KNOWLEDGE, PERCEPTION, ILLNESS EXPERIENCES AND HEALTH-SEEKING BEHAVIOUR RELATING TO MALARIA AMONG IN-SCHOOL ADOLESCENTS IN IBADAN NORTH LOCAL GOVERNMENT AREA, OYO STATE, NIGERIA

BY

Joy Dorcas FAMOYEGUN
B.Sc. Chemistry (IBADAN)
MATRIC. NO.: 157621

A project in the Department of Health Promotion and Education submitted to Faculty of Public Health

In partial fulfillment of the requirements of the degree of

MASTER OF PUBLIC HEALTH
(HEALTH PROMOTION AND EDUCATION)

Of the

UNIVERSITY OF IBADAN

MAY, 2019

ABSTRACT

Malaria remains a major public health challenge in Nigeria, despite the fact that it is preventable, treatable and curable. The burden of the disease among In-School Adolescents (ISA) is enormous; yet, the knowledge and the health-seeking behaviour of ISA relating to the disease have not been adequately explored. This study was therefore designed to investigate the knowledge, perception, illness experiences and health seeking behaviours relating to malaria among ISA in Ibadan North Local Government Area (LGA).

A descriptive cross-sectional design was adopted for this study. A five-stage sampling technique was used to select 430 ISA from Private and Public Schools (PPS) from different wards in the LGA. A semi-structured questionnaire used for data collection which included questions on the following issues: socio-demographic characteristics; respondents living conditions; a 66-point knowledge scale for assessing knowledge of causes, transmission route, symptoms, prevention, treatment and consequences of malaria; a 22-point perception scale for assessing the perception relating to malaria; malaria related health-seeking behaviour and illness experiences. An observation checklist was also used to assess the first aid services in each of the schools. Knowledge scores of less than 33, 33-50 and >50 points were rated as poor, fair and good respectively. Perception scores of less than 11 and $\geq$11 were categorized as unfavourable (risky) and favorable (non-risky) respectively. The data were analyzed using descriptive statistics and inferential statistics such as T-test, ANOVA and Chi-square test at p=0.05.

Respondents' age was 14.5±2.2 years, 82.7% were from public schools and most (82.7%) were Yoruba. Respondents' mean knowledge score was 27.0±7.9, with majority (76.1%) having poor knowledge. The mean perception score was 12.3±4.2 with 61.0% of the respondents having favourable perceptions. Most of the respondents (99.8%) had ever experienced malaria, but 51.8% had malaria within three months preceding the study. Majority (83.1%) claimed to own a mosquito net however, 57.6% slept under the mosquito net a night preceding the interview. The various treatment pathways adopted by respondents included: going to the hospital to receive treatment (76.1%), buying drugs from patent medicine vendors (70.7%), and use of herbs to treat malaria (66.9%). All the schools had first aid boxes and 83.3% were in use. However, none of the first aid boxes in

use had antimalarial medicine. Schools with sick bays constituted 41.7%; however, anti-malaria drugs were present in only one (20%) of the sick bays.

Respondents' had inadequate knowledge relating to malaria. Unreliable malaria treatment practices were common among the respondents and several of them had perceptions which can put them at risk of the disease. Public enlightenment, peer-education and trainings strategies are needed to address the identified gaps in knowledge, perceptions not in-line with the biomedical world view and some inappropriate health-seeking behaviours.

Keywords: In-school adolescents; Malaria-related knowledge; Malaria-related perception; health-seeking behaviour.

Word Count: 451

DEDICATION

This research work is dedicated to Almighty God who is my source and my all in all. To Him alone be all the glory.

ACKNOWLEDGEMENT

My heartfelt gratitude goes to my supervisor, Dr. Frederick O. Oshiname who indeed is more than a supervisor but also a father. I appreciate the exceptional and professional guidance he gave me throughout this research work. He was always ready to listen, and to make constructive criticism during the various phases of the research. May God Almighty reward him richly.

My profound gratitude goes to all lecturers in the department- Prof. O. Oladepo, Prof. A.J. Ajuwon, Prof. O.S. Arulogun, Dr. O.E. Oyewole, Dr. M.A. Titiloye, Dr. Y. John-Akinola, Dr. O.I. Dipeolu, Dr. M.M. Oluwasanu and Mrs. A.T. Desmenu for their input at one point or the other. I am also highly indebted to Mr. J. Imaledo for his technical and moral support during the course of my study. I sincerely acknowledge the support of Mr. O.O. Bello, Mr. T. Oyeyemi, Mr. Lanre Quadri and all other non-academic staff of the Department of Health Promotion and Education. I acknowledge all the authors, whose works were used as reference materials for this study.

Special thanks to go Prof. J.O. Babalola, Dr. D.A. Adewole, Dr. A.M. Adebayo, Dr. A.S. Adebowale and Dr. A.A. Adeyemo for their valuable contributions to this research work. I would like to thank all my friends and colleagues, who contributed in one way or the other to the success of this study. I hereby pay special tributes to Dr. A.O. Ogunwale, Adeyemi Mary, Balogun Oluwadamilola, James Doyinsola, Ayeni Olaoluwa, Anikan Grace, Folaranmi Zaynab, Ogunyoye Obafemi and Oluwagbayela Babatunde. I acknowledge the support I received from Mr. I.A. Odetayo and Mr. T. O. Abiona.

I also want to appreciate the respondents that took part in this study for giving consent to provide the data used. I would like to express my profound gratitude to my parents, Mr. and Dns. Famoyegun for their constant encouragement, prayers and financial support throughout the programme. Finally, I appreciate the support and ceaseless prayers for me by Reverend Dayo and Motunrayo Olajire. May God bless them abundantly.

CERTIFICATION

I hereby certify that this study was carried out by Joy Dorcas FAMOYEGUN in the Department of Health Promotion and Education, Faculty of Public Health, College of Medicine, University of Ibadan, Nigeria under my supervision.

SUPERVISOR

Frederick O. Oshiname

Senior Lecturer

MPH (Ibadan), MA (CWRU, Cleveland), PhD. (Ibadan)

Senior Lecturer, Department of Health Promotion and Education

Faculty of Public Health, College of Medicine

University of Ibadan, Nigeria

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LIST OF ACRONYMS

ACT	Artemisinin Combination therapy
CDC	Centre for Disease Control
FMoH	Federal Ministry of Health
GDB	Global Burden of Disease
GDP	Gross Domestic Product
IEC	Information, Education and Communication
IHME	Institute for Health Metrics and Evaluation
IPTp	Intermittent preventive treatment for pregnant women
IRS	Indoor Residual Spraying
ISA	In-school Adolescents
ITN	Insecticide treated nets
LLIN	Long lasting Insecticide Nets
LGA	Local Government Area
NMCP	National Malaria Control Programme
NMEP	National Malaria Elimination Programme
NMIS	National Malaria Indicator Survey
NMSP	National Malaria Strategic Plans
NMFS	Nigeria Malaria Facts Sheet
NPC	National Population Commission
RBM	Roll Back Malaria
RDT	Rapid Diagnostic Test
SMC	Seasonal Malaria Chemoprevention
SPSS	Statistical Package for Social Sciences
WHO	World Health Organization

OPERATIONAL DEFINITION OF TERMS

Adolescents: any person ages 10 - 19 years undergoing a transitional phase of growth and development between childhood and adulthood.

In-school adolescents: adolescents currently attending a formal school

Malaria: Malaria is a human disease that is caused by protozoan parasite (genus Plasmodium) in the red blood cells transmitted through the bite of an infective female anopheles mosquito or by a contaminated needle or transfused blood.

Malaria case: Occurrence of malaria infection in a person in whom the presence of malaria parasites in the blood has been confirmed by a diagnostic test (WHO, 2018)

Simple/ uncomplicated malaria: Symptomatic malaria parasitaemia without signs of severity or evidence of vital organ dysfunction (WHO, 2018)

Complicated malaria: Acute falciparum malaria characterized by severe organ dysfunction

Antecedent factor: These are factors which influence behaviour; they provide motivation or a reason for the occurrence of behaviour. (Green and Kreuter, 1999)

Health-seeking behaviour: This entails how people engage with health systems and services in response to an illness. (MacKian, 2002)

Chemoprophylaxis: Administration of a medicine, at predefined intervals, to prevent either the development of an infection or progression of an infection to manifest disease (WHO, 2018)

Parasitaemia: Presence of parasites in the blood

Cerebral Malaria: Severe *P. falciparum* malaria with impaired consciousness (Glasgow coma scale < 11, Blantyre coma scale < 3) persisting for > 1 hour after a seizure (WHO, 2018)

Malaria endemic area: An area in which there is an ongoing, measurable incidence of malaria infection and mosquito-borne transmission over a succession of years. It is an area where malaria is always present but may be at varying seasonal variations.

Face-me-I-face-you house: a type of building where several rooms face each other in a row with a common kitchen, toilet and bathroom.

CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

Malaria is a parasitic disease caused by four species of the genus *Plasmodium*. The species are P. *falciparum*, P. *vivax*, P. *ovale*, P. *malariae* and P. *knowlesi* (Coluzzi, 2013). The pathogen is transmitted to human beings by infected mosquitoes. Malaria imposes an enormous burden on much of the world's population in terms of morbidity and mortality (Zoghi, Mehrizi, Raeisi, Haghdoost, Turki, Safari, Kahanali, and Zakeri, 2012). *Plasmodium falciparum* predominates in Africa and it causes the most severe and life-threatening form of malaria. The largest proportion of malaria victims are under five children who often die when they do not receive immediate treatment (Alnwick, 2000). The disease has a gradual, cumulative and far-reaching effect on economic and social development. The direct costs of treatment and prevention of malaria contribute to significant losses in productivity and undermine educational achievement (WHO, 1999).

In 2016, an estimated 216 million cases of malaria occurred worldwide compared with 237 million cases in 2010 and 211 million cases in 2015. In 2016, it was estimated that there were 445 000 deaths from malaria globally, compared to 446 000 estimated deaths in 2015 (WHO, 2017). The WHO (2017) also reported that most (90%) malaria cases in 2016 were in the African Region which also accounted for 91% of malaria mortality, followed by South-East Asia Region (7%) and the Eastern Mediterranean Region (2%). Of the 91 countries reporting indigenous malaria cases to WHO in 2016, 15 countries – all in sub-Saharan Africa, accounted for 80% of the global malaria burden. Malaria also accounted for up to 50% of all deaths among African school-age children (Snow *et al.*, 2003). According to WHO (2017), the incidence rate of malaria is estimated to have decreased by 18% globally, from 76 to 63 cases per 1000 population at risk, between 2010 and 2016. The South-East Asia Region recorded the largest decline (48%) followed by the Region of the Americas (22%) and the African Region (20%). The largest decline of malaria mortality occurred in the regions of South-East Asia (44%), Africa (37%) and the Americas (27%). It is however, noted that despite these reductions, substantial increases in case incidence occurred in the Region of the Americas, and marginally in the South-East Asia, Western Pacific and African regions between 2014 and 2016 (WHO, 2017).

Prompt diagnosis and treatment is the most effective means of preventing a case of simple malaria from developing into a severe disease and death (Patel *et al.*, 2003). Adoption of Artemisinin Combination Therapy (ACT) contributes to the recent success of global malaria control although multidrug resistance, including artemisinin (partial) resistance and partner drug resistance, has been reported in five countries of the Greater Mekong sub region (Cambodia, Laos People's Democratic Republic, Myanmar, Thailand and Viet Nam) (WHO, 2017). The WHO however noted that in Africa, artemisinin (partial) resistance has not been reported to date and ACTs remain efficacious in all malaria endemic settings. Also, resistance to one insecticide was detected in 61 countries, two or more in 50 countries between 2010 and 2016. Resistance to pyrethroids (the only insecticide class currently used in ITNs) increased from 71% in 2010 to 81% in 2016. Yet, ITNs continue to be an effective tool for malaria prevention, even in areas where mosquitoes have developed resistance to pyrethroids. (WHO, 2017)

Malaria is endemic in Nigeria and remains a major public health problem although it is preventable, treatable, and curable. Nigeria accounts for about 29% of Africa's malaria burden. Moreover, in combination with the Democratic Republic of Congo, Nigeria contributes up to 40% of the global burden (WHO, 2014). Globally, mortality rate related to malaria in adolescents aged 10 – 14 years is 0.3 per 1000 year and 1.0 per 1000 per year among children aged 5 – 10 (Lalloo, Olukoya and Olliaro, 2006). The climatic conditions in Nigeria enable continuous malaria transmission and approximately 30% of the population live in areas of high to very high transmission intensity while 67% reside in the moderate transmission zone (FMoH, 2009). However, there is new evidence of a progressive divergence of in-country variations in malaria endemicity. Recent reports showed that 85% of Nigerians live in areas of meso-endemic transmission, and only 15% live under conditions of hyper-endemic and holo-endemic transmission. Conditions of hypoendemic transmission are located in areas of the Federal Capital Territory, Adamawa, and Borno. (Simon et al., 2008)

Adolescence is a period of life with specific health and developmental needs; changes during adolescence are influenced by individual, social, cultural and environmental factors (Salisu-Olatunji & Odeyemi, 2011). Antecedent factors that influence the involvement of adolescents in prevention, treatment and control of malaria include their knowledge and perception. These factors also influence the health-seeking behaviour of the adolescents

relating to malaria; these should be considered during intervention programmes for the control of the disease. Studies conducted among in-school populations who are mainly adolescents have revealed gaps in knowledge and misconceptions relating malaria (Yamrot, Zewdie and Yohanne's, 2014; Udonwa, Gyuse and Etokidem, 2010; Oluyemi, 2017). Poor health-seeking behaviour has also been reported by several studies including Mbony, Neema and Magnussen, (2011) and Nyahoga & Bochkaeva, (2018). Addressing factors that influence their knowledge, perception and health-seeking behaiour has been linked to reduction in the prevalence of malaria (Brooker, Kolaczinski, Gitonga, Noor and Snow, 2009).

There are many public and private secondary schools in Ibadan North LGA. Most of the students in the schools are adolescents aged 10-19. The LGA, like most other LGAs in Ibadan is malaria-endemic. This implies that ISA are among the populations that are vulnerable to the disease. Knowledge of the factors that influence the occurrence, prevention, treatment and control of the disease is therefore, needed to design effective malaria interventions that focus on them. However, information relating to these factors in the LGA among ISA is scarce. The study, therefore, focuses on their exploration.

1.2 Statement of Problem

Malaria has a worldwide distribution, affecting people of all ages and the burden of the disease is enormous amounting to 196-263 million clinical cases in 2016; of this number, 90% occurred in Africa. Malaria is a major public health problem especially in the tropics where about 40% of the world population lives and it is responsible for hundreds of thousands to million deaths each year (Parks, 2002). Nigeria is the second leading country of malaria burden globally; over 750,000 increase in cases reported in 2015 and 2016 (WHO, 2016). Over 97% of the Nigeria population is at risk of malaria. The remaining 3% of the population live in the malaria free highlands. Malaria is responsible for approximately 60% of outpatient visits and 30% of admissions in Nigeria hospitals. It is estimated to contribute up to 11% of maternal mortality, 25% of infant mortality, and 30% of under-5 mortality (FMoH, 2014). According to FMoH (2014).the disease overburdens the already-weakened health system and exerts great social and economic burden on Nigeria, retarding the Gross Domestic Product by 40% annually and costing

approximately 480 billion naira in out-of pocket treatments, prevention costs, and loss of man hours.

In-school adolescents have attracted relatively little attention as a group in need of special protective measures against malaria despite the fact that malaria has great effects on their health and school performance. More than 500 million school-age children including ISA worldwide are at risk of malaria infection (Nankabirwa Brooker, Clarke, Fernando, Gitonga, Schellenberg, and Greenwood, 2014). Most of them with malaria parasitemia do not have any symptoms because they have acquired some immunity; however, asymptomatic infections can contribute to anemia and to impairment of cognitive development (WHO, 2012). The Nigeria Malaria Indicator Survey of 2015 focused on women of reproductive age (15-49 years) and children aged 6 to 59 months excluding most of the ISA. In-school adolescents infected with malaria parasite can result in the development of simple or complicated malaria (Nankabirwa et al., 2014).

In-school adolescents in Ibadan North LGA are, like other populations, vulnerable to malaria and the associated adverse consequences. The burden of disease and consequences of infection in this age-group have not been fully studied (Lalloo et. al, 2006). This is so because this age group is not included routinely in household-based cluster surveys (WHO, 2012). The problem of malaria in adolescence has been largely overshadowed by the huge burden of disease in young children and pregnant women. In addition, knowledge of the factors associated with the occurrence of the disease and the related health-seeking behaviours or practices have not been well explored in the study LGA. This is despite the fact that a substantial proportion of adolescents are at risk of malaria infection because of their resistance in endemic communities in IBNLGA. This accounts for the focus of the study on the knowledge, perception, illness experiences and health seeking behaviours relating to malaria among in-school adolescents in IBNLGA.

1.3 Justification of the Study

Adolescence is a period of life with special health and developmental needs, rights and challenges; they therefore need explicit attention (WHO, 2018). Understanding the burden of malaria among school-age children cannot be over emphasized. Exploring their

knowledge, perceptions and health seeking behaviour relating to the disease is essential to justify investment in school-based malaria treatment and control interventions.

The study investigated the knowledge, perception, illness experiences and health seeking behaviours relating to malaria among ISA, a study population which is often not explored by previous studies. Results from this study are useful as baseline information for guiding the design of malaria control and prevention programmes targeted at in-school adolescents in the LGA. The findings are also potentially useful for the formation of school policies aimed at the treatment, control and prevention of malaria among in-school adolescents in school settings.

1.4 Research Questions

The research questions formulated to guide the study were as follow:

1. What is the level of knowledge of ISA in IBNLGA relating to causes, symptoms, consequences, prevention and treatment of malaria?
2. What is the perception of ISA in IBNLGA relating to malaria?
3. What are the health seeking behaviours of ISA in IBNLGA relating to malaria?
4. What are the factors which influence the health seeking behaviours of ISA in IBNLGA relating to malaria?
5. What are the malaria illness experiences among the ISA in IBNLGA?
6. What are the school-based resources for the primary health care management of malaria among the ISA in IBNLG?

1.5 Objective of the Study

1.5.1 Broad Objective

The broad objective of the study was to investigate the knowledge, perception, illness experiences and health seeking behaviours relating to the causes, symptoms, consequences, prevention and treatment of malaria among in-school adolescents in Ibadan North Local Government Area, Oyo State, Nigeria.

1.5.2 Specific Objectives

The specific objectives were to:

1. Assess the level of knowledge of malaria among ISA
2. Determine the perception of the ISA relating to malaria;
3. Identify the health seeking behaviours relating to malaria among ISA;
4. Identify the school-based resources for the primary health care management of malaria among the ISA;
5. Determine malaria illness experiences among the ISA;
6. Identify the factors influencing health seeking behaviours of ISA relating to malaria.

1.6 Research Hypotheses

The hypotheses formulated to guide the study were as follow:

H_O1: There is no significant association between respondents' knowledge and their perception of malaria.

H_O2: There is no significant association between the class of the respondents and their knowledge of malaria.

H_O3: There is no significant association between respondents' knowledge and their health seeking behaviour relating to malaria.

H_O4: There is no significant association between respondents' history of malaria and their health seeking behaviour relating to malaria

H_O5: There is no significant association between respondents' perception and their health-seeking behaviour relating to malaria.

1.7 Study Variables

Two categories of variables will be measured. They are the following dependent and independent variables:

Independent Variables

The independent variables are the socio-demographic characteristics: gender, age, religion, ethnicity, family type, educational status and school type.

Dependent Variables

The dependent variables are the knowledge, perception, health-seeking behaviours and other, factors influencing health-seeking behaviours.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview of Malaria

Malaria is clinically defined as a mosquito-borne disease caused by an intra-erythrocytic protozoan parasites of the genus Plasmodium (CDC, 2014). Nigeria is a malaria-endemic country and the disease causes high morbidity and mortality among various segments of the population (Adeyemo Okpala, Oyana and Imoukhuede, 2014). The prevalence of the disease is exacerbated by poverty (Nyahoga & Bochkaeva, 2018) and several other socio-cultural and economic factors (Oreagba Onajole, Olayemi, and Mabadeje 2004). All persons living in malaria endemic communities are vulnerable to the disease (Adesina, 2013). There are two main typologies of malaria based on level of severity. These are simple/ uncomplicated malaria and severe/ complicated malaria (WHO, 2018). The effects of malaria ranges from uncomplicated clinical manifestations such as fever, vomiting, headache and cold to loss of productive hours (WHO, 2010). Complicated symptoms include anemia, convulsion, hypoglycaemia and failure of various organ systems (Patel, Pradeep, Surti and Agarwal., 2003).

Malaria can be prevented by avoiding exposure to the vector (Ajayi et al, 2015) or by intermittent treatment (Barger, Maiga, Traore, Tekete, and Tembine 2009). The prevention of exposure to the vector which is the mosquito can be achieved through measures which include Indoor Residual Spraying (IRS), destruction of mosquito breeding sites and use of Insecticide Treated Nets (ITN) (Maduka, 2018). Indoor Residual Spraying (IRS) involves coordinated regular spraying of the interior walls of houses and housing structures with insecticides to kill mosquitoes (Abah and Temple, 2015). On the other hand, Intermittent Preventive Treatment (IPTp) often involves treatment of pregnant women with Sulphadoxine Pyrimethamine and Seasonal Malaria Chemoprevention (SMC).

Intermittent Preventive Treatment for Pregnant women ensures at least two doses of anti-malaria are given to pregnant women (Valley *et al.*, 2007) while SMC entails administration of antimalarial drugs to people at intervals (WHO, 2010). It has been recommended that the management of malaria should be based on evidence of the presence of malaria parasites (WHO, 2010). Prompt parasitological confirmation by either microscopy or Rapid Diagnostic Test (RDT) is recommended for all patients with

suspected malaria before treatment begins and use of Artemisinin based combination therapy (ACT) is the standard treatment for uncomplicated malaria (NMFS, 2011).

Malaria could be more severe in some categories of people than the others. Those at highest risk of malaria among who the disease can be very severe include infants and young children, pregnant women, non-immune people (such as travelers, migrant populations moving from low-transmission to high-transmission areas) and people living with HIV/AIDS (WHO, 2018). Available evidence suggests that gender is not a factor for vulnerability to the disease except for pregnant women who are at greater risk of severe malaria in most endemic areas (Reuben, 1993). This is because of their decreased immunity.

Studies have also shown that infection rates are highest in first and second parity women while rates are lower in later pregnancies. Malaria in pregnancy increases the risk of abortion (CDC, 2013), stillbirth (Aribodor, Nwaorgu, Eneanya, and Aribodor, 2007), premature delivery (Verhoeff, Brabin, Hart, Chimsuku, Kazembe and Broadhead, 1999) and low-birth weight infants (Fried & Duffy, 2005). People Living with HIV/AIDS (PLWHA) are at an increased risk of clinical malaria, severe illness, hospitalization, and death. This is so because malaria contributes to a temporary increase in viral load among them, a situation which may worsen the clinical disease and increase mother-to child transmission in case of pregnant women (NMFS, 2011).

Adolescent girls could be vulnerable to malaria. Adolescents who are often parasitaemic could be anemic when they first become pregnant in many sub-Saharan African settings (Brooker, Clarke, Fernando, Gitonga, Nankabirwa, Schellenberg and Greenwood, 2013). Data from Malawi revealed that adolescent girls had significantly higher parasite rates than women over 19 years of age (Brabin, 2005). Pregnant adolescent girls face difficulties in accessing health services; they might not also seek timely care for malaria mainly because of the stigma associated with adolescent pregnancy and the negative attitude of health workers (Okonofua, Davis-Adetugbo, and Sanusi, 1992).

2.2 Health Needs of Adolescents

The secondary school students that constitute the focus of the study are mainly adolescents. Adolescence is one of the most rapid phases of human development with

specific needs that are distinct from those of other age groups (WHO, 2016). The changes that take place during adolescence are influenced by several factors which could include individual and environment factors (Okereke, 2010). Younger adolescents may be particularly vulnerable to diseases when their capacities are still developing (Solarz, 2002). The changes in adolescence have health consequence not only in adolescence but also over the entire life-course (Alexander, 2017). The unique nature and importance of adolescence places an explicit mandate and specific attention on health policy and programmes (Lalloo *et al.*, 2006). Adolescent development is a major factor in the difference in disease burden among children and adults as many of the health-related behaviours that arise during adolescence have implications for both present and future health and development (WHO, 2017).

Around 1.2 billion people (1 in 6 of the world's population), are adolescents aged 10 to 19 years and it is estimated that about 1.2 million adolescents died in 2015, mostly from preventable or treatable causes (WHO, 2017). Approximately 914 million adolescents live in low income countries, and many of them are vulnerable to malaria. However this group of people has been rarely targeted for malaria control (Brabin, 2005). It is therefore important to promote healthy behaviours during adolescence and take steps to better protect them from health risks through health education and other intervention programmes. Promoting healthy behaviours during adolescence is critical for the prevention of health prob lems in adulthood and for future health. It also influences the ability of a nation to develop and thrive (WHO, 2017).

