www.ajbrui.org

Afr. J. Biomed. Res. Vol. 26 (May 2023); 223- 229

Research article

Malaria Illness Experiences and Health-Seeking Behaviours among In-school Adolescents in Ibadan North Local Government Area, South-west Nigeria

Famoyegun J.D.[1], Ogunwale A.O.[2]

[1]*Department of Health Promotion and Education, Faculty of Public Health, University of Ibadan, Nigeria.*
[2] *Department of Public Health, College of Health Sciences, Bowen University Iwo, Osun State, Nigeria*

ABSTRACT

The burden of malaria among In-School Adolescents (ISAs) is enormous; yet, their malaria-related illness experiences and health-seeking behaviours have not been adequately explored. The study investigated malaria-related illness experiences and health seeking behaviours among ISA in Ibadan North Local Government Area (IBNLGA), Oyo State, Nigeria. The study was conducted in both private and public secondary schools located in IBNLGA, Oyo State, Nigeria. A descriptive cross-sectional design was adopted and a four-stage sampling technique was used to select 430 ISAs from 12 secondary schools. A self-administered questionnaire was used to collect data. Data were analyzed using descriptive statistics, chi-square test and logistic regression at p=0.05. Respondents' age was 14.5±2.2 years and 82.7% were from public schools. Most (99.8%) respondents had ever-experienced malaria and 51.8% of them reportedly had malaria within the three months preceding the study. Majority (83.1%) claimed to own a mosquito net; however, only 48.5% use it daily. Treatment pathways adopted by respondents during malaria episodes included: visiting hospital to receive treatment (76.1%); using drugs purchased from patent medicine vendors (70.7%), and use of herbs (66.9%). Significant associations were noted between respondents' sex, age and class and their health seeking behaviour with their respective p-values being 0.023, 0.001 and 0.013. Malaria is a common disease among the in-school adolescents; yet use of mosquito nets among them was not overwhelming. Furthermore, unreliable malaria treatment practices were common among them. Health education interventions including training and advocacy relating to consistent use of net and appropriate malaria-related health-seeking behaviours are recommended.

Keywords: *In-school adolescents; malaria-related health-seeking behaviour; malaria prevalence, Malaria illness experiences.*

**Author for correspondence: Email: tayoogunwale@gmail.com; Tel: +234-7062241984*

Received: June 2022; Accepted: February 2023

DOI: 10.4314/ajbr.v26i2.11

INTRODUCTION

Malaria, a parasitic disease caused by various species of Plasmodium (Ajero *et al*., 2015), is a commom cause of morbidity nad mortality in areas where it is endemic. The disease poses an enormous burden on much of the world's population (Zoghi *et al*., 2012). In 2018, an estimated 228 million cases of malaria occurred worldwide and an estimated 405, 000 deaths were reported (WHO, 2018). In Africa the commonest cause of the most severe form of malaria is *Plasmodium falciparum*, which is transmitted by the female anopheles mosquitoes (Snow *et al*., 2005). According to the world malaria report of 2019, most (93%) malaria cases in 2018 occurred in the African region. It was also noted that the Africa region accounted for 94% of malaria related mortality worldwide (WHO, 2019). The burden of the disease is particularly very great in sub-Sahara Africa. It has been reported that 15 out of the 91 countries that reported indigenous malaria cases to WHO in 2016 were in sub-Saharan Africa. Together sub-Saharan African countries accounted for 80% of the global malaria burden (WHO, 2017).

Nigeria is one of the sub-Saharan African countries with a high prevalence of malaria; this is in spite of the fact the disease is preventable, treatable and curable. The wet and humid weather conditions in Nigeria coupled with the prevailing poor environmental sanitation create opportunities for the breeding of mosquitoes, the vectors of the causative agents, and continuous transmission of malaria. Nigeria is one of the six countries that account for more than half of all malaria cases globally, with the country alone contributing 25% of the global burden of the disease (WHO, 2019). Approximately 30% of the Nigerian population is known to reside in areas of high to very high malaria transmission intensity while 67% reside in the moderate transmission zone

(FMoH, 2009). In-School Adolescents (ISAs) are, like other school populations, vulnerable to the malaria in endemic communities. It has been reported that the disease accounts for much of the deaths among school-aged children in Africa (Snow *et al*., 2003).

