



# Knowledge, perception & practice of malaria management among non-medical students of higher institutions in Osun State Nigeria

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## ABSTRACT

**Background:** Malaria is an infectious disease caused by eukaryotic protist of genus *Plasmodium* and transmitted by female *Anopheles* mosquitoes. Those living mainly in the world's poorest countries are at risk of malaria infection as it is more endemic in the tropical and sub-tropical regions. Malaria transmission have been linked to environmental changes, malaria vector dynamics, host immune status and individual or community factors such as the socio-economic status, knowledge of malaria and the protective behaviour. **Objectives:** To assess knowledge, perception and practice of malaria management among non-medical students of higher institutions in Osun State, Nigeria. **Materials and Methods:** An open-ended structured questionnaire was administered consecutively to 1195 consenting non-medical students by interviewer at various higher institutions. Data for the cross-sectional study were collected from July 2014 till March 2015 while analysis was done in April 2015. **Results:** The mean age (SD) was 22.8 (12.7) years. Seven hundred and thirty three respondents (61.3%) are male while four hundred and sixty two respondents (38.7%) are female. 1080 students (90.4%) reported that malaria can be cured. 130 students (10.9%) understand malaria prophylaxis to be a preventive treatment of malaria and 194 students (16.2%) said Artemisinin-based Combination Therapies (ACTs) are the most effective among the drugs they have used to treat malaria. **Conclusion:** Non-medical students have relatively reasonable knowledge about malaria management and practices, they do not well understand certain aspects, probably due to the scope of their educational curricula. Hence, there is need to intensify malaria public enlightenment programmes and promote affordable treatment.

**KEY WORDS:** Malaria; Student; Mosquito; Management.

## INTRODUCTION

Malaria, one of the most important causes of morbidity in the world, is a vector-borne infectious disease caused by a eukaryotic protist of the genus *Plasmodium*. Malaria is transmitted by female *Anopheles* mosquitoes which carry infective sporozoite stage of *Plasmodium* parasite in their salivary glands [1]. Malaria is a serious disease that causes a high fever and chills. The disease is transmitted by an infected female *Anopheles* mosquito bite. The mosquito would have been infected with the parasites before transmission. Malaria transmission have been linked to environmental changes, malaria vector dynamics, host immune status and individual or community factors [2]. The burden of malaria or estimated cases of malaria is reported worldwide to be between 350 – 550 million, with over 80% occurring in Africa. The treatment of malaria depends on the severity of the disease. Uncomplicated malaria may be treated with oral medications. The most

effective strategy for *Plasmodium falciparum* infection is the use of artemisinins in combination with other antimalarials (known as artemisinin-combination therapy, or ACT), which reduces the ability of the parasite to develop resistance to any single drug component [3]. A 2011 study revealed that 64% of respondents said malaria can lead to death, 85% stated malaria manifests with fever, headaches/body pains and 59% know about and are using prophylactic malaria drugs [4]. A 2010 research in Tanzania, reported that artemether-lumefantrine was the most common antimalarial therapy used and health facilities were the first option for malaria treatment as said by 47.3% respondents [5].

In Colombia, the authors of a 2014 study stated that 89.3% respondents said malaria can be cured using tablets. 52.8% of the respondents stated fever, 17.8% stated headache while 15.0% stated chills as malaria symptoms [6]. Another 2010 Indian study reported that the respondents had

partially correct understanding of malaria transmission, treatment and prevention [7]. Also, a 2008 study in Abeokuta, Nigeria, reported 65% of the participants had three to four episodes of malaria per year. 27% stated general body pain and headaches as symptoms associated with malaria [8]. Another 2013 study in Nigeria, stated that 40.1% of respondents visited hospital for malaria treatment, 57% said malaria is caused by malaria parasite, 50.9% used ACTs in malaria treatment and 27.4% stated fever, chills, vomiting, body ache and headache as symptoms of malaria [9].

Inadequate knowledge and misconceptions about the transmission, as well as, the management of malaria, have been reported among various strata of the society especially students studying non-medical courses, with the notion that these category of people have little or no idea about this subject matter, which thus affect their malaria control measures, probably because of variation in courses offered. This study is therefore designed to assess knowledge, perception and practice of malaria management among non-medical students of higher institutions in Osun State, Nigeria.

## **MATERIALS AND METHODS**

### **STUDY SITE/SUBJECT SELECTION/STUDY DESIGN**

The cross-sectional survey study utilizing both qualitative and quantitative method of data collection was conducted at various higher institutions across Osun State, Nigeria. Participation was voluntary and informed written consent was obtained by participants' signing the consent form attached to the questionnaire. Names of participants were not included in the information requested. Data for the study were collected from July 2014 till March 2015 (a period of nine months). Data analysis was done in April 2015. The structured questionnaire was administered to 1195 consenting non-medical students by interviewer in each of the institutions. Simple random sampling was used to randomly select the required number of participants (students not in any medical related field) till the required number of willing participants is recruited. The questionnaire contained sections including socio-demographic data, knowledge about malaria management, knowledge about causes of malaria and practice of malaria management. The data collected through the questionnaire were statistically analyzed using Statistically Package for the Social Sciences (SPSS) for windows version 20.0 software. Frequency counts were generated for all variables and statistical tests of significance was performed with chi square test. Significance was fixed at  $P < 0.05$  and highly significant if  $P < 0.01$ .

