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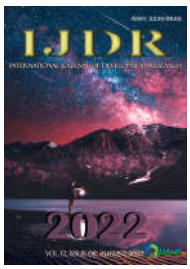

RESEARCH ARTICLE OPEN ACCESS

# MALARIA CONTROL PRACTICES AMONG SECONDARY SCHOOL STUDENTS IN AMASSOMA COMMUNITY

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## ABSTRACT

**Background:** Although there are lots of seemingly malaria preventive options, it remains a huge public health problem in Africa and particularly high in Nigeria by virtue of its endemicity and topography, which have strong affinity with temperature and rainfall. **Objective:** This article described, ascertained the factors and made recommendations of malaria control practices to secondary school students in Amassoma community. **Method:** Study design is quantitative and descriptive survey approach, given, the main object of the study was to provide relevant and accurate information that described the phenomenon under review-malaria control practices. Having obtained the sample size of 178 through Taro Yamen's framework from SSS-1, 2 and 3 drawn from a population of 320 students. A simple random sampling technique was utilized to select the student sample with structured and validated instrument (questionnaire) was utilizedto obtained data. Data was manually presented and analysis were conducted through the use of simple frequency tables and percentages respectively. **Findings**: The findings indicate current class of study shows 70(39.3%) in SS1,60 (33.7%); SS2 and 48(27%) were in SS3. Again, respondents who utilized the use of mosquito spray, coils/repellantswere 88.8%; sleeping under insecticide treated nets 71.9%, wore protective clothes 89.9% at night as some of the common malaria control practices amongst others. But the use of these were more akin to certain personal and economic factors-fear 71.9%, lack of knowledge 43% finance 67.4% amongst others. Students` recommended control practices were: prompt treatment 88.8%, prophylactic drugs 84.3% and compliance 78.9% amongst others. Based on these findings, the study further recommended health education should form a key component in the general studies curriculum to ensure all students have adequate knowledge regarding malaria control practices to enable demystify fears of using any control practice.

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# INTRODUCTION

Presently, there are lots of seemingly management and preventive options, yet, malaria remains one of the most severepublic health problems, particularly in Africa, where Nigeria records high by virtue of its topography, (temperature,and rainfall closely tied to its endemicity) (Ukala, Osuafor, & Amaka, 2020).The purpose of this article therefore, is to describe malaria control practices, identify factors that predispose one to malaria and recommend further measures that can control mosquitoes among Secondary School students in Amassoma Community. Globally, malaria is described as a disease transmittedto man through a bit from infected female anopheles' mosquito insect. There are more than 400 different species of anopheles mosquitoes, of which, around 30 are malaria vectors of major importance. Malaria parasite belongs to the genus plasmodium (phylum Apicomplexa) (Collins,2012). In humans, malaria is caused by *P.falciparum, P.malariae, P.ovale, P.vivax and P. knowlesi*, all of vector species that bite between dusk to dawn (WHO, 2020; Arnott, Barry, Reeder, 2012, Collins & Barnwell, 2009; Mueller, Zimmerman & Reeder, 2007). Not only that, Hoo, Bruske, Dimonte*et al* (2019),postulates that the extent of transmission depends on factors related to the parasite, the vector, the human host, and the environment.For instance, studies proved malaria can be absent from areas where anopheles` mosquito exists, primarily because $15.60^{oc}$ ($60^{0}$f), which is the minimum required temperature of parasite development and go all-out in the mosquito (Ukala, Osuafor, &Amaka, 2020). Onyinyechi, *et al* (2021)also confirmed this assertion when the writers stated that malaria persists on account of the temperature as important health problem for close to a billion and still counting number of people living or visiting the tropics and less

developed sub-tropical areas. In the early 18th century, Nigeria was referred to as "the white man's grave", primarily as a result of the endemic nature of malaria in the region and there were no evidenced-based solutions to it. For instance, history has it that, Mongo-park and his co-explorers who discovered River Niger were the first victims recorded to have been bitten by mosquitoes that resulted in the death of all explorers due to lack of treatment, except Mongo-park who barely survived it, thus, Nigeria was considered the white man`s grave (Mendis&Carter, 1995). Nevertheless, since the discovery of malaria in 1880, Laveran has received serious attention from 1898 in so much that the attention that was given yielded positive result, evidenced by the different measures discovered towards either managing the disease or preventing its transmission to a large extent. For instance, in 1950 programmes were organized in many countries in an attempt to control or eradicate by the large scale application of DDT-an insecticide that proved effective only for a while. The brief patho-physiology is that, the anopheles' mosquitoes layeggs in available quantity of shallow fresh water, ie, it requires aquatic habitat, such as collection of fresh water, ponds and roof prints, which are abundant during the rainy season in tropical countries, which favors the progression. The nitty-gritty is that, the parasiteseeks a blood meal to nurture the eggs, hatches into larvae, which few days` later metamorphoses to adult mosquito. In terms of specific demographics, studies (Rijken, *et al* 2012; Danis, Baka, Lenglet *et al,* 2011) quoted WHO/UNICEF (2009) report, which indicates, it affects every demographics. The report stated that "children under the age of five and pregnant mothers are mostly affected by malaria and the awkward evidences to a large extent are severe anemia, growth retardation, developmental issues and the likes.

So far, it has claimed not less than 750,000 children in the last few years. To buttress this claim, studies (Danis, Baka, Lenglet *et al,* 2011) further stated that more than two thirds (70%) of all malaria deaths are still of under-five, of which 17% of the mortality rate are recorded among other children. Both empirical and non-empirical evidences have shown that,in malaria endemic places, to a large extent, malaria attacks the economically less viable people than the others, possibly due to poor conditions of living environment. Meaning, economic status plays a vital role in terms of contacting and transmitting the mosquito (Worrall, Basu, & Hanson 2005). Not only that, in 2017, five countries accounted for half of all malarial cases worldwidesuch as;Nigeria, the Democratic Republic of Congo, Mozambique,Uganda and India, meaning, malaria does not affect only someregions, but globally (Nadjm, & Behrens, 2012; Ahmed, Haque, Haque, & Hossain, 2018).This was made evidencedyetin WHO (2011) report, which maintained that, the hardest hit in terms of severity amongst non-Africa countries includes; Afghanistan, Columbia, Sri-Lanka, Brazil, India, and Viet Nam. All the same, WHO, (2019) stillpostulated that, the long lifespan and strong human-biting habit of the African vector species is the main reason why nearly 90% of the world's malarial cases are in Africa.