Prompt diagnosis and treatment is the most effective means of preventing the progression of malaria from the simple form to the severe form which readily lead to death (WHO, 2015). Relatively recent initiatives which have contributed tremendously to the global malaria treatment and control in endemic communities include the adoption of Artemisinin Combination Therapy (ACT), and the uptake of the Insecticide Treated nets (Pousibet-Puerto *et al*., 2016). In-School adolescents in secondary schools in Ibadan North Local Government Area (IBNLGA) aged ≤19 years constitute the focus of this study. Adolescents are young person's transiting from childhood to adulthood whose ages range from 10-19 years (WHO, 2020). It is a period that is subject to the influence of a variety of individual, socio-cultural and environmental factors (Okereke, 2010). Some of these factors also have implications for the prevalence of malaria among adolescents in endemic communities. In IBNLGA the prevailing socio-cultural and physical environmental conditions in which many adolescents live expose them, to malaria.

The burden of malaria among ISAs is enormous and it includes the following: anemia, school absenteeism and adverse effects on cognitive functioning (Ohlin, 2012). The health seeking behavious of persons in malaria endemic areas have been documented in many parts of Nigeria to some extent (Chinweuba *et al*., 2017; Dave-Agboola & Raji, 2018). Health seeking behaviours can be explained as behaviours which are associated with how populations engage with health systems and how individuals engage with health services (Dupas, 2011). It is a process which involves multiple steps relating to how people respond to illness. Poor malaria related health seeking behaviour has been reported among in-school populations in Nigeria. For insance, use of Insecticide Treated Net (ITN) was found to be low among secondary school students in Zaria (Aliyu & Alti-Mu'azu, 2009). Self-medication was reported to be common malaria treatment option among University students in South-South Nigeria (Adeyemo *et al*., 2014). However, the malaria related health seeking behaviours among In-school adolescents in IBNLGA have not been well explored. The need to understand the malaria related health seeking behaviour and the burden of the disease─among ISAs in this IBNLGA cannot be over emphasized; this is more so because the Local Government Area (LGA) which is located in the rain forest belt is one of the malaria endemic zone in southwestern Nigeria. Such information is potentially useful for designing appropriate school-based malaria prevention and control interventions and the formulation of evidence-based school policies geared towards promoting the primary health care management of malaria among ISAs

MATERIALS AND METHODS

Study design: The study was a descriptive cross-sectional survey. It was limited in scope to the investigation of malaria illness experiences and health-seeking behaviour among ISAs in IBNLGA, Oyo State, Nigeria.

Study population and Setting: The study population comprised ISAs who were from junior and senior secondary schools in IBNLGA. The study was carried out among ISAs in secondary schools in IBNLGA. The LGA is one of the five Metropolitan LGAs in Ibadan. The LGA has a land area of 27km² and an estimated population of 400,878 based on the 2006 population census using a growth rate of 3.4%. The LGA, which consists of 12 wards, is located in the tropical rain forest belt of south western Nigeria. There are several environmental conditions or factors which favour the breeding of mosquitoes in the LGA. These factors include presence of stagnant water, containers which hold water, streams, blocked gutters and poor drainage systems.

The educational institutions in the LGA include primary, secondary and tertiary educational establishments. The primary and secondary schools are either public or private institutions. A typical secondary school in Oyo State consists of two components (a junior and a senior secondary school) which usually co-exist in the same premises but are run by different principals or administrators. A Junior Secondary School (JSS) consist of classes often called JSS 1, JSS2, and JSS3 with each class, in many cases, having two or more arms; similarly, a Senior Secondary School (SSS) consists of classes labeled as SSS1, SSS2, and SSS 3 with each class having two or more arms. The public tertiary educational and health establishments in the LGA include the following; University of Ibadan, Ibadan Polytechnic, a branch of the Open University of Nigeria, and the University College Hospital (a teaching Hospital). The formal health care facilities that address the malaria treatment needs of people in the LGA include the following: primary health care centres owned by the Local Government, private clinics, and pharmacies. There are also numerous Patent medicine Vendors' (PMV) stores, herbal stores/homes and itinerant drug peddlers which constitute informal sources of health care especially for persons who engage in self-care practices or prefer alternative health care systems. Most formal and informal health care establishments in the LGA provide malaria related services to their clientele

Sample size and Sampling procedure: The sample for the study was calculated to be 430 using sample size formula for a single cross-sectional survey recommended by Pourhoseingholi *et al* (2013). The respondents were recruited using a four-stage sampling technique. The first stage involved the selection of 50% of the 12 wards in the LGA by balloting; this resulted in the selection of six wards. In the second stage, secondary schools in the selected wards were stratified into public and private schools; subsequently, two schools (i.e., one public and one private school) were randomly selected from each of the selected wards. Overall, 12 secondary schools (six public and six private schools) with both junior and senior classes were selected. In order to arrive at the appropriate sample for each school, the determined sample size (430) was shared among the 12 schools proportionately. In the third stage, an arm of a class was randomly selected from each of the classes in the selected

schools cutting across JSS1, JSS2, SS1 and SS2; this procedure was facilitated by balloting. The JSS 3 and SS3 classes were excluded from study because they were about to sit for their external examinations. The fourth and the final stage of the sampling process involved the selection of students from each of the selected arms of the various classes through systematic random sampling facilitated by use of their class registers.

