 school days by each student. Malaria is thought to account for between 13% and 50% of the medical reasons for absenteeism from school. In the previous study of Okwa (2022), malaria was reported as the most important health-related cause of school absenteeism in Nigerian schools. Such losses in school days represent a loss in academic standard and drain in the nation's investment in education. This is because absence from school due to malaria imparts on lower performances and poor grades (Okwa, 2022).

Our literature search did not reveal any previous study of this nature on the students of the institution. We designed this novel study therefore, to assess the knowledge, attitude and perception of malaria and its management practices by the resident undergraduate students of University of Abuja, Nigeria. The result from this study may be helpful to the school authorities in designing an appropriate policy framework towards addressing the persistence of the disease on the campus of University of Abuja, Nigeria.

2 Materials and Methods

2.1 Ethical approval

The protocol for carrying out this study was approved by the Health Research Ethics Committee of the Federal Capital Territory with Ethics number: FHREC/2022/01/210/04-11-22.

2.2 Study Area

This study was carried out in the main campus of University of Abuja, located along the Airport Road, Abuja, Nigeria. Abuja is located on latitude, 9° 03' 28.26" N and longitude, 7° 29' 42.29" (Alkasum, 2012). The university is a tertiary educational institution founded in January, 1988 as a dual-mode university employing both traditional and remote learning methods. With a population of approximately 55,364 undergraduate students, the university covers an area of 11,824 square kilometer (<http://www.uniabuja.edu.ng>) and harbors a lot of surface water pools and expanse of undeveloped terrain which provide a good habitat for mosquito vectors of *Plasmodium* parasite. The institution has about 10 faculties, five undergraduate hostels comprising three for females and two for males as at the time of this survey. The university has one 5-bed clinic that serves the entire student and staff population of the campus on health issues.

2.3 Study Design

2.3.1 Sample Size Determination

The sample size was determined using the simple random method (Noor et al., 2022). In mathematical notation, $n = \frac{Z^2 p (1 - p)}{d^2}$; where n is the required sample size; Z^2 is the standard deviation, 1.96; p is the expected response from the target populations; and d is the desired absolute precision. The Open Source Epidemiologic Statistics for Public Health (OpenEpi) version 2.3.1 software (Dean et al., 2013), with power set at 50% and 4% margin of error at 95% confidence level was used for computation. A sample size of 380 participants was obtained for the study.

2.3.2 Questionnaire Design

This cross-sectional study was purposely targeted at the resident (residing in school hostels) undergraduate students of University of Abuja between November 24th, to December 6th, 2023 using self-administered questionnaires designed by the authors. This group of students was targeted because the available hostel accommodation at the time of this study was exclusively for the undergraduate students of the university. The questionnaire contained close-ended, multiple-choice, binary and Likert-scale questions. Many of these questions helped us in constructing the index variables of knowledge, attitude, and practice score of the students regarding malaria. The questionnaire design was based on previous literatures on KAP studies

(Alhaji et al., 2022; Adeiza et al., 2024) and those modified from other previous KAP studies on malaria. The questionnaire was designed in English language and sectioned into six parts: Section A focused on the socio-demographic factors of the participating students using close-ended questions. It consisted of 17 questions on 3 themes of age, sex and faculties; Section B was designed to evaluate the knowledge of mode of transmission of malaria parasites to man based on the frequency of response of the multiple choice of 4 distinct variables; and Section C dealt with the students' knowledge of malaria symptoms based on 10 questions. Questions on this section were based on Likert scale of strongly agreed (SA) carrying 2 points, agreed (A) – 1 point, disagreed (D) – 0 point. The knowledge score obtained for each respondent was recorded from 0 to 10, and the higher the score, the better the knowledge of transmission of malaria. Overall scores <50% signifies poor knowledge, 51 – 80%, moderate knowledge; 81 – 100, Full knowledge; Section D asked 5 questions with binary responses of "Yes" or "No" to evaluate the perception of students on the state of university health facilities for management of malaria. Section E dealt with the knowledge of the effectiveness of the malaria control and prevention programmes adopted by the authorities of university of Abuja on the campus. The section had 13 questions. Each response was categorized on Likert scale of strongly agreed (SA) carrying 2 points, agreed (A) – 1 point, disagree (D) – 0 point. The knowledge score obtained for each respondent was recorded from 0 to 13, and the higher the score, the better the knowledge of malaria. Overall scores of <50% signifies poor knowledge, 51 – 80, moderate knowledge and 81 – 100%, Full knowledge. Section F in two subsets comprising 12 questions. The responses were multiple choice of 7 distinct variables for the first subset and 5 distinct variables for the second subset and frequencies of the responses were used to evaluate the immediate responses of students to an attack of malaria and their attempt at medication.