A while ago, Crutcher and Hoffman (1996) confirmed there is seeming metamorphosis of the incidence pattern of malaria due to reasons not limited to: countless deforestations, continuous land misuse, massive dam buildings and persistent irrigations. According to the authors, these factors createdthe enabling environment or the opportunities of breeding more mosquitoesand bringing immune compromised and susceptible people to suffer malaria. Furthermore, the latest world malaria prevalence report in developed countries` released in November, 2018 indicates, there were 219 million estimated cases of malaria in 2017, up from 435,000 ----217 million cases in 2016 (WHO, 2019). Based on the abovementioned, it is imperative to describe malaria control practices among secondary school students in Amassoma to enable researchers have a basis for making recommendations. Besides these, the WHO African Region recorded 92% of malaria incidences and 93% death toll (WHO, 2019). Although, as at then, the number of under-five malaria death declined from 440,000 in 2010 to 285,000 in 2016 due to several programmes (WHO, 2019). Of all WHO regions, 85% of the estimated 243 million malaria episodes and 89% was of death related malaria cases worldwide in 2010, which presently has far exceeded these figures in recent time.In terms of clinic attendance, on the average, malaria accounts for 25%-45% of all outpatient clinic attendance, and between 20% and 45% of all hospital admissions (WHO, 2019). Of all these estimates, non-was focused on students, it was either on the generality of the population, pregnant womenHartman, Rogerson and Fischer, (2010) or on under-five. Thus, to have a vivid understanding of how this population (students) control malaria becomes paramount, judging that, they are the economically more viable population who are at the prime of their age. Thus, it is expedient to conduct this study. In an earlier development, study indicates, there are at least 15 cases of malaria for every25 persons that were reported sick in the Sub-Sahara Africa, excludingthe numerous unreported cases from the hard-to reach population. Whichmeans, the number is enormous. Before the 2000-2008 report in 2015, 56 to 90 million cases were reported by WHO (2009). Which succinctly confirms UNICEF/WHO earlier publication in January 2004 that, malaria threatens the lives of over 40% of the world population affecting over 220 million. Same report estimated 300-500 million clinical cases each year with a death toll of about 1 million people annually, of which authors were silent over the students` population, despite their substantial world population.

Conditions that predispose man to malaria diseases include, but not limited to: climatic conditions (rain forest, indiscriminate refuse disposal) that favor transmission, low body immunity and refugee settlements (Key 2018; WHO, 2019, Baird, 2013). As a consequence, WHO recommends suspected malaria cases be confirmed using parasite-based diagnostic testing (microscopy or rapid diagnostic test to detect the plasmodium parasite, the result is usually graded as +; ++; +++ depending on the parasite load in the blood stream), before administering treatment? to enable obtain results in less than 30minutes and commence effective treatment based on test-outcomes as above. Aside the blood firm that could detect the parasite, there are other signs and symptoms, such as fever, severe headaches, generalized body malaise, nausea and vomiting as well as loss of appetite. It was stated that, mosquito has its own economic benefit or effect on man, though the negative effect far exceeds the benefits (Sachs & Malaney 2012). For instance, most people do not actually know the real cause of malaria, as a result, have failed in applying appropriate preventing measures towards it. Consequently, the endemic disease spreads from rural to peri-urban and urban areas in developing world, such as Africa. Another effect is that, malaria poses social, public health and economic problem, which is again tied to the affinity between illness and the economy of the world in strong terms (Gollin & Zimmermann 2007). Not only that, there is insomnia when one sleeps in a mosquitoes infested room. Once the real disease manifests, the victim becomes weak throughout the day because of the sleeplessness caused by mosquito bites, which often time results in reduction in man hour, absenteeism from work, school and subsequent reduction in economic advancement (McKinsey36, 2008). Apart from these, in extreme cases, there is death on account of the disease (GBD 2015).

On account of the ill-effect, several actions and initiatives takenagainst malaria were part of the fight for the sustainability and profitability of companies because, this scourge has killed 627,000 people in 2012 and malaria caused an annual loss of USD 12 billion according to the World Bank report. These call for global concern. Management of malaria is divided into preventive and curative management. The former is protection from exposure to bites, eliminates mosquito breeding areas through environmental interventions such as fix doors, window and bed with treated nets and skin repellent creams (Killeen, Kiware & Sinka (2017). Others are the use of prophylactic drugs (Fairhurst, & Wellems, 2010, Eli 2012) and the unpopular malaria vaccine initiatives (MVI). For the later (curative management), is the use of drugs after infestation (Danis, Baka, Lenglet *et al,* 2011; Gregory & Thompson 2019). Malaria control practices refersin this context are procedures employed to lessen the spread of malaria by the anopheles` mosquitoes through biological, chemical and environmental control measures as well as chemotherapeutics(WHO 2010; Rozendaal 2014), The essence of adopting any of these control practices is to

regulate the disease processby breaking the chain of transmission of the parasite (Brady, (2016);Taylor, Hanson, Turner, *et al.* (2012); Beare, Taylor, Harding, Lewallen, &Molyneux, 2006). Similarly, control activities according to Rozendaal (2014)are aimed at minimize suffering from diseases and stop preventable death. These imply that, adequate control practices should be adopted to prevent illness among vulnerable groups and to reduce mortality arising from the disease. This does not in any way eradicate the parasitic disease though. This assertion can be inferred that, malaria can only be controlled on temporary basis, but cannot be completely eradicated. According to the authors, eradication is the removal of the parasite in a country or other larger area, whereas, control is the removal, poisoning or changing of the larval course, thus, reducing their numbers or by killing the adult mosquitoes is what is appropriate for now. To achieve these, Charlie Easmon, a renowned specialist and UK adviser on travel medicine propounded prevention and control of malaria framework as: A, B, C and D. A = Awareness of the risk. B = Bite avoidance. C = Chemophylaxis (taking preventive medicine if you are travelling to or living in a malaria region and D = Diagnosis made promptly with early treatment of infected case (Charlie, 2019; Mutebi, 2018).