Instrument for data collection: The researcher-designed self-administered questionnaire designed to facilitate data collection contained questions framed to elicit respondents' socio-demographic characteristics, malaria related illness experiences and health seeking behaviours. Steps were taken to ensure the validity and reliability of the questionnaire for data; these steps included the following: review of related literature; selection of study variables; framing of questions guided by the formulated objectives; review of the draft instrument by three experienced researchers in the fields of community medicine and epidemiology with a view to improving its quality; and pretesting of the instrument among forty-three secondary school students (i.e. 10% of the study sample) in Ibadan North West LGA. Ibadan North West LGA where the pretest exercise took place shares similar characteristics with IBNLGA. The data generated from the pretest were analyzed and the results were used to fine-tune the instrument. The Cronbach's Alpha coefficient technique of Statistical Package for Social Sciences (SPSS) was used to ascertain the reliability of the instrument in terms of its internal consistency. A Cronbach's Alpha coefficient score of 0.7 was obtained indicating that the instrument was reliable.

Data collection procedure: Copies of the questionnaire were administered to the participants with the help of four trained Research Assistants (RAs) who were all university graduates. The RAs had previous experiences relating to the conduct of research interviews or data collection. The RAs were, not withstanding, subjected to a three-hour training which covered issues that included the following: objectives of the study; content of the questionnaire; appropriate school community entry procedures; ways of establishing rapport with research participants; and ethical issues that must be respected while conducting the study. In situations where the study participants needed any clarification and guidance in filling the questionnaire the RAs were available to provide necessary help. The RAs collected all the filled copies of the questionnaire from the participants before leaving the field. Seven completed copies of the questionnaires were not well completed and so were discarded leaving a total of 423 copies of the questionnaires.

Data analysis: The administered copies of the questionnaire were re-checked for completeness and a serial number was assigned to each for easy identification and recall. A manual coding guide was developed to facilitate data entry into a computer. Each copy of the questionnaire was coded, guided by the developed coding guide, and entered into a computer. A 13-point practice scale which was an integral component of the questionnaire was used to measure respondents' health-seeking behaviour. Practice scores of <6 and ≥6 was categorized as "*poor"* and "*good"* health-seeking behaviour respectively. Descriptive statistics used to analyze the data included mean, frequency distribution and percentages. Chi-square test and logistic regression method were used to test the association between dependent and independents variables at a level of significance set at 0.05.

Compliance with Ethical Standards: Ethical approval to conduct the study was obtained from the Oyo State Ethical Review Committee. In each school, permission to conduct the study was obtained from the principal. Prior to enrolment to be involved in the study, all the eligible participants <18 years were given informed consent forms to give to their parents or guardians; this was done a day or two before the day of the interview. On the day of actual data collection each student <18 years was requested to submit the informed consent form signed by a parent or guardian. Additionally, each student <18 years was requested to provide assent before being allowed to participate in the study. For the students aged ≥18years they were required to personally provide written informed consent on the day of the interview before being involved in the study. All the participants were briefed about the following relating to the study: the purpose and processes involved in the study, voluntary nature of participation; lack of any adverse consequences of participating; freedom to withdraw from the study at any time without loss of any privilege; and the potential benefits of participating in the study. Participants were assured that information volunteered by them would be kept confidential.

.

RESULTS

Socio-demographic information: The socio-demographic characteristics of the participants relating to age, sex, type of school, religion, class, ethnicity and type of family are presented in Table 1.

Table 1
Respondents' Socio-Demographic Characteristics (N= 423).