The content validity of the study instrument (Questionnaire) was done by cross-checking and authentication from experts in the field of the study (Two academically senior members and subject experts in the faculty) to assess its content, relevance, clarity, understanding, design and simplicity. The questionnaire was then modified according to their counsel, recommendations and suggestions. The reliability of the questionnaire was 0.81 (Cronbach's alpha). The questionnaire was

pre-tested on 7 students of Faculty of Science, as part of a pilot study, through a focus study to assess the convenience and interpretation of the questionnaire. A few adjustments were made by changing the wordings of the questions after the pilot study. The questionnaire was designed to take an average of fifteen minutes to fill. The validated and eventual well-structured questionnaires were administered to 373 consenting students to obtain information on their knowledge of the cause of malaria, ability to recognize malaria symptoms, treatment seeking behavior and the preventive measures used.

2.4 Sampling Method

The sample size was proportionally divided among the faculties based on their resident undergraduate population in the hostels. Within each faculty, the sampling instruments (Questionnaire) were randomly distributed among the students.

2.5 Administration of Questionnaire

Trained survey assistants helped in the administration and clarifications of some of the relevant parts of the questionnaire and the objectives of the study to the participants. These were done with a care to minimize the limitations in differences in apprehension of the respondents. The questionnaire were administered randomly to the students within their lecture break periods in their faculty lecture halls. The lecture break periods were from 12noon to 2.00pm.

The staff, post-graduate students and the undergraduates not living within the university hostels were excluded from this study. Participation in the survey was voluntary with an option to withdraw at any stage in line with Helsinki declaration (WMA, 2013). The questionnaires that were not 80% completed were rejected. The completed questionnaires were

collated and checked for accuracy, labeled and coded.

2.6 Data Analysis

Questionnaires were checked for proper completion by the participants. Questionnaires with >20% unanswered questions were rejected. Data were summarized in a Microsoft Excel 2016 spreadsheet, exported, and analyzed using SPSS version 25. Descriptive statistics were used to analyze variables with frequencies and proportions predominantly used to describe the data. Independent variables were created for the knowledge of transmission of malaria parasite to man, main symptom of malaria in man and belief in the methods of control and prevention of malaria on the campus. To create outcome variables, a unique score card was used for the responses. Each study participant was assigned a score that reflected the stringency of his or her response. To measure responses to these independent factors, the scoring system ranged between the 0 and 2 points for knowledge of zoonotic risks, symptoms of malaria and preventive health practices.

3 Results

Out of the 380 determined sample size in the study, 7 (1.8%) was used in a pilot test to test the reliability of our method. This leaves 373 as the effective sample size used in this study. The age distribution of the respondents ranged from 15-50 years with most 271 (72.7%) of the respondents within 21-25 years. Female students 205 (55%) completed the survey more than males 168 (45%). Respondents were spread across the ten (10) faculties of the university with the students from the Faculty of Management Sciences emerging the most frequent respondents 85 (22.8%) (Table 1).

Table 1: Socio-demographic Characteristics of the students in the Study of knowledge of Malaria in University of Abuja

Parameters	Respondents (n = 373)	Percentage (%)
Age		
15 – 20	73	19.6
21 – 25	271	72.7
26 – 30	28	7.5
31 – 36	0	0
36 and above	1	0.3
Sex		
Male	168	45
Female	205	55
Faculties		
Agriculture	44	11.8
Art	17	4.6
College of Health Sciences	32	8.6
Education	14	3.8
Engineering	56	15
Law	29	7.8
Management Sciences	85	22.8
Sciences	36	9.7
Social Sciences	35	9.4
Veterinary Medicine	25	6.7

In terms of mode of transmission of malaria, the majority of the respondents 362 (97.1%) perceived

mosquitoes as the vector of transmission of malaria parasite (Table 2)