Moreover, malaria control measures exist in different places in different forms and the level of involvement of members equally differs even within same country. WHO authorities including the world political leaders recently accepted the conquest of malaria as of topmost priority, which is yet to be seen in this part of the world. This prompted Glo-Halem, the Director General of the WHO to state in January 2001 that the control of malaria would be one of the topmost priorities of her administration, hence initiated Roll Back Malaria initiative to the whole world in order to reduce overall mortality due to malaria by the year 2010 (Glo-Halem, 2001). Other of Glo-Halem`s suggestions were: re-orientation through conferences and summits in global perspective, involvement of the general health services at all levels and engagement of communities/individual at risk from malaria. These mean that the fight against malaria requires individual, collective effort and actions that should involve all demographics and statuses (Kondrash, 2015). However, Rozendal (2014) suggested that, preferred control method depends solely on local situationsand inclinations.Rozendal (2014) suggestion also prompted the need to conduct this study to describe the practices students in Amassoma adopt. Another control practice is the use of mosquito net, which was the well-known method of control of malaria mentioned by 92% of schoolchildren in Tanzania, 71% of students in Ethiopia and 76% of school-going children in Cameroon. More specifically in Southern Nigeria, 41.9% of students recognized that sleeping under insecticide treated bed nets (ITNs) is the strategy to prevent malaria (Debela, 2014). In view of this backdrop, it is essential to conduct this study by describing further the malaria control practices adopted by secondary school students from a rural community to have better understanding and make policy recommendation. Following these are the theoretical and empirical review of studies conducted on this subject matter.

## THEORETICAL AND EMPIRICAL REVIEW

***The Neuman Systems Model:*** The Neuman system`s model was postulated by Betty Neuman in (1982), as a model for teaching total personal approach to patient problems in nursing research. The system's model focused on the interaction between the client (an open system) and the environment. To put it differently. The Neuman Systems Model views the client as an open system that responds to stressors in the environment. The client variables are physiological, psychological, sociocultural, developmental, and spiritual. The client system consists. of a basic or core structure that is protected by lines of resistance. Consequently, Neuman postulates that, interaction results in the environment adjusting to the individuals or the individuals make necessary adjustment to suit the environment. This interaction adjustment process contains factors that create the flexible line of defense that serves as a protective buffer for preventing stressors from breaking through the line.Again, Neuman demonstrates that a system is general in nature, however, nursing actions have very specific goals for vigorously controlling those variables that affect the individual. Since public health nursing focuses on primary prevention, variables interfere with those of secondary and tertiary prevention are carefully looked out for.Neuman againaffirmed that, nurses can use this theory to assist individuals, families and other groups to attain and maintain maximum level of total wellness by purposeful intervention.Assumptions of Neuman`s model: Neuman postulated ten (10) basic assumptions underlying the model, among several others is the 7th assumption relevant to this study and school healthcare promotion practice specifically and public health care practice in general, which says; "Primary prevention relates to general knowledge that is applied in client assessment and intervention in identification and reduction or mitigation of risk factors associated with environmental stressors to preventpossible reaction" .

**Application of Neuman System Model to this study:** The Neuman system model is a theory that assists the individual, families and other groups to attain and maintain maximum level of total wellness by purposeful intervention.Therefore, the concept implies that the nurse has a general knowledge that when applied in client assessment helps in identification and control of risk factors which could be associated with environmental stressors such as mosquitoes, to prevent possible reaction which could be the development of malaria among secondary school students. Therefore, with the timely control measures the incidence of malaria can be reducedto a bare able ebb.

# EMPIRICAL REVIEW

Hlongwana, Mabaso, Kunene, et al. (2009) conducted a study on "Community knowledge, attitudes and practices (KAP) on malaria in Swaziland: a country earmarked for malaria elimination". The aim was to investigate the local communities' among others understanding the concept of malaria and treatment-seeking patterns, preventive measures and practices in order to inform the country's proposed malaria elimination programme in Northern Swaziland. The authors used a descriptive cross-sectional survey in four Lubombo Spatial Development Initiative (LSDI) sentinel sites in the area under review using a self-designed structured questionnaire was administered to randomly selected 320 sample size. One Headof each household was an eligibility criterion, except one that had none, thus, was substituted with the availableperson. Results on control measures indicatestoppage of stagnant water 11-4.4%, Close windows, 3-1.2%; clinic, 54-21.6%; hygiene 31-12.4%; proper disposal of tins 15-6.0%; spraying 54-21.6%; Through continuous education 11-4.4%: use of bed nets, 39-15.6%; others 6-2.4% donot know: 26-10.4%, given a total of 250-100%. Similarly, an anonymousstudy conducted on knowledge attitude and practice household survey undertaken with incidentally same 320 respondents in Northern Swaziland. This was the premier knowledge attitude and practice in Swaziland and was meant to provide baseline data before the implementation of a malaria elimination strategy at the community level. Result indicates, 99.7% of respondents correctly associated malaria with mosquito bites and 90% reported that they would seek treatment within 24 hours of seeing the first symptoms of malaria. For preventive measures, the writer found out that the respondents reported indoor residual spraying (IRS) 87.2%;bed net ownership was reported at 38.8%. while others were effective medicines, early diagnosis/treatment and follow up.