Demographic Characteristics		No	%
Respondent's age*	10-12	79	18.7
	13-14	148	35.0
	15-16	110	26.0
	17-19	86	20.3
Sex	Male	210	49.6
	Female	213	50.4
Type of School	Private	73	17.3
	Public	350	82.7
Religion	Christianity	290	68.6
	Islam	128	30.3
	Traditional	5	1.2
Class	JS 1	98	23.2
	JS 2	110	26.0
	SS 1	103	24.3
	SS 2	112	26.5
Ethnicity	Yoruba	350	82.7
	Igbo	46	10.9
	Others**	27	6.4
Type of family	Monogamy	348	82.3
	Polygyny	75	17.7

**Mean Respondents' Age= 14.5 ± 2.2 years*
***Others: South-South ethnic minorities-13(48.2%), Middle Belt ethnic minorities-(33.3%), Hausa 5 (18.5%)*

Overall, the ages of the 423 ISAs ranged from 10-19 years with a mean of 14.5 ± 2.2 years. Respondents within the 13-14 years age group topped the list (35%.0), followed by those in the 15-16 age group, (26%.0). The results showed that 23.2% of the respondents were in JSS1 while 26.0% were in JSS2. The results also showed that 24.3% were from SS1 and 26.5% were from SS2. Majority (82.7%) of the respondents belong to the Yoruba ethnic group, 68.6% were Christians, and 82.3% were from monogamous families.

Malaria related illness experience, control/ prevention measures and health-seeking behaviour: Nearly all the respondents (99.8%) had ever experienced malaria in their life time. Respondents who had malaria within the three months preceding the study constituted 68.1%, while 31.5% of the respondents reportedly experienced malaria more than once within the three months preceding the study (see figure 1 for more details).

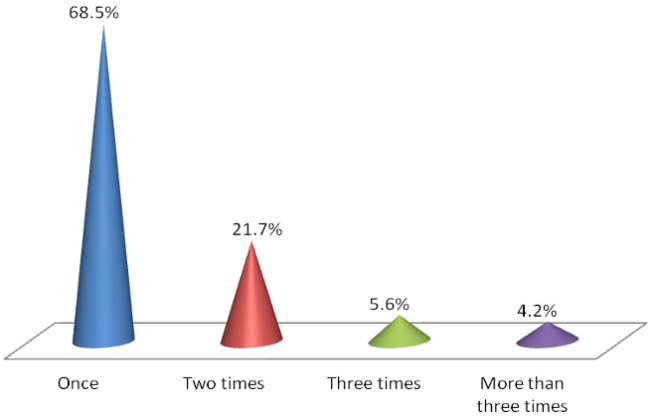

Figure 1:
Frequency of experience of Malaria within the three months

Table 2
Number of Nets owned by Respondents' Family and Pattern of use of mosquito net (n = 373)

Number of nets owned and pattern of use		No	%
***Number of nets owned by family**	One	19	5.2
	Two	70	19.1
	Three	89	24.3
	Four	77	21.0
	Five	53	14.4
	More than five	58	15.9
***Pattern of use by respondents**	Daily	181	48.5
	Sometimes	66	17.7
	Rarely	103	27.6
	Never	23	6.2

**mean= 3.39±2.09 **range=10*

Three hundred and seventy-three (88.4%) respondents had at least a mosquito net in their houses/at homes. Of this, less than half (48.5%) regularly slept in a mosquito net every day, while 6.2% never slept in their mosquito nets. A majority (94.7%) of the respondents' families owned two or more nets. The details of the number of nets owned by respondents' families and pattern of use of mosquito nets are shown in table 2. There was a probe into the reasons adduced by respondents for not sleeping under a mosquito net in the night preceding the study; the reasons given included the following: excessive heat (36.7%); dislike for sleeping under a net (28.5%) and inconvenience (20.3%) (see table 3 for more details).

Table 3
Reasons adduced by respondents for not sleeping under a mosquito net during the night preceding the study

N = 158

Adduced reasons	No	%
Excessive heat	58	36.7
Dislike sleeping under the net	45	28.5
Not convenient	32	20.3
Skin Irritation	22	13.9
Eye pain	1	0.6

Table 4
Technologies/materials used by respondents to eliminate/control mosquitoes (N =423)

Technologies/materials used	Responses*	
	Yes (%)	No (%)
Mosquito coil	353 (83.5)	70 (16.5)
Insecticide Treated Net	315 (74.5)	108 (25.5)
Insecticide spray	313 (74.0)	110 (26.0)
Removal of mosquitoes breeding sites	265 (62.6)	158 (37.4)
Mosquito repellant cream	256 (60.5)	167 (39.5)
Ordinary mosquito net	224 (53.0)	119 (47.0)

**multiple responses*

Table 5
Malaria treatment seeking pathways or practices adopted by respondents (N = 422)

Malaria treatment seeking pathways or practices adopted by respondents	Number*	%
Going to the hospital to receive treatment for malaria	322	76.1
Buying of drugs from Patent medicine Vendors (Chemist)/ Pharmacies to treat malaria	299	70.7
Taking a malaria test before treatment	298	70.4
Use of herbs to treat malaria	283	66.9
Treatment of malaria using medicine kept at home	233	55.1
Using a combination of western medicine and herbs to treat malaria	203	48.0
Starting malaria treatment without carrying out any test	192	45.4

**Multiple responses present*

Information on technologies/materials used to eliminate or control mosquitoes in respondents' houses are presented in table 4. These technologies/materials included the following: mosquito coil (83.5%), insecticide treated net (74.5%) and insecticide spray (74.0%). The information relating to respondents' malaria treatment seeking pathways or practices are presented in table 5. Majority (76.0%) of the respondents reportedly go to the hospital to receive treatment. The proportion of respondents who usually indulged in the use of herbs to treat malaria was 66.9%.-Many respondents (45.4%) reportedly commenced malaria treatment without carrying out any test (see table 5 for details).