Adolescents have their percularities (Salisu-Olatunji & Odeyemi, 2011). Public health must therefore, adopt approaches which take these peculiarities into consideration (Solarz, 2002). The approaches should go beyond the health sector and should involve them in order increase their active participation as agents of change in health promotion (Thuiliez, 2010). According to Ki-moon (2003), the services, commodities, information and skills needed to sustain healthy behaviour must be provided in the safest and most supportive of environments, building on the protective factors of family and community. This also applies to programmes which target adolescents including malaria related interventions. Increasing the level of knowledge of adolescents and improving their health seeking behaviour to help them make better decisions that will positively affect their health and their prospects for the future is a challenge for health educators (WHO, 2013).

2.3 Prevalence of Malaria

Malaria is one of the most important parasitic diseases of humans, affecting more than 1 billion people worldwide. The disease is estimated to cause more than 1 to 3 million deaths every year (White and Breman, 2001). The Global Burden of Disease Study revealed that malaria is the leading disease burden in Nigeria from 1990 (15.7%) to 2010 (23.2%). It is one of the leading causes of death in Nigeria (CDC, 2012). Malaria accounts for up to 50% of all deaths among African school-age children. This represents an estimated 214,000 deaths per year (Snow, Craig, Newton and Steketee, 2003). Malaria is one of the five diseases which contributed an additional 17% of all deaths among adolescents (aged 10-19 years) amounting to 30,764 deaths in 2013 (Institue of Health Metrics Evaluation, 2010).

The prevalence of malaria among in-school adolescents is high in the east, west and central areas of sub-Saharan Africa (Brooker *et al.*, 2014). This has been proven by several studies carried out among school children aged <18 years (Pullan, Bukirwa, Staedke, Snow, and Brooker. 2010, Ojurongbe *et al.*, 2011, Kimbi, Sumbele, Nweboh, Anchang-Kimbi and Lum, 2013, Rehman Coleman, Schwabe, Baltazar and Matias 2011). Studies conducted in Uganda, East Africa reveals 11 to 70% parasitemic school-age children at any time, with the parasite rate depending on the transmission setting and season (WHO 2012). It has also been stated that 7% of children aged 6 - 14 years experienced a clinical attack of malaria during 42 days of follow-up in Uganda (Nankabirwa *et al.*, 2010). A prevalence rate of over 50% was accounted for in the Lakeside and Island communities of Lake Victoria while a lower prevalence of over 4% was reported in a countrywide school survey conducted in 480 schools across different transmission settings among children ages 5 to 18 years in Kenya (Gitonga, Edwards, Karanja, Noor, Snow and Brooker 2012 & Gitonga Karanja, Kihara, Mwanje and Snow, 2010). The prevalence rate of malaria was however higher in the coastal areas. (Halliday, Karanja, Turner, Okello and Njagi 2012)

In West Africa, the prevalence of malaria among school-age children was found to be over 10% in the Senegal River basin (Dia, Konate, Samb, Sarr and Dio., 2008) however, a 50% prevalence rate was reported in the southwestern part of the country (Clarke, Roschnik, Rouhani, Diarra, Barnadio, Sacko, Traore… Fall, 2012). The prevalence of malaria in children aged 6 - 12 years in Gambia was found to be 17% during the wet season and 5% during the dry season (Oduro, Conway, Schellenberg, Satoguina, Greenwood and Bojang,

2013). A higher prevalence of 50% was however found in a survey conducted in Côte d'Ivoire among people of all age groups in 21 villages (Assi, Henry, Rogier, Dossou-Yovo and Audibert, 2013). In Mali, 42% of school-aged children were found to have malaria parasite (Thuilliez *et al.*, 2010). While in southern Mali, the parasite was found to range from 65 - 98% in 38 schools surveyed in 2011 (Clarke *et al.*, 2012).

Approximately 50% prevalence was found in school-aged children in several surveys in the Southwest, Cameroon (Achidi, Apinjoh, Mbunwe, Besingi and Yafi., 2008, Wanji, Kimbi, Eyong, and Tendongfor., 2008, Kimbi *et al.*, 2013). In areas Outside of Sub-Saharan Africa, school surveys found a prevalence ranging from 0% to 15% in Ethiopia (Ashton, Kefyalew, Tesfaye, Pullan. and Yedeta, 2011; Noor, Moloney, Borle, Fegan, Shewchuk, and Snow 2008). A prevalence of 13% was reported in children aged 6 to 11 years in the Republic of Yemen (Bin Mohanna, Bin Ghouth and Rajaa, 2007). An intervention study in Sri Lanka reported that school-aged children in malaria-endemic areas experience at least one clinical attack of malaria severe enough to warrant treatment once every one to two years as incidence of clinical malaria stood at 44% to 49% yearly (Fernando *et al.*, 2006).

Microscopy data from the 2015 Nigeria Malaria Indicator Survey (NMIS) showed that malaria prevalence in children under five years of age to be 27% although with a wide regional variation. Parasite prevalence ranges from 14% in the South East to 37% in the North West geopolitical zones. The prevalence of malaria in rural population has been noted to be three times that in urban populations (12% vs. 36%) (FMoH, 2014). The prevalence among respondents in the lowest socioeconomic group was 10 times higher than those of the highest socioeconomic group (4% vs. 43%) (FMoH, 2013). Twenty-seven percent of children aged 6-59 months tested positive for malaria when microscopy was used to detect the presence of parasites during the nation-wide survey. It was also found that malaria prevalence increases with the age of children regardless of the test used. (FmOH, 2015)

Malaria is more prevalent among under-5 children compared to other age groups (Nwaorgu & Orajaka, 2011). A prevalence of malaria among under-5 children in Southeast Nigeria ranged from 62.4% to 76.4% and *Plasmodium falciparum* was responsible for 51.8% of the infections (Nwaorgu & Orajaka, 2011). Olashinde,

Ojurongbe, Akinjogunla and Adeyeba (2015) similarly reported a prevalence of 61.1% in Southwestern Nigeria. In a study in urban areas in Abia state, the prevalence of malaria stood at 86.4% in Aba and 74.4% among individuals across all age group in Umuahia. The highest infection rate of 90% was observed in Umuahia among the age group 11-20 years. (Kalu Obasi, Nduka and Otuchristian., 2012). Analysis of 16 household clusters in Owerri, Imo state revealed 25.7% prevalence of malaria with adolescents having the highest malaria prevalence rate of 42.3% followed by children aged 0-9years (35.6%). (Ajero, Ukanga, Uzochukwu, and Chigbo, 2015). A study conducted to assess the prevalence of malaria parasite among asymptomatic primary school children in Bayelsa State, Nigeria, found 63.3% of the blood samples collected to be positive with malaria parasite at varying degrees of parasitemia (Abah and Temple, 2015). However, a higher percentage (80.3%) was reported in a similar study among asymptomatic and symptomatic students of the Federal University of Technology, Akure, Nigeria (Adepeju, 2017).

One of the factors that contribute to the emergence and/or re-emergence of malaria is resistance to anti-malaria drug resistance (Olashinde *et al.*, 2015). Malaria in pregnancy also remains a major public health problem in Nigeria. Gajida, Iliyasu and Zoakah, 2010 reported that 2% of antenatal clients including adolescent pregnant women in Kano, Nigeria were found to have malaria parasitemia with younger pregnant women having a higher percentage compared to older women. A cross-sectional study carried out in Anambra State to determine the prevalence of malaria infection among secondary school students' revealed 10.3% prevalence with 9.9% in males and 10.8% in females. The study also indicated that a higher prevalence rate of 13.5% was found in private schools compared to 6.2% found in public schools (Ogolo, Urindwanayo, Obieze, Ogbuagu and Ekwunife., 2015).

A study in Ondo, South western Nigeria reported 80.3% prevalence of *Plasmodium falciparum* among young people less than 24 years (Adepeju, 2017). A prevalence rate of 10.3% was also found among secondary school students in South-East Nigeria (Ogolo et. al, 2015). Malaria was the most prevalent (46.9%) parasitic disease reported among young in-school adolescents in Delta State, Nigeria in a study on self-reported presence of parasitic infection (Nmor *et al.*, 2014). The prevalence of P. falciparum and malaria intestinal helminthic co-infection was 52.3% and 57.1% respectively in a study among children and young adolescents in rural communities in Ibadan. (Ajayi *et al.*, 2015)

2.4 Knowledge and Perception relating to Malaria among in-school population

A number of studies relating in-school populations knowledge of malaria have been conducted in malaria endemic regions including Nigeria. In Ethopia, a survey was conducted to assess malaria related knowledge and child to parent communication regarding prevention and control of malaria among primary school students. The study showed that knowledge of malaria was high. However, a gap in knowledge was observed about the cause and transmission of malaria (Yamrot *et al.*, 2014). A study has shown that primary school children in Tanzania were aware of malaria, its symptoms and preventive measures, although some had misconceptions and could not associate the malaria with its transmission (Sumari *et al.*, 2016). Despite the high level of knowledge about malaria, there are still some gaps; study carried out in India showed that in-school adolescents had a low understanding of mode of transmission, treatment and prevention of malaria despite the widespread knowledge of the morbidity associated with the disease (Dambhare, Nigmgade and Dudhe 2012).

A cross-sectional study was designed and conducted in Tanzania among college students to assess malaria prevalence, bed net utilization, and knowledge about the disease. The study reported that knowledge about malaria was relatively high as majority (65.8%) of the respondents had knowledge of the causative agent- Plasmodium (Nyahoga & Bochkaeva, 2018). Studies conducted to assess the knowledge and misconceptions about malaria among secondary school students and teachers in Kassala eastern Sudan revealed that there were deficiencies regarding their knowledge of seriousness of malaria in children. There was also a misconception that chloroquine may cause abortion. Other misconceptions reported by this study include the following: that the plant *Unkoleeb* (*Sorghum saccharatum*) causes malaria; that local beverage Aradaib (*Tramindus indica*) cures malaria; that multi-vitamins may prevent the disease and that chloroquine injections are more effective than the tablets form for the treatment of malaria (Elzubier *et al.*, 1997).

Cross-sectional descriptive study carried out in Calabar, Nigeria to assess Malaria knowledge and prevention practice among secondary school students reported knowledge gaps among them. The study suggested the need to empower teachers with information about the cause of malaria and prevention strategies (Udonwa *et al.*, 2010) A descriptive study carried out among university students of Benin, Edo State, Nigeria reported that

most of the students are misinformed about the pre-disposing factors relating to malaria (Adeyemo *et al.*, 2014).

A research conducted to investigate the social aspects of malaria among students in two tertiary institutions in Lagos, Nigeria reported that 74.3% and 70.3% of young people had knowledge of the cause of malaria in Lagos State University (LASU) and AOCOED (Adeniran Ogunsanya College of Education) respectively. 94% of students in the state university were of the perception that malaria can be prevented, however, a lower percentage of 64% of reported in a college of education (Okwa, Bello. and Olundegun, 2011). Oluyemi, (2017) reported that secondary school students aged 9 – 17 years in Akure showed a high level of awareness of malaria (96%). The result however showed that 44% of these respondents had never slept under ITN while only 2% always sleep under mosquito net. A study carried out among secondary school students and teachers in Ibadan reported knowledge gap on how malaria can be prevented and treated. However, majority (89%) of the respondents in this was able to mention mosquitoes as the causative agents (Morenikeji, 2009).

2.5 Health-Seeking Behaviours relating to Malaria

Health seeking behaviours relates to behaviours 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. A lot of factors contribute to it which includes personal, social, cultural and environmental factors. (MacKian, 2002). Generally, health seeking behaviours relating to malaria includes prevention and treatment practices (Alexander, 2017). A positive health seeking behaviour in prevention and treatment of malaria has proven to reduce its prevalence (Brooker *et al.*, 2009).

Poor health seeking behaviour relating to malaria was reported in Uganda despite the awareness and knowledge about the disease. The study was conducted in a peri-urban setting in southwest Uganda among 800 women. The study revealed that 96.1% knew that malaria was a dangerous disease in pregnancy; yet only 19% attended recommended four antenatal visits and 48.8% complied with IPTp (Mbonye *et al.*, 2016). A Study in Ogun state, Nigeria also showed that only 24.6% of those who experience symptoms of malaria visited the hospital for treatment, 12% use local healers while 25% bought malaria drugs

without prescription. It was also reported that 17.4% people combine antimalarial drugs with traditional medicine. The study also reported poor preventive practices as only 18% use insecticide treated mosquito nets, 42.3% use window and door nets while 13% did not employ any mosquito preventive method (Olashinde *et al.*, 2015).

Study in Osogbo, Nigeria has revealed that out of 87.8% of participants who had good knowledge about malaria during pregnancy, only 34.4% used the insecticide treated nets (ITNs) and 21.4% adopted the intermittent preventive Treatment (IPTp). Other preventive measures against mosquito bites reported by respondents included clearing of surrounding bushes, maintenance of drainages and netting of windows and doors (Alexander, 2017). A cross-sectional survey relating to the health seeking behaviour of caregivers was conducted in a rural community in Enugu State, Nigeria. The results showed that an inappropriate dose of choloroquine was used by 83.7% of the caregivers and 52.3% of them sought care from patent medicine vendors. The respondents reportedly preferred self-treatment using herbal remedies to utilizing the formal health facilities due to cost of treatment in the facilities and absence of health personnel (Okafor & Okeke, 2008).

Across sub-Saharan Africa, household ownership of at least one ITN increased from 50% in 2010 to 80% in 2016 (Clarke *et al.*, 2012). In Nigeria, 71% of households have at least one mosquito net, 69% have at least one ITN. Almost all ITNs owned by households in Nigeria are LLINs. The average number of any nets per household is two, and the average number of ITNs and LLINs per household is two. This percentage is however higher among rural (73%) than urban households (63%). Households with at least one net for every two persons stood at 36% ITN (NMEP, 2015).

Kinyua (2014) conducted a study to assess the knowledge, attitude and use of ITN among students in boarding secondary schools in Kenya revealed that possession of ITN does not translate to its usage. The use of ITN was reported to be lowest in South West geographical zone (53%) and highest in North West (91%). The use is lower in the highest wealth quintile households (58%) compared with 86% of the households in the lowest wealth quintile. Few (12%) of respondents in the study reported that they do not like to use ITN (NMEP, 2015). A study among 16 household clusters in Imo showed low use of LLIN among respondents, 6.7% households had LLIN while only 3.4% reported use of the nets (Ajero *et al.*, 2015).

According to a study conducted among student's aged 8-17 years in Tanzania, there was a significant decline in asymptomatic malaria from 24.3% in 1994 to 3% in 2012 following a wide scaled up use of ITNs and ACTs use among primary school children (Manangwa, 2012). Another study conducted among primary school children in Tanzania with a view to assessing knowledge, attitudes and practices relating to revealed that 80.8% of the respondents go to the hospital as their immediate care-seeking behaviour once they felt malaria symptoms, while 11.2% opted for self-medication. Use of bed nets was reported by 92% of the respondents as their main malaria prevention strategy while 4.8% preferred the use of medicines (Sumari, Dillip, Ndume, Mugasa and Gwakisa 2016). A study conducted among college students in Tanzania showed that only 44.7% of respondents used bed nets, 4.5% use a body spray or ointment daily to prevent mosquito bites while others seldom use spray or ointment or do not care about malaria prevention at all (Nyahoga & Bochkaeva, 2018).

A study among adolescents in Uganda revealed that self-medication was common for the treatment of malaria involving use of over the counter drugs, herbs or combination of both. Seeking care in health care facilities was one of the options taken after the self-medication has failed. However, they prefer to go to health units with laboratory facilities to examine their blood (Mbony *et al.*, 2011). Dambhare *et al.*, (2012) reported the health seeking behavior school going adolescents in Wardha district, Central India relating to malaria. Prevention practices respondents reported include: cleaning the surroundings to destroy mosquito breeding place (47.4%), mosquito nets (20.7%) and adolescents resorted to self-medication (12.1%).

A study carried out in Zaria, northern Nigeria to investigate usage of insecticide-treated and malaria episodes among boarding students revealed that 87.3% of the respondents knew about and had actually seen ITN while only 43.3% used the net (Aliyu & Alti-Mu'azu, 2009). Udonwa *et al.*, (2010) reported poor health seeking behaviour, relating to malaria among secondary school students in Calabar, South-South Nigeria, most of the respondents did not practice preventive measures. Malaria preventive practices reported by respondents are clearing vegetation (13%), opening up drainage (11%), use of ITN (25.7%) and use of antimalarial drugs (11.2%). Majority (66%) of respondents in a study carried out among students of University of Benin, Edo, State reportedly use anti-malaria

drugs bought from the chemist to combat malaria, 12% use the doctor's prescription while 2.9% resorted to non-medical alternative treatment (Adeyemo *et al.*, 2014)

2.6 Factors Influencing Health-Seeking Behaviours relating to Malaria

A study in developing countries has identified factors affecting health seeking behaviours. These includes lack of basic information, limited ability to process information because of low levels of education and market imperfections affecting people's ability to invest in health (Dupas, 2011). Social capital has been shown to have a direct effect on the health of communities. It has also been noted that participation in community-centered projects demonstrated to have an indirect effect on the participants' health seeking behaviour (MacKian, 2002).

Social capital is defined as social, non-formalized networks that are created, maintained and used by the networks actors in order to share norms, values, preferences and other social attributes and characteristics (Westlund 2006). This is relevant in malaria prevention and control because norms, perceptions and attitude relating to the disease are key antecedent factors for health seeking behavior.

According to a study in Ghana, gender roles affect health seeking behaviour towards malaria as women usually do get adequate economic support from males. Those who disagreed with husbands or family elders about seeking appropriate treatment, faced difficulties in accessing health care for children with malaria (Nyonator & Tolhurst, 2005). Low social status, economic class inequality and poverty, have been found to contribute to the burden of the disease in a study conducted in Cameroon (Kuate, 1997).

A study in Oye-Ekiti has showed that knowledge of transmission of malaria is vital in seeking effective treatment measures in rural communities. Gender and malaria belief were found to have no significant influence on health seeking behaviour among respondents (Lawal, Shyngle and Bada., 2014). Educational status influences the level of knowledge on malaria. This trend is similar to what was noted in a study by National Malaria Elimination Program where 84% women had the knowledge of the cause of malaria among those with a primary education while 94% had the knowledge among those with more than a secondary education. The channel of information also influences the awareness and knowledge of community members about malaria. According to a study in

rural Ghana, 83.3% of the respondents disclosed that health professionals was their source of information; the sources of information to some other respondents include radio (7.3%), television (5.8%) and newspapers (0.8%) (Laar, Laar and Dalinjong., 2013).

Factors such as those related to poverty, and lack of health care infrastructure adversely influences people's poor health seeking behaviour relating to malaria. According to a study among school-aged children and youth in Akuak Rak, South Sudan, the prevalence of malaria was 40% (Charchuk Houston and Hawkes., 2015). Factors influencing adolescents' health, like adults, include social, economic, gender, religion, peer influence, social media (Ki-moon, 2003). Low level of knowledge about the symptoms of malaria affects timely requests for appropriate preventive measures and treatment. Low level of knowledge about malaria transmission also interferes with the ability to take appropriate preventive measures (Kumar, 2017).

Adolescents utilize school-based adolescent health clinic (sick bays) more when counseling for psychological or behavioural problems are incorporated into the facility. Boys tend to consult their friends or peers (48%) while girls tend to consult their mothers (63%) to resolve health problems (Kumar *et al.*, 2008). It was also reported in a study in India that females are more aware of health issues compared to males. The geographical location of the adolescents; urban or rural settings, also influence their awareness and health seeking behaviours (Kumar *et al.*, 2017). Economic factors influence the use of ITN as a preventive method. For instance, a study has revealed that majority (78.7%) of the college students who do not make use of ITN are among those of the low economic class. Cost of ITN and lack of information relating to malaria protection are major factors reported, which influence use of ITN among college students in Tanzania (Nyahoga & Bochkaeva, 2018).

A study in northern Nigeria has showed that religion plays a vital role in shaping the health seeking behaviour of household members in the health seeking practices regarding malaria control and prevention (Ahmad & Kalthum, 2015). The religious belief of the respondents is one of the antecedent factors to their perception relating to malaria. It was therefore, noted that malaria control activities should involve educating religious leaders to enlighten their subjects about the contemporary stand of religion on health seeking and health related issues.

2.7 The burden of malaria among In-School Adolescents

The burden of malaria among in-school adolescents is enormous. The burden includes anemia (Kurtzhals, Addae, Akanmori, Dunyo, Koram, Appawu, Nkrumah and Hviid 1999), school absenteeism (Nankabirwa *et al.*, 2014) and, adverse effects on cognitive function (Ohlin, 2012). Anaemia is a health condition in which the blood lacks enough healthy red blood cells or hemoglobin (Snow *et al.*, 2005). This condition is a common problem among school-age children in the tropics. It has been noted that malaria related anemia led to the death of 21.6% of children admitted to have severe anemia in Accra, Ghana (Commey & Dekyem, 1995). Many other cross-sectional surveys carried out in highly endemic areas have found a significant association between the prevalence of anemia and malaria parasitemia; these studies were, however conducted mainly among preschool-age children in Mali and Senegal. Intervention studies have given evidence for the role of malaria as a cause of anemia in school-age children as intermittent preventive therapy (IPT) have demonstrated significant reduction in anemia (Barger, Maiga, Traore, Tekete and Tembine., 2009; Clarke *et al.*, 2013). Though there are confounding factors for this such as iron deficiency and malnutrition. The WHO and other health authorities therefore recommend that the control of malaria should include iron supplementation in malaria endemic areas (Raiten *et al.*, 2011).

School absenteeism refers to the failure to attend school by a pupil or student for a given period of time. School absenteeism could be due to numerous factors and malaria contributes much to school absenteeism in malaria endemic communities (Nankabirwa *et al.*, 2014). One of the early studies conducted in Nigeria shows that malaria was the most important health-related cause of school absenteeism (Erinoso & Bamgboye, 1988). A similar experience has been reported in Kenya (Brooker *et al.*, 2000). In Nepal, a study has shown school absenteeism ranging from 4-14 school days (Mills, 1993), Malaria accounted for 36% of school absenteeism due to medical reasons in a study conducted in Senegal (Trape, Lefebvre-Zante, Legros, Druilhe and Rogier 1993).

In Kenya, malaria caused 11% loss of the school year for primary school students; it also contributed 4.3% loss of school year among secondary school students (Leighton & Foster, 1993). The annual loss in Kenya due to malaria in 2000 was estimated to be 4 million to 10 million school days (Brooker *et al.*, 2000). An estimate of 2.7% school days was lost to only malaria and 3.2% to all other illnesses put together during a year study in

Sri Lanka (Konradsen, Van der Hoek, Amerasinghe and Amerasinghe 1997). A similar study in Yemen revealed that parasitemia was found significantly more frequently in those absent from school than in regular attendees (Mohanna *et al.*, 2007). Preventive efforts to reduce the prevalence of malaria have proven to reduce school absenteeism. For instance, it has been noted that school health education programs directed at malaria reduced absenteeism by 25% among Kenyan school children (Ogutu, Oloo, Ekissa, Genga, Mulaya and Githure., 1992). Another intervention study in Sri Lanka, reported a 55% reduction in malaria incidence and 62.5% reduction in school absenteeism during a nine-month period among children who received prophylaxis (Fernando, de Silva, Carter, Mendis and Wickremasinghe., 2006).

Studies conducted in Africa and Asia provide strong evidence that malaria can impair the cognitive function of school-age children (Kihara, Carter, and Newton 2006 & Fernando *et al.*, 2010). The impacts of simple and severe malaria, as well as the effect of asymptomatic parasitemia on various aspects of cognition have been evaluated through descriptive studies. Cerebral malaria was found to be significantly associated (3.7 relative risk) with impairment of one or more cognitive domains in a prospective study among Ugandan children (Boivin, Bangirana, Byarugaba, Opoka and Idro, 2007). Similar findings were also reported among Malawian children with retinopathy-positive cerebral malaria (Boivin, Gladstone, Vokhiwa, Birbeck and Magen., 2011). Asides from Cerebral malaria, uncomplicated episodes of malaria and asymptomatic parasitemia can also adversely affect cognition (Clarke *et al.*, 2008).

Studies conducted in Sri Lanka show that school-age children with malaria episodes scored significantly lower on tests of mathematics and language (Fernando *et al.*, 2003b). A similar conclusion was also drawn in Mali in a study conducted among school-age children (Thuilliez *et al.*, 2010). A study in Yemen also showed that students with malaria performed poorly on formal cognitive testing compared to those without malaria even after confounding factors have been adjusted for. The effect was not however, as marked as in students with clinical malaria (Snow & Marsh, 1998; Thuilliez *et al.*, 2010). However, association between asymptomatic parasitemia and cognitive function was not found in all the studies (Halliday, Karanja, Turner, Okello and Njagi 2012).

The strongest evidence to support the view that malaria impairs cognitive function comes from intervention studies. An intervention study was conducted in Sri Lanka, among pupils aged 6 - 12 years. Prophylaxis showed improvement in academic performance (Fernando *et al.*, 2006). Malaria can also impair learning and education achievements when it occurrence prevents students from doing assignments, writing school examinations or participate in co-curricular activities (Brooker, 2009).

2.8 Opportunities for malaria control and prevention in Schools

It has been proposed that health education for malaria prevention and control should be strengthened in schools to upgrade student' the knowledge of malaria. Equipping teachers with information about malaria prevention and control strategies will also improve the knowledge of students on malaria (Yamrot *et al.*, 2014). Inclusion of school children in malaria control educational programmes could yield substantial benefits towards malaria elimination (Sumari *et al.*, 2016).