A high incidence and prevalence of malaria and detrimental complications in schoolchildren as shown in literature of sub-Saharan Africa by Rehman, Coleman and Schwabe (2014) through a systematic review. The search engines which were used to obtain the literature include databases such as PubMed, Hinari, Cumulative Index of Nursing and Allied Health (CINAHL), Google scholar, African Journals online (AJOL) and grey literature. The articles published from 2010 to 2016 which assessed the knowledge, attitude and practice of malaria prevention among school children. Initial search results obtained, 273 studies. Based on the eligibility criteria, 14 articles were identified to be included in the review. 13 Quantitative studies and 1 mixed study were screened including those

which assess knowledge, attitude and practice. Those which used quasi-experimental study design and compare the knowledge, attitude and practice towards malaria prevention among schoolchildren in the age group of 5 to 14 years were also included in the review. The results revealed knowledge, attitudes and practice of malaria among schoolchildren in sub-Saharan Africa. Knowledge of malaria cause and transmission was ranging from 19.2% in Zimbabwe Midzi, Mtapuri-Zinyowera and Mapingure (2011) to 85% in Nigeria (Eko, Kalu & Dominic2013). However, the age group of the schoolchildren in two countries were different. In Zimbabwe the schoolchildren were young (8-10 years) compared to those in Nigeria (11-20 years). There are still misconception of malaria cause and transmission in schoolchildren in many countries of Sub-Saharan Africa. Studies showed low to moderate level of practice of malaria prevention ranging from 32.4% in Malawi to 67.9% in Kenyan school children. Some studies showed that boys use insecticide treated nets less likely than girls. Studies have been conducted in various countries of sub-Saharan Africa revealed the knowledge, attitude and practice of school children towards malaria. The reviewed studies were conducted in Cameroon Makoge, Mba, and Makoge(2013), Debela (2014), Nigeria, EkoKalu and Dominic (2013), Kenya, Zambia, Zimbabwe,Malawi, Liberia and Ghana. On the whole, several malaria control practices have been applied in the Sub Sahara, they include environmental improvements, use of insecticide impregnated nets, residual indoor spraying, early case detection and treatment with effective antimalarial drugs. However, the adaptation of vector and parasite has so far limited the effect of these interventions.

Besides these, Ugot, (2013) postulates that, in Cross River State, South-south Nigeria, malaria is a significant problem among school children that the state government decided to involve the students fully in the implementation of the RBM programme. The school children`s involvement has yielded positive results evidenced from their enthusiasm to acquire new knowledge aimed at being agents of change. This study investigated the malaria knowledge and prevention practices among school adolescents in a coastal community in Calabar, Cross River State, Nigeria. This was a cross-sectional, descriptive study of malaria knowledge and prevention practices among school adolescents in a coastal community in Calabar. A multi-stage sampling method was used to randomly selected five (5) government owned secondary schools and 17 privately owned secondary schools in the local government areas (LGAs). 400 self-designed questionnaires were administered and same number was retrieved (100%). Demographics were thus: 228 (57%) male and 172 (43%) female both within the age range of 13 to 19 years, with a mean age 14.7 (s.d. ±4.2).Only nine (2.3%) respondents gave an acceptable definition of malaria as an infective disease caused by parasites that are transmitted through the bite of an infected mosquito (Klein &Ruebush, 2010).With regards to the mode of transmission of malaria, 310 (77%) of the respondents were aware that the vector transmits the parasite by biting, while 77 (20%) gave other modes of transmission that include swallowing the vector in contaminated food (7%), kissing (6%) and sexual intercourse (7%). Thirteen (3%) of the respondents were indifferent. Respondents differed greatly on the main source of their knowledge of malaria prevention. In total, 135 (33.8%) had heard about it over the radio, 90 (22.5%) through the television, 27 (6.8%) from newspapers and medical books, 25 (6.4%) from friends and 78 (19.5%) from health care providers such as nurses and doctors, while 45 (11%) had heard about malaria from their teachers.

Preventive measures were identified as thus: 282 (70.5%) of the respondents were aware that insecticide-treated nets (ITNs) kill mosquitoes, while 90 (22.5%) responded that ITNs are used to treat insects. Nineteen (4.75%) respondents indicated that ITNs are used to catch fish, while 9 (2.25%) responded that they are used to trap rats (Ndifreke, Abraham &Aniekan, 2010). Among the respondents, 296 (74%) were aware of a place in their locality where ITNs are sold, while 104 (26%) were not aware of such a place or did not respond. This is shown in Table 2. Out of the 296 respondents that knew where ITNs are sold, 75 (18.8%) mentioned chemists as the place where ITNs are sold in their locality, 179 (44.8%) mentioned hospitals/clinics, while 42 (10.5%) mentioned supermarkets (Edson &Kayombo, 2007).Concerning the main method of preventing malaria attacks, 54 (13.5%) of the respondents would clear the vegetation in the peri-domestic environment, 67 (16.9%) would fill potholes, 44 (11%) would open up drainage, 103 (25.7%) would use ITNs, 45 (11.2%) would use antimalarial drugs and 32 (8%) would use various other methods, such as not accepting unscreened blood. Among those who responded to the use of an ITN as a preventive measure, 34 (33%) had ever used an ITN themselves, while 61 (59%) had never used it Twenty-one (35%) of the learners refused to use an ITN for fear of death while inside the net due to poor ventilation, while 17 (28%) gave the use of a poisonous chemical for treatment of the net as their reason for refusal to use an ITN. Thirteen (21%) gave high cost of the net as reason for refusal to use it (Salako (1993). The malaria control measures used focused on the reduction of contacts between mosquitoes and humans, the destruction of larvae by environmental management and the use of larvicides of mosquito predators, as well as destruction of adult mosquitoes by indoors residual spraying and the use of insecticide treated nets. Again, Ugot, (2013) postulates that,malaria control measures used in Cross Rivers State focused on the reduction of contacts between mosquitoes and humans, the destruction of larvae by environmental management and the use of larvicides of mosquito predators, as well as destruction of adult mosquitoes by indoors residual spraying and the use of insecticide treated nets.