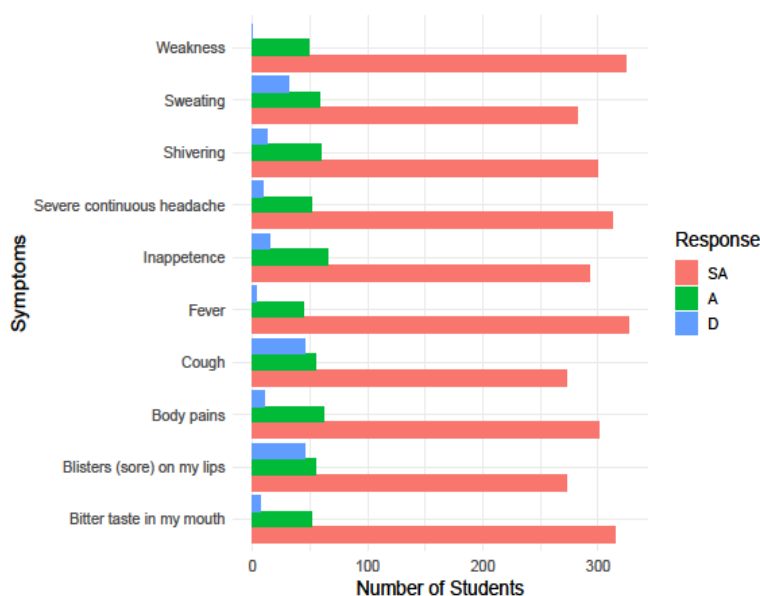
Table 2: University of Abuja Students' Knowledge of Mode of Transmission of Malaria Parasite to Man

Vectors of Malaria parasite	Respondents	%
Mosquito bites	362	97.1
Rodents' bites	1	0.3
Contact with animals (Zoonotic)	2	0.5
Man, to Man (Anthroponotic)	8	2.1

% = percentage.

Participants showed varied knowledge about the symptoms of malaria. Of the "Bitter taste in .my mouth", 315 (85%) participants strongly agreed; On 'body pains' as the main symptom, 301 (80.7%) strongly agreed; Approximately 312 (83.7%) strongly agreed on headache as the main symptom of malaria; Reduction in food intake was strongly agreed on by 292 (78.3%). On fever as the main symptom, 326 (87.4%) strongly agreed while 324

(86.9%) strongly agreed on weakness. On 'Blisters on the lips' as main symptom, 273 (73.2%) strongly agreed, 300 (80.4%) students strongly agreed on shivering, 273 (73.2%) strongly agreed on cough as a symptom of malaria while in terms of sweat as the symptom of malaria, 282 (75.6%) participants strongly agreed. The students generally had moderate knowledge (58.5%) regarding symptoms of malaria (Figure 1)



On the state of the university's health facilities, majority of the students 331 (88.7%) believed that students do not go to the school clinic because the clinic had no drugs. Furthermore, on the perception that "students do not go to the clinic because there are no doctors" majority of the students, 313 (83.9%) answered "Yes". On the

likelihood of students "purchasing drugs off-campus" as there were no pharmacies within the campus, majority 342 (91.7%) answered "Yes". The study revealed that the majority of the participants 330 (88.5%) answered "Yes" to "it was a waste of time to go to the school clinic" (Figure 2).

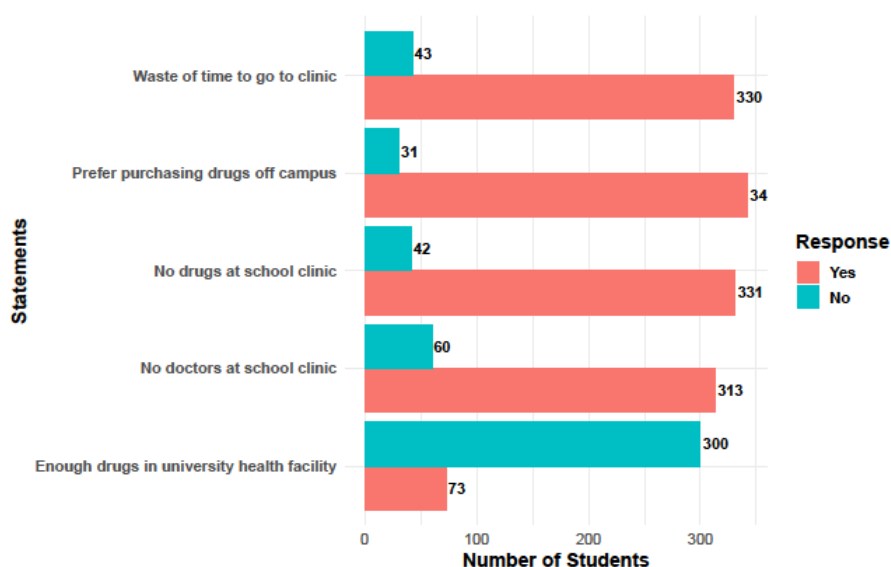


Figure 2: University of Abuja Students Perception of Health Facilities in Managing Malaria on the Campus