Several strategies are available for the control of malaria among in-school adolescents which can be delivered either though schools or as part of community wide control interventions (Nyahoga & Bochkaeva, 2018). The WHO added that frequency, timing, and effectiveness of these interventions will vary according to the local intensity of malaria transmission. Interventions against malaria according to WHO (2002) are delivered best as part of an integrated package, for example, as part of a school health program that also delivers deworming. Schools can play a vital role in ensuring that students obtain rapid access to diagnosis and treatment of malaria by providing a sick bay and appropriate health education activities in school. However, information about the treatment of malaria is not often part of the school curriculum which reduces the impact of school on malaria control. (Nankabirwa *et al.*, 2014)

The various approaches which have potential for malaria control, prevention and treatment will be reviewed starting with vector control in Schools. The school can help to control malaria vectors through the use of ITNs, IRS, and reduction of mosquito breeding sites (Van Bortel, Delacollette, Barutwanayo and Coosemans 1996). Use of ITN in boarding schools has proven to be effective in reducing episodes of malaria although the use is not very high. In a study among boarding school students in Kenya for instance, respondents using ITN experienced less episode of malaria (16.6%) compared to those who do not use

it (61%). Cost and availability were contributing factors to non-use of ITN in the boarding schools (Kinyua, 2014).

The application of long-acting insecticides to the walls and roofs of residential houses and public buildings such as schools is an effective method of malaria control. Targeted IRS conducted over 12 months in the epidemic-prone Kenyan highlands reduced the prevalence of asymptomatic infection in school-age children by 50% and reduced the incidence of clinical disease (Zhou, Githeko, Minakawa. and Yan, 2010). The mosquito, the vector for malaria parasite can also be significantly reduced in schools by destroying and reducing their breeding sites through the introduction of predator species, or habitat destruction and drainage (Tusting, Thwing, Sinclair, Fillinger, Gimnig and Bonner, 2013). This is however difficult to achieve in many parts of Sub-Saharan Africa because of the multiplicity and changing nature of breeding sites of the main vector species (Fillinger & Lindsay, 2011).

Seasonal Malaria Chemoprevention and Intermittent Screening and Treatment are other approach that has potential for malaria prevention and control among in-school adolescents. Chemoprophylaxis is the regular administration of antimalarial drugs to those at risk over a sustained period to provide persistent, protective blood levels (with low parasitemia). This has proven to be beneficial among school-aged children. It involves administration of treatment on a monthly basis to coincide with the annual peak in malaria transmission (Wilson, 2011). In 2012, the WHO recommended implementation of SMC for children under age of five years in areas of the Sahel sub region of Africa with highly seasonal transmission. An alternative to SMC is intermittent screening and treatment; this involves screening periodically for malaria infection using the RDT, and those infected (whether symptomatic or not) should be treated with an effective antimalarial drug. (Nankabirwa *et al.*, 2014)

2.9 Theoretical Framework

A theoretical framework is an explicit statement of theoretical assumptions consisting of concepts, reference to literatures and existing theory (Grant & Osanloo, 2014). A good theoretical framework gives a strong scientific research base and provides support and guidance to a research project (Adom, Hussein and Agyem,., 2018). Concepts are placed within a logical and sequential design to make conceptual distinctions and organize ideas.

It captures something real and does this in a way that is easy to remember and apply. It serves as a foundation upon which a research is constructed (Sinclair, 2017).

The PRECEDE framework, developed by Lawrence Green and Marshall Kreuter was adopted to guide the design of the study. It offers a framework for identifying behavioral antecedent factors and appropriate intervention strategies. The PRECEDE is an acronym which stands for Predisposing, Reinforcing, Enabling Constructs in Educational/ Environmental Diagnosis and Evaluation. According to the PRECEDE framework, just as a medical diagnosis is needed to design a treatment plan, educational diagnosis (i.e. diagnosis of antecedent factors) is needed to guide the design of a health promotion intervention.

According to the model, the determinants of behavior can be categorized into the following broad typologies: Predisposing factors; Reinforcing factors; and Enabling factors. Predisposing factors motivate or provide a reason for behavior. They refer to issues that are cognitive in nature. These factors include knowledge, attitudes, cultural beliefs, norms, values, perceptions and readiness to change. The enabling factors enable persons to act on their predispositions which include available resources (time, money, skills etc) supportive policies, assistance, and service.

Reinforcing factors are factors which encourage repetition or persistence of behaviors by providing continuing rewards or incentives. They come after the behaviour has been initiated. It refers to the influence of significant others such as friends, family, peers etc. Reinforcing factors include social support, praise, reassurance, and symptom relief from parents, peers, teachers and other significant others. These factors can either influence behaviours positively or negatively. These factors were used as a guide in construction of the questions in the questionnaire used in the study. Antecedent factors investigated in this study includes knowledge, perception and health seeking behaviours which are predisposing factors of the PRECEDE model (See fig. 2.1 for details). Availability of mosquito nets was one of the enabling factors considered.

Figure 2.1 is a diagrammatic expression of the PRECEDE model adapted to the study of malaria among in-school adolescents. It depicts the health promotion activities that could

influence the predisposing, enabling and reinforcing factors which in-turn affects behaviour and health of the study population.

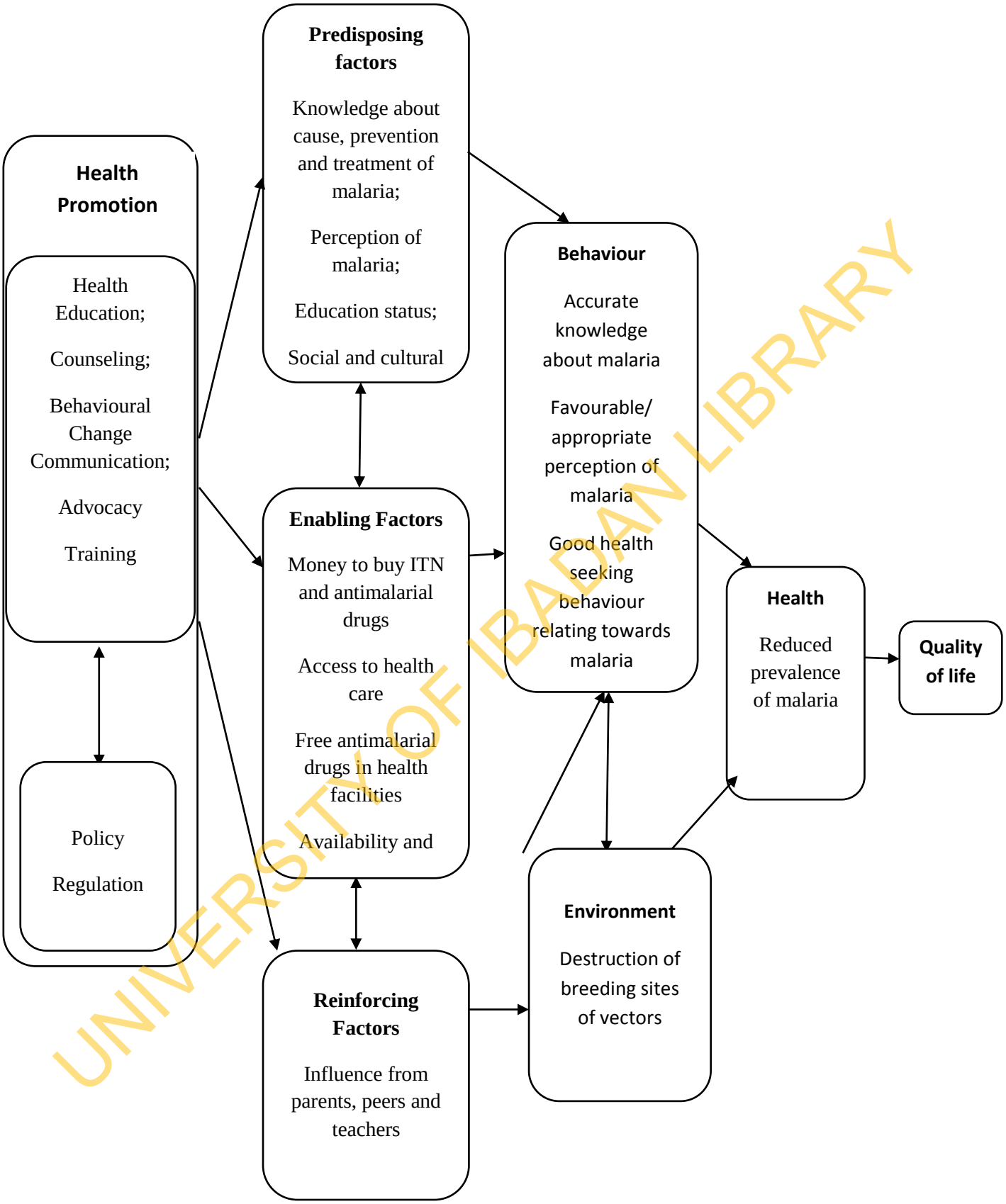

Fig. 2.1 The PRECEDE model adapted to the study of malaria among in-school adolescents

CHAPTER THREE

METHODOLOGY

3.1 Study Design

The study was a descriptive cross-sectional survey which involved the use of a semi-structured questionnaire. The questionnaire was used to measure the following: knowledge of causes, symptoms, consequences, prevention and treatment of malaria; the perception of malaria; the health seeking behaviours relating to malaria and factors which influence the malaria related behaviours among ISA aged 10-19 years. The study was carried out in selected private and public secondary schools in Ibadan North Local Government Area (IBNLGA).

3.2 Description of the Study Area

The study was carried out among public and private secondary schools in IBNLG, Oyo State, Nigeria. Ibadan North LGA is one of the 11 LGAs in Ibadan land. It is one of the five metropolitan LGA. It is bounded in the North by Akinyele LGA; in the South by Ibadan South East LGA; in the East by Ibadan North East and Lagelu LGAs; In the West by Ibadan North West and Ido LGAs. It has a land area of 27km² and an estimated population (NPC, 2006) estimate of 400,878 people according to the 2006 population census growth rate of 3.4%.

The LGA has two tertiary and four public secondary health care facilities. There are 42 public secondary schools and 54 government approved private schools in the LGA. The climate of the area is tropical with an average temperature of 26.5^0C and 1311mm of precipitations annually. There are several conditions or factors which favour the breeding of mosquitoes, the malaria vectors in the LGA. These factors include presence of stagnant water, containers which hold water, streams, blocked gutters and poor drainage systems.

3.3 Study Population

The study population consists of male and female adolescents aged 10-19 years in six (6) private and six (6) public secondary schools in IBNLGA. The respondents were of different socio-demographic characteristics.

3.4 Inclusion Criteria and Exclusion Criteria

Inclusion criteria

- Adolescents who were males and females in the selected public and private schools in IBNLGA.
- Adolescents who were aged 10 – 19 years.
- In-school adolescents who volunteered to be involved in the study.

Exclusion criteria

- Adolescents who were not aged 10-19 years
- Adolescents schooling outside the study area
- Adolescents in JSS3 and SS3 who were unavailable due to the examinations they were writing at the time of the study.

3.5 Sample Size Determination

The sample size (N) for this study was determined using the Leslie Kish (1965) formula for single proportion for descriptive studies.

The prevalence (P) used in this study is 46.9%, which is the percentage of self-reported malaria in a study conducted in Southern Nigeria. (Nmor, 2014)

$$n = \frac{Z^2pq}{d^2}$$ where:

n = minimum sample size

Z = Standard normal deviation set at 1.96 (95% confidence interval)

p = prevalence, 0.469 (Nmor, 2014)

q = proportions that does not have the characteristics being investigated (q = 1-p), q= 1-0.469= 0.531

d = Level of significance set at 0.05 (precision set at 5%)

Therefore, the sample size $$n = \frac{(1.96)^2 \times 0.469 \times 0.531}{0.05 \times 0.05}$$

$$n = 382.86 \approx 383.$$

10% of the calculated sample size was added to make up for possible cases of improper completion of the questionnaires and or cases of attrition.

$$\frac{10}{100} \times 383 = 38.3$$

N was readjusted to be equal to 383 + 38.3 = 421.3

The n was adjusted to 430 to increase the power of the study

3.6 Sampling Procedure

A multistage sampling method was employed in this study; it involved the following stages:

- Stage 1: 50% out of the 12 wards in the LGA was randomly selected by balloting. This resulted in the selection of 6 wards.
- Stage 2: Secondary Schools in the selected wards were stratified into public and private schools and two schools (i.e. 1 public and 1 private per ward) were randomly selected from each of the selected wards.
- Stage 3: The populations of students in the selected schools were determined and proportionate sampling was used in the selection of study participants in each school
- Stage 4: An arm of a class was randomly selected from each of the classes (JSS1, JSS2, SS1 and SS2) in the schools through balloting
- Stage 5: Respondents in each arm of class were selected using systematic random sampling facilitated by use of their class registers.

The sampling process was as follows: In ward III, there were 109 students in private school 001 (see table 3.1). The sample size selected was 13 students approximately using the following formula:

$$n = \frac{x}{y} \times S$$

where n is the number of respondents to selected from a particular class

x = number of students in a school

y = total number of students in the all 12 selected schools

S = calculated sample size

The same procedure was used to select the proportionate sample sizes in other schools as contained in table 3.1

Table 3.1 Sampling Procedure

Selected Wards	School type and codes	Total no of students in JS1, JS2, SS1 and SS2	Sample size determination	No of respondents selected
Ward III	Private (01)	109	$\frac{109}{3498} \times 430 = 13.4 \approx 13$	13
	Public (02)	652	$\frac{652}{3498} \times 430 = 80.14 \approx 80$	80
Ward IV	Private (03)	73	$\frac{73}{3498} \times 430 = 8.97 \approx 9$	9
	Public (04)	435	$\frac{435}{3498} \times 430 = 53.47 \approx 54$	54
Ward VI	Private (05)	106	$\frac{106}{3498} \times 430 = 13.03 \approx 13$	13
	Public (06)	421	$\frac{421}{3498} \times 430 = 51.75 \approx 52$	52
Ward VII	Private (07)	139	$\frac{139}{3498} \times 430 = 17.09 \approx 17$	17
	Public (08)	368	$\frac{368}{3498} \times 430 = 45.23 \approx 45$	45
Ward VIII	Private (09)	100	$\frac{100}{3498} \times 430 = 12.29 \approx 12$	12
	Public (010)	290	$\frac{290}{3498} \times 430 = 35.64 \approx 36$	36
Ward XI	Private (011)	77	$\frac{77}{3498} \times 430 = 9.47 \approx 9$	9
	Public (012)	728	$\frac{728}{3498} \times 430 = 89.49 \approx 90$	90
		3498		430

3.7 Method and Instrument for Data Collection

A semi-structured interview was used for data collection facilitated by an interviewer-administered questionnaire and an observation checklist (See Appendix 1 and 2 for more details). The questionnaire contained five sections as follow:

Section A: Socio-demographic characteristics of the respondents.

Section B: Respondents living conditions/situation

Section C: Knowledge on causes, transmission route, symptoms, prevention, treatment and consequences of malaria. This section of the questionnaire contains a 66-point knowledge scale for assessing respondents' knowledge of malaria

Section D: Perception of respondents relating to malaria. This section contains a 22-point perception scale.

Section E: Malaria related health-seeking behaviour and malaria illness experiences.

3.8 Recruitment of Research Assistants, Validity and Reliability

3.8.1 Recruitment of Research Assistants and their training

Five Research Assistants (RAs) made up of M.PH students were recruited and trained to help in the data collection exercise. The training focused on the following issues: objectives and nature of the study; instruments for data collection; sampling process; data collection techniques; ways of establishing rapport with respondents and ethical issues that should be respected or taken into consideration during the study. The training methods used included lecture, role play, discussion and brain storming.

3.8.2 Validity of the Instrument

The validity of the instrument (i.e. the questionnaire) for this study was ensured through extensive literature review to identify pertinent variables that were included in the instrument for measurement. The draft instrument was subjected to review and comments from my supervisor and other experts in the fields of community medicine, epidemiology and adolescents health.

3.8.3 Reliability of the Instrument

The reliability of the instrument was assessed through pretesting and use of Cronbach Alpha statistical tool. The Pre-test involved administering copies of the questionnaire to

10% of the total sample size in another representative population. The exercise was carried out among 44 in-school secondary school adolescents in Ibadan North West Local Government Area. After the pre-test, the copies of the questionnaire were coded guided by a coding guide and entered into a computer and analysed. The cronbach alpha coefficient was used to determine the reliability of the instrument. In this technique, a minimum coefficient score of 0.5 indicates that the instrument is reliable to some extent. The higher the coefficient score is i.e. as it approaches 1, the more reliable it is. In this study, the cronbach alpha coefficient score obtained was 0.624 indicating it was very reliable.

3.9 Data Collection Process

The data were collected using copies of the semi-structured questionnaire. Copies of the questionnaire for data collection were administered by the researcher and other RAs. The researcher and RAs visited each selected schools during their break period. In each school, permission to conduct the study was sought for from the principal. In most cases, the Vice Principal (academics) was approached to facilitate access to the class registers of the classes selected.

One class in each arm was randomly selected and respondents to be selected from the class were systematically selected from the class register based on the calculated number of respondents. The gender was also factored in during this selection as the register is stratified into male and female. Data collection was done from 9am to 2pm during the week days for 3 weeks. The participants assent was sought before administration of the questionnaire after explaining to them the purpose of the research, time that would be spent to complete the questions and importance of the research. The researcher waited to collect the completed copies of the questionnaire immediately a respondent was through with it. It was checked for completeness and accuracy. Attention of respondents was drawn to any case of omission or incomplete responses in the questionnaire.

3.10 Data Management, Analysis and Presentation

A serial number was written on each copy of the questionnaires for easy identification and recall of any instrument with problems for correct data entry and analysis. All the copies of the administered questionnaire were checked individually and edited for purpose of completeness and accuracy. A coding guide was developed after a careful review of responses in the copies of the questionnaire to facilitate coding and data entry (See

Appendix 5 for more details). The data contained in the copies of the questionnaire were coded and entered into the computer. A template was designed using the Statistical Package for the Social Sciences (SPSS version 21) software for entry of the coded data and analysis. The data entered into the computer were analyzed using descriptive statistics such as percentages, means and inferential statistics such as Chi-square test, t-test, f-test at p = 0.05.

The knowledge of respondents was determined and their knowledge scores categorized. Knowledge score of <33 points (0-50 percentile) was categorized as poor, 33 - <50.0 points (50 - <75 percentile) and 50.0 – 66 points (> 75 percentile) were categorized as poor, fair and good respectively. Perception scores were also categorized as favourable or unfavourable. Favourable perceptions are those in-line with the biomedical world-view. A 22 point perception scale was used; perception scores of 0-11 points (0 – 50 percentile) was categorized unfavourable and >11 – 22 points (> 50 percentile) was categorized favourable (See Appendix 7 for more details). The results of the analysed data are presented in tables and charts in chapter four.

3.11 Ethical Considerations

Ethical approval was obtained from the Oyo State Ethical Review Committee (See Appendix 7). For adolescents aged < 18 years, permission was obtained from their school principals and assent obtained from such adolescents. Participants were informed that participation is voluntary and that they would not suffer any consequences or penalty in anyway if they chose not to participate (See Appendix 3 for more details). Participants were briefed about the following:

a. Confidentiality of data

They were informed that serial numbers and not their names would be written on the copies of the questionnaire to maintain confidentiality. Names of schools used were not also written on the copies of the questionnaire; rather codes were used to ensure confidentiality. The respondents were assured that their responses would be kept confidential and the questionnaires will be kept safe in a locked cupboard. Information related to the study contained in the computer system used would be password-protected and accessible to the investigator only.

b. Beneficence to Participants

The participants were told that the study would not be of direct benefit to them. The findings of the study would be forwarded to relevant stake-holders in the schools studied as well as the ministries of Health and Education with a view to assisting them to formulate policies relating to prevention and control of malaria among in-school adolescents.

c. Non-maleficence (non-harmful) to Participants

The study is non-invasive and does not involve any procedure that can physically harm participants. There are some questions, however, which respondents may find uncomfortable to answer as they may be related to their privacy.

d. Right to decline/withdrawal from the study without loss of benefits

The participants were assured that they were free to decide not to participate and that they could choose to withdraw from the study at any time during the interview. In addition they were informed that they would not suffer any loss of benefits or privileges if they chose not to participate.

3.11 Limitation of the Study

All students of arms JS3 to SS3 were not involved in the study. This was because as at the time of the study, SS3 students had completed their examinations and was no longer in the school. The JS3 students were not available because they were about writing their examinations. However, the available arms of JS1, JS2, SS1 and SS2 were used which gave a representative of the study population

CHAPETR FOUR

RESULTS

4.1 Socio-demographic characteristics of respondents

Overall, a total of 423 In-school adolescents participated in this study. This number is different from the calculated sample size of 430 because 6 of the questionnaires were not used for computation of the result due to incomplete of the data supplied. Table 4.1 shows the age, gender, type of school, religion, class, ethnicity and family type of respondents. The respondents' ages ranged from 10-19 with a mean of 14.5 ± 2.2. Respondents within 13-14 years age group topped the list (35%), followed by those in the 15-16 age group, (26%). There were 49.6% males and 50.4% females, this was due to the fact that the study was purposively designed to ensure equal or nearly equal distribution of respondents by gender. All the respondents were from mixed schools and majority (82.7%) were from public schools. The results showed that 23.2% of the respondents were in JSS1 while 26% were in JSS2. The results also showed that 24.3% were from SS1 and 26.5% were from SS 2. Majority of the respondents (82.7%) were Yoruba and about two-third were Christians (68.6%) while 82.3% of the respondents were from monogamous families (See table 4.1 for more details).

Fig. 4.1 shows that 30.6% of mothers and 36.5% of fathers had secondary school education. Mothers and fathers with tertiary education were 50.7% and 50.0% respectively. The occupations of the respondents' Fathers/Guardians included civil service (29.3%), trading (27.9%) and working in a private organization (20.6%). Slightly over half (51.5%) of the mothers of respondents were traders. (See table 4.2 for more details).

Table 4.1 Respondents' Socio-Demographic Characteristics- age, gender, type of school religion, class, ethnicity and type of family

N=423

Demographic Characteristics	No	%
Respondent's age**		
10-12	79	18.7
13-14	148	35
15-16	110	26
17-19	86	20.3
Gender/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

*Others: South-South ethnic minorities 13 (48.2%), Middle belt ethnic minorities (33.3%), Hausa 5 (18.5%).

**$\bar{x}$ = 14.5 ± 2.2

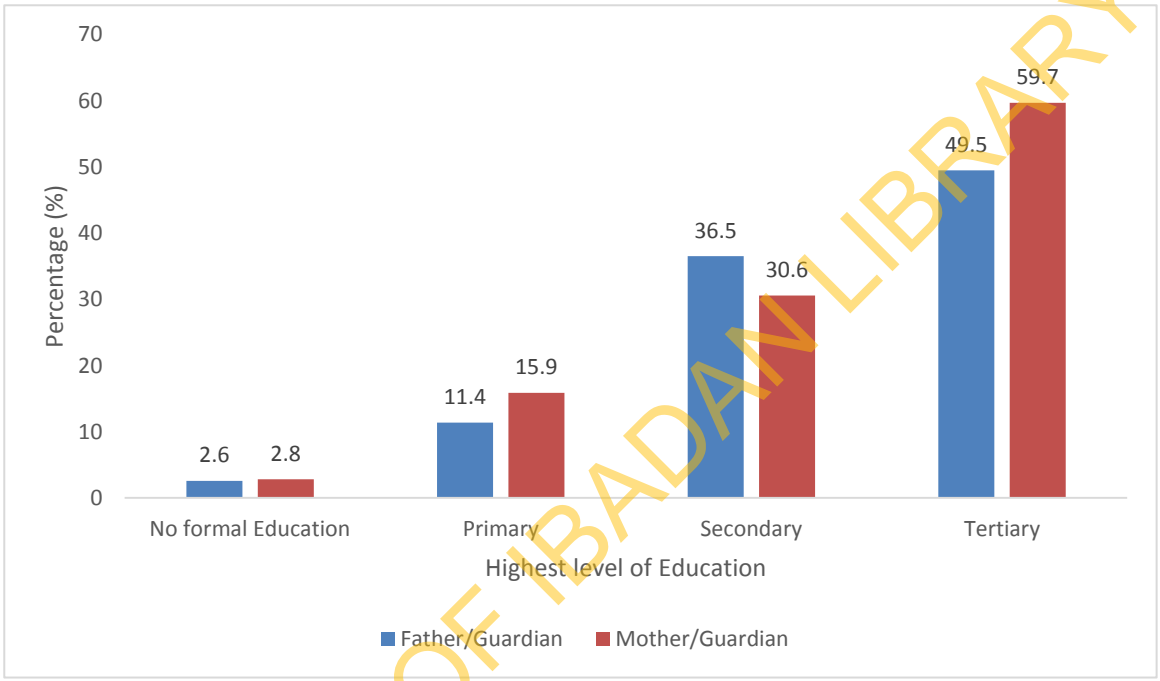

Fig. 4.1: Socio-demographic Characteristics: Parents highest level of Education

Table 4.2 Socio-demographic Characteristics: Occupation of Parents/Guardian

N=423

Occupation	No	%
Occupation of Father/ Guardian		
Trading	118	27.9
Civil-Service	124	29.3
Working in a Private Organization	87	20.6
Retired	20	4.7
Artisan	50	11.8
Teacher	18	4.3
*Others	6	1.4
Occupation of Mother/ Guardian		
Trading	218	51.5
Civil-Servant	65	15.4
Working in a Private Organization	44	10.4
Retired/Not working	13	3.1
Artisan	43	10.2
Teacher	40	9.5

*Others: Politician 1 (16.7%), Clergy 5 (83.3%)

4.2 Respondents' Living Situation

Table 4.3 shows the typologies of respondents' dwelling units. Slightly over half (51.3%) of the respondents live in flats followed by those living in *Face-me-I-face-you* type of house (19.6%). The number of persons living in respondents dwelling unit is highlighted in table 4.4. Less than half (46.6%), of the respondents reported that they were 4-5 living in a dwelling unit; 42.2% disclosed that 6-8 of them were living in a dwelling unit. The mean number of persons living in a dwelling unit was 5.8 ± 1.8.