With regards to factors that influence the use of malaria control measures, same anonymous writer, stated what influences malaria control practices in Northern Switzerland were as a result of the level of education that the respondent had attained, distribution of ITN by health professionals, community mobilization programs for malaria prevention, wealth index, type of house and presence of bed. Finding also shows a significant relationship between malaria prevention practice and marital status. Married Persons were more likely to use malaria prevention method than singles. Again, Fikrie, Kayamo and Bekele (2021) conducted another community-based multi-staged study to provide concrete evidence towards malaria prevention practices and associated factors among households of Hawassa City Administration, Southern Ethiopia, in 2020. The authors used trained data collectors through a face-to-face interview with though adopted pre-tested structured questionnaire to collect data. Then the data was checked for the completeness and consistencies, then, coded and entered into Epi data 3.1 and it was exported to SPSS IBM version 23 for analysis. Descriptive mean with standard deviation was used to summarize the continuous variables. Fikrie, Kayamo and Bekele (2021) adopted Bivariable and multivariable logistic regression models were used to assessed factors affecting prevention and control of Malaria and adjusted odds ratio together with 95% CI and p-value <0.05 was used to declare the statistical significances.Fikrie ,Kayamo and Bekele (2021) study results showed the overall factors that influence the prevention and control practices as 317 (54.3%) of households practiced good measure of malaria prevention and control measures. Urban residence [AOR = 1.95 (95%CI: 1.17-3.24)], Secondary school completed [AOR = 5.02(95%CI 2.24-12.03)], Tertiary school completed [AOR = 7.27(95%CI: 2.84-18.55)], Positive Attitude [AOR = 8.20(95%CI: 5.31-12.68)] and Good knowledge about malaria [AOR = 2.81(95%CI: 1.78-4.44)] were significantly associated with malaria prevention practices. thus recommended continuous health education and follow up measures to control malaria.

Furthermore, Dako-Gyeke and Kofie (2015) conducted a study onmalaria prevention and control practices among 120 pregnant women within the age range of 18-49 in Chorkor and Korle-Gonno in Accra, Ghana, though the population was on pregnant women, but could be applied to this study because, the study`s objectives are closely related to this study. A verbatim report shows, respondents were randomly recruited during antenatal sessions with a questionnaire used for data collection. Data was analysed with SPSS version 16.0. the study revealed a good number of respondents (57.4% and 42.6%)have been infected with malaria parasite. However, there was no significant relationship between religious

beliefs of respondents and their malaria prevention and control practices (X2 = 0.28, P = .53). but then, there was a significant relationship between malaria prevention and control practices of respondents economic (X2 = 53.94, P = .00) and employment (X2 = 61.76, P = .00) statuses respectively. Dako-Gyeke and Kofie (2015) study also revealed ethnicity and other factors related to socio-cultural significant (X2 = 35.62, P =.22), thus suggest the need to integrate poverty and poor living conditions in malaria prevention and control strategies. Some of the factors that influenced their control practices in the Sub Sahara includes research studies and educational background.The factors which influence malarial control measures in Cross Rivers State were marital status, level of education economic background of the respondents, social and emotional wellbeing (Ugot, 2013). Their recommendations centered on prompt treatment of infected adult and children, regular use of ITNs and removal of stagnant waters and pits.

With regards to recommendation, studies conducted in one year by Schwartz (2012) and Meremikwu, Donegan, Sinclair, Esu andOringanje, (2012) in Switzerland,recommend the use of chemoprophylaxis, prompt treatment of malaria and the use of ITN as well as Intermittent Preventive Treatment in children (IPTc). Result of the later study (systematic review) indicate IPTc prevents approximately three quarters of all clinical malaria episodes (rate ratio 0.26; 95% CI 0.17 to 0.38) for preventing the complications of malaria in pregnant women and infants living in endemic settings. The Sub-Sahara also recommend the regular use of treated nets and prophylactic drugs, as well as the regular awareness campaigns to combat the spread of malaria among the people both old and young.
In the south- south coastal geo-political region of Nigeria, Cross Rivers State recommendations were centered on prompt treatment of infected adult and children, regular use of ITNs and removal of stagnant waters and pits. In addition, like any other coastal area, Bayelsa state precisely, malaria is the leading cause of infant mortality and morbidity as well as maternal mortality. It is also the major reason for student absenteeism in primary and secondary schools. Some undocumented malaria control practices, not limited to use of bed nets, monthly sanitation exercise to clean up gutter and drainages. The focus of this article is to ascertain the malaria control practices used, identify factors influencing their malaria control measures and make recommendations.

The problem is that; malaria is prevalent in most areas of the World. Morbidity and mortality rates of the disease are increasing annually from direct and indirect causes,despite all efforts to reduce the menace as a result of favorable condition offered for the survival and multiplication of its mosquito vector. Reasons being that, millions of mosquitoes are being hatched every minute in the thick, warm and rainy forest zone.WHO tagged it still the most prevalent and the most devastating disease in the tropic WHO (2011). Among secondary school students, malaria is responsible for school sickness related absenteeism, poor performance in school, examination failures, school dropouts and even death if not intervene promptly (Lalloo Olukoya & Olliaro 2016; Beare, Lewallen, Taylor, Hanson, Turner *et al.,* (2012). Thebreeding habitats are strengthened by the squalid nature of the area and poor environmental care, despite the monthly sanitation exercises and as some persons seldom complies to the regulation, the drainage systems are poor and surrounded by grown grasses, filthy ponds, improper refuse disposal which has led to increased man-vectors contact WHO (2011).

Not only that, the vectors are both in the households and classrooms and bite their victims. If this trend continues, more secondary school students in Amassoma will be affected in terms of as it would affect their health, academic performance and their productivity in life by this endemic disease. Moreover, as at the time of this study, researcher has not identified any known study with regards to this subject among the secondary school children in Amassoma, despite numerous studies conducted in malaria. Consequently, there is need to conduct this study by describing the various malaria control practices adopted by secondary school students in Amassoma to increase knowledge and give appropriate recommendation where need be.The purpose of this study is to describe malaria control methods that exist among secondary school students in Amassoma community to increase knowledge and make necessary recommendations, by describing the malaria control practices, ascertain the factors influencing malaria control practices and to make recommendation on malaria control practices among secondary school students in Amassoma Community. Significantly, investigating malaria control practices that exists among secondary school students in Amassoma community is essential to increase researchers` knowledge and enlighten the students on the heavy burden of malaria and highlight the conditions that predispose secondary school students in Amassoma community. The findings which are expected to reveal the methods existing amongst students would be useful to health workers whose contributory efforts would complement that of the teachers who work to strengthen or introduce other methods. The government is expected to utilize the findings of this research when allocating funds to health sector and secondary schools for effective distribution of scientifically sound measures to students in the community.