On the knowledge of the effectiveness of measures used to control or prevent malaria on the campus, most of the respondents 238 (63.8%) agreed to clearing of bushes around rooms and hostels. Majority of the respondents 220 (59.0%) strongly agreed to stamping out stagnant water within the campus as an effective method; When it comes to preventing malaria by periodic fumigation of the campus, majority of participants, 216 (57.9%) strongly agreed. Most participants 301 (80.7%) strongly agreed on timely removal of waste bins and refuse as a way of control and prevention of malaria; Evacuation of drainage as a control and preventive measure against malaria was agreed to by majority 228 (61.1%). The majority of the participants 299 (80.2%) strongly agreed to the use of mosquito repellent as effective in controlling malaria. The provision of netting on doors and windows was also supported by a high proportion

of participants 296 (79.4%) who strongly agreed. Education and awareness of malaria was supported by 289 (77.5%) of the participants who strongly agreed; On the use of prescription of anti-malaria drugs in the school clinic to combat malaria, 299 (80.2%) strongly agreed; Decongestion of rooms for the students as an effective tool to control malaria was strongly agreed upon by 294 (78.8%) of the participants; Majority of the respondents 290 (78.0%) strongly agreed with designing 'good lecture plans that could give students adequate rest' as an effective way to control malaria; "Provision of health workers on the campus" was regarded as an effective method of controlling malaria. The students had moderate knowledge 218 (58.5%) of the measures adopted by the school authorities to control or prevent malaria on the campus (Figure 3).

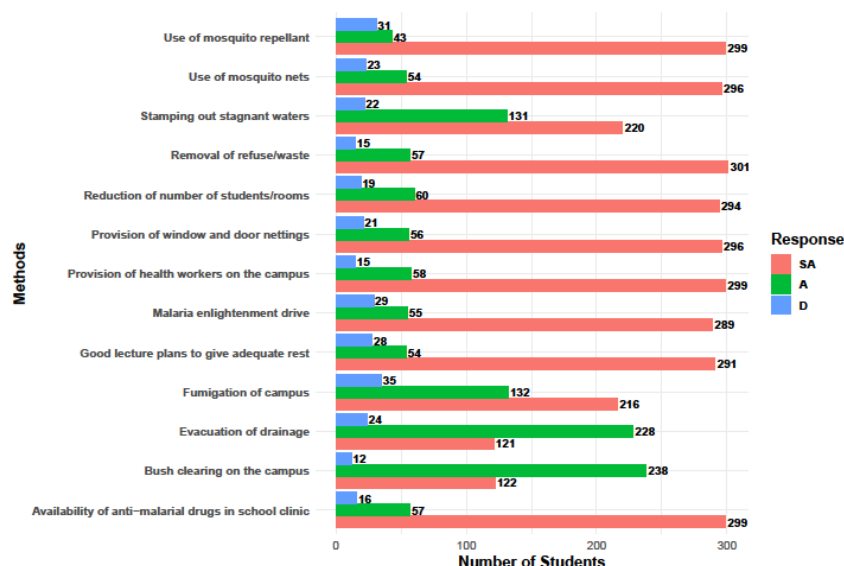


Figure 3: University of Abuja students' perception of the methods of controlling or preventing malaria

Survey on the students first approach to suspected case of malaria revealed 94 (25%) of the population self-medicate (Table 3) while on the participants

preferred medication for malaria treatment, Coartem, 305 (76.1%) was the most accepted medication (Table 3).