Table 6:
Association between respondents' socio-demographic characteristics and their health-seeking behaviours

N = 423

Variables		Health-Seeking Behaviour			Chi-square	Logistic regression
		Poor N (%)	**Good** N (%)	**Total** N (%)		
Sex	Male	111 (52.9)	99 (47.1)	210 (100.0)	χ^2=5.202	Ref
	Female	89 (41.8)	124 (58.2)	213 (100.0)	p= 0.023*	OR=1.45, p=0.06
Age (in years) $^{\beta}$	≤ 12years	57 (37.7)	94 (62.3)	151 (100.0)	χ^2=8.990	OR=1.565, p=0.26
	13-17 years	113 (51.6)	106 (48.4)	219 (100.0)	p= 0.011*	OR=1.041, p=0.90
	≥ 18years	30 (56.6)	23 (43.4)	53 (100.0)		Ref
School Type	Private	30 (41.1)	43 (58.9)	73 (100.0)	χ^2=1.354	
	Public	170 (48.6)	180 (51.4)	350 (100.0)	p= 0.245	NA
Class	JSS^{+}	85 (40.9)	123 (59.1)	208 (100.0)	χ^2=6.758	Ref
	SSS^{++}	115 (53.5)	100 (46.5)	215 (100.0)	p= 0.009*	OR=0.79, p=0.35
Family Type	Monogamy	161 46.3)	187 (53.7)	348 (100.0)	χ^2=0.814	NA
	Polygamy	39 (52.0)	36 (48.0)	75 (100.0)	p= 0.367	

$^{\beta}$ Non responses were excluded ** p< 0.05- Statistically significant* *$^{+}$JS 1 & 2* *$^{++}$SS 1 & 2*

Another issue investigated was the period of waiting on noticing any malaria related symptoms before initiating treatment. Over half (56.5%) of the respondents reportedly initiate treatment immediately, 24.1% did so after a day while 19.4% resorted to treatment after two or more days.

Table 6 shows respondents' health-seeking behaviour by selected socio-demographic characteristics including age, sex, and class. The table contains details of findings of relevant bivariate and multivariate analyses. The bivariate analysis showed that more males (52.9%) than females (41.8%) had poor malaria-related health-seeking behaviour relating to malaria care (p<0.05). A higher proportion of respondents aged ≥ 18years (56.6%) compared with respondents aged 13-17 years (51.6%) and those aged ≤ 12years (37.75) had poor malaria-related health-seeking behaviour (p<0.05). In addition, a higher proportion of respondents (53.5%) in senior secondary classes compared with those in junior secondary schools (40.9%) had poor health-seeking behaviour relating to malaria care (p<0.05). The variables that were significantly related to malaria-related health-seeking behaviour with the bivariate analysis at 5% level of significance were further subjected to multivariate logistic regression. With the use of the logistic model respondents' age, sex and class were not observed as significantly factors associated with malaria related health-seeking behaviour (See table 6 for detailed information).

DISCUSSION

Nearly all the respondents had ever had malaria while slightly over half (51.8%) experienced the disease within three months preceding the study. A high burden of the disease was reported in a similar among secondary school students in Ibadan. The proportion of students who had ever had malaria in this study was 95% while 70.0% had a history of malaria at least once a year (Morenikeji, 2009). It could be safely concluded, therefore, that malaria is a big burden among ISAs in the study area. Majority of respondents (88.2%) reported the availability of mosquito nets in their homes but by far less than half (48.5%) usually sleep under a net regularly or on daily basis. A similar pattern of adoption of mosquito nets was observed in a previous study conducted among ISAs in Calabar Nigeria (Udonwa, Gyuse & Etokidem, 2010). The Nigeria Demographic and Health Survey (NHDS) report of 2018 revealed that 61% of households in Nigeria owned a net while 43% of those with the nets slept under them a night before the survey (NPC & ICF, 2019). It is to be noted, however, the NHDS usually focus on adult populations. In Nigeria, promotion of the use of ITN often focuses more on high-risk groups that include pregnant women and under five children. The results of this and other studies indicate that much needs to be done to promote mosquito net use among people with special reference to ISAs in malaria endemic areas.

Reasons adduced for non-use of ITN included "excessive heat" and the fact that "it's not convenient". These reasons have similarly been adduced by adult net users in Nigeria (FMoH, 2009). Studies have reported other reasons for low adoption of ITN among adolescents. For instance, a study in Calabar, Nigeria revealed that 35% of the respondents refused to use mosquito nets because of the fear of death which may result from poor ventilation while inside the net and the perceived poisonous effect of the chemicals for treating mosquito nets (28.0%). A study conducted in Uganda showed that reported breathing difficulties was one of the reasons adduced for non-use of ITN by respondents (Mwanje, 2013). The reasons adduced by respondents in this study and those revealed by respondents in other studies for not using nets by people should be noted and taken into consideration while implementing programmes aimed at promoting the adoption of mosquito nets. In addition, the aforementioned behavioural antecedent factors which are perception in nature should not be ignored in the design and technological improvement of mosquito nets.

Technologies used majorly by respondents to control mosquitoes included mosquito coil, ITN, insecticides sprays, mosquito repellant creams and removal of mosquito breeding sites. Similar results were obtained from a study conducted among 370 boarding school students in Gboko, Benue State (Amagu, Obisike & Amuta, 2019), Nigeria and the one conducted among secondary students in Calabar (Udonwa *et al*., 2010). The adopted mosquito control technologies that cut across this and the aforementioned previous studies were use

of ITN, insecticide sprays, and environmental control involving the elimination of mosquito breeding sites. The results of our study and the previous ones imply that ISAs have inherent potential for the control and prevention of malaria; they can therefore, be readily mobilized to be more actively involved in the control and prevention of malaria in their schools and/or residential homes if well motivated.

The result of this study indicates high patronage of PMVs and pharmacy outlets for the treatment of malaria. This is undoubtedly, a reflection of the malaria treatment seeking pathway in the larger society. The results of a NHDS which revealed that 46% of Nigerians first visit the PMVs when they have symptoms of malaria has led credence to this (NPC & ICF, 2014). The PMV's are known to constitute the first port of call for persons involved in self-medication in primary health care in Nigeria (Oshiname & Brieger, 1992; Awosan & Ibitoye, 20018). This finding of this study underscores the social acceptability of PMVs and pharmacy outlets as active players in the management of malaria among ISAs. The other health care facilities that are also commonly used by the respondents in this study included public and private formal health establishments such as clinics or hospitals. More respondents in this study reportedly used private health care facilities for the management of malaria. Similar to the findings of our study, several researches (Uchendu, Ilesanmi & Olumide, 2013; Abodunrin *et al*., 2010), have noted that most Nigerian population access health care in private healthcare facilities for a variety of reasons. The higher rate of use of private health care facilities could be due prompt provision of care or treatment and less waiting time for patients, provision of quality healthcare, better hospitality and friendly attitudes of health, ready availability of drugs, and geographical accessibility to the facility (Basu *et al*., 2012; Joseph *et al*., 2017). Individuals' socio-demographic characteristics such as age, education, sex, level of education of household head and socio-economic status have also been found to play vital roles in the choice of healthcare facilities (Mills *et al*., 2002).

Slightly over half of the respondents disclosed that their parents kept malaria related drugs including Artemisinin based medications at home. This is indicative of the practice of self-medication in primary health care among respondents' families. It should be noted that most anti-malaria drugs in Nigeria are over-the-counter medicines which consumers can use without prescription by a certified health worker. The practice of keeping and using them at home as medically required or permissible amounts to rational malaria drug use. It was noted that many respondents did not take a test before commencing malaria treatment despite the promotion of Rapid Diagnostic Test (RDT) technology or microscopy as advocated by the World Health Organisation. This practice can lead to drug resistance occasioned by inappropriate treatment. A lot, therefore, needs to be done to promote evidence-based malaria treatment involving either microscopy or RDT when treating in-school adolescents. It is also necessary to enhance the capacity of ISA to be requesting for either microscopy or RDT before they are provided with antimalarial medicaments; in addition, their knowledge of the importance basing malaria treatment on the results of a diagnostic test should be upgraded. The added advantage of this effort is that ISAs who are well informed about the importance of basing malaria treatment on diagnostic test results can play pivotal roles in helping to promote appropriate malaria management practices among their parents and their peers.

The results of this study could serve as baseline information for the design of educational interventions targeted at upgrading the knowledge of ISAs and promoting appropriate health seeking behaviours, within the context of malaria treatment, control and prevention, among them. Educational interventions are needed to and effective environmental sanitation related approaches for controlling the breeding of mosquitoes. The results of such a formative study will be useful for designing evidence-based malaria prevention interventions.

In conclusion, malaria is a common health problem among the respondents. Many of them own ITN at home but less than half of them use it regularly as expected. The respondents adopt diverse malaria related health seeking pathways including patronage of formal and informal health care sources. The inapt and unreliable health seeking pathways being by the respondents for malaria treating malaria included using drugs purchased from patent medicine vendors and use of herbs. Findings of this study underscore the need to design health education interventions that can promote appropriate malaria-related preventive practices and health seeking behaviours.

Acknowledgement:
We seize this opportunity to thank the students who voluntarily participated in this study and to acknowledge the support provided by authorities and staff of the participating secondary schools.

.

REFERENCES

Abiodun, O.A. and Olu-Abiodun, O.O. (2014). The Determinants of choice of Health Facility in Shagamu, South-West, Nigeria. *Scholars Journal of Applied Medical Sciences (SJAMS)*, 2(1): 271-282.

Abodunrin, O.L., Bamidele, J.O., Olugbenga-Bello, A.J. and Parakoyi, D.B. (2010). Preferred choice of Health Facilities for Healthcare among Adult Residents in Ilorin Metropolis, Kwara State, Nigeria. *International Journal of Health Research*, 3(2): 79-86.

Adeyemo F.O., Okpala P.U., Oyana E.N. and Imoukhuede M.O. (2014). Malaria Infection Amongst Students of The University of Benin, Edo State, Nigeria. *International Journal of Recent Scientific Research* 5(9)1529-1532.

Ajero, C.M.U., Ukanga, C.N., Uzochukwu, U.C. and Chigbo, U.N. (2015). Studies on the Prevalence, Knowledge, and Practices Toward Malaria in Owerri West Local Government Area of Imo State, Nigeria. *West African Journal of Industrial & Academic Research*, 14:1.

Aliyu A. A. and Alti-Mu'azu. M. (2009). Insecticide-treated nets usage and malaria episodes among boarding students in Zaria, northern Nigeria. *Annals of African Medicine* Vol. 8, No. 2; 2009:85-89

Amagu, N., Obisike, V. U., and Amuta, E. U. (2019). The KAPP Study of Malaria and its Prevalence amongst Boarding School Students in Gboko Local Government Area of Benue State, Nigeria. International Blood Research &

Reviews, 10(2), 1-7. https://doi.org/10.9734/ibrr/2019/v10i230115

Awosan, Kehinde and Ibitoye, P. (2018). Knowledge, risk perception and practices related to antibiotic resistance among patent medicine vendors in Sokoto metropolis, Nigeria. Nigerian journal of clinical practice. 21. 1476-1483. 10.4103/njcp.njcp_69_18.

Basu, S, Andrews S, Kishore S, Panjabi R, and Stuckler D. (2012). Comparative Performance of Private and Public Healthcare Systems in Low- and Middle-Income Countries: A Systematic Review. PLoS Med. 2012;9(6):e1001244.

Chinweuba A. U., Agbapuonwu N. E., Onyiapat J. E., Isreal C. E., Ilo C. I. and Arize J. C. (2017). Determinants of Malaria Prevention and Treatment Seeking Behaviours of Pregnant Undergraduates Resident in University Hostels, South-East Nigeria. Hindawi. Article ID 3653874, 9 pages.

Dave-Agboola I. O. and Raji J. I. 2018. Health-Seeking Behaviour of Malaria Patients in Lagos, Nigeria. *International Journal of Health Sciences and Research*, 8, (7).

Dupas, P. (2011). Health Behavior in Developing Countries . *Annual Review of Economics*, p. 3.

Federal Ministry of Health. (2009): National Malaria Control Programme, Strategic Plan 2009-2013 A Road Map for Malaria Control in Nigeria. Geneva, Switzerland: WHO. Available at https://extranet.who.int/countryplanningcycles/sites/default/files/planning_cycle_repository/nigeria/nigeria_draft_malaria_strategic_plan_2009-2013.pdf

Joseph O, Muhamad A, Raji A, Ibimidu A, Joseph A and Kehinde K. (2017). Factors determining the utilization of healthcare facilities in a semi-urban setting in Kwara State, Nigeria. *Anthropological Researches and Studies*, 7(7): 80 - 86

Mills A, Brugha R, Hanson K, and McPake B. (2002). What can be done about the private health sector in low-income countries? *Bulletin of World Health Organization*, 80:325-330.

Morenikeji O.A. (2009). Perception and Management of Malaria in Secondary Schools in a Nigerian City. *Pak Journal of Medical Science.* 25(3):508-511

Mwanje, L.F. (2013). 'Knowledge, attitudes and practices on malaria prevention and control in Uganda: A case study of Nsaabwa village, Mukono District'. Post-Doctoral Report. Kampala: Gulu University

National Population Commission (NPC) [Nigeria] and ICF. (2014). 2013 Nigeria DHS Key Findings. Abuja, Nigeria and Rockville, Maryland, USA: NPC and ICF.

National Population Commission (NPC) [Nigeria] and ICF. (2019). 2018 Nigeria DHS Key Findings. Abuja, Nigeria and Rockville, Maryland, USA: NPC and ICF.

Ofoli J.N.T., Ashau-Oladipo T., Hati S.S, Ati L. and Ede V. (2020). Preventive healthcare uptake in private hospitals in Nigeria: a cross-sectional survey (Nisa premier hospital). *BMC Health Service Research*, 20, 273.

Ohlin E. (2012). Children as health change agents in the fight against malaria- A case study in Babati town, Tanzania. Sodertorn University College, School of Life Sciences Development and International Cooperation, Bachelor's Thesis. Retrieved from http://urn.kb.se/resolve?urn=urn:nbn:se:sh:diva-16812

Okereke C.I. (2010). Unmet Reproductive Health Needs and Health-Seeking Behaviour of Adolescents in Owerri, Nigeria. *African Journal of Reproductive Health 14(1):43-54*

Oshiname F.O and Brieger W.R. (1992). Primary Care Training for Patients Medicine Vendors in Rural Nigeria. *Social Science Medicine*, 35(12):1477-1484.

Patel D.N., Pradeep P., Surti M.M. and Agarwal S.B. (2003). Clinical Manifestations of Complicated Malaria – An Overview. *Journal, Indian Academy of Clinical Medicine* 4(4): 323-31 4(4): 323-31

Pousibet-Puerto J., Salas-Coronas J., Sánchez-Crespo A., Angustias M., Manuel J. S., José G., José V. and Cabezas-Fernández M.T. (2016). Impact of using artemisinin-based combination therapy (ACT) in the treatment of uncomplicated malaria from Plasmodium falciparum in a non-endemic zone. Malar J 15, 339

Snow, R. W., M. H. Craig, C. R. J. C. Newton, and R. W. Steketee (2003): "The Public Health Burden of Plasmodium falciparum Malaria in Africa: Deriving the Numbers." Disease Control Priorities Project Working Paper 11, Fogarty International Center, National Institutes of Health, Bethseda, Md. http://www.fic.nih.gov/dcpp.

Snow R.W., Guerra C.A., Noor A.M., Myint H.Y., Hay S.I. (2005). The global distribution of clinical episodes of Plasmodium falciparum malaria. Nature. 434(7030):214-217.

Uchendu O.C, Ilesanmi O.S. and Olumide A.E. (2013). Factors influencing the choice of health care providing facility among health workers in a Local Government Secretariat in Southwestern Nigeria. *Ann Ibadan Postgrad Med*. 11(2),87-95 – 13.

Udonwa, N.E, Gyuse, A.N. and Etokidem, A.J. (2010). Malaria: Knowledge and prevention practices among school adolescents in a coastal community in Calabar, Nigeria. . *African Journal of Primary Healthcare and Family Medicine*, 2(1), Art. #103, 4.

WHO. (2017). World Malaria Report 2017. Geneva, Switzerland: https://www.who.int/malaria/areas/treatment/overview/en/

World Health Orgainzation. (2017). World Malaria Report 2017. Geneva, Switzerland: https://www.who.int/malaria/areas/treatment/overview/en/

World Health Organization (2018). World Malaria Report 2018. Geneva, Switzerland. https://apps.who.int/iris/bitstream/handle/10665/275867/9789241565653-eng.pdf

World Health Organization (2019). World Malaria Report 2019. Geneva, Switzerland. https://www.who.int/malaria/publications/world-malaria-report-2019/World Malaria-Report-2019-briefing-kit-eng.pdf

World Health Organization (2020). Adolescent Health https://www.who.int/health-topics/adolescenthealth/#tab=tab_1

Zoghi, S., Mehrizi, A. A., Raeisi A., Haghdoost A.A., Turki, H., Safari, R., Kahanali, A.A. and Zakeri, S. (2012). Survey for asymptomatic malaria cases in low transmission settings of Iran under elimination programme. *Malaria Journal*, 11:126.