The environmental factors which could promote the breeding of mosquitoes in respondents' houses were listed to include the following: open gutters (47.8%), empty containers/cans (29.1%) and unclear bush (28.4%) (See details in table 4.5). Fig. 4.2 presents dwelling units whose windows and doors had mosquito screens. Majority (81.1%) had windows with mosquito screens while 65.7% had doors with mosquito screens.

Table 4.3 Typologies of Respondents' dwelling unit

N = 423

Types of dwelling unit	No	%
Flat (3 or more bedroom)	217	51.3
Face-me-I-face-you house	83	19.6
A room and parlour	65	15.4
Two room apartment	37	8.7
One room apartment (Self-contained)	21	5.0

Table 4.4 Number of persons living in respondents' dwelling unit

N = 420

Number of persons living in the same dwelling unit **	**No**	**%**
1-3	32	5.2
4-5	196	46.6
6-8	177	42.2
> 8	53	5.9

**$\bar{x}$ = 5.8 ± 1.8

Table 4.5 Environmental factors in respondents' house that can promote mosquito breeding

N = 423

Environmental factors that can promote mosquito breeding	Responses	
	Yes (%)	**No (%)**
Unclear bushes near house	120 (28.4)	303 (71.6)
Open gutters near house	202 (47.8)	221 (52.2)
Presence of stagnant water or pools of water	80 (18.9)	343 (81.1)
Heap of refuse near house	96 (22.7)	327 (77.3)
Presence of empty containers or cans	123 (29.1)	300 (70.9)

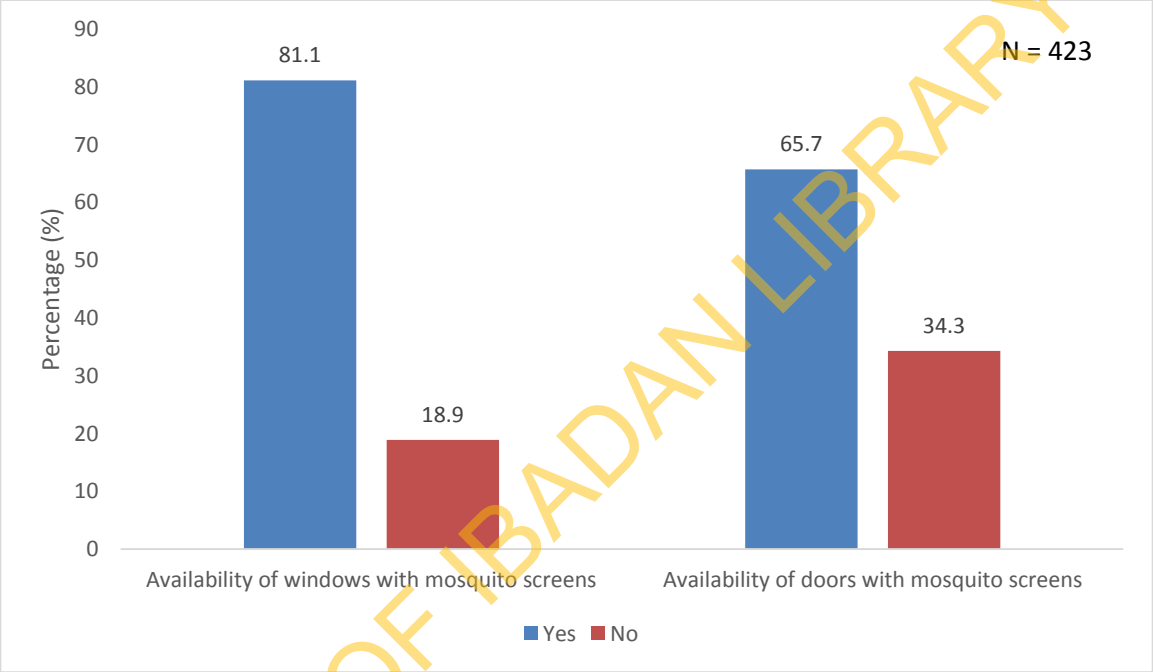

Fig.4.2: Presence of Windows and Doors with mosquito screens

4.3 Respondents' Knowledge on causes, symptoms, prevention, treatment and consequences of malaria

Respondents' mean knowledge score was 27.0 ± 7.9; 76.1% of them had poor knowledge while 23.8% had fair knowledge. Majority (70.3%) of the respondents did not know that malaria is caused by *Plasmodium falciparum*. Factors which were not regarded as causes of malaria were exposure to too much sun (43.3%), inadequate sleep (40.9%), and overwork (39.7%) (See details in table 4.6).

Table 4.7 showed respondents knowledge of the route of transmission of malaria. Majority (79.7%) of the respondents correctly stated that malaria is transmitted through mosquito bite and 51.1% correctly stated that blood transfusion is a route of transmission. The knowledge of respondents on symptoms of simple malaria is highlighted in table 4.8. Those who correctly stated the symptoms of simple malaria to include headache, high body temperature and body pains were 79.9%, 78.3% and 64.8% respectively (See table 4.8 for more details).

The knowledge of respondents on the symptoms of complicated malaria is shown in table 4.9.Slightly above half (54.4%) correctly stated that a symptom of complicated malaria is dark and limited urine. Breathing difficulties (53.7%), Fainting/loss of consciousness (47.5%), convulsion (35.9%) and coma (27.4%) were also correctly mentioned as typical symptoms of complicated malaria. (See table 4.9 for more details).

Table 4.10 highlights respondents' knowledge relating to various ways of preventing malaria. The correctly listed ways of preventing malaria mentioned by majority of the respondents included use of insecticide treated net (84.9%), clearing of bushes around dwelling units (86.5%), use of insecticide spray (75.9%), removal of stagnant water around dwelling unit (75.4%) and use of mosquito coils (72.6%). The wrongly mentioned ways of preventing malaria included the following: avoidance of overwork(40.9%), praying (41.1%), avoiding stress (48.0%) and drinking a lot of water regularly (51.1%) (See table 4.10 for more details).

Respondent's knowledge of medicines for treating malaria is presented in table 4.11. The correctly mentioned medicines that tops the list was Arthemetherlumenfanthrine (66.7%) followed distantly by ArtesunateAmodiquine (30.7%). Sulphadoxine Pyrimethamine (SP) was correctly mentioned by 43.3%. However, this antimalarial is normally used for

preventive purposes or as a chemo prophylactic especially by expectant mothers. It could also be used as a second line anti-malaria drug. Chloroquine (47.8%) was correctly mentioned; its use is however, no longer promoted officially. Quinine (26.7%) was correctly mentioned. It is however used on rare occasions under the supervision of a competent health worker. Medicines which were inaccurately listed as anti-malaria medications included the following: Paracetamol (64.5%), Herbs (68.1%), Aspirin (37.4%) and Ibuprofen (41.6%) (See table 4.11 for more details).

The knowledge of respondents on the consequences of untreated malaria is shown in table 4.12. Some of the consequences of malaria which were correctly listed by respondents included anemia (52.5%), impaired consciousness (41.4%), death (47.8%) and coma (27.9%) (See table 4.12 for more details). Respondents' level of knowledge relating to the dosages of Coartem (Arthemether Lumenfanthrine-AL) is depicted in Fig. 4.3. Many of the respondents (45.6%) provided wrong responses relating to the dosage of coartem for 10 – 19 year age group. Coartem was used in the study because it is the major artemisinin based combination therap promoted by the federal ministry of health. Over a quarter of them (29.6%) stated that they did not know the dosage for the drug. Only 24.8% correctly know the dosage for Coartem for the specified age group. It is to be noted that the study population falls within age 10-19years age range.

Table 4.6 Respondents' Knowledge of the Cause of Malaria

N = 423

Cause of Malaria	Responses		
	True (%)	False (%)	Don't know (%)
Exposure to too much Sun	149 (35.2)	183 (43.3)*	91 (21.5)
Mosquito	341 (80.6)	59 (13.9)*	23 (5.4)
Stress	176 (41.6)	161 (38.1)*	86 (20.3)
Plasmodium falciparum	124 (29.3)*	95 (22.5)	204 (48.2)
Germs	197 (46.6)	148 (35.0)*	78 (18.4)
Inadequate Sleep	162 (38.3)	173 (40.9)*	88 (20.8)
Overwork	151 (35.7)	168 (39.7)*	104 (24.6)

*Correct Response

Table 4.7 Respondents' Knowledge of the Route of transmission of malaria

N = 423

Route of transmission	Responses		
	True (%)	**False (%)**	**Don't know (%)**
Through mosquito bite	337 (79.7)*	55 (13.0)	31 (7.3)
Through blood transfusion	216 (51.1)*	151 (35.7)	56 (13.2)
Contact with body fluid from an infected person	144 (34.0)	190 (44.9)*	89 (21.0)
From mother-to-child during pregnancy	145 (34.3)*	199 (47.0)	79 (18.7)

*Correct Response

Table 4.8 Respondents' Knowledge of Common Symptoms of Simple malaria

N = 423

Symptoms of Simple malaria	Responses		
	True (%)	False (%)	Don't know (%)
Headache	338 (79.9)*	60 (14.2)	25 (5.9)
Body pains	316 (64.8)*	63 (23.2)	44 (12.1)
Chills	163 (38.5)*	117 (27.7)	143 (33.8)
High body temperature	331 (78.3)*	68 (16.1)	24 (5.7)
Nausea and vomiting	254 (60.1)*	91 (21.5)	78 (18.4)
Inability to sleep	243 (57.4)*	111 (26.2)	69 (16.3)
General weakness	282 (66.7)*	71 (16.8)	70 (16.5)

*Correct Response

Table 4.9 Respondents' knowledge of the symptoms of complicated malaria

N = 423

Symptoms of Complicated malaria	Responses		
	True (%)	False (%)	Don't know (%)
Breathing difficulties	227 (53.7)*	101 (23.9)	95 (22.5)
Febrile Convulsion*+	152 (35.9)*	101 (23.9)	170 (40.2)
Prostration/Inability to sit	144 (34.0)*	147 (34.8)	132 (31.2)
Dark and limited urine	230 (54.4)*	85 (20.1)	108 (25.5)
Coma*+	116 (27.4)*	141 (33.3)	166 (39.2)
Fainting	201 (47.5)*	101 (23.9)	121 (28.6)

*Correct Response

*+Core or major Symptoms

Table 4.10 Respondents' knowledge of ways of preventing malaria

N = 423

Ways of preventing malaria	Responses		
	True (%)	**False (%)**	**Don't know (%)**
Use of insecticide treated net	359 (84.9)*	37 (8.7)	27 (6.4)
Clearing of bushes in the environment	366 (86.5)*	36 (8.5)	21 (5.0)
Removal of stagnant water in the environment	319 (75.4)*	56 (13.2)	48 (11.3)
Use of mosquito repellant cream	284 (67.1)*	70 (16.5)	69 (16.3)
Use of insecticide spray	321 (75.9)*	54 (12.8)	48 (11.3)
Avoidance of overwork	173 (40.9)	151 (35.7)*	99 (23.4)
Eating fruits	252 (59.6)	110 (26.0)*	61 (14.4)
Drinking a lot of water regularly	216 (51.1)	132 (31.2)*	75 (17.7)
Use of mosquito coil	307 (72.6)*	69 (16.3)	47 (11.1)
Praying	174 (41.1)	173 (40.9)*	76 (18)
Avoiding Stress	203 (48.0)	132 (31.2)*	88 (20.8)
Avoid working under the sun	216 (51.1)	122 (28.8)*	85 (20.1)

*Correct Response

Table 4.11 Respondents' knowledge of medicines for treating malaria

N = 423

Medicines for treating malaria	Responses		
	True (%)	False (%)	Don't know (%)
SulphadoxinePyrimethamine (eg Amalar)	183 (43.3)[+]	66 (15.6)	174 (41.1)
Paracetamol	273 (64.5)	89 (21.0)*	61 (14.4)
Aspirin	160 (37.8)	103 (24.3)*	160 (37.8)
Arthemetherlumenfanthrine (eg Coartem)	282 (66.7)*	42 (9.9)	99 (23.4)
ArtesunateAmodiquine (eg Camosunate)	130 (30.7)*	66 (15.6)	227 (53.7)
Dihydroartemisinin & Piperaquine Phosphate	92 (21.7)*	79 (18.7)	252 (59.6)
Ibuprofen (eg Ibupain, Ibucap)	176 (41.6)	82 (19.4)*	165 (39.0)
Artesunate	120 (28.4)	74 (17.5)*	229 (54.1)
Quinine	113 (26.7)**	90 (21.3)	220 (52.0)
Chloroquine	202 (47.8)[++]	68 (16.1)	153 (36.2)
Herbs (agbo)	288 (68.1)	61 (14.4)*	74 (17.5)
Prayer water	218 (51.5)	84 (19.9)*	121 (28.6)

*Correct Response

**Used only under certain conditions

[+]Used mainly for prevention

[++]No longer recommended as a matter of national policy

Table 4.12 Respondents' knowledge of the possible Consequences of untreated malaria

N = 423

Possible Consequences of untreated malaria	Responses		
	Correct (%)	Incorrect (%)	Don't know (%)
Impaired Consciousness	175 (41.4)*	71 (16.8)	177 (41.8)
Kidney Failure	104 (24.6)*	149 (35.2)	170 (40.2)
Coma	118 (27.9)*	129 (30.5)	176 (41.6)
Anemia (lack or shortage of blood)	222 (52.5)*	84 (19.9)	117 (27.7)
Paralysis	123 (29.1)*	114 (27.0)	186 (44.0)
Hypogylcemia (low glucose level)	159 (37.6)*	86 (20.3)	178 (42.1)
Jaundice	97 (22.9)*	89 (21.0)	237 (56.0)
Shock	152 (35.9)*	105 (24.8)	166 (39.2)
Hyper parasitemia	93 (22.0)*	74 (17.5)	256 (60.5)
Pulmonary edema	75 (17.7)*	82 (19.4)	266 (62.9)
Hypotension	128 (30.3)*	96 (22.7)	199 (47.0)
Death	202 (47.8)*	95 (22.5)	126 (29.8)
Spleen enlargement	79 (18.7)*	87 (20.6)	257 (60.8)
Abortion	78 (18.4)*	154 (36.4)	191 (45.2)

*Correct Response

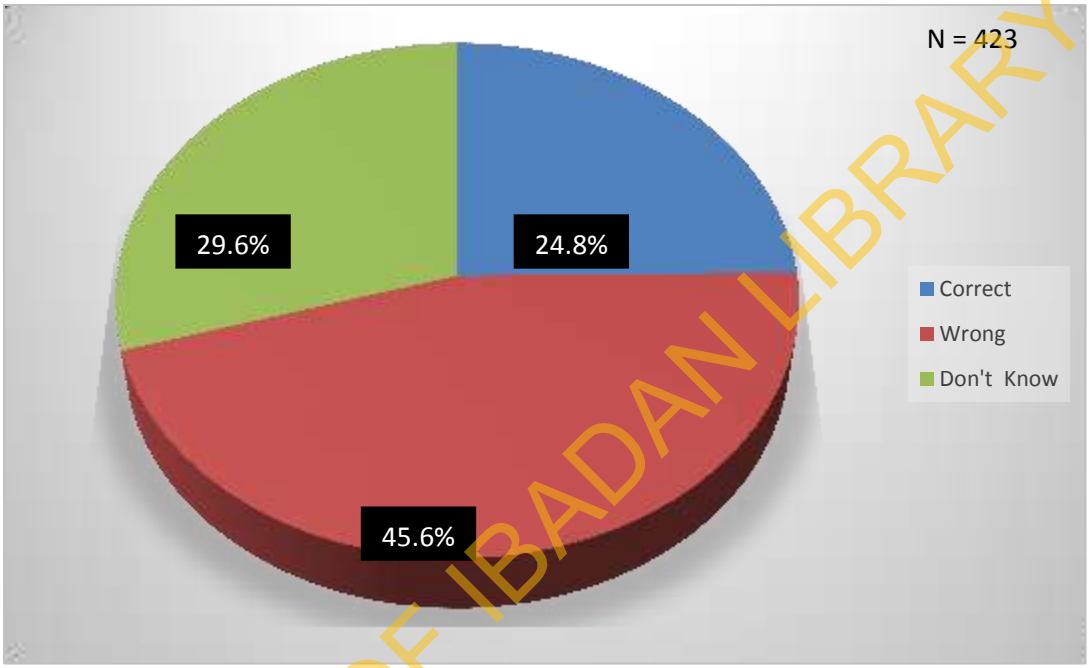

Fig. 4.3: Respondents' level of knowledge of the dosage of Coartem- (an antimalarial medicine).

N = 423

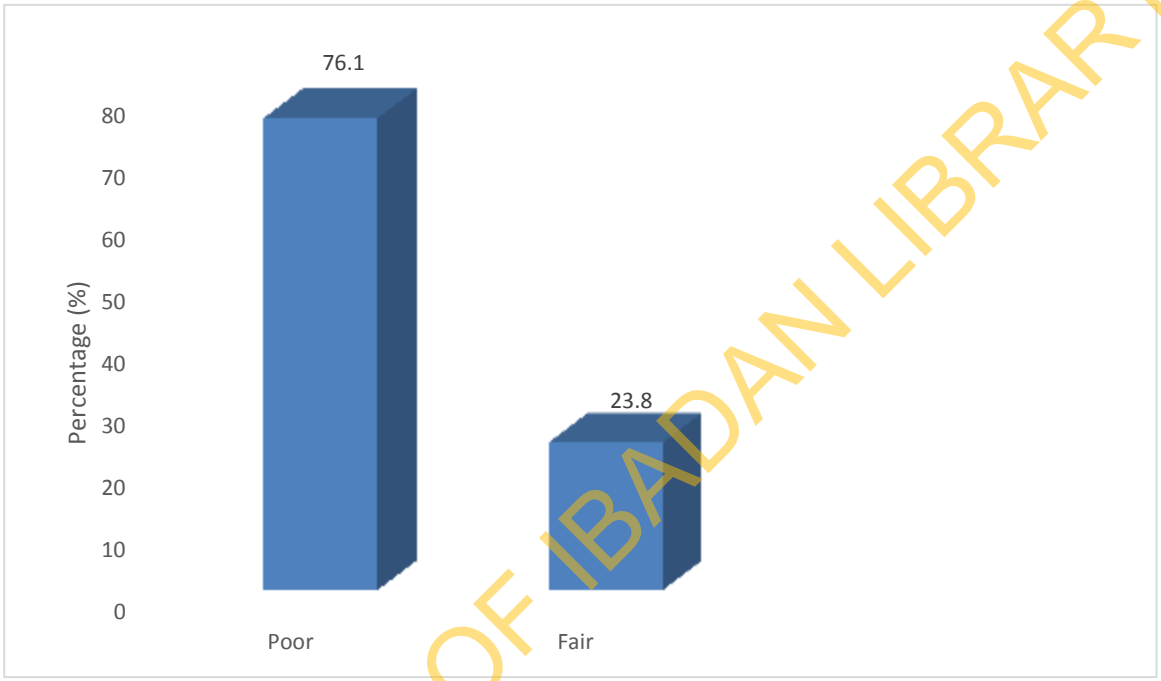

Fig.4.4 Respondents Overall Knowledge of Malaria

Mean Knowledge Score = 27.0 ± 7.9

4.4 Perception of Respondents Relating to Malaria

This section presents the following four typologies of respondents' perception relating to malaria: Perceived seriousness of malaria; prevention related perceptions; perceived vulnerability to malaria; and perceived effect of malaria on secondary school students.

The respondents' perceived seriousness of malaria is presented in the table 4.13. The table also indicates perceptions that are in line with the biomedical world view. Majority (79.2%) of them were of the view that malaria is a serious disease. The perception of 31.7% of the respondents was that malaria cannot kill or lead to death while 60.0% was of the view that malaria is serious in children as well as among adolescents. Well over half (59.3%) of the respondents did not share the view that symptoms of malaria will disappear after some days without treatment (See details in table 4.13)

Table 4.14 shows respondents' perceptions relating to prevention and treatment. Over two-third (66.7%) of the respondents were of the view that one should take anti-malaria medicines immediately after a mosquito bite. Majority (71.2%) were of the view that malaria can be prevented. However, 39.7% were of the appropriate view that western medicines are better for treating malaria compared to traditional medicines. Slightly over half (52.2%) were of the perception that mosquito net can prevent one from having malaria. (Details are contained in table 4.14)

Respondents' perception of vulnerability to malaria is depicted in table 4.15. Slightly over a quarter (25.3%) perceived themselves not to be vulnerable because they do not live in areas where mosquitoes breed. Almost an equal proportion (25.1%) claim not to be vulnerable because they use herbal medicines. Respondents whose perceptions are indicative of perception of vulnerability are asterisked in the table (See table 4.15 for more details).

Respondents' perception of the serious effects of malaria on secondary school students is shown in table 4.16. The views of majority of the respondents were in line with the biomedical world view. Such views that topped the list were that malaria can make one absent from school (90.3%) and malaria can reduce a student's concentration in class (82.7%) (See table 4.16 for more details).

Fig. 4.5 shows respondents overall perception scores with 61% having favourable perception i.e. perception in line with the biomedical world view. The mean perception score was 12.27 ± 4.2.

Table 4.13 Respondents' perceived seriousness of malaria

N = 423

Perceived seriousness	Responses		
	Agree (%)	Undecided (%)	Disagree (%)
Malaria is a serious disease	335 (79.2)*	36 (8.5)	52 (12.3)
Without treatment, symptoms of malaria disappear after some days	80 (18.9)	92 (21.7)	251 (59.3)*
Malaria is a mild disease	191 (45.2)	117 (27.7)	115 (27.2)*
Malaria cannot kill or lead to death	134 (31.7)	87 (20.6)	202 (47.8)*
Malaria can't prevent one from doing well at school	201 (47.5)	62 (14.7)	160 (37.8)*
Malaria is only serious in children not among people of our age (i.e. adolescents)	95 (22.5)	74 (17.5)	254 (60.0)*

*Perception in line with biomedical world view/appropriate

Table 4.14 Respondents' perception related to malaria prevention and treatment

N = 423

Prevention and Treatment related Perceptions	Responses		
	Agree (%)	Undecided (%)	Disagree (%)
Mosquito repellant creams cannot prevent mosquito bite	146(34.5)	86 (20.3)	191 (45.2)*
One should take anti-malaria immediately after a mosquito bite	282 (66.7)	77 (18.2)	64 (15.1)*
Malaria cannot be prevented	72 (17.0)	50 (11.8)	301 (71.2)*
Western medicine are better for treating malaria compared with traditional medicines or herbs	168 (39.7)*	129 (30.5)	126 (29.8)
Mosquito nets cannot prevent one from having malaria	127 (30.0)	75 (17.7)	221 (52.2)*
Chloroquine is still the main drug used for treating malaria	124 (29.3)	159 (37.6)	140 (33.1)*

*Perception in line with biomedical world view/appropriate

Table 4.15 Respondents' perceived vulnerability to malaria

N = 423

Perceived vulnerability	Responses		
	Agree (%)	Undecided (%)	Disagree (%)
I cannot have malaria because mosquitoes do not breed in our area	107 (25.3)	76 (18.0)	240 (56.7)*
Mosquitoes are not in any way related to malaria	73 (17.3)	57 (13.5)	293 (69.3)*
People get malaria when they are short of blood	94 (22.2)	94 (22.2)	235 (55.6)*
We use herbal medicine in our house, so we cannot have malaria	106 (25.1)	80 (18.9)	237 (56.0)*
Only very young children get malaria	41 (9.7)	64 (15.1)	318 (75.2)*
We can't get malaria because we live in a beautiful house	45 (10.6)	55 (13.0)	323 (76.4)*

*Perception in line with biomedical world view/appropriate

Table 4.16 Respondents' perceived effect of malaria on secondary school students

N = 423

Perceived effect of Malaria	Responses		
	Agree (%)	Undecided (%)	Disagree (%)
Malaria can make one absent from School	382 (90.3)*	22 (5.2)	19 (4.5)
Malaria can reduce a student's concentration in class	350 (82.7)*	34 (8.0)	39 (9.2)
Malaria can lead to low intelligence level	217 (51.3)*	89 (21.0)	117 (27.7)
Episodes of malaria can affect ones school grades	239 (56.5)*	87 (20.6)	97 (22.9)

*Perception in line with biomedical world view/appropriate

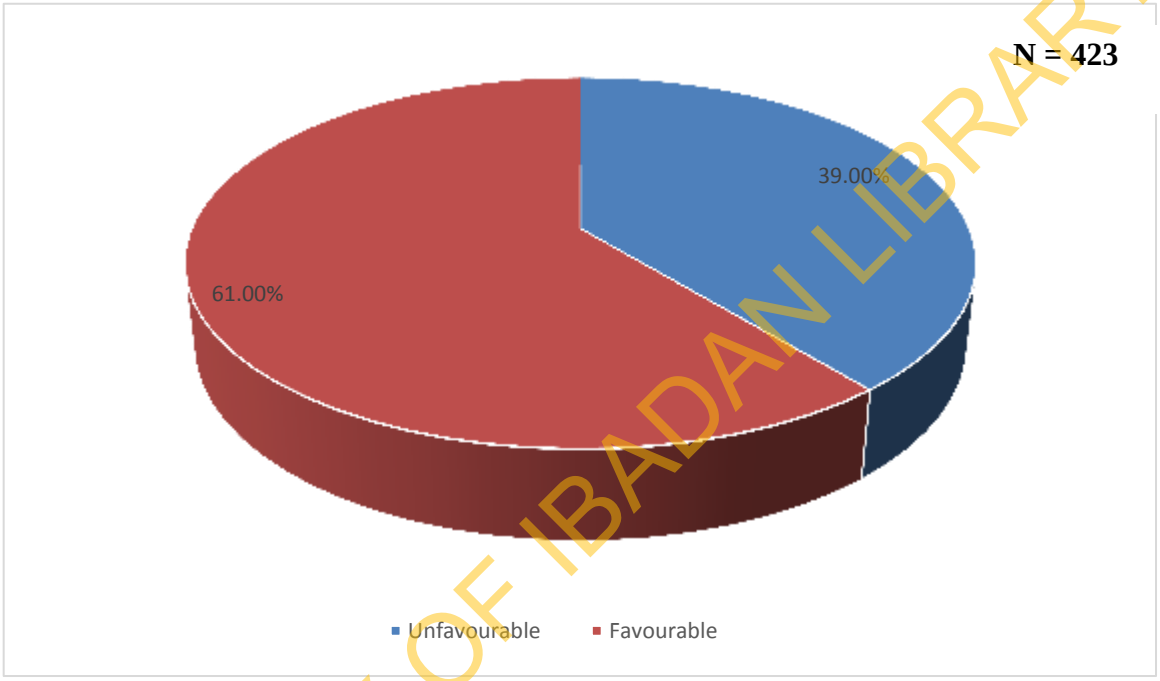

Fig. 4.5 Respondents' Overall Perception relating to malaria

Mean Perception Score = 12.3 ± 4.2

4.5 Malaria related health-seeking behavior and malaria illness experiences

Almost all the respondents (99.8%) had ever experienced malaria in their life time, and 51.8% had malaria within three months preceding the study (See table 4.17 for more details). Table 4.18 summarizes the places reportedly visited for malaria treatment; the places includes the following: Health Centre (79.7%), Pharmacy (76.6%), Private Hospitals (72.3%) and Patent Medicine Vendors (71.6%) (See table 4.18 for more details).