Table 3: University of Abuja Approach and Preferred Medication to Malaria Treatment

Factors	Responses (Yes)	Percentage (%)
First approach to malaria infection		
Self-Medication with antimalarials	94	25.2
Pain Relievers	77	20.6
Consult at the school clinic	74	19.8
Take some time off to rest	59	15.8
Steam my body and drink some herbs	38	10.2
Pray and talk to imam/pastor	23	6.2
Do some exercise	9	2.4
Preferred medication for malaria		
Chloroquine	19	5.1
Quinine	17	4.6
Sulphadoxine + Pyrimethamine	10	2.7
Herbs	22	5.9
Co-artem (Artemeter and Lumefantrine)	305	81

% = percentage

4 Discussion

All the administered questionnaire in this study were 100% returned filled. The questionnaire return rate was high and encouraging, indicating participants probable interest in the subject of the study.

The study revealed that the students have moderate knowledge of malaria. This is consistent with the previous studies of Afolayan et al., (2020), Awosolu et al. (2019) in Federal University of Technology, Minna, Nigeria and Nyahoga et al., in Tanzania (2018). Previous studies showed that moderate to good knowledge of malaria in a community is a facilitator for good personal and preventive practices (Muñoz-Laiton et al., 2024 and Naserrudin et al., 2023). Socio-demographically, majority of the respondents in

this survey were females. The respondents were mostly within the age of 21-25 years. The dominance of this age group may be due to the age of entrance to university after secondary school that makes this age group dominant on the campus. We were unable to find a plausible reason for the gender disparity in response to our questionnaire. The differences in response rate may be due to their variation in interest on the subject matter. The return rate of the questionnaire was proportionally highest from the students of Faculty of Management Science.

Regarding the knowledge of respondents about the main route of transmission of malaria parasite to man, a significant proportion of respondents (78%) regarded mosquito bites as the

primary mode. This result is consistent with the findings of Kamau et al., (2022), who, in Switzerland, reported that almost all individuals who were aware of malaria correctly associated it with mosquito bites through which the causative agent of malaria is transmitted. Malaria has long been associated with bites of female mosquito, mostly of genus *Anopheles* (Tsukushi et al., 2022) that reportedly transmit plasmodium, the causative agent of malaria (Kamau et al., 2022). This suggests a good understanding of mode of transmission. In a similar study by Takken (2022), though differing in age and education, various misconceptions about malaria have been reported. This is apparent in the insignificant small number of students in this study that perceived academic stress, heat and sunlight, consumption of bad water, congestion in rooms, poisoned food, unsanitary environment and witches as the main causes of malaria. Stress, according to the work of van Vasquez (2021) is not a cause of malaria. Similarly, superstition and traditions which are rife in the third world may be responsible for the participants' perception of witches and poisoned food as the cause of malaria but these beliefs lack scientific basis in the same way as consumption of bad water, congestion in the rooms, unsanitary environment, heat and sunlight.

These misconceptions on the mode of transmission of malaria underscores the importance of continuously educating people about malaria especially university students who live in malaria-prone areas. Sodangi (2024) posited that identifying symptom of a disease is an indication of possessing of a good knowledge of the disease. "Fever" appears to be the most commonly identified symptom of malaria by students in this study. This is in contrast to 'Headache' reported in the study of Bria et al., (2021) in a Nigerian university. Other symptoms perceived by the students variously included bitter taste in the mouth, body pains, reduction in level of food intake, coughing, blisters in the mouth. It is important to note that although fever is a likely symptom of malaria, it may also be due to other non-malarial illnesses. It is therefore advisable that proper malaria diagnosis according to Ngaba et al. (2022) be conducted in order to prevent non-specific drug use.

The majority of the respondents in this survey perceived the state of the health facilities in the university as inadequate or non-existent. This is attested to, by more than 4/5th (85.0%) of the students who considered "going to the school clinic for malaria treatment as a waste of time" just

as more than 80% (83.7%) of the students "Don't bother going to the school clinic because they have "no drugs nor doctors". Since the facility seldom has the required drugs, more than four-fifth of the respondents to "prefer purchasing drugs off campus instead of going to the school clinic. These practices could lead to a culture of indulgence in self-medication and drug abuse. Inadequate budgetary allocation to the campus health sector may be responsible for the obvious infrastructural and personnel gap of the facility.