### **SAMPLE SIZE**

Sample size calculation was done using 95% confidence interval, 0.02 precision and prevalence rate. A 2011 study on

the malaria morbidity in Akure revealed that 87.32% of the sampled populations in Akure Township have experienced malaria [10]. The formula for sample size when population is more than 1000 is:  $n = Z^2PQ/d^2$  [11, 12].

$$n = Z^2PQ/d^2$$

Where:

n = minimum sample size,

Z = standard normal deviation at 95% confidence interval which is 1.96,

d = degree of precision (taken as 0.02),

P = proportion of the target population or prevalence of malaria

(estimated at 87.32% which is  $87.32/100 = 0.8732$ ),

Q = alternate proportion (1-P) which is  $1-0.8732 = 0.1268$

$$n = \frac{(1.96)^2 (0.8732)(0.1268)}{(0.02)^2} = 1063$$

## **RESULTS**

### **SOCIO-DEMOGRAPHIC DATA**

A total of 1195 consenting higher institution students located within the state participated in the study. The mean age (SD) was 22.8 (12.7) years. 981 students (82.1%) are between ages 18 – 25 years. Seven hundred and thirty three (61.3%) of the respondents are males while four hundred and sixty two (38.7%) are females.

Nine hundred and forty five (79.1%) of the students are Christians with 250 (20.9%) being Muslims. 239 (20.0%) students are in Accounting Department, 199 (16.7%) in Law, 194 (16.2%) in Civil Engineering, 167 (14.0%) in Computer Science, 156 (13.1%) in Economics, 81 (6.8%) in Mathematics, 80 (6.7%) in Agricultural Economics and Extension, as well as, 60 (5.0%) in Science Laboratory Technology.

### **KNOWLEDGE ABOUT CAUSES OF MALARIA**

Six hundred and eighty five (57.3%) agreed that malaria parasite belong to the Genus Plasmodium while 158 (13.2%) disagree, with others deciding not to respond. Of those that know about Plasmodium and the various species that cause malaria infection in human, 173 (14.5%), 58 (4.9%), 44 (3.7%) and 50 (4.2%) listed Plasmodium falciparum, Plasmodium vivax, Plasmodium ovale and Plasmodium malariae respectively. 173 students (14.5%) knew Plasmodium falciparum is the most common species that cause malaria infection. 153 students (12.8%) stated microscopy as the most commonly used laboratory method to detect malarial parasite.

130 students (10.9%) understand malaria prophylaxis to be a preventive treatment of malaria. Majority (more than

## KNOWLEDGE ABOUT MANAGEMENT OF MALARIA

	Yes		No		No Response	
	Frequency	%	Frequency	%	Frequency	%
Malaria can be cured	1080	90.4	47	3.9	68	5.7
Malaria can lead to death	995	83.3	108	9.0	92	7.7
There is vaccine against malaria	299	25.0	681	57.0	215	18.0

two-thirds) of the students listed signs and symptoms of malaria to include headache, fever, vomiting, nausea, pain, chills, loss of appetite, body weakness etc, with at least one sign/symptom mentioned by most of the students.

## PRACTICE OF MALARIA MANAGEMENT

Fifty three (4.4%) students reported they had been diagnosed of malaria infection within the last six months. Most of them were reportedly diagnosed by Clinicians in their school clinics following laboratory test result obtained. Generally, during the last diagnosis of malaria, 147 (12.3%) used Artemisinin-based Combination Therapy (ACT) mainly artemether and lumefantrine while 72 students (6.0%) used Non-ACT mainly sulfadoxine-pyrimethamine (fansidar), with certain 23 students (1.9%) reported to have used chloroquine.

Most of the drugs used by the students for the last bout of malaria, were received from the school clinic and patent medicine store, with 145 (12.1%) receiving their drugs from the school clinic while 280 (23.4%) students got their drugs from patent medicine store. 68 (5.7%) reported self-medication. 194 students (16.2%) felt in their own judgement, ACTs mainly referred to as coartem/lonart, are the most effective among the drugs they have used to treat malaria. 115 students (9.6%) claimed it is fansidar, while 32 (2.7%) said chloroquine is the most effective.

In summary, the average percentage knowledge score was based on the total number of correct responses by respondents. An average score of 46% was obtained as the average percentage of correct responses provided to

questions asked the respondents. The study methodology rating scale of percentage knowledge score, classified an average score below or equal to 39% as poor knowledge, 40 – 49% rated fair knowledge, 50 – 59% rated average knowledge, 60 – 69% rated good knowledge, while 70% and above is classified as excellent knowledge. Based on this rating, the students are rated as having average knowledge about the management of malaria as well as the practice of the disease management.