Table 4.19 highlights the ownership and pattern of use of mosquito net among respondents. Majority (88.2%) of the respondents own a mosquito at home, 83.11% own one for themselves while 57.6% slept under a mosquito net a night prior to data collection. The number of nets owned by the respondents' family and pattern of use of mosquito nets are shown in table 4.20. Possession of 3-4 nets (45.3%) topped the list; those who owned two nets in the family constituted 19.1%. Of the respondents that owned a mosquito net, 48.5% used it daily while 27.6% used it once in a while. Very few (6.2%) had never used the net. (See table 4.20 for more details). Reasons adduced by respondents for not sleeping under a mosquito netin the night preceding the study include excessive heat (36.7%), dislike sleeping under the net (28.5%) and inconvenience (20.3%) (See table 4.21 for more details).

The technologies/materials reportedly used to kill or control mosquitoes are shown in table 4.22. They include the following: mosquito coil (83.5%), insecticide treated net (74.5%) and insecticide spray (74%), (See table 4.23 for more details). The period of waiting before initiating treatment on noticing symptoms of malaria is presented in Fig. 4.6. Over half (56.5%) of the respondents reportedly start treatment immediately, 24.1% start after a day while 19.4% start after two or more days. Figure 4.7 depicts parents of respondents who keep medicines at home for managing malaria. The types of drugs kept at home for such purpose are shown in fig. 4.8 and they include ACT related medicines (76.2%), herbs (herbs (6.2%) and Sulphadoxine pyrimethamine (3.1%) (See fig. 4.8 for more details).

Table 4.23 shows the malaria treatment practices respondents had ever adopted. Majority of the respondents (81.1%) had ever been to the hospital to receive treatment for malaria in the past, 79.0% had ever bought drugs from patent medicine vendors, 72.6% had used herbs to treat malaria while 73.0% had ever taken a malaria test. The most common practices still in use among the respondents are presented in table 4.24 and these include going to the hospital to receive treatment (76.1%), buying drugs from patent medicine

vendors (70.7%), taking a malaria test before treatment (70.4%) and use of herbs to treat malaria (66.9%).

Table 4.25 shows the availability and use of first aid boxes. The schools (100%) studied and observed using a checklist had first aid boxes and majority (83.3%) of the first aid boxes were in use as at the time of the study. None of the boxes contained malaria related drugs. The medicines found in the first aid boxes included: Paracetamol (66.7%), Mist. Magnesium trisilicate (50%) and Metronidazole (25%) (See fig. 4.9 for more details). Teachers and Vice-Principals were in charge of 25% of the boxes while the Physical and Health Education teachers specifically monitor 16.7% of the boxes (See fig. 4.10 for more details). Less than half (41.7%) of the schools had sick bay and all were in use. Anti-malaria drugs were present in only one (20%) of the sick bays. (See table 4.26 for more details)

Table 4.17 Respondents' malaria experiences and frequency of occurrence

Malaria Experiences	Responses	
	Yes (%)	No (%)
Ever had malaria (N=423)	422 (99.8)	1 (0.2)
Had malaria in 3 months preceding study (n=423)	216 (51.8)	196 (48.8)
Frequency of experience within 3 month preceding study	**No**	**%**
Once	147	68.1
Two times	47	21.7
Three times	12	5.6
Four times	5	2.3
Five times or more	4	1.9

Table 4.18 Health care related facilities usually visited for treatment of malaria

N = 423

Health care related facilities usually visited for treatment	Responses	
	Yes (%)	**No (%)**
Patent Medicine Vendors/ Chemist	303 (71.6)	119 (28.1)
Pharmacy	324 (76.6)	97 (22.9)
Health Centre	337 (79.7)	86 (20.3)
Private Hospital	306 (72.3)	17 (27.7)
Government hospital	290 (68.6)	33 (31.4)
Nurse in the community	185 (43.7)	238 (56.3)
Traditional healers/ traditional healing homes	104 (24.6)	319 (75.4)
Herbal Medicine Centre	155 (36.6)	268 (63.4)

Table 4.19 Ownership and pattern of use of mosquito nets among respondents

Ownership and pattern of use of mosquito net	Responses	
	Yes (%)	No (%)
Own a net at home (N = 423)	373 (88.2)	50 (11.8)
Own a net to himself/herself (n=373)	310 (83.11)	63 (16.89)
Whether respondent slept under the mosquito net a night prior to data collection (n=373)	215 (57.6)	158 (42.4)

Table 4.20 Number of Nets owned by Respondents' Family and Pattern of use of mosquito net

n = 373

Number Owned and pattern of use	No	%
Number Owned		
One	19	5.2
Two	70	19.1
Three	89	24.3
Four	77	21.0
Five	53	14.4
Six	30	8.2
More than six	28	7.7
Pattern of use		
Daily	181	48.5
Often/every now and then	66	17.7
Once in a while	103	27.6
Never	23	6.2

Table 4.21 Reasons adduced by respondents for not sleeping under a mosquito net during the night preceding the study

n = 158

Adduced reasons	Responses	
	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 4.22 Technologies/materials used by respondents to kill/control mosquitoes

N = 423

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

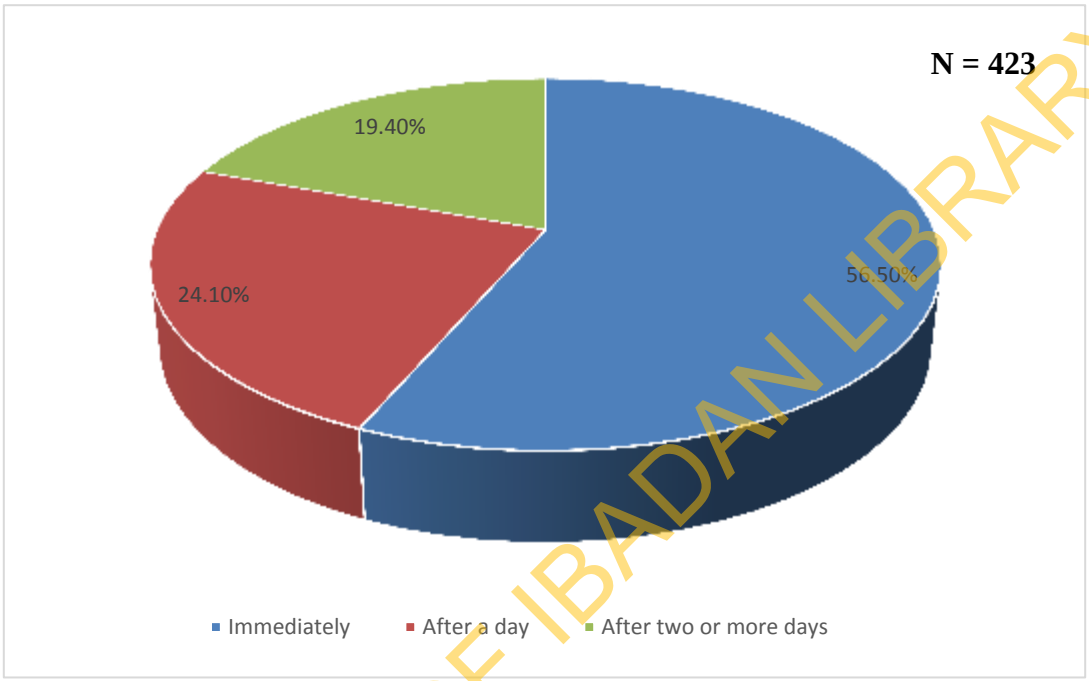

Fig. 4.6 Respondents period of waiting before initiating treatment on noticing symptoms of malaria

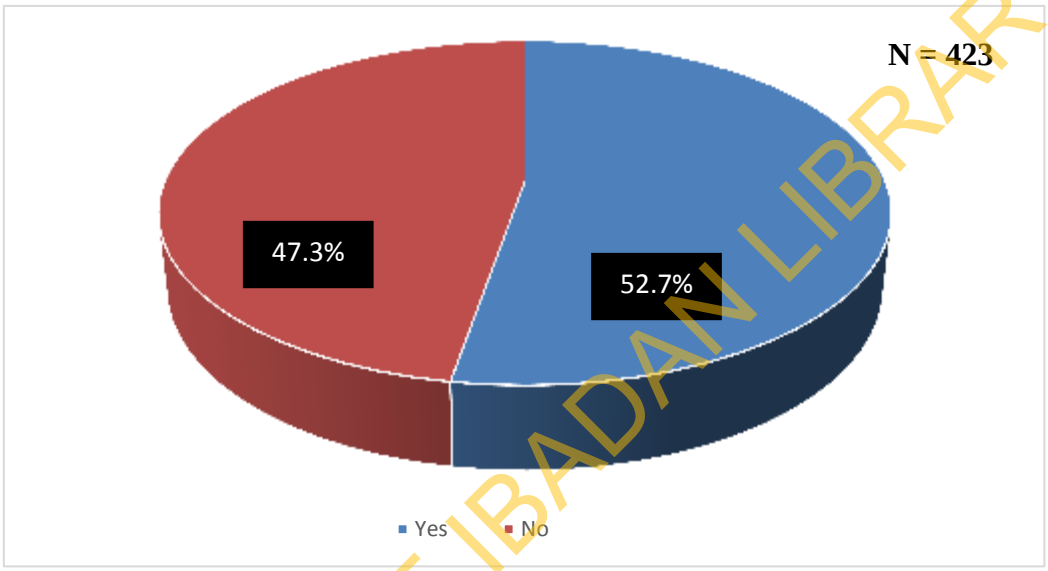

Fig. 4.7: Whether parents keep drugs at home for management of malaria

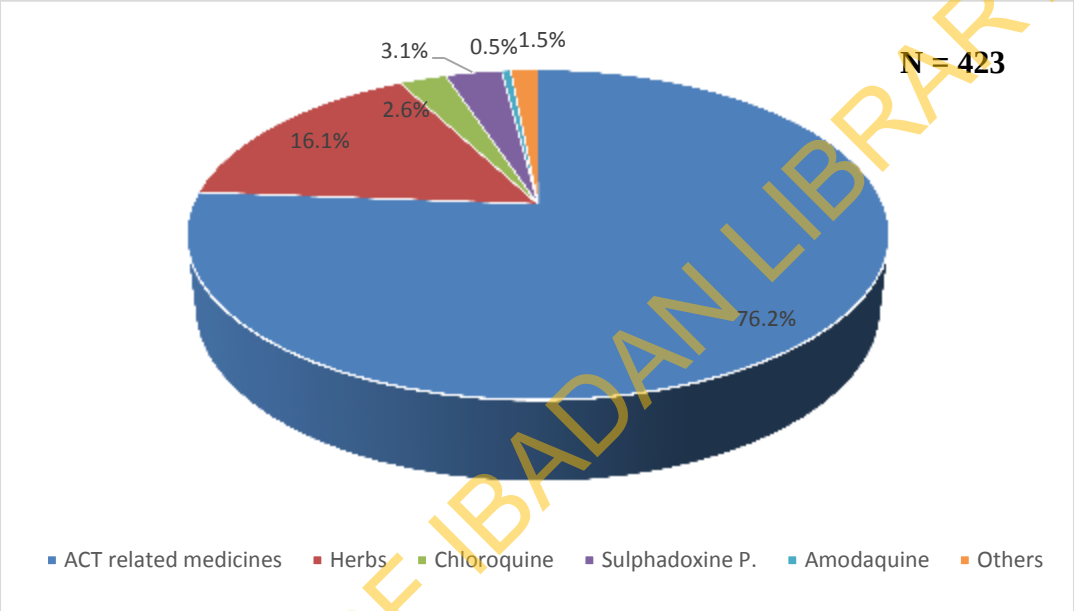

Fig 4.8: Types of Medicines kept at Home by Respondents parents for managing malaria

Table 4.23 Malaria treatment practices ever adopted by respondents

N = 422

Treatment practices ever used	Responses	
	Yes (%)	**No (%)**
Use of herbs to treat malaria	307 (72.6)	115(27.4)
\Treatment of malaria using medicine kept at home	271 (64.1)	151(35.9)
Using a combination of western medicine and herbs to treat malaria	236 (55.8)	186(44.2)
Taking a malaria test before treatment	309 (73.0)	113 (27.0)
Going to the hospital to receive treatment for malaria	343 (81.1)	79 (18.9)
Buying of drugs from Patent medicine Vendors (Chemist) / Pharmacies to treat malaria	334 (79.0)	88 (21.0)
Starting malaria treatment without carrying out any test	205 (48.5)	217 (51.5)

Table 4.24 Malaria treatment practices still being used by respondents

N = 422

Treatment practices still being used	Responses	
	Yes (%)	**No (%)**
Use of herbs to treat malaria	283 (66.9)	139 (33.1)
Treatment of malaria using medicine kept at home	233 (55.1)	188 (44.7)
Using a combination of western medicine and herbs to treat malaria	203 (48.0)	219 (52.0)
Taking a malaria test before treatment	298 (70.4)	124 (29.6)
Going to the hospital to receive treatment for malaria	322 (76.1)	100 (23.9)
Buying of drugs from Patent medicine Vendors (Chemist) / Pharmacies to treat malaria	299 (70.7)	123 (29.3)
Starting malaria treatment without carrying out any test	192 (45.4)	230 (54.6)

Table 4.25 Availability and use of school first aid boxes

N = 12

Availability and use	Responses	
	Yes (%)	**No (%)**
Presence of First Aid Box	12 (100)	0 (0)
First Aid Box in Use	10 (83.3)	2 (16.7)
Presence of malaria related drugs in the first aid box	0 (0)	12 (100.0)

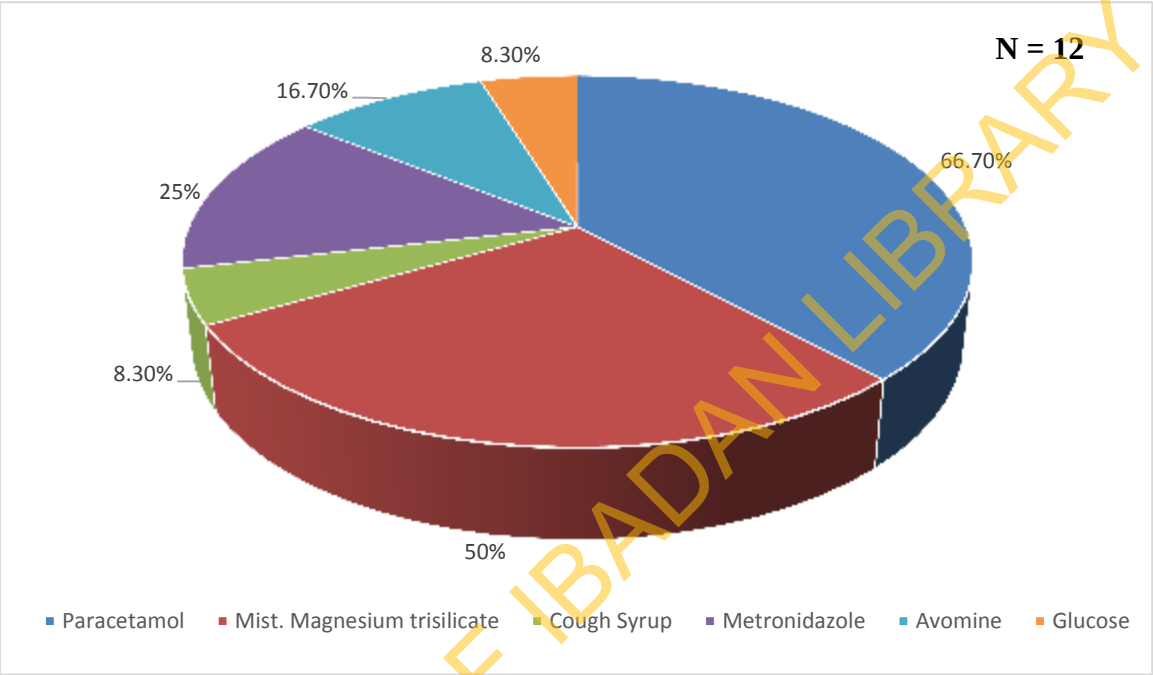

Fig. 4.9 Types of medicine present in the first aid box

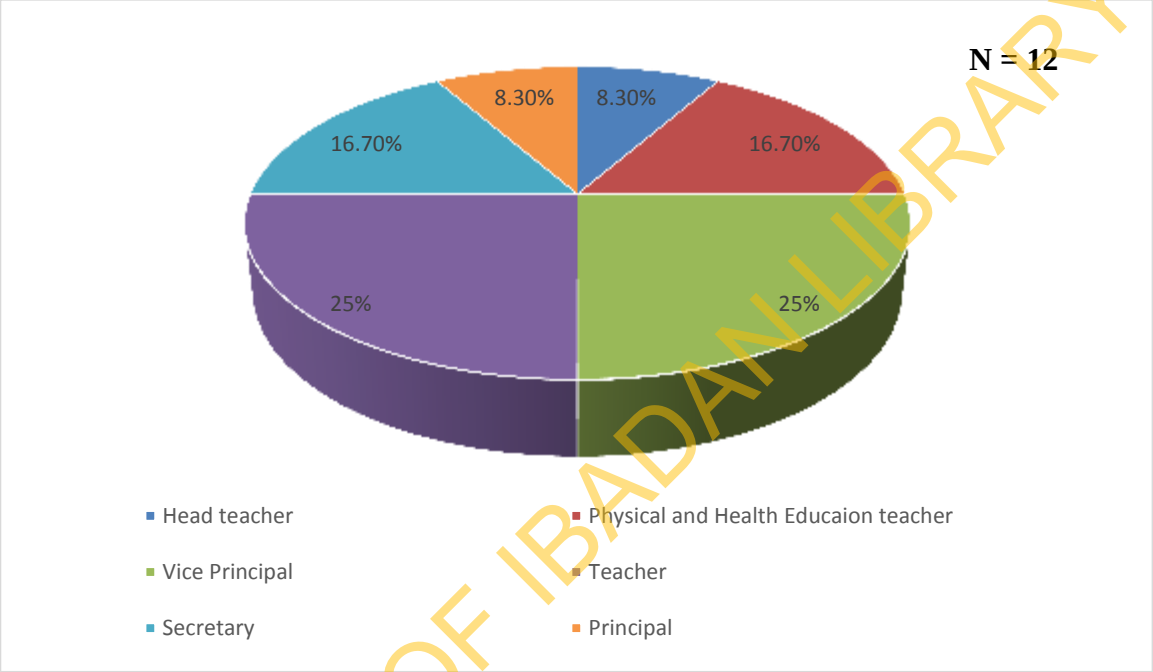

Fig. 4.10 Officials in Charge of the First of Aid boxes in the school

Table 4.26 Availability and use of sickbay in the school

N = 12

Availability and use	Responses	
	Yes (%)	**No (%)**
Presence of Sick bay	5 (41.7)	7 (58.3)
Sick bay in Use+	5 (41.7)	7 (58.3)
Presence of malaria related drugs in the Sick bay (n=5)	1 (20.0)	4 (80.0)

+ One school had a school clinic

4.6 Comparisons of Respondent's Knowledge and Perceptions

Table 4.27 summarizes the comparison of respondents' knowledge by socio - demographic characteristics. The result shows a statistically significant difference in the mean knowledge scores of respondents in private and public schools. The differences in mean knowledge scores by other socio-demographic parameters are not significant. The comparison of respondents' knowledge of health seeking behaviour is shown in table 4.28. The mean knowledge scores by period of waiting before initiating treatment were as follow: Immediately- 26.9 ± 7.8; after a day- 27.6 ± 8.2; after two or more days 26.8 ± 8.0. The difference in the mean knowledge scores was not however, significant. Similarly there was no significant difference in respondent' mean knowledge scores by pattern of use of mosquito net.

The comparison of respondents' mean knowledge score by respondents with favourable perception (i.e. those whose perceptions are in line with the biomedical world view) is shown in table 4.29. The mean was 28.1± 7.4 among respondents with favourable perception; among those with unfavourable perception, the mean score was 25.4 ± 8.5 with a significant difference.