Most students believed timely removal of wastes around their hostels could help prevent mosquito breeding sites and consequently reduce malaria infections. Their perception tallies with the findings of Agyemang-Badu (2023) that suggested maintaining clean environment, instant removal of bins, draining stagnant water, and clearing bushes around homes as effective measures of control and prevention of malaria

On the students approach at treating malaria, a quarter of the participants chose self-medication, while a little over one-fifth of the participants in the survey used only pain reliever. This is consistent with the reports of self-medication with over-the-counter medicines by students as the primary method for early malaria treatment (Bankole et al., (2023). Self-medication is reported to be a global concern among professionals and non-professionals, with a rapid increase in prevalence. In a study on students in Iran conducted by Alomoush et al., (2024), about 75.40% of the participants reportedly use medications without professional prescription. Of these medications, analgesics were the most commonly used (82.80%), while the most common symptom necessitating such abuse was headache (81.50%). "Lack of time to consult a physician" has often been cited by the students as a reason for their indulgence in self medication while majority of them based their choice of medication on their knowledge of "previous prescription" (Alomoush et al., 2024). Self-medication is reported to be a prevalent practice among students in higher education institutions in Nigeria (Jibo et al., 2021). Self-medication and early fever treatment were also identified by Zalwango et al., (2025) as likely challenges to early diagnosis and proper treatment of malaria particularly when patients relied on medication purchased on a perceived-need basis to alleviate symptoms. This study suggests that among other likely reasons of indulging in non-prescription medications, the students may be in the habit of tolerating the symptoms of the disease before consulting the school clinic. This is

consistent with the observation of Chokkara et al. (2022) who noted that outpatients in New Delhi did not approach the doctor until they were critically ill with fever for three days.

The majority of the students in this study appeared to believe in the efficacy of the contemporary anti-malarial drugs. This is demonstrated by their choice of artemether and lumefantrine, a relatively newer formulation, over older ones in the market such as chloroquine, sulphadoxines, quinine, and herbs. Although resistance to some of these older drugs have been reported, their success rate in the treatment of malaria is considered still high Alghamdi et al., (2024). Despite their efficacy, majority of the students still preferred the newer generation anti-malarial probably due to their lack of bitter taste in the mouth. Surprisingly, those that preferred herbs in this study were comparatively high and next only to those with preference for artemether and lumefantrine. This preference for herbs is consistent with the study of Tabuti et al., (2023) where significant number of students chose herbs as their preferred method of treating malaria. The relatively high preference for herbs suggests a belief in their efficacy in malaria treatment. Their acceptance may be due to their relative availability on the campus and the low budget involved in its preparation.

4.1 Limitation

The differences in comprehension of the questionnaire among the respondents despite the training of the questionnaire administrators administering them during students break time which created bias towards sampling were limitations to our study as some students may not be present in the class during the time of sampling. Sampling only during the break time when only a fraction of the students were in the class, may therefore have returned a result that does not reflect the sentiments of the entire students. The relatively small sample size in this study is not enough to draw a decisive conclusion on the entire students population.

5 Conclusion

Our study suggested that the resident undergraduate students of University of Abuja, Nigeria generally had moderate knowledge of malaria transmission and perception of the various methods of controlling and preventing malaria. Possession of moderate knowledge suggest existence of misconceptions and gaps in

knowledge of the disease. Such gaps may lead to sustenance of reservoir status for the disease and continuous re-infection in the populace.

The study suggested students belief in efficacy of co-artem (Artemether and Lumefantrine), mostly done through self-medication as the study suggests that majority of the respondents uphold such practice. The study also suggested that a good percentage of the students resort to herbal treatment probably due to their perception of the conventional medications as rather expensive while attending the university healthy facilities as time wasting.

We recommend therefore, a continuous improvement on the facilities at the school clinic, a concerted public health education and awareness drive on malaria to the students of University of Abuja to bridge these gaps and improve on their misconceptions.

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We received no fund from any commercial, public nor non-profit organization for this study.

5.2 CRediT authorship contribution statement

Abdulrahman Musa Adeiza, Esther T. Ekanem and Salma Musa Adeiza: Conceptualization, Writing – original draft, Methodology, Investigation, Formal analysis; Donken Ikwe Ajogi, Abdulrahman Adeiza, Salma Musa Adeiza and Esther T. Ekanem: Validation, Design of questionnaire and administration protocol, Methodology, Formatting and Validation of questionnaire; Formal analysis; Abdulrahman M. Adeiza, Esther T. Ekanem, Salma Musa Adeiza and Donken Ikwe Ajogi: Manuscript Writing – review & editing, Validation, Supervision, Project Administration.

5.3 Data availability

Data is available on reasonable request

5.4 Declaration of Competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

5.5 Consent for publication

All the authors have approved the submission of this work.

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