# RESEARCH METHODOLOGY

This article adopted a quantitative study design, utilizing a descriptive survey approach to provide relevant and accurate information that would enable describe the phenomenon under review-malaria control practices among secondary school students at government secondary school Amassoma. Government secondary school is one of the secondary schools located in Amassoma, Bayelsa State.

***Target Population:*** The target population is 320, which comprises Senior Secondary1-150, Senior Secondary-2 and-3, 100 and 70 students respectively, since this population have spent significant number of years at the school.

***Sampling and Sampling Technique:*** Sampling is the selection of a subset of the population of interest in a research study. In this study, Taro Yemenne's framework was adopted to calculate sample size as presented below.

**Sample Size**

Taro Yamane's formula
n = N/( 1 +N(e) 2)
Where
n = signifies the sample size
N signifies population under the study
e = signifies the margin error (it could be 0.10,0.05 or 0.01)
Therefore

n = *3201(1+320 (0.05)2)*
n = 320/(1+320(0.0025)
n = 1(1+0.8
n = 320/1.8
n = 178

Having obtained the sample size of 178. A simple random sampling technique was used to select the student sample in real terms.

***Inclusion criteria:*** Government secondary school students in Amassoma. Must be in SS1 to SS3 and willingness to respond.

***Instrument for Data Collection:*** The instrument for data collection in this study was a two (2) sectioned questionnaire. Section A is respondents` demographic data, whereas, section B focused on specific study objectives. The content and face were validated by both second author who designed and the authors critic further (see appendix 2). To test the reliability of this study`s instrument, 18 copies (10 percent) of the questionnaire was administered to respondents from another secondary school in Amassoma who had similar attributes as the original population of the study. The results

were compared with that obtained from the sampled respondents via Pearson's Product Moment Correlation Coefficient analysis.

***Methods of Data Collection:*** Having obtained the necessary permission from all relevant authorities and gatekeepers, consent formsand questionnaires were distributed concurrently to students who indicated interestin accordance with their head teacher`s demand due to time factor. Thereafter, both consent forms and questionnaires were retrieved immediately on daily basis. The exercise lasted for two weeks, given researchers only had time with students during recess (11-11.45am) period, Mondays-Fridays. The whole exercise lasted two weeks, given, it required respondents only ticked were relevant.

***Method of Data Analysis:*** After gathering all the data shared to the respondents, the information gathered will be organized in an orderly manner based on the objectives of the study. The data analysis would be done manually by the researcher. The scores on the related question in the research instrument is going to be strongly agree (SA), agree (A), disagree (D) and strongly disagree (SD).

***Ethical Consideration:*** A letter of permission to conduct this study was attached to the questionnaire stating the purpose of the study and assuring the respondents of anonymity and confidentiality and that the study is for purely academic purpose.

response pattern is presented in table and simple percentage as shown below.

***Data presentation and analysis:*** Result from the table above shows the personal and demographic data of the respondents. It shows 70(39.3%) of the respondents were within the age range of 12-15years, 50(28.1%) were within the age range of 15-18years and 40(22.5%) were within the age range of 18-21years as well as 18(10.1%) were within the age range of 21-24 years. Besides these, the result also shows 178 (100%) of the respondents were single, butnone of them were married. With regards to religious affiliation of respondents.Result shows 177(99.4) of the respondents were Christians, whereas 1(0.6%) of respondent reported to being Muslim. Furthermore, information on respondents` current class of study shows 70(39.3%) in SS1,60 (33.7%); SS2 and 48(27%) were in SS3. From the table above on Malaria control practices among secondary school students, 100(56.2%) of respondents' test for malaria as a control practice, 78(43.8) donot visit the clinic for malaria test. Also, 128(71.9%) sleeps under insecticide treated nets to control malaria, 50(28.1) refuses to sleep under insecticide treated nets and 158(88.8%) usesmosquito spray, coils and repellent. Whereas, 20(11.2%) abhors the use of mosquito spray, coils and repellent as control practices. Again, 160(88.8%) wears protective clothes at night whereas, 18(10.1%) abhors wearing protective clothes at night.

**Table 1. Socio Demographic data of Respondents**

| | Response | Number of respondents | Percentage % |
|---|---|---|---|
| Age range | 12-15yrs | 70 | 39 |
| | 15-18yrs | 50 | 28 |
| | 18-21yrs | 40 | 23 |
| | 21-24yrs | 18 | 10 |
| Marital Status | Single | 178 | 0 |
| | Married | 0 | 100 |
| Religion | Christian | 177 | 99.4 |
| | Muslim | 1 | 0.6 |
| Class | SS1 | 70 | 39.3 |
| | SS2 | 60 | 33.7 |
| | SS3 | 48 | 27 |
| | | 178 | 100 |

**Table 2. Malaria control practices among secondary school students**

| | Response | Number of Respondents | Percentage % |
|---|---|---|---|
| Going for Malaria test as a method control practice | Yes | 100 | 56.2 |
| | No | 78 | 43.8 |
| | Total | 178 | 100 |
| Sleeping under insecticide treated nets | Yes | 128 | 71.9 |
| | No | 50 | 28.1 |
| | Total | 178 | 100 |
| Use of mosquito spray, coils and repellent | Yes | 158 | 88.8 |
| | No | 20 | 11.2 |
| | Total | 178 | 100 |
| Wearing of protective clothes at night | Yes | 160 | 89.9 |
| | No | 18 | 10.1 |
| | Total | 178 | 100 |
| Participate in cleaning of bushes and clearing of house surrounding | Yes | 168 | 94.4 |
| | No | 10 | 5.6 |
| | Total | 178 | 100 |
| Closing of windows and doors early | Yes | 163 | 91.6 |
| | No | 15 | 8.4 |
| | Total | 178 | 100 |

# RESULTS

This segment shows results obtained from respondents to find out malaria control practices among secondary school students in Amassoma community, presented in accordance with the study objectives. A total number of one hundred and seventy-eight questionnaires were administered, same number retrieved and the

In addition, 168(94.4%) responded positively towards clearing of bushes and house surrounding to control malaria. On the contrary, 10(5.5%) never practiced it. Furthermore, 163(91.6%) practiced closing of windows and doors early to control malaria, on the contrary, 15(8.4%) never involved in closing windows and doors early.