The comparison of respondents' perception by socio - demographic characteristics is summarized in table 4.30. The result showed a statistically significant difference in the perception scores of respondents in private and public schools. The p-value of the comparison of perception score by age of respondents was 0.008, indicating a statistically significant difference in the perception scores. There was also a significant difference in the perception of respondents based on their fathers/guardians highest level of education with a p-value of 0.020.
(See table 4.30 for details)

Table 4.27 Comparison of Respondents' knowledge by Socio - Demographic Characteristics

	No	$\bar{x}$ knowledge score	Std. Deviation	df	F/t-test	P value
Age group						
10 - 12	79	25.77	8.411	3, 419	1.572**	0.195
13 - 14	148	26.68	7.364			
15 – 16	110	28.17	7.619			
17 -19	86	27.40	8.841			
Total	423	27.04	7.963			
School Type						
Private	73	24.86	8.052	421	2.590*	0.010
Public	350	27.50	7.880			
Gender						
Male	210	27.66	8.299	421	1.580*	0.115
Female	213	26.44	7.588			
Class						
JS1	98	26.28	7.718	3, 419	1.236**	0.296
JS2	110	26.65	7.672			
SS1	103	26.90	8.325			
SS2	112	28.23	8.090			
Total	423	27.04	7.963			
Type of family						
Monogamy	348	26.87	7.951	421	0.941*	0.347
Polygyny	75	27.84	7.987			
Father/Guardian Highest level of Education						
No formal education	11	23.73	7.656	3, 418	0.810**	0.489
Primary	47	26.49	9.764			
Secondary	154	27.08	7.759			

Tertiary	210	27.34	7.699			
Total	422	27.06	7.967			
Mother/Guardian Highest level of Education						
No formal education	12	27.08	8.317	3, 418	0.240**	0.869
Primary	67	26.33	8.745			
Secondary	129	27.33	7.127			
Tertiary	214	27.13	8.213			
Total	422	27.06	7.967			

*Results are based on t-test analysis

**Results are based on F-test analysis

Table 4.28 Comparison of Respondents' knowledge by Health-Seeking Behaviour

	No	$\bar{x}$ knowledgescore	Std. Deviation	df	F-test	P value
Waiting period						
Immediately	239	26.87	7.827	2, 420	0.360	0.698
After a day	102	27.63	8.295			
After two or more days	82	26.82	8.000			
Total	423	27.04	7.963			
Use of Mosquito Net						
Daily	181	26.57	7.911	3, 419	0.714	0.544
Often/every now and then	65	28.26	8.691			
Once in a while	103	27.15	7.872			
Don't use	74	27.00	7.585			
Total	423	27.04	7.963			

Table 4.29 Comparison of Respondents' knowledge by Perception

	No	$\bar{x}$ knowledgescore	Std. Deviation	df	t-test	P value
Unfavourable	165	25.36	8.459	421	3.530	0.000*
Favourable	258	28.12	7.448			

* Statistically Significant

Table 4.30 Comparison of Respondents' Perception by Socio-demographic Characteristics

	No	$\bar{x}$ perception score	Std. Deviation	df	F/t-test	P value
Age group						
10 - 12	79	13.35	3.843	3, 419	4.021**	0.008
13 - 14	148	12.58	4.025			
15 - 16	110	11.85	4.331			
17 - 19	86	11.30	4.382			
Total	423	12.27	4.193			
School Type						
Private	73	13.45	3.559	421	2.658*	0.008
Public	350	12.03	4.277			
Gender						
Male	210	12.21	4.307	421	0.315*	0.753
Female	213	12.34	4.086			
Class						
JS1	98	12.42	4.031	3, 419	1.253**	0.290
JS2	110	12.84	3.939			
SS1	103	12.03	4.290			
SS2	112	11.82	4.460			
Total	423	12.27	4.193			
Type of family						
Monogamy	348	12.24	4.244	421	0.377*	0.706
Polygyny	75	12.44	3.970			
Father/Guardian Highest level of Education						
No formal education	11	12.00	3.742	3, 418	3.306**	0.020
Primary	47	11.00	4.324			

Secondary	154	11.86	4.021			
Tertiary	210	12.84	4.223			
Total	422	12.26	4.185			
Mother/Guardian Highest level of Education						
No formal education	12	11.50	3.849	3, 418	0.392**	0.758
Primary	67	12.00	3.892			
Secondary	129	12.15	4.062			
Tertiary	214	12.45	4.375			
Total	422	12.26	4.185			

*Results are based on t-test analysis

**Results are based on F-test analysis

+Level of Significance = 0.05

4.7 Test of Hypotheses

Hypothesis 1

Table 4.31 shows the result of the testing of the null hypothesis which states that "there is no significant association between respondents' knowledge and their perception of malaria". The result showed that there was no significant association between knowledge and perception of malaria. (X^2= 2.991, df = 1, p-value = 0.084). Hence, the null hypothesis (Ho) is not rejected.

Table 4.31 Association between Knowledge and Perception of Respondents on Malaria

Knowledge level	Perception		Chi-square	df	p-value
	UnFavourable (%)	Favourable (%)			
			2.991	1	0.084
Poor (0 - <33)	133 (41.3)	189 (58.7)			
`Fair (33 - 49)	32 (31.7)	69 (68.3)			

(p<0.05)

Hypothesis 2

Table 4.32 shows the results of the testing of the null hypothesis which states that "there is no significant association between grade level (class) of the respondents and their knowledge of malaria". The result showed there was no significant association between knowledge and class of respondents. (X^2= 5.355, df = 3, p-value = 0.148). The null hypothesis (Ho) is therefore not rejected.

Table 4.32 Association between level of Knowledge and Class of Respondents

Class	Knowledge level		Chi-square	df	p-value
	Poor (%)	Fair (%)			
			5.355	3	0.148
JSS 1	79 (24.5)	19 (18.8)			
JSS 2	88 (27.3)	22 (21.8)			
SSS 1	78 (24.2)	25 (24.8)			
SSS 2	77 (23.9)	35 (34.7)			

(p<0.05)

Hypothesis 3

Table 4.33 shows the result of the testing of the null hypothesis which states that "there is no significant association between respondents' knowledge and their health seeking behaviour relating to malaria ". The result showed there was no significant association between knowledge and health seeking behaviour relating to malaria. (X^2= 0.982, df = 2, p-value = 0.612). The null hypothesis (Ho) is therefore not rejected.

Table 4.33 Association between level of Knowledge and Health Seeking Behaviour: waiting period before initiating malaria treatment

Waiting Period	Knowledge level		Chi-square	df	p-value
	Poor (%)	Fair (%)			
			0.982	2	0.612
Immediately	184 (57.1)	55 (54.5)			
After a day	74 (23.0)	28 (27.7)			
After two or more days	64 (19.9)	18 (17.8)			

(p<0.05)

Hypothesis 4

Table 4.34 shows the result of the testing of the null hypothesis which states that "there is no significant association between respondents' history of malaria and their health seeking behaviour relating to malaria". The result showed there was no significant association between knowledge and perception on malaria. (X^2= 2.986, df = 1, p-value = 0.084). The null hypothesis (Ho) is therefore not rejected.

Table 4.34 Association between Knowledge level and History of Malaria

Knowledge level	**Malaria History within 3 month prior to data collection**		**Chi-square**	**df**	**p-value**
	Yes (%)	**No (%)**			
			2.986	1	0.084
Poor (0 - <33)	172 (53.4)	150 (46.6)			
Fair (33 – 49)	44 (43.6)	57 (56.4)			

(p<0.05)

Hypothesis 5

Table 4.35 shows the result of the testing of the null hypothesis which states that "there is no significant association between respondents' perception and their health-seeking behaviour relating to malaria". The results show that there is a statistically significant association perception and health-seeking behaviour of respondents'. (X^2= 13.562, df = 3, p-value = 0.004). The null hypothesis (Ho) is therefore rejected.

Table 4.35 Association between Perception and Health Seeking Behaviour: use of mosquito nets of Respondents

Use of mosquito nets	Knowledge level		Chi-square	df	p-value
	Unfavourable (%)	Favourable (%)			
			13.562	3	0.004
Daily	74 (44.8)	107 (41.5)			
Often	34 (20.6)	31 (12.0)			
Once in a while	26 (15.8)	77 (29.8)			
Don't use	31 (18.8)	43 (16.7)			

(p<0.05)

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATION

This chapter focuses on the major findings of the study. It is organized into the following sub-sections: Socio-demographic characteristics; Respondents' living situation; respondents' knowledge of causes, symptoms, prevention, treatment and consequences of malaria; perception of respondents relating to malaria; malaria related health-seeking behaviour and malaria illness experiences. Other sub-sections are the implications of the findings for health promotion and education, conclusion and recommendations.

5.1 Discussion

5.1.1 Socio-demographic characteristics of respondents

The respondents mean age was 14.5 ± 2.2 with many of them aged 13-14 years. This is in-line with the National Policy on Education in terms of the age of students in secondary school. A previous study conducted in Nigeria among adolescents revealed a mean age of 14.7 ± 4.2 (Udonwa et al, 2010). There was an almost equal number of males and females in the study. This is so because the study was purposively designed to ensure equal or nearly equal proportion of respondents by sex/gender. About two-third (68.6%) of the respondents were Christians while 30.3% were Muslims. It should be noted that Christianity and Islam are the most dominant religions in the study area (Morenikeji, 2009). Majority of the respondents were from monogamous families. This is an emerging phenomenon in Nigeria which may be partly due to the influence of Christianity which promotes monogamy and the prevailing economic challenges in Nigeria which makes polygyny unattractive or burdensome.

Socio-demographic characteristics such as age, gender and level of education revealed in this study are very important in the design and implementation of educational programs targeted at different populations. They are useful for guiding to guide the selection of educational methods, strategies, and educational aids for implementing interventions relating to the prevention/control of malaria among the study population. Therefore, the particular socio-demographic characteristics of the study population should be taken into consideration in the design and execution of educational activities aimed at preventing and controlling malaria among in school adolescents with special reference to the study population.

5.1.2 Respondents' Living Situation

The mean number of persons living in respondents dwelling unit was 5.8 ± 1.8. This has implications for the average number of mosquito nets that should be in each dwelling unit. Some of the dwelling units are houses of the "face-me-I-face-you" room design. This type of housing design coupled with the presence of bushes, stagnant water bodies in many of the dwelling units as well as absence of door and window screen in majority of the houses have great potential in enhancing the vulnerability of the study population to malaria. The implication of this is that environmental control measures are needed to compliment other technologies such as drugs, mosquito nets as well as door and window screens in the prevention and control of malaria among the study population.

5.1.3 Respondents' Knowledge on causes, symptoms, prevention, treatment and consequences of malaria

The results show that there are several gaps in respondents' knowledge relating to malaria. For instance, mosquito is erroneously regarded as the cause of malaria instead of being correctly regarded as the vector of the pathogen that causes the malaria disease. The associations of malaria with exposure to "too much sun" or "stress" with the causation of malaria are other indicators of misconceptions relating to the causation of the disease among the study population. Recent studies have yielded similar findings. Previous studies conducted among similar populations such as those of Elzubier et al, (1997) and Brooker et al, (2000); and even recent studies including those of Okwa & Ibidapo, (2010) and Udonwa et al. (2010) have consistently revealed similar misconceptions.

Only 29.3% of the respondents could correctly identify the causative organism as *Plasmodium falciparum.* Previous studies have similarly revealed that respondents' knowledge of plasmodium and the causative agent for malaria is very poor. For instance, only a few of respondents had correct knowledge of the causative agent for malaria in a study conducted by Kinyua among students in boarding Secondary Schools in Igembe District, Kenya. The proportion of respondents in a study conducted by Midzi et al. (2011) among primary school children in Zimbabwe shows that those who were knowledgeable about the pathogen that causes malaria was 8.6%. A study by Dambhare et al. (2012)

conducted among in-school adolescents in India showed that only 19.2% of the respondents had correct knowledge of the causative agent of malaria.

Majority of the respondents in the study were more conversant with the common symptoms of simple malaria compared with the symptoms of complicated malaria. This is a gap in knowledge which needs to be bridged because complicated malaria readily leads to death. Complicated (severe) malaria is a serious concern especially among the under five children; it gets less common in older children and adults as they acquire some immunity over time (WHO, 2014).

Many of the respondents were able to identify ways of preventing malaria. However, almost half lacked precise knowledge of the practices for preventing malaria. Several respondents erroneously listed basic healthy living practices such as drinking a lot of water regularly, eating of fruits and avoidance of overwork as malaria preventive measures. A study by Yamrot, (2014) reported that 71.1% of students recruited were able to identify preventive measures such as use of ITN among others. Majority (66.7%) of the respondents were knowledgeable about ACT-related medicines for treating malaria. Many of them identified chloroquine as an anti-malaria treatment despite the fact that it is no longer recommended for use in Nigeria. This indicates that awareness needs to be created on the current recommended malaria treatment medicines.

Respondents' knowledge of the consequences of malaria is generally low. Less than half of the respondents' stated death as the possible consequence of untreated malaria. In addition, their knowledge of anti-malaria drug dosage in line with the new National malaria policy was poor. In-school adolescents should be made to be knowledgeable about malaria. This is crucial for the initiation of preventive and appropriate health-seeking behaviour. Overall, the level of knowledge of malaria among the respondents is poor. Previous studies conducted elsewhere have similarly revealed inadequate knowledge of malaria among in-school adolescents (Ohlin, 2012; Nyahoga & Bochkaeva, 2018).

5.1.4 Perception of Respondents Relating to Malaria

The perception of majority of the respondents were in line with the biomedical world view; for instance, majority of the participants perceived malaria to be a serious disease. A study in Uganda similarly revealed that 79% of respondents were of the view that malaria

is a serious and life-threatening disease (Mwanje, 2013). Malaria is serious because it can lead to death (Ilesanmi &Orimadegun, 2015), convulsion (Lindblade, Steinhard, Samnels, Kachur and Slutsker, 2013), miscarriage (Tijani, 2017), abortion (Mbonye et al., 2016) and several other unpleasant physical and social adverse effects. Although the perception of majority of respondents was that malaria can be prevented, only 30% stated that mosquito nets cannot prevent one from having malaria. A qualitative study is needed to probe into why they are of the opinion that mosquito nets cannot prevent malaria. This is more so because previous studies conducted in Nigeria and elsewhere have revealed that the adoption of ITN is not encouraging. Majority (66.7%) of the respondents are of the perception that one should take anti-malaria medication after a mosquito bite. This is not appropriate; moreover it will be a case of irrational self-medication which can in turns lead to malaria drug resistance. Only 39.7% of the respondents were of the perception that western medicines are better than traditional medicines for managing malaria. This is indicative of the respondents' malaria drug preferences with special reference to adoption of traditional medicines. Respondents feel they were vulnerable to the disease with majority (69.3%) being able to associate mosquitoes with malaria. The perception of vulnerability is quite favourable; this may be associated with their previous experience of bouts of malaria.

The social burden of the diseases with special reference to how it is perceived to adversely affect students' education has been revealed in this study. For instance, most of the participants were of the view that malaria can make them absent themselves from school and that it can reduce their concentration in class. A study among school children in Tanzania similarly revealed that nearly all of them had been absent from school as a result of malaria for periods varying from a few days to weeks depending on the severity of the disease (Ohlin, 2012). However, in a study in Thai-Myanmar, the association between malaria infection and school performance was not significant after adjusting for potential confounders, including gender, school absenteeism over a semester or term, and emotional intelligence. (Vorasan, Pan-Ngum, Jittamala, Maneeboonyang, Rukmanee, and Lawoolsri., *2015).*

The result of this study showed a significant difference in the mean knowledge scores of adolescents based on their perception. Those with a higher level of knowledge had a more favourable perception compared to those who had lower knowledge level. This implies that knowledge influences the perception of adolescents relating to malaria. There was

also a significant difference in perception of the respondents based on their age group with the younger age group having a more favourable perception; this is worth noting for educational interventions.

5.1.5 Malaria related health-seeking behaviour and malaria illness experiences

Most of the respondents had a history of malaria while slightly more than half (51.8%) had experienced the disease within three months preceding the study. This is not surprising because of the endemicity of malaria in Nigeria. Morenikeji (2009) similarly reported a high rate of endemicity in Ibadan. A study conducted among school children in Tanzania showed that every interviewed respondent had reportedly ever experienced malaria (Ohlin, 2012).

In Nigeria, patent medicine vendors (PMV's) are known to constitute the first port of call for persons involved in self-medication in primary health care. The patronage of PMV's and Pharmacies is very high among the respondents; so also is the use of formal health care facilities which includes government and private hospitals. A study in India similarly reported the use of health care facilities for malaria treatment; however, respondents make use of the government hospitals more. About a quarter (25.85) takes treatment from private hospital while a few (12.1%) took to for self-medication (Dambhare et al., 2012). The high rate of use of private hospitals revealed in this study could be due to easy access and availability of the private hospitals. The patronage rate of PMVs implies that they are also active players in the control of malaria as they are readily available at the community level.

Majority of respondents (88.2%) had net(s) at home, although only 57.6% slept under a net a night prior to the study. This shows that there is no proportionate increase in net use among them. The same pattern of adoption has played out elsewhere in Nigeria. A study in Owerri, Nigeria reported that 6.7% had LLIN while 3.4% of this proportion used such nets (Ajero et al., 2014). Another study conducted among in-school adolescents in Calabar reported that only 25% used ITN as a preventive measure (Udonwa et al., 2010). Dambhare et al., (2012) similarly reported that only 20.7% of school going adolescents in India made use of mosquito nets. Reasons adduced for this included "excessive heat" and the fact that "it's not convenient". These reasons have similarly been adduced by adult net

users in Nigeria (FMOH, 2014). Studies have reported other reasons for low adoption of ITN among adolescents. For instance, a study in Calabar, Nigeria reported that 35% of the respondents refused to use mosquito nets because of the fear of death due to poor ventilation while inside the net. Several other respondents (28%) refused to use nets because of the perceived poisonous effect of the chemicals for treating mosquito nets (Udonwa et al., 2010). Studies in Uganda also reported breathing difficulties as one of reasons respondents don't use mosquito nets (Mwanje, 2013).

Technologies used by majority of respondents to control mosquitoes include mosquito coil, ITN, insecticides, mosquito repellant creams and removal of mosquito breeding sites. Similar results were obtained from a study conducted in India among adolescents. It was noted, for instance, the method adopted by 47.4% of the adolescents was the reduction of mosquito breeding places, 37.1% ensured proper drainage and 14.7% sprayed chemicals (Dambhare et al., 2012). A lower percentage of secondary school adolescents in Calabar, however, indulge in such malaria prevention strategies; In the Calabar study, only 13.5% of the respondents would clear the vegetation in the peri-domestic environment, 16.9% would fill potholes, 11% would open up or clear the drainage system and 25.7% would use ITNs. This implies that adolescents could actively be involved in the control of malaria and better results can be obtained if they are well informed and educated on malaria prevention practices (Udonwa et al., 2010).

Slightly over half of the respondents disclosed that their parents keep malaria drugs including Artemisinin based medications at home. This is indicative of the practice of self-medication in primary health care. It is to be noted that most anti-malaria drugs are over the counter medicines which consumers can use without prescription by a certified health worker. It is to be noted that ACT-related medicines are now promoted for the management of malaria in Nigeria following the emergence of chloroquine resistant malaria. It was noted that many respondents did not take a test before commencing malaria treatment despite the promotion of RDT technology. A lot therefore, needs to be done to promote evidence based malaria treatment involving either microscopy or RDT among in-school adolescents.

5.1.6 Implications of the findings for Health Promotion and Education

Findings from this study have health promotion and education implications. The results suggest the need for multiple interventions directed at tackling Malaria. Health education strategies are pivotal to the control and management of malaria. Health education is any planned combination of learning experiences designed to predispose, enable and reinforce voluntary actions, conducive to health in individuals, groups or communities (Green and Kreuter, 1991). Health promotion is the process of enabling people to increase control over their health and its determinant through the combination of educational environmental supports for actions and conditions of living conducive to health (WHO, 1986). According to the Ottawa Charter of 1986, health promotion action includes building healthy policy, creating supportive environments, strengthening community action, developing personal skills, and reorienting health services (WHO, 1986). The implications of the aforementioned concepts of health promotion for malaria management are that people's capacities need to enhanced so as to be able to prevent the disease and to treat it within the context of primary health care. The capacity development will relate to knowledge and skills acquisition needed for responding to malaria prevention, control and management. Possible health promotion strategies that can be used include advocacy, training, public enlightenment, peer education and partnership. These strategies will be discussed one after the other:

Training

Studies have shown that improved knowledge of malaria including its mode of transmission promote preventive practices including the encouragement of personal protection practices among endemic communities (Ahorlu, Koram, Ahorlu, de Savigny and Weiss., 2006). This study show that gaps in knowledge exist relating to the causes, symptoms, prevention, treatment and consequences of malaria among in-school adolescents which training can be used to address. In order to increase the level of knowledge of this population or group on malaria, teachers need to be trained to upgrade their students' capacity to be involved in the management, prevention and control of malaria. Training is an educational strategy which facilitates the acquisition of functional knowledge and skills. A study conducted in Calabar has shown that only 10% of adolescents got information on malaria prevention from their teachers (Udonwa et al, 2011). In Tanzania 47.4% of students reported that teachers were their sources of

information about malaria (Edson & Kayombo, 2007). These previous studies and this current one point out the potential pivotal roles teachers can play in the prevention of malaria if well trained.

Peer Education

Peer education is a behavioural change e strategy which involves training conducted among people belonging to the same social group especially based on age, grade or status (Boyle et al., 2011). It draws on social learning theory which depicts the role of individual functioning as role model in the environment; theory of reasoned action in relation to the subjective norm; and diffusion of innovation theory as a communication channel to enhance the innovation-decision and adoption process. Peer education has been used in many areas of public health, including nutrition education (Perez-Escamilla, Hromi-Fiedler, Vega-Lopez, Bermudez-Millan and Segura-erez., 2008), family planning (Charandabi et al., 2010), substance use (MacArthur, Harrison, Caldwell, Hickman and Campbell, 2016) and violence prevention (Arlene & Beverly, 2010). It has been used in a variety of studies that focus on upgrading in-school adolescents' knowledge relating to prevailing health related challenges. This strategy can therefore be employed to increase the level of knowledge of in-school adolescents on malaria.

Public Enlightenment

Public enlightenment refers to organized communication activities designed to raise awareness, induce behavior change and improve quality outcomes for individuals and populations. According to Seymour (2017), evidence has shown that this strategy can improve awareness of palliative care and probably improve quality of care. The strategy involves awareness creation in schools. This has the potential for reaching the school community which with functional information relating to malaria. Awareness creation can be done in schools during the morning assembly; by designing, providing and distributing Behavioural Change Communication (BCC) materials in schools; or by integrating malaria related programs with co-curricular activities such as debates, essay writing and quiz competitions. Use of mass media such as Radio and Television could also be used to disseminate information to the general populace with special attention paid to in-school adolescents and their parents or guardians. Use of a variety of media could be very helpful as the weakness of one could be counter-balanced by the strengths of others. School based public enlighten activities on malaria should focus on the various gaps in knowledge

identified in the study with a view to making such public enlightenment activities evidence-based and appropriate to the age and level of maturity of the adolescents.

Partnership

A partnership is an arrangement where parties agree to cooperate to advance their mutual interest. Public-Private Partnership (PPP) is collaboration between the public and the private sector organisations (private for profit, faith based, or NGOs). Collaborations could be in the form of institutional arrangements ranging from simple collaboration, joint venture, direct contract, lease and concession (Itika & Mwageni, 2006) Partnership involves identifying and articulating the common interest to promote the shared goals that can benefit both the coalition and the community (McLeod, 2001). Advantages of partnership in public health includes leveraging and maximizing resources by pooling talents, expertise, and resources; generating broad based support; creating better ways to reach audiences where they live, work and play; building on public health's expertise and evidence based tools and information to improve the health of the community aid; reduction in costs—both direct and indirect—related to health, Improving health status (CDC, 2008). Governmental agencies and NGOs could partner with schools to provide LLIN and engage community members in source destruction of vectors in the environment. Distribution of LLIN among in-school adolescents could also increase the ownership of the nets. In-school net distribution programs should be implemented with education on net use, installation and maintenance. Governments and NGOs should also encourage the community at large to engage in source reduction of mosquitoes by removing breeding sites such as open gutters, refuse dumping sites and water-holding containers around residential areas. This will help minimize vulnerability of adolescents and the community at large to mosquito bite and malaria.

Policy Intervention

Nigeria has a school health policy. Schools should use the policy as a guide to promote the provision of first aid services in schools in the study area. The first aid services should include recognition and primary health care management of malaria in school system. Towards this end, every school should be encouraged and assisted to own and maintain a first aid box. The first aid box should be stocked with appropriate antimalarial medications currently prescribed in the Nigeria for the management of malaria in-line with the Nigerian anti-malaria policy. Students should be actively involved in the provision of first

aid services relating to malaria managements in schools. In-school adolescents in malaria endemic areas such as the study area should be provided with basic factual information about malaria. The adolescents of today will grow and develop to become the adults of tomorrow. Therefore, the enhancement of in-school adolescents capacity to be involved in the prevention, control and management of malaria will constitute a major investment with great potential for yielding rewarding dividends.

5.2 Conclusion

This study explored the antecedent factors and health-seeking behaviours relating to malaria among in-school adolescents in Ibadan North LGA. The results indicated that the respondents had a fair knowledge of symptoms and preventive measures relating to malaria. There are gaps in respondents' knowledge relating to complicated malaria, treatment and consequences of untreated malaria. There were major misconceptions relating to malaria with special reference to cause and mode of transmission of malaria, preventive measures and perception of prevention and treatment. Findings from this study also revealed that many of the adolescents patronise PMVs and health care facilities during episodes of malaria. The use of herbs and self-medication were noted to be common practices among the respondents. Health Education and Promotion strategies should be employed to improve malaria prevention and control strategies in school settings and in the communities where schools are located.

5.3 Recommendations

The following recommendations are made based on the findings of the study:

1. Educational interventions should be targeted at in-school adolescents to enlighten them on causes, mode of transmission, symptoms, prevention, recommended treatment practices and consequences of untreated malaria;
2. Insecticide treated nets should be distributed to in-school adolescents to enable them own at least a net; in addition they should be trained on how to use and maintain the nets.

3. Malaria related behavioural change communication materials should be developed for schools and made accessible to students in order to upgrade their knowledge and promote favourable perception and good health-seeking behavior relating to malaria among them.
4. Factors which have potential for promoting mosquito breeding should be identified and addressed in schools and at the community level.
5. The adoption and sustained use of insecticide treated nets should be promoted among the in-school adolescents.
6. The primary health care management of malaria should be integrated into the school health programmes in the study area with the active involvement of in-school adolescents.

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APPENDIX I

QUESTIONNAIRE

Knowledge, Perception, Illness experiences and Health-seeking Behaviours Relating to Malaria among In-School Adolescents in Ibadan North Local Government Area, Oyo State.

Dear Respondent,

My name is Famoyegun Joy Dorcas, a Master of Public Health Student in the Department of Health Promotion and Education, University of Ibadan. The purpose of this study is to investigate the *Knowledge, Perception, Illness experiences and Health-seeking Behaviours Relating to Malaria among In-School Adolescents in Ibadan North Local Government Area, Oyo State.* Your participation in this study is voluntary. It is desired that honest and sincere answers should be given. The findings from this study will help in the design of programs and formulation of policies aimed at preventing and controlling malaria among in-school adolescent populations. All information gathered during the course of this study will be treated with high level of confidentiality, please note that your names are not needed in the study so you do not have to write your name on this questionnaire. Your willingness to answer the questions in this questionnaire implies that you have consented to participate in this study.