## DISCUSSION

Our finding that 12.8% stated microscopy as the most commonly used laboratory method to detect malarial parasite could be due to widespread use of antigen-based Rapid Diagnostic Tests (RDTs) in most laboratories/clinics making microscopy technique less popular among the entire populace day after day. 90.4% respondents that reported malaria can be cured is similar to the 2014 Colombian study, which stated 89.3% respondents said malaria can be cured using tablets [6]. The finding that 83.3% said malaria can lead to death is slightly similar to that reported by a 2011 research that revealed 64% of respondents said malaria can lead to death [4].

Our research outcome that 10.9% of the students understand malaria prophylaxis to be a preventive treatment of malaria, is contrasting to that reported by the 2011 study which stated 59% know about and are using prophylactic malaria drugs [4]. The low outcome regarding malaria prophylaxis may be as a result of course curriculum difference across various respondents' programmes. Also,

**Table 1.** Relationship between Academic Level with Availability of Vaccine Against Malaria

Academic Level	Availability of vaccine against malaria			Total
	Yes	No	No Response	
First Year	70	184	48	302
Second Year	54	135	44	233
Third Year	67	155	49	271
Fourth Year	30	45	15	90
Fifth Year	15	44	8	67
Ordinary National Diploma (OND)	33	39	14	86
Higher National Diploma (HND)	30	79	37	146
Total	299	681	215	1195

$\chi^2 = 92.868$ ,  $p$ -value = 0.001

our finding that more than two-thirds of the students listed signs and symptoms of malaria to include headache, fever, pain, chills, loss of appetite, body weakness etc, probably is as a result of the fact that they have experienced some of them previously in course of having malaria infection. This finding is corroborated by the 2011 study that reported 85% of respondents stated malaria manifests with fever, headaches and body pains [4]. It is however not in agreement with the report of the 2014 Colombian research that stated 52.8%, 17.8% and 15.0% of respondents indicated fever, headache and chills as malaria symptoms [6], and the outcome of another 2008 research which showed 27% of participants stated general body pain and headaches as symptoms associated with malaria [8]. These findings do not concur with the 2013 study outcome that indicated 27.4% of respondents stated fever, chills, vomiting, body ache and headache as symptoms of malaria [9].

Our findings also revealed that 4.4% students reported they had been diagnosed of malaria infection in the past six months. This could be as a result of the fact that the respondents have more knowledge about the various ways of malaria prevention or due to cases of malaria not adequately reported [8]. Most of the drugs used by the students for the last bout of malaria were received from the school clinic (12.1%) and patent medicine store (23.4%) respectively. This finding is does not correspond with the 2013 study outcome that reported 40.1% respondents visited hospital for the treatment of malaria [9], as well as the 2010 study carried out in Tanzania, which found out that health facilities were the first option for malaria treatment as said by 47.3% respondents [5]. During the last diagnosis of malaria, 12.3% of the students used Artemisinin-based Combination Therapy (ACT) mainly artemether and lumefantrine, while 6.0% used Non- Artemisinin based Combination Therapy mainly sulfadoxine-pyrimethamine (fansidar), with certain 1.9% reported to have used chloroquine. This is related to the findings of the 2010 Tanzanian research which reported that artemether-lumefantrine was the most common antimalarial therapy used [5]. With a 16.2% proportion of students naming Artemisinin-based Combination Therapies (ACTs) as the most effective among drugs used to treat malaria, may be because ACTs are now widespread in various clinics and patent medicine stores, and perhaps, they are the most common antimalarial drugs available in recent years, as non-ACTs are largely no longer recommended. Also, it could be because of resistance issues that have made other previously used drugs to be less popular in recent times. This study rated the students as having fair knowledge about the management of malaria as well as the practice of the disease management, this is similar to the 2010 Indian research that indicated that the respondents had partially correct understanding of malaria transmission, treatment and prevention [7].

Major aspects of the knowledge, perception and practice of

malaria management that the students seem to have done poorly include species of plasmodium that cause malaria infection in human, the most common species that cause malaria infection, the most commonly used laboratory technique to detect malaria parasite, information about malaria prophylaxis, most effective antimalarial drugs currently used, among others, as substantial number of students have some knowledge gap in these areas. This was largely responsible for the eventual fair knowledge outcome. This could be due to the fact that majority of the students either have such knowledge gap because they do not have a science-based background or have not given more attention to the issue of malaria infection, especially as their courses curricula do not cover the field.

## CONCLUSION

In conclusion, non-medical students have relatively reasonable knowledge about malaria treatment/management and practices, although, certain aspects such as information about malaria prophylaxis, species of plasmodium that cause malaria infection in human, the most common species that cause malaria infection, the most commonly used laboratory technique to detect malaria parasite, among others, are still not well understood, probably due to the scope of their educational curricula. Thus, because sizeable proportions of the society are students, to achieve total elimination of malaria disease in this environment, the practice of proper malaria management among students must be improved tremendously. This can be achieved by intensifying malaria public enlightenment programmes and promoting affordable preventive measures.

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