**Table 3. Factors influencing malaria control practices among secondary school adolescents**

| Factors | Response | Number of Respondents | Percentage % |
|---|---|---|---|
| Fear of being uncomfortable while using insecticide treated nets | Yes<br>No<br>Total | 128<br>50<br>178 | 71.9<br>28.1<br>100 |
| Finance hinders the practice of control measures | Yes<br>No<br>Total | 120<br>58<br>178 | 67.4<br>32.6<br>100 |
| Using insecticide treated nets and repellent are not effective | Yes<br>No<br>Total | 108<br>70<br>178 | 50.7<br>39.3<br>100 |
| Not sick even without applying control measures | Yes<br>No<br>Total | 100<br>78<br>178 | 56.2<br>43.8<br>100 |
| Lack of knowledge about control measures | Yes<br>No<br>Total | 78<br>100<br>178 | 43.8<br>56.2<br>100 |

From the table above on factors influencing malaria control practices among secondary school students, 128(71.9%) of the respondents have fear of being uncomfortable while using insecticide treated nets, whereas, 50(28.1%) feel comfortable using the insecticide treated nets. Also, 120(67.4%) of the respondents` finance hinders them from practicing the control measures whereas, 58(32.6%) are not hindered by finance. Again, 108(60.7%) are on the opinion that using insecticide treated nets and repellent are not effective, whereas, 70(39.3%) agreed that using insecticide treated nets and repellent are effective. Not only that, 100(56.2%) donot fall sick even without applying control measures, whereas, 78(43.8%) fall sick without applying control measures. Again, 100(56.2%) of respondents totally lack knowledge about control measures, while 78(43.8%) are aware of the control measures.

**Table 4. Measures Recommended to improve malaria control practices**

| Recommendation | Response | Number of Respondents | Percentage % |
|---|---|---|---|
| Prompt treatment of infected students | Yes | 158 | 88.8 |
| | No | 20 | 12.2 |
| | Total | 178 | 100 |
| Regular use of insecticide treated nets and removal of stagnant water and pits | Yes | 160 | 89.9 |
| | No | 18 | 10.1 |
| | Total | 178 | 100 |
| Use of prophylactic drugs | Yes | 150 | 84.3 |
| | No | 28 | 15.7 |
| | Total | 178 | 100 |
| Compliance with treatment regimen | Yes | 140 | 78.7 |
| | No | 38 | 21.3 |
| | Total | 178 | 100 |

From the table above on measures recommended to improve malaria control practices among secondary school students. 158(88.8%) of the respondents agreed that prompt treatment of infected children and students would improve malaria control practices, while 20(12.2%) thinks otherwise. On one hand, 160(89.9%) attests regular use of insecticide treated nets and removal of stagnant water and pits would control malaria, on the other hand, 18(10.1) are of contrary opinion. Again, 150(84.3%) uses prophylactic drugs to improve malaria control, contrarily, 28(15.7%) are against the use of prophylactic drugs to improve malaria control practices. Lastly, 140(78.7%) agreed that compliance with treatment regimen controls malaria, 38(21.3%) disagrees the fact that compliance with treatment regimen would control malaria.

# DISCUSSION

This segment discusses the results of the study, highlights the implication of the results and suggestion for further studies. It constitutes the summary/conclusion, recommendation and limitation of study and conflict of interest. This study achieved the aim of the study as indicated below. The demographics revealed, majority of the respondents were within the age range of 12-15 with 70(39.3%), 50(28.1%) of the respondents are within the age range of 15-18years and 40(22.5%) were within the age range of 18-21years and 18(10.1%) were within the age range of 21-24 years. The data collected also shows, 178(100%) of the respondents were single on relation and none of them were married. With regards to religion of respondents shows, 177(99.4) of the respondents were Christian, despite the fact that 1(0.6%) of respondents reported being Muslim. Whereas, the figure for the religion affiliation indicates the Amassoma is a predominantly Christian community. Information on the current class of study respondents shows that 70(39.3%) were in SS1,60(33.7%) were in SS2 and 48(27%) were in SS3. The results indicate the appropriate age range of respondents who are students from SSS 1-3. Again, the fact that none of the respondents were single also portrays their young nature, who are still building their lives in schools. More evident of achieving the objective is the fact that researchers were able to reach the targeted population. Following the demographics, is the first objective of the study. This was achieved--on "malaria control practices among secondary school students"Ripostesfrom respondents indicate majority of the respondents 100 (56.2%) go for malaria test as a control practice, whereas, 78(43.8) avoids going for proper test for malaria. Similarly, 128(71.9%) sleep under insecticide treated nets to control malaria,however, 50(28.1) refused to sleep under insecticide treated nets, adding that, it is uncomfortable. In addition, 158(88.8%) uses mosquito spray, coils and repellent, contrarily, 20(11.2%) are not in agreement to the use of mosquito spray, coils and repellent as control practice. Likewise, 160(88.8%) wear protective clothes at night, but 18(10.1%) objected towearing any protective clothings at night, because clothings ability to protect mosquito bite is not much. 168(94.4%) participate in clearing of bushes and house surrounding to control malaria, despite the fact 10(5.5%) do not practice it. Similarly, 163(91.6%) of respondents practice closing of windows and doors in the early hours of the evening to control malaria, conversely, 15(8.4%) do not involve in closing windows and doors early.

