Research Article

Knowledge, Attitude, and Practice in Relation to Major Mosquito-Borne Diseases in Urban and Semi-urban Communities of Niger State, Nigeria

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ABSTRACT

A survey at the household level was carried out on KAP regarding major mosquito-borne diseases. Data was collected from 967 respondents based on the population. The results revealed that 78.80% of the respondents had formal education at least basic (primary) education. Of the 967 respondents, 71.04% and 68.98% of the population had the right knowledge of major mosquito diseases and mosquito vectors, respectively. Common sources of information on these diseases are mainly from health workers (29.78%) and broadcasting media 26.88%. Transmission of the diseases is linked to mosquito bites by 66.80%, usually at night (76.11%), while 20.41% and 23.84% of the respondents knew other means and times. 100% of the respondents correctly knew the signs and symptoms of any one of the diseases. General lack of clearing of house surrounding (43.85%), draining of gutter (24.30%), bush clearing (20.06%), proper disposal of empty cans (11.79%) keeps more mosquitoes. Mosquito-treated bed nets (53.05%) are the most preventive method against mosquito bite practice, mosquito coils (20.57%), window screen netting (11.79%), cloth covering (7.80%), and traditional plant repellents (6.83%) attest to be effective. On attitudes toward treatment, 52.64% seek treatment at the nearest hospital/clinic within 1