Thanks for your cooperation.

SECTION A: Socio-Demographic Characteristics of Respondents

In this section, please tick (√) any of the responses that apply to you in the options provided or complete the blank spaces provided as applicable.

1. **Age** as at last birthday in years: _____ years
2. **Gender/Sex:** Male ☐ Female ☐
3. **Type of School Attending:** Private ☐ Public ☐
4. **Religion:** Christianity ☐ Islam ☐ Traditional ☐
5. **Class:** _____
6. **Ethnicity:** Yoruba ☐ Igbo ☐ Hausa ☐ Others (specify) _____
7. **Type of Family**: (a) Monogamy (father marries only one wife) ☐

(b) Polygyny (father marries more than one wife**)** ☐

8a. **Highest Level of Education of Father /Guardian:** Primary ☐ Secondary ☐
No Formal Education Tertiary ☐ Any other (specify) _____

8b. If tertiary, (specify) _____

9. **Highest Level of Education of Mother /Guardian:** Primary Secondary ☐
No Formal Education ☐ Tertiary ☐ Any other (specify) _____
_____

9b. If tertiary, (specify) _____

10. **Occupation of Mother/Guardian:** Trading ☐ Civil-Servant ☐ works in a Private Organization ☐ Retired ☐ Artisan ☐ Teacher ☐

Any other, please specify _____

11. **Occupation of Father/ Guardian:** Trading ☐ Civil-Servant ☐ works in a Private Organization ☐ Retired ☐ Artisan ☐ Teacher ☐

Any other, (please specify) _____

SECTION B: Respondents living situation

2. Type of house living in:
   a) Flat (3 or more bedroom) ☐
   b) Face me I face you house ☐
   c) One room apartment ☐
   d) Two rooms apartment ☐
   e) A room and parlour ☐
   f) Others (specify) _____

13. Total number of persons living in your family _____

14. **Table 1** ***contains a description of the conditions relating to where you are living. For each condition, thick 'Yes' if it applies to your house or 'No' if it does not.***

Table 1

	Condition of your house	Tick √	
		Yes	**No**
14.1	Unclear bushes near your house		
14.2	Open gutters near your house		
14.3	Presence of stagnant water or pools of water		
14.4	Heap of refuse/ refuse drainage near your house		
14.5	Presence of empty containers or cans		
14.6	Presence of windows with net/screens		
14.7	Presence of doors with net/screen		

SECTION C: Knowledge on causes, symptoms, prevention, treatment and consequences of malaria

15. **Table 2** ***contains terms or concepts relating to the cause of malaria can be transmitted. For each statement tick (√) whether it is True or False. If you do not know if it is true or false, tick 'Don't know'.***

Table 2

	Cause(s) of malaria	Tick √		
		True	**False**	**Don't know**
15.1	Exposure to too much Sun			
15.2	Mosquito			
15.3	Stress			
15.4	Plasmodium falciparum			
15.5	Germs			
15.6	Inadequate Sleep			
15.7	Overwork			
15.8	Any other causes (specify):			

16. **Table 3** ***contains statements or phrases relating to the transmission or spread of malaria. For each statement tick (√) whether it is True or False. If you do not know if it is true or false, tick 'Don't know'.***

Table 3

	Ways of transmitting malaria from person to person	Tick √		
		True	**False**	**Don't know**
16.1	Through mosquito bite			
16.2	Through blood transfusion			
16.3	Contact with body fluid from an infected person			
16.4	From mother to child during pregnancy			
16.5	Having stagnant water around the house			

17. **Table 4** ***contains a list of the common symptoms of simple malaria. For each statement tick (√) whether it is True or False. If you do not know if it is true or false, tick 'Don't know'.***

Table 4

	Common symptoms of simple malaria	Tick √		
		False	**True**	**Don't know**
17.1	Headache			
17.2	Fever			
17.3	Body pains			
17.4	Chills			
17.5	Cough			
17.6	High body temperature			
17.7	Nausea and vomiting			
17.8	Inability to sleep			
17.9	General weakness			

18. **Table 5** ***contains terms relating to the symptoms of complicated malaria. For each term tick (√) whether it is True or False. If you do not know if it is true or false, tick 'Don't know'.***

Table 5

		Tick √

	Symptoms of complicated malaria	True	False	Don't know
18.1	Breathing difficulties			
18.2	Convulsion			
18.3	Prostration/Inability to sit			
18.4	Dark and/or limited urine			
18.5	Coma			
18.6	Fainting/Loss of consciousness			

19. **Table 6** ***contains statements or phrases relating to effective ways of preventing malaria. For each statement tick (√) whether it is True or False. If you do not know if it is true or false, tick 'Don't know'.***

Table 6

	Effective ways of preventing malaria	Tick √		
		False	True	Don't know
19.1	Use of insecticide treated net			
19.2	Clearing of bushes in the environment			
19.3	Removal of stagnant water in the environment			
19.4	Use of mosquito repellant cream			
19.5	Use of insecticide spray			
19.6	Avoidance of overwork			
19.7	Eating fruits			
19.8	Drinking a lot of water regularly			
19.9	Use of mosquito coil			
19.10	Praying			
19.11	Avoiding Stress			
19.12	Avoid working under the sun			

20. **Table 7** ***contains a list of drugs/medicines. For each statement tick (√) whether it is True if it an antimalarial and False if it is not an antimalarial. If you do not know if it is true or false, tick 'Don't know'.***

Table 7

	Main medicine recommended for treating malaria once malaria starts	**Tick √**		
		True	**False**	**Don't know**
20.1	Sulphadoxine Pyrimethamine eg Amalar, Fasidar			
20.2	Paracetamol			
20.3	Aspirin			
20.4	Arthemether lumenfanthrine eg (Coartem, Lumartem, Lonart)			
20.5	Artesunate Amodiquine (eg Camosunate)			
20.6	Dihydroartemisinin & Piperaquine Phosphate (eg P-Alaxin, Artexaten)			
20.7	Ibuprofen (eg Ibupain, Ibucap)			
20.8	Artesunate			
20.9	Quinine			
20.10	Chloroquine			
20.11	Herbs (agbo)			
20.12	Prayer water			

21. Table 8 ***illustrates the antimalarial dosage or treatment schedule for adolescents. Kindly fill up the spaces with appropriate answers. If you do not know the appropriate answer, tick 'Don't know'.***

What is the Anti-malaria dosage schedule for adolescents aged 10-19 years using Coartem?

Table 8

Time/Period	**Number of tablets**	**Don't know**
Day 1: Morning		
Evening		
Day 2: Morning		
Evening		
Day 3: Morning		

Evening		

22. **Table 9** ***contains a list of possible health problems that can result when malaria is not treated. For each statement tick (√) whether it is Correct or Incorrect. If you do not know if it is correct or incorrect, tick (√) 'Don't know'.***

Table 9

	Possible health problems associated with untreated malaria	**Tick √**		
		Correct	**Incorrect**	**Don't know**
22.1	Impaired Consciousness			
22.2	Kidney Failure			
22.3	Coma			
22.4	Anemia (lack or shortage of blood)			
22.5	Paralysis			
22.6	Hypogylcemia (low glucose level)			
22.7	Jaundice			
22.8	Shock			
22.9	Hyper parasitemia			
22.10	Pulmonary edema			
22.11	Hypotension			
22.12	Death			
22.13	Spleen enlargement			
22.14	Abortion			

SECTION D: Perception of in-school adolescents relating to malaria

23. **Table 10** ***contains statements relating to perceived seriousness of malaria. For each statement tick (√) whether you agree with it or whether you disagree with it. If you are not sure, tick (√) undecided.***

Table 10

	Perceived seriousness of Malaria	**Tick √**		
		Agree	**Undecided**	**Disagree**
23.1	Malaria is a serious disease			

23.2	Without treatment, symptoms of malaria disappear after some days			
23.3	Malaria is a mild disease			
23.4	Malaria cannot kill or lead to death			
23.5	Malaria can't prevent one from doing well at school			
23.6	Malaria is only serious in children not among young people like us			

24. Table 11 ***contains perception statements relating to prevention and treatment of malaria. For each statement tick (√) whether you agree with it or whether you disagree with it. If you are not sure, tick (√) undecided.***

Table 11

	Perception related to Malaria prevention and treatment	**Tick √**		
		Agree	**Undecided**	**Disagree**
24.1	Mosquito repellant creams cannot prevent mosquito bite			
24.2	One should take anti-malaria immediately a mosquito bite			
24.3	Malaria cannot be prevented			
24.4	Western medicine are better for treating malaria compared with traditional medicines or herbs			
24.5	Mosquito nets cannot prevent one from having malaria			
24.6	Chloroquine is still the main drug used for treating malaria			

25. Table 12 ***contains statements relating to perceived vulnerability to Malaria. For each statement tick (√) whether you agree with it or whether you disagree with it. If you are not sure, tick (√) undecided.***

Table 12

	Perceived vulnerability to Malaria	**Tick √**		
		Agree	**Undecided**	**Disagree**
25.1	I cannot have malaria because mosquitoes do not breed in our area			
25.2	Mosquitoes are not in any way related to malaria			
25.3	People get malaria when they are short of blood			
25.4	We use agbo/herbal medicine in our house, so we cannot have malaria			
25.5	Only very young children get malaria			
25.6	We can't get malaria because we live in a beautiful house			

26. **Table 13** ***contains statements relating to the perceived effect of Malaria on secondary school students. For each statement tick (√) whether you agree with it or whether you disagree with it. If you are not sure, tick (√) undecided.***

Table 13

	Perceived effect of Malaria on secondary school students	**Tick √**		
		Agree	**Undecided**	**Disagree**
26.1	Malaria can make one absent from School			
26.2	Malaria can reduce a student's concentration in class			
26.3	Malaria can lead to low intelligence level			
26.4	Episodes of malaria can affect ones school grades			

SECTION E: Malaria related health-seeking behaviour and malaria illness experiences

For each statement tick (√) any of the responses that apply to you in the options provided or complete the blank spaces provided as applicable.

27. **Have you ever had malaria?** Yes ☐ No ☐

If yes, answer questions 28 and 29. If your answer is no, go to question 30

28. **Have you had malaria in the last 3 months?** Yes ☐ No ☐

29. **How many times have you experienced malaria in the last 3 months?** _____

30. Table 14 ***contains statements relating to places usually visited for treatment of malaria. For each place tick (√) Yes or No where applicable.***

Table 14

	Places visited for treatment of malaria	**Tick √**	
		Yes	**No**
30.1	Patent Medicine Vendors/ Chemist		
30.2	Pharmacy		
30.3	Health Centre		
30.4	Private Hospital		
30.5	Government hospital		
30.6	Nurse in the community		
30.7	Traditional healers		
30.8	Herbal Medicine Centre		

31. Do you have a mosquito net at home? Yes ☐ No ☐

32. If yes to question 31, how many nets does your family have at home? _____

If No, go to Question 37

33. If yes to question 31, do you have a mosquito net to yourself? Yes ☐ ☐

No

34. If you have a mosquito net, how often do you use the mosquito net?

a) Daily ☐ b) often/ every now and then ☐ c) once in a while ☐ d) never ☐

35. Did you sleep under the mosquito net last night? Yes ☐ No ☐

36. If you did not sleep under a net last night, why is it so? a) excessive heat ☐

b) skin irritation ☐ c) I dislike sleeping under a net ☐ d) not convenient ☐ e) others _____

37. Table 15 ***contains list of materials or ways used to prevent mosquitoes. For each statement tick (√) Yes or No concerning the one you use.***

Table 15

	Materials or ways used for preventing mosquito in your house	**Tick √**	
		Yes	**No**
37.1	Mosquito coil		
37.2	Mosquito repellant cream		
37.3	Insecticides e.g. Mortein, Raid		
37.4	Remover of breeding sites of mosquitoes		
37.5	Ordinary mosquito net		
37.6	Insecticide Treated Net		
37.7	Others (specify)		

38. When you notice symptoms of malaria, how long do you usually wait before starting to treat yourself or before your parent starts to treat you?

a) Immediately ☐ b) After a day ☐ c) After two or more days ☐

d) Any other (specify) _____

39. Do your parents keep drugs at home for the treatment of malaria? a) Yes ☐

b) No ☐

40. If yes to question 40, list the drugs kept at home by your parents for managing malaria in the space provided below:

_____

_____

_____

41. Table 16 ***contains a list of malaria treatment practices. For each statement tick (√) Yes if you have ever practiced it and No if you have never used it.***

Table 16

	Malaria treatment practices you have ever used	**Tick √**	
		Yes	No
41.1	Use of herbs (agbo) to treat malaria		
41.2	Treatment of malaria using medicine kept at home		
41.3	Using a combination of western medicine or herbs to treat malaria		

41.4	Taking a malaria test before treatment		
41.5	Going to the hospital to receive treatment for malaria		
41.6	Buying of drugs from Patent medicine Vendors (Chemist) / Pharmacies to treat malaria		
41.7	Starting malaria treatment without carrying out any test		

43. Table 17 ***contains a list of malaria treatment practices. For each statement tick (√) Yes if you still use it or No if you are no longer using it.***

Table 17

	Malaria treatment practices you still use	**Tick √**	
		Yes	No
42.1	Use of herbs (agbo) to treat malaria		
42.2	Treatment of malaria using medicine kept at home		
42.3	Using a combination of western medicine or herbs to treat malaria		
42.4	Taking a malaria test before treatment		
42.5	Going to the hospital to receive treatment for malaria		
42.6	Buying of drugs from Patent medicine Vendors (Chemist) / Pharmacies to treat malaria		
42.7	Starting malaria treatment without carrying out any test		

APPENDIX II

OBSERVATION CHECKLIST

A. Type of School: Public ☐ Private ☐

B. **Checklist for antimalarial drugs in the school first aid**

	Variable	Yes	No
1	Presence of First aid Box		
2	Is the first aid box in use?		
3	Presence of malaria drugs in the first aid box		
4	Access of students to the drugs in the first aid box		

C. Content of first aid box

1. Types of malaria drugs present

_____

_____

2. Other drugs present in the first aid box

_____

_____

_____

D. Official in Charge of first aid box: _____

E. Checklist for Sickbay in the school

	Variable	Yes	No
1	Presence of Sick bay		
2	Is the sick bay in use?		
3	Presence of malaria drugs in the sick bay		
4	Access of students to the drugs in the sick bay		

F. Official in Charge of sick bay: _____

APPENDIX III

INFORMED CONSENT FORM

IRB Research Approval Number:

This Approval will elapse on:

Title of Research: *Knowledge, Perception, Illness experiences and Health-seeking Behaviours Relating to Malaria among In-School Adolescents in Ibadan North Local Government Area, Oyo State.*

Name and Affiliation of Researcher: FAMOYEGUN Joy Dorcas, a Postgraduate student of the Department of Health Promotion and Education, Faculty of Public Health, College of Medicine, University of Ibadan is carrying out this study.

Purpose of research: The purpose of this study is to investigate the Knowledge, Perception, Illness experiences and Health-seeking Behaviours Relating to Malaria among In-School Adolescents in Ibadan North Local Government Area, Oyo State.

Procedure of the research: The study will involve the use of a questionnaire to elicit information from study participants. A total of 450 secondary school students aged 10-19 years selected through multistage sampling technique will be requested to fill the questionnaire.

Expected Duration of research and Participants' involvement: Each research participant is expected to fill the questionnaire within thirty to forty-five minutes; the questionnaires will be collected back immediately after completion. The research work is expected to last for two months.

Risk: This research will not cause any physical harm. It will not involve the utilization of any invasive procedures or collection of biological samples. However, it will take part of their time and some people may not be comfortable with some of the questions.

Cost to participants: Participation in this research will not have any financial cost to respondents but will require only about thirty to forty-five (30-45) minutes of participants' time.

Benefit: There is no direct benefit from this study to the participants; however the findings will be of great value in formulating policies and designing interventions aimed at the promotion of health seeking behaviours relating to malaria among the study population.

Confidentiality: All identifiers will be removed from the questionnaire and confidentiality will be ensured through protection of data collected from participants.

Voluntariness: Your participation in this study is entirely voluntary. You have the right to choose to participate in the study or not without any penalty.

Alternatives to Participation: You are at liberty to participate in the study. Your decision not to participate will not be used against you in anyway.

Undue Inducement/Influence: No payment will be made to any participant for participating in this research. Individuals who consent to participate in the study will be appreciated verbally.

Consequences of participants' decision to withdraw from research and procedure for orderly termination of participation: Participants can choose to withdraw from the study any time they wish without reprove. However, any information gathered prior to withdrawal may be used in reports or publication.

What happens to participant and community after the study: To ensure study participants are not left in the dark and for proper dissemination of information, the result of the findings will be sent to the Oyo State Ministries of Education and Health.

Any apparent potential conflict of interest: There is no conflict of interest pertaining to this study.

Statement of person obtaining informed consent:

I have fully explained the nature and scope of the research to……..…….and have given sufficient information including risks and benefits to enable him/her make an informed decision to participate or not participate.

Date: _____ **Signature: _____**

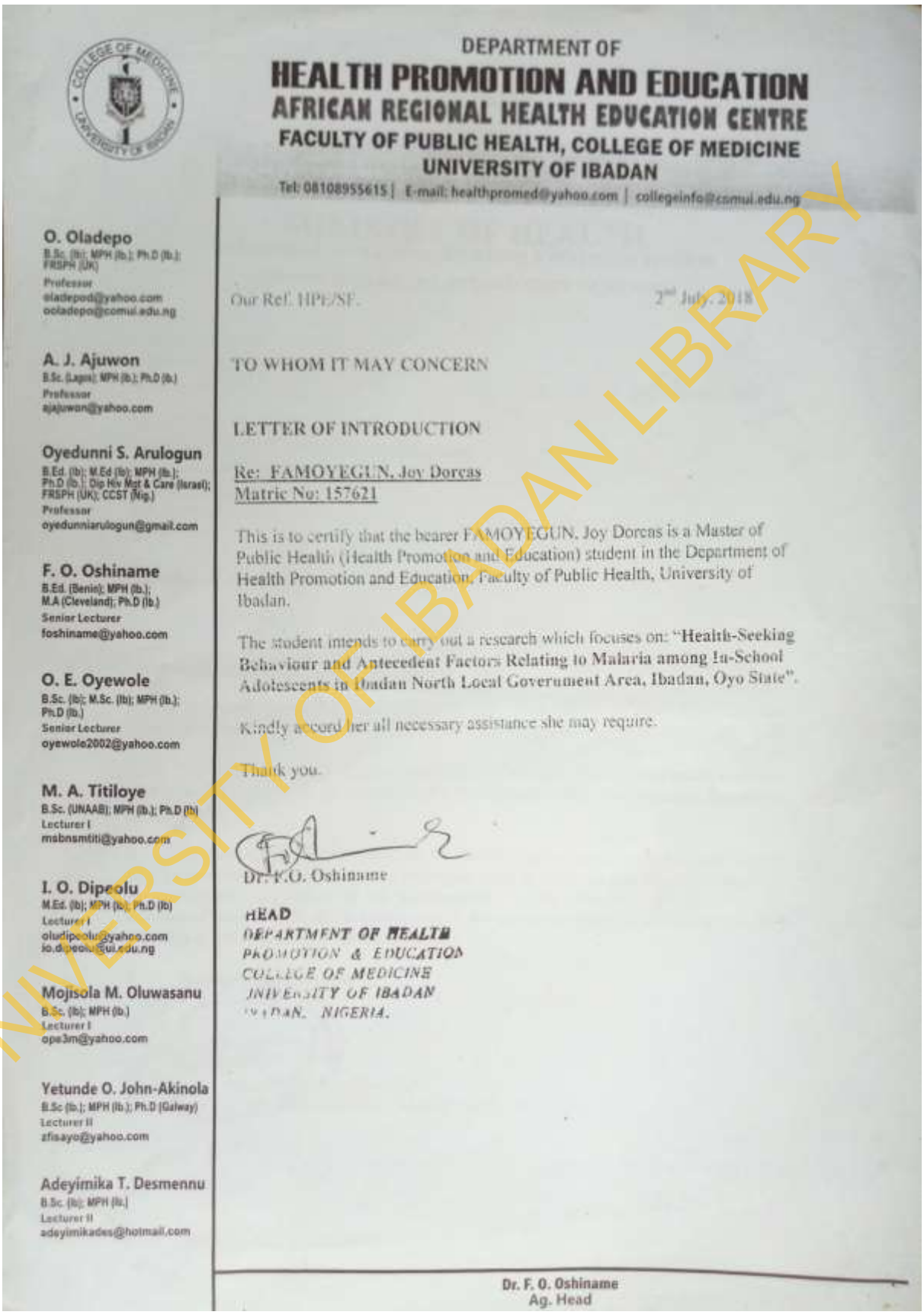
Name: _____

Statement of person giving informed consent: The research has been fully explained to me and I understand the study process and the nature of the research. I understand that my participation is voluntary. I know enough about the purpose, methods, risks and benefits of the research to judge that I want to take part in it. I am aware that I have the right to freely stop being part of this study at any time. I have received a copy of this consent form and additional information sheet to keep for myself. I hereby agree to participate in the study by answering the questions contained in the questionnaire

Date: _____ **Signature: _____**

Name:_____

APPENDIX IV



DEPARTMENT OF
HEALTH PROMOTION AND EDUCATION
AFRICAN REGIONAL HEALTH EDUCATION CENTRE
FACULTY OF PUBLIC HEALTH, COLLEGE OF MEDICINE
UNIVERSITY OF IBADAN

Tel: 08108955615 | E-mail: healthpromed@yahoo.com | collegeinfo@comui.edu.ng

O. Oladepo
B.Sc. (Ib); MPH (Ib.); Ph.D (Ib.); FRSPH (UK)
Professor
oladepod@yahoo.com
ooladepo@comui.edu.ng

A. J. Ajuwon
B.Sc. (Lagos); MPH (Ib.); Ph.D (Ib.)
Professor
ajajuwon@yahoo.com

Oyedunni S. Arulogun
B.Ed. (Ib); M.Ed (Ib); MPH (Ib.); Ph.D (Ib.); Dip Hiv Mgt & Care (Israel); FRSPH (UK); CCST (Nig.)
Professor
oyedunniarulogun@gmail.com

F. O. Oshiname
B.Ed. (Benin); MPH (Ib.); M.A (Cleveland); Ph.D (Ib.)
Senior Lecturer
foshiname@yahoo.com

O. E. Oyewole
B.Sc. (Ib); M.Sc. (Ib); MPH (Ib.); Ph.D (Ib.)
Senior Lecturer
oyewole2002@yahoo.com

M. A. Titiloye
B.Sc. (UNAAB); MPH (Ib.); Ph.D (Ib)
Lecturer I
msbnsmtiti@yahoo.com

I. O. Dipeolu
M.Ed. (Ib); MPH (Ib.); Ph.D (Ib)
Lecturer I
oludipeolu@yahoo.com
io.dipeolu@ui.edu.ng

Mojisola M. Oluwasanu
B.Sc. (Ib); MPH (Ib.)
Lecturer I
ope3m@yahoo.com

Yetunde O. John-Akinola
B.Sc (Ib.); MPH (Ib.); Ph.D (Galway)
Lecturer II
zfisayo@yahoo.com

Adeyimika T. Desmennu
B.Sc. (Ib); MPH (Ib.)
Lecturer II
adeyimikades@hotmail.com

Our Ref: HPE/SF. 2nd July, 2018

TO WHOM IT MAY CONCERN

LETTER OF INTRODUCTION

Re: FAMOYEGUN, Joy Dorcas
Matric No: 157621

This is to certify that the bearer FAMOYEGUN, Joy Dorcas is a Master of Public Health (Health Promotion and Education) student in the Department of Health Promotion and Education, Faculty of Public Health, University of Ibadan.

The student intends to carry out a research which focuses on: "**Health-Seeking Behaviour and Antecedent Factors Relating to Malaria among In-School Adolescents in Ibadan North Local Government Area, Ibadan, Oyo State**".

Kindly accord her all necessary assistance she may require.

Thank you.

Dr. F.O. Oshiname

HEAD
DEPARTMENT OF HEALTH
PROMOTION & EDUCATION
COLLEGE OF MEDICINE
UNIVERSITY OF IBADAN
IBADAN. NIGERIA.