These agree with the cross-sectional study carried out by YakoboNyahoga and ZandaBochkaeva in a University campus in Tanzania in 2017. The study was carried out using a questionnaire comprising of closed and semi-closed questions and a sample size of 246. The result showed that the students were relatively educated on malaria, but do not follow any preventive guideline. Secondly, Hlongwana, Mabaso and Kunene *et al* (2009) results are consistent with this present study. The study sought to control malaria through stoppage of stagnant water 11-4.4%, Close windows3-1.2% and clinic visits 54-21.6% as well as hygiene 31-12.4%. Others were proper disposal of tins 15-6.0%; spraying 54-21.6% and continuous education as control practices scores 11-4.4%.Yet others are use of bed nets, 39-15.6%; 6-2.4% do not know/indifferent and 26-10.4%, which gave a total of 250-100%. Meaning, simple methods can control malaria, but often time, especially students treat these simple (proper refuse disposal, good hygiene practice, environmental cleanlinessetc) acts with contempt. With regards to those have contrary opinion towards test before treatment, it means, some students treat malaria blindly, accounting for persistent, bouts of malaria attacks in Africa. The second objective of this study was also achieved"factors influencing malaria control practices among secondary school students". 128(71.9%) of the respondents feel uncomfortable, nevertheless, 50(28.1%) feel comfortable using the insecticide treated nets. It means, this figure, uses insecticide treated nets. Also, 120(67.4%) of the respondents` finance hinders them from practicing control measures.Whereas, 58(32.6%) are not hindered by finance. Not only that, 108(60.7%) are of the opinion using insecticide treated nets and repellent are not effective,even though 70(39.3%) agreed that using insecticide treated nets and repellent are effective. Again, 100(56.2%) said, they donot fall sick even without applying control measures, while 78(43.8%) fall sick without applying control measures. 100(56.2%) of respondents lack knowledge on control measures, even though 78(43.8%) are aware of the control measures.

These findings from this objective are in consonance with Rozendaal (2011) which states that the effectiveness of these control measures depends on various factors such as financial restraints, lack of knowledge among others. Self-protective measures such as repellents, protective clothing, insecticides etc. used to protect individuals, families and small group of people can be simple, small, portable and inexpensive. Regardless of these simple methods, students would refuse to adopt any practice, but preferred bitten by mosquitoes, claiming they are uncomfortable with the use of bed nets, available methods are ineffectiveand the likes. It means, wrong perception towards control practices. Again, Fikrie ,Kayamo and Bekele (2021) recent study results are both inconsistent in one hand and consistent on the other hand with this study showed in terms of the overall factors that influence the prevention and control practices. The inconsistent aspect is thus: 317 (54.3%) of households practiced good measure of malaria prevention and control measures. Urban residence [AOR = 1.95 (95%CI: 1.17-3.24)], Secondary school completed [AOR = 5.02(95%CI 2.24-12.03)], Tertiary school completed [AOR = 7.27(95%CI: 2.84-18.55)], Positive Attitude [AOR = 8.20(95%CI: 5.31-12.68)]. Whereas, the area consistent with this study is good knowledge about malaria [AOR = 2.81(95%CI: 1.78-4.44)] were significantly associated with malaria prevention practices. Thus, recommended continuous health education and follow up measures to control malaria. The meaning is that, the respondents of this article believed the factors that influence the use of control practices are, area of residence, educational status and positive attitude. However, the adoption of these control practices depends largely on relevant knowledge of its use.

Third objective was on measures recommended to improve malaria control practices among secondary school students. On one hand, a total of 158(88.8%) of the respondents agreed that prompt treatment of infected children and students would help improve malaria control practices. On the other hand, 20(12.2%) do have dissimilar opinion. Again, a total of 160(89.9%) of the respondents recommended regular use of insecticide treated nets, removal of stagnant water and pits would improve malaria control. But 18(10.1) do not accept this affirmation. In addition, 150(84.3%) recommend the use of prophylactic drugs to control malaria, meanwhile, 28(15.7%) do not recommend the use of prophylactic drugs as malaria control practice. Also, 140(78.7%) recommended compliance with treatment regimen to control malaria, while 38(21.3%) would not recommend compliance to the treatment regimen as malaria control practice. These recommendations made by respondents are consistent with Schwartz (2012) in Switzerland and Meremikwu, Donegan, Sinclair, Esu and Oringanje, (2012) studies` recommendations to use chemoprophylaxis for prompt treatment of malaria, the use of ITN and IPTc. Going by the above studies` recommendations and the students` responses, use of IPTcwould be a good malaria control practice if adopted for secondary school students to prevent approximately three quarters of all clinical malaria episodes (rate ratio 0.26; 95% CI 0.17 to 0.38) and complications of malaria in endemic settings.

***Implications to Nursing:*** From this study the nurse would have the knowledge to create awareness and educates students on various malaria control practices among secondary school students and its environments. It would direct the focus of nurses to caring for malaria patients compare to other patients in the ward. It would also stimulate nurses in the community health facilities to initiate more sophisticated methods to control mosquito in the environments such as clearing of bushes and swampy areas and directing to use insecticides treated net (ITN)**.**

***Summary:*** This study sought to explore malaria control practices used among secondary school students, the factors influencing the practice of the control measures and make recommendations on malaria control practices among secondary school students. From the literature review the concept and the various types of malaria causing parasites were reviewed. The theory that was applied to this study focuses on the interaction between the client and the environment. The Betty Neuman system model (1982) interaction postulated that the environment adjusting to the individuals or the individuals adjusting to the environments could create a good health. The study uses a descriptive research design, convenient sampling technique was used in selecting the sample of 178 respondents, and the questionnaire was the tool used in gathering the data. The gathered data was analyzed using simple percentage. The data gathered was critically analyzed and results were reported.

# CONCLUSION

From the data collected it shows that majority of the secondary schools students applied various control practices to control malaria. The choice of malaria control was varied among the respondents on their choice of malaria control. Majority of the respondents agreed on the measures recommended to improve malaria control practices.

***Recommendations:*** In view of the findings, the following recommendations are made. Compliance with treatment regimen is important to prevent frequent re-occurrence. Health education about malaria should be included to the general studies. Medical outreaches should be made routinely to create awareness. Government at various levels should endeavour to provide needful materials to school children at all levels

***Suggestions for Further Studies:*** The researchers encourage other researchers to conduct broader researches that would include all other secondary schools in south-south geographical setting in Nigeria with appropriate methodology.

***Limitation of Study:*** The researchers would have preferred using more sophiscated data analysis tool, but for huge mistake identified. So rather than the continuous delay, researchers decided to use frequency tables and percentages.

***Ethical approval and consent to participate:*** Not applicable.

***Consent for publication:*** Not applicable.

***Competing interests:*** The authors declare that they have no competing interests.

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