Dr. F. O. Oshiname
Ag. Head

APPENDIX V

A CODING GUIDE

ITEMS	VARIABLES	CODE
	SECTION A: Socio-Demographic Characteristics of Respondents	
Q1	**Age**	Actual figure
Q2	**Gender:** Male	1
	Female	2
	NR	9
Q3	**Type of School Attending:** Private	1
	Public	2
	NR	3
Q4	**Religion:** Christianity	1
	Islam	2
	Traditional	3
	NR	9
Q5	**Class:** JS1	1
	JS2	2
	SS1	3
	SS2	4
	NR	9
Q6	**Ethnicity:** Yoruba	1
	Igbo	2
	Hausa	3
	Edo	4
	Kogi	5
	South-South	6
	Urogbo	7
	Igala	8
	Idoma	9
	NR	99
Q7	**Type of Family:** Monogamy	1
	Polygyny	2
	No response	9
Q8a	**Highest Level of Education of Father /Guardian:**	
	No formal Education	1
	Primary	2
	Secondary	3
	Tertiary	4
	NR	9
Q8b	University	1

	Polytechnic	2
	College of Education	3
	Aviation School	4
	Not Applicable (NA)	7
	NR	9
Q9a	**Highest Level of Education of Mother /Guardian:**	
	No formal Education	1
	Primary	2
	Secondary	3
	Tertiary	4
	NR	9
Q9b	University	1
	Polytechnic	2
	College of Education	3
	Aviation School	4
	NA	7
	NR	9
Q10	**Occupation of Mother/Guardian:** Trading	1
	Civil-Servant	2
	Works in a Private Organization	3
		4
	Retired	5
	Artisan	6
	Teacher	7
	Politician	9
	NR	
Q11	**Occupation of Father/Guardian:** Trading	1
	Civil-Servant	2
	Works in a Private Organization	3
		4
	Retired	5
	Artisan	6
	Teacher	7
	Politician	9
	NR	
	SECTION B: Respondents living situation	
Q12	**Type of house living in:**	
	a) Flat (3 or more bedroom)	1
	b) Face me I face you house	2
	c) One room apartment	3
	d) Two rooms apartment	4
	e) A room and parlour	5
	NR	9

Q13	**Total number of persons living in family**	Actual Figure
Q14	**Condition of your house**	(for each) Yes = 1 No = 2 No Response = 9
14.1	Unclear bushes near house	
14.2	Open gutters near house	
14.3	Presence of stagnant water or pools of water	
14.4	Heap of refuse/ refuse drainage near house	
14.5	Presence of empty containers or cans	
14.6	Presence of windows with net/screens	
14.7	Presence of doors with net/screen	
	SECTION C: Knowledge on causes, symptoms, prevention, treatment and consequences of malaria	
Q15	**Cause(s) of malaria**	(for each) True = 1 False = 2 Don't Know = 3 No Response = 9
15.1	Exposure to too much Sun	
15.2	Mosquito	
15.3	Stress	
15.4	Plasmodium falciparum	
15.5	Germs	
15.6	Inadequate Sleep	
15.7	Overwork	
Q16	**Ways of transmitting malaria from person to person**	(for each) True = 1 False = 2 Don't Know = 3 No Response = 9
16.1	Through mosquito bite	
16.2	Through blood transfusion	
16.3	Contact with body fluid from an infected person	
16.4	From mother to child during pregnancy	
16.5	Having stagnant water around the house	
Q17	**Common symptoms of simple malaria**	(for each) False = 1 True = 2 Don't Know = 3 No Response = 99
17.1	Headache	
17.2	Fever	
17.3	Body pains	
17.4	Chills	
17.5	Cough	
17.6	High body temperature	
17.7	Nausea and vomiting	
17.8	Inability to sleep	
17.9	General weakness	
Q18	**Symptoms of complicated malaria**	(for each) True = 1 False = 2 Don't Know = 3 No Response = 9
18.1	Breathing difficulties	
18.2	Convulsion	
18.3	Prostration/Inability to sit	
18.4	Dark and/or limited urine	
18.5	Coma	

Q19	**Effective ways of preventing malaria**	(for each) False = 1 True = 2 Don't Know = 3 No Response = 99
19.1	Use of insecticide treated net	
19.2	Clearing of bushes in the environment	
19.3	Removal of stagnant water in the environment	
19.4	Use of mosquito repellant cream	
19.5	Use of insecticide spray	
19.6	Avoidance of overwork	
19.7	Eating fruits	
19.8	Drinking a lot of water regularly	
19.9	Use of mosquito coil	
19.10	Praying	
19.11	Avoiding Stress	
19.12	Avoid working under the sun	
Q20	**Main medicine recommended for treating malaria once malaria starts**	(for each) True = 1 False = 2 Don't Know = 3 No Response = 99
20.1	Sulphadoxine Pyrimethamine eg Amalar, Fasidar	
20.2	Paracetamol	
20.3	Aspirin	
20.4	Arthemether lumenfanthrine eg (Coartem, Lumartem, Lonart)	
20.5	Artesunate Amodiquine (eg Camosunate)	
20.6	Dihydroartemisinin & Piperaquine Phosphate (eg P-Alaxin, Artexaten)	
20.7	Ibuprofen (eg Ibupain, Ibucap)	
20.8	Artesunate	
20.9	Quinine	
20.10	Chloroquine	
20.11	Herbs (agbo)	
20.12	Prayer water	
Q21	**What is the Anti-malaria dosage schedule for adolescents aged 10-19 years using Coartem**	Correct response (<35kg) = 1 Correct response (>35kg) = 2 Wrong Response = 3 Don't Know = 7 No Response = 9
	Day 1: Morning	
	Evening	
	Day 2: Morning	
	Evening	
	Day 3: Morning	
	Evening	
Q22	**Possible health problems associated with untreated malaria**	
22.1	Impaired Consciousness	
22.2	Kidney Failure	

22.3	Coma	(for each) Correct = 1 Incorrect = 2 Don't Know = 3 No Response = 99
22.4	Anemia (lack or shortage of blood)	
22.5	Paralysis	
22.6	Hypogylcemia (low glucose level)	
22.7	Jaundice	
22.8	Shock	
22.9	Hyper parasitemia	
22.10	Pulmonary edema	
22.11	Hypotension	
22.12	Death	
22.13	Spleen enlargement	
22.14	Abortion	
	SECTION D: Perception of in-school adolescents relating to malaria	
Q23a	**Perceived seriousness of Malaria**	(for each) Agree = 1 Undecided = 2 Disagree = 3 No response = 9
23.1	Malaria is a serious disease	
23.2	Without treatment, symptoms of malaria disappear after some days	
23.3	Malaria is a mild disease	
23.4	Malaria cannot kill or lead to death	
23.5	Malaria can't prevent one from doing well at school	
23.6	Malaria is only serious in children not among young people like us	
Q23b	**Perceived seriousness of Malaria** For either agree or disagree Other Responses	Appropriate = 1 Inappropriate = 2 NA = 7
Q24a	**Perception related to Malaria prevention and treatment**	(for each) Agree = 1 Undecided = 2 Disagree = 3 No response = 9
24.1	Mosquito repellant creams cannot prevent mosquito bite	
24.2	One should take anti-malaria immediately a mosquito bite	
24.3	Malaria cannot be prevented	
24.4	Western medicine are better for treating malaria compared with traditional medicines or herbs	
24.5	Mosquito nets cannot prevent one from having malaria	
24.6	Chloroquine is still the main drug used for treating malaria	
Q24b	**Perception related to Malaria prevention and treatment** For either agree or disagree Other Responses	Appropriate = 1 Inappropriate = 2 NA = 7
Q25a	**Perceived vulnerability to Malaria**	(for each)
25.1	I cannot have malaria because mosquitoes do not breed in our area	

25.2	Mosquitoes are not in any way related to malaria	Agree = 1 Undecided = 2 Disagree = 3 No response = 9
25.3	People get malaria when they are short of blood	
25.4	We use agbo/herbal medicine in our house, so we cannot have malaria	
25.5	Only very young children get malaria	
25.6	We can't get malaria because we live in a beautiful house	
Q25b	**Perceived vulnerability to Malaria** For either agree or disagree Other Responses	Appropriate = 1 Inappropriate = 2 NA = 7
Q26a	**Perceived effect of Malaria on secondary school students**	(for each) Agree = 1 Undecided = 2 Disagree = 3 No response = 9
26.1	Malaria can make one absent from School	
26.2	Malaria can reduce a student's concentration in class	
26.3	Malaria can lead to low intelligence level	
26.4	Episodes of malaria can affect ones school grades	
Q26b	**Perceived effect of Malaria on secondary school students** For either agree or disagree Other Responses	Appropriate = 1 Inappropriate = 2 NA = 7
	SECTION E: Malaria related health-seeking behaviour and malaria illness experiences	
Q27	**Have you ever had malaria?** Yes No No response	1 2 9
Q28	**Have you had malaria in the last 3 months?** Yes No No response	1 2 9
Q29	**How many times have you experienced malaria in the last 3 months?**	Actual response
Q30	**Places ever visited for treatment of malaria**	(for each) Yes = 1 No = 2 No Response = 9
30.1	Patent Medicine Vendors/ Chemist	
30.2	Pharmacy	
30.3	Health Centre	
30.4	Private Hospital	
30.5	Government hospital	
30.6	Nurse in the community	
30.7	Traditional healers	
30.8	Herbal Medicine Centre	
Q31	**Do you have a mosquito net at home?** Yes	1

	No	2
	No response	9
Q32	**How many nets does your family have at home?**	Actual Response
Q33	**Do you have a mosquito net to yourself?** Yes	1
	No	2
	No response	9
Q34	**If you have a mosquito net, how often do you use the mosquito net?** Daily	1
	Often/ every now and then	2
	Once in a while	3
	Never	4
	No response	9
Q35	**Did you sleep under the mosquito net last night?** Yes	1
	No	2
	No response	9
Q36	**If you did not sleep under a net last night, why is it so?**	
	Excessive heat	1
	Skin irritation	2
	I dislike sleeping under the net	3
	Not convenient	4
	No net	5
	No response	9
Q37	**Materials or ways used for preventing mosquito in your house**	(for each) Yes = 1 No = 2 No Response = 9
37.1	Mosquito coil	
37.2	Mosquito repellant cream	
37.3	Insecticides eg Mortein, Raid	
37.4	Remover of breeding sites of mosquitoes	
37.5	Ordinary mosquito net	
37.6	Insecticide Treated Net	
Q38	**When you notice symptoms of malaria, how long do you usually wait before starting to treat yourself or before your parent starts to treat you?** Immediately	1
	After a day	2
	After two or more days	3
	No response	9
Q39	**Do your parents keep drugs at home for the treatment of malaria?** Yes	1
	No	2
	No Response	9
Q40	**List the drugs kept at home by your parents for managing malaria**	1
	Arthemether lumenfanthrine	2

	Artesunate Chloroquine Sulphadoxine Pyrimethamine Artesunate Amodiquine Herbs No Response	3 4 5 6 9
Q41	**Malaria treatment practices you have ever used**	(for each) Yes = 1 No = 2 No Response = 9
41.1	Use of herbs (agbo) to treat malaria	
41.2	Treatment of malaria using medicine kept at home	
41.3	Using a combination of western medicine or herbs to treat malaria	
41.4	Taking a malaria test before treatment	
41.5	Going to the hospital to receive treatment for malaria	
41.6	Buying of drugs from Patent medicine Vendors (Chemist) to treat malaria	
41.7	Starting malaria treatment without carrying out any test	
41.8	Buying of drugs from Pharmacies to treat malaria	
Q42	**Malaria treatment practices you still use**	(for each) Yes = 1 No = 2 No Response = 9
42.1	Use of herbs (agbo) to treat malaria	
42.2	Treatment of malaria using medicine kept at home	
42.3	Using a combination of western medicine or herbs to treat malaria	
42.4	Taking a malaria test before treatment	
42.5	Going to the hospital to receive treatment for malaria	
42.6	Buying of drugs from Patent medicine Vendors (Chemist) to treat malaria	
42.7	Starting malaria treatment without carrying out any test	
42.8	Buying of drugs from Pharmacies to treat malaria	
43	Total knowledge score	Actual score
44	Category of knowledge Score	Poor = 1 Fair = 2 Good = 3
45	Total perception score	Actual score
46	Category of perception Score	Appropriate = 1 Inappropriate = 2

APPENDIX VI

KNOWLEDGE SCALE/MARKING SCHEME

S/N	Knowledge of Malaria	Pattern of Responses			Maximum Score
15	**Causes of malaria**	**True**	**False**	**Don't Know**	
	Exposure to too much Sun	Incorrect	Correct	Incorrect	1
	Mosquito	Correct	Incorrect	Incorrect	1
	Stress	Incorrect	Correct	Incorrect	1
	Plasmodium falciparum	Correct	Incorrect	Incorrect	1
	Germs	Incorrect	Correct	Incorrect	1
	Inadequate Sleep	Incorrect	Correct	Incorrect	1
	Overwork	Incorrect	Correct	Incorrect	1
				Subtotal	7
16	**Ways of transmitting malaria from person to person**	**True**	**False**	**Don't Know**	
	Through mosquito bite	Correct	Incorrect	Incorrect	1
	Through blood transfusion	Correct	Incorrect	Incorrect	1
	Contact with body fluid from an infected person	Incorrect	Correct	Incorrect	1
	From mother to child during pregnancy	Correct	Incorrect	Incorrect	1
	Having stagnant water around the house	Incorrect	Correct	Incorrect	1
				Subtotal	5
17	**Common symptoms of simple malaria**	**False**	**True**	**Don't Know**	
	Headache	Incorrect	Correct	Incorrect	1
	Fever	Incorrect	Correct	Incorrect	1
	Body pains	Incorrect	Correct	Incorrect	1
	Chills	Incorrect	Correct	Incorrect	1
	Cough	Incorrect	Correct	Incorrect	1
	High body temperature	Incorrect	Correct	Incorrect	1
	Nausea	Incorrect	Correct	Incorrect	1
	Vomiting	Incorrect	Correct	Incorrect	1
	Inability to sleep	Incorrect	Correct	Incorrect	1
	General weakness	Incorrect	Correct	Incorrect	1
				Subtotal	9
18	**Symptoms of complicated malaria**	**True**	**False**	**Don't Know**	

	Breathing difficulties	Correct	Incorrect	Incorrect	1
	Convulsion	Correct	Incorrect	Incorrect	1
	Prostration/Inability to sit	Correct	Incorrect	Incorrect	1
	Dark and/or limited urine	Correct	Incorrect	Incorrect	1
	Coma	Correct	Incorrect	Incorrect	1
	Fainting/Loss of consciousness	Correct	Incorrect	Incorrect	1
				Subtotal	6
19	**Effective ways of preventing malaria**	**False**	**True**	**Don't Know**	
	Use of insecticide treated net	Incorrect	Correct	Incorrect	1
	Clearing of bushes in the environment	Incorrect	Correct	Incorrect	1
	Removal of stagnant water in the environment	Incorrect	Correct	Incorrect	1
	Use of mosquito repellant cream	Incorrect	Correct	Incorrect	1
	Use of insecticide spray	Incorrect	Correct	Incorrect	1
	Avoidance of overwork	Correct	Incorrect	Incorrect	1
	Eating fruits	Correct	Incorrect	Incorrect	1
	Drinking a lot of water regularly	Correct	Incorrect	Incorrect	1
	Use of mosquito coil	Incorrect	Correct	Incorrect	1
	Praying	Correct	Incorrect	Incorrect	1
	Avoiding Stress	Correct	Incorrect	Incorrect	1
	Avoid working under the sun	Correct	Incorrect	Incorrect	1
				Subtotal	12
20	**Main medicine recommended for treating malaria once malaria starts**	**True**	**False**	**Don't Know**	
	Sulphadoxine Pyrimethamine	Incorrect	Correct	Incorrect	1
	Paracetamol	Incorrect	Correct	Incorrect	1
	Aspirin	Incorrect	Correct	Incorrect	1
	Arthemether lumenfanthrine	Correct	Incorrect	Incorrect	1
	Artesunate Amodiquine	Correct	Incorrect	Incorrect	1
	Dihydroartemisinin & Piperaquine Phosphate	Correct	Incorrect	Incorrect	1
	Ibuprofen	Incorrect	Correct	Incorrect	1
	Artesunate	Correct	Incorrect	Incorrect	1
	Quinine	Correct	Incorrect	Incorrect	1
	Chloroquine	Incorrect	Correct	Incorrect	1
	Herbs (agbo)	Incorrect	Correct	Incorrect	1

	Prayer water	Incorrect	Correct	Incorrect	1
				Subtotal	12
21	**Anti-malaria dosage schedule**	3 tablets	4 tablets	Any other response	
	Day 1: Morning	(for all) Correct for ages 10 - <12	(for all) Correct for ages >12 - 19	Incorrect	Correct (<12) = 1 Correct (>12) = 1
	Evening				
	Day 2: Morning				
	Evening				
	Day 3: Morning				
	Evening				
				Subtotal	1
22	**Possible health problems associated with untreated malaria**	**Correct**	**Incorrect**	**Don't Know**	
	Impaired Consciousness	Correct	Incorrect	Incorrect	1
	Kidney Failure	Correct	Incorrect	Incorrect	1
	Coma	Correct	Incorrect	Incorrect	1
	Anemia (lack or shortage of blood)	Correct	Incorrect	Incorrect	1
	Paralysis	Correct	Incorrect	Incorrect	1
	Hypogylcemia (low glucose level)	Correct	Incorrect	Incorrect	1
	Jaundice	Correct	Incorrect	Incorrect	1
	Shock	Correct	Incorrect	Incorrect	1
	Hyper parasitemia	Correct	Incorrect	Incorrect	1
	Pulmonary edema	Correct	Incorrect	Incorrect	1
	Hypotension	Correct	Incorrect	Incorrect	1
	Death	Correct	Incorrect	Incorrect	1
	Spleen enlargement	Correct	Incorrect	Incorrect	1
	Abortion	Correct	Incorrect	Incorrect	1
				Subtotal	14
		Total Maximum Score			**66**

POINTS	QUATITATIVE ASSESSMENT/EVALUATION	CODE
0- <33	POOR	1
33-49	FAIR	2
>49-66	GOOD	3

PERCEPTION SCALE/MARKING SCHEME

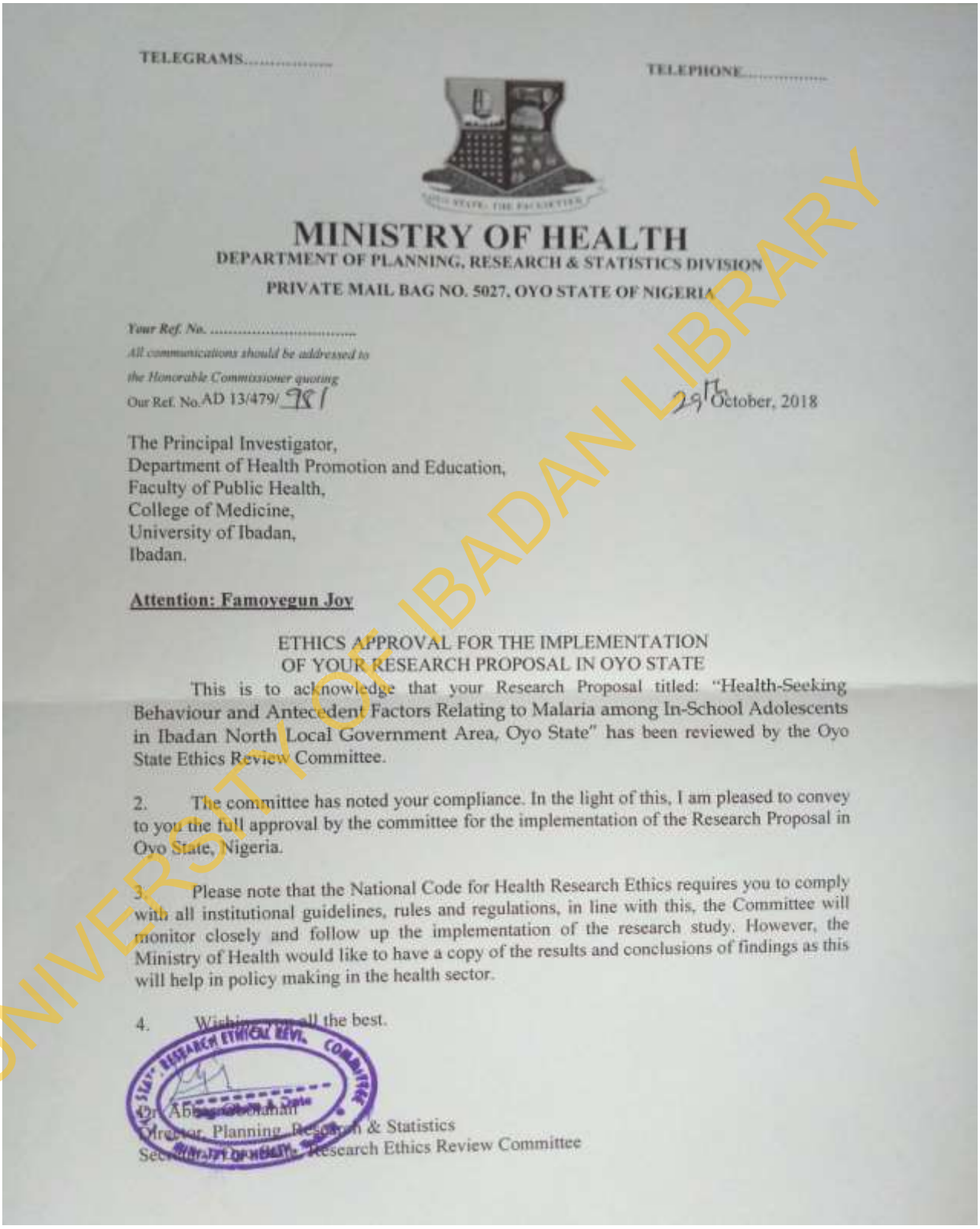
S/N	Perception relating to Malaria	Pattern of Responses			Maximum Score
23	**Perceived seriousness of Malaria**	**Agree**	**Undecided**	**Disagree**	
	Malaria is a serious disease	Appropriate	Inappropriate	Inappropriate	1
	Without treatment, symptoms of malaria disappear after some days	Inappropriate	Inappropriate	Appropriate	1
	Malaria is a mild disease	Inappropriate	Inappropriate	Appropriate	1
	Malaria cannot kill or lead to death	Inappropriate	Inappropriate	Appropriate	1
	Malaria can't prevent one from doing well at school	Inappropriate	Inappropriate	Appropriate	1
	Malaria is only serious in children not among young people like us	Inappropriate	Inappropriate	Appropriate	1
				Subtotal	6
24	**Perception related to Malaria prevention and treatment**	**Agree**	**Undecided**	**Disagree**	
	Mosquito repellant creams cannot prevent mosquito bite	Inappropriate	Inappropriate	Appropriate	1
	One should take anti-malaria immediately after a mosquito bite	Inappropriate	Inappropriate	Appropriate	1
	Malaria cannot be prevented	Inappropriate	Inappropriate	Appropriate	1
	Western medicine are better for treating malaria compared with traditional medicines or herbs	Appropriate	Inappropriate	Inappropriate	1
	Mosquito nets cannot prevent one from	Inappropriate	Inappropriate	Appropriate	1

	having malaria				
	Chloroquine is still the main drug used for treating malaria	Inappropriate	Inappropriate	Appropriate	1
				Subtotal	6
25	**Perceived vulnerability to Malaria**	**Agree**	**Undecided**	**Disagree**	
	I cannot have malaria because mosquitoes do not breed in our area	Inappropriate	Inappropriate	Appropriate	1
	Mosquitoes are not in any way related to malaria	Inappropriate	Inappropriate	Appropriate	1
	People get malaria when they are short of blood	Inappropriate	Inappropriate	Appropriate	1
	We use agbo/herbal medicine in our house, so we cannot have malaria	Inappropriate	Inappropriate	Appropriate	1
	Only very young children get malaria	Inappropriate	Inappropriate	Appropriate	1
	We can't get malaria because we live in a beautiful house	Inappropriate	Inappropriate	Appropriate	1
				Subtotal	6
26	**Perceived effect of Malaria on secondary school students**	**Agree**	**Undecided**	**Disagree**	
	Malaria can make one absent from School	Appropriate	Inappropriate	Inappropriate	1
	Malaria can reduce a student's concentration in class	Appropriate	Inappropriate	Inappropriate	1
	Malaria can lead to low intelligence level	Appropriate	Inappropriate	Inappropriate	1
	Episodes of malaria can affect ones school grades	Appropriate	Inappropriate	Inappropriate	1
				Subtotal	6

		Total Maximum Score	**22**

POINTS	**QUATITATIVE ASSESSMENT/EVALUATION**	**CODE**
0-11	POOR	1
>11-22	GOOD	2

APPENDIX VII
OYO STATE ETHICAL APPROVAL



TELEGRAMS..... TELEPHONE.....

MINISTRY OF HEALTH
DEPARTMENT OF PLANNING, RESEARCH & STATISTICS DIVISION
PRIVATE MAIL BAG NO. 5027, OYO STATE OF NIGERIA

Your Ref. No. .....
All communications should be addressed to the Honorable Commissioner quoting
Our Ref. No. AD 13/479/781 29th October, 2018

The Principal Investigator,
Department of Health Promotion and Education,
Faculty of Public Health,
College of Medicine,
University of Ibadan,
Ibadan.

Attention: Famoyegun Joy

ETHICS APPROVAL FOR THE IMPLEMENTATION
OF YOUR RESEARCH PROPOSAL IN OYO STATE

This is to acknowledge that your Research Proposal titled: "Health-Seeking Behaviour and Antecedent Factors Relating to Malaria among In-School Adolescents in Ibadan North Local Government Area, Oyo State" has been reviewed by the Oyo State Ethics Review Committee.

2. The committee has noted your compliance. In the light of this, I am pleased to convey to you the full approval by the committee for the implementation of the Research Proposal in Oyo State, Nigeria.

3. Please note that the National Code for Health Research Ethics requires you to comply with all institutional guidelines, rules and regulations, in line with this, the Committee will monitor closely and follow up the implementation of the research study. However, the Ministry of Health would like to have a copy of the results and conclusions of findings as this will help in policy making in the health sector.

4. Wishing you all the best.

Dr. Abdulrahman
Director, Planning, Research & Statistics
Secretary, Research Ethics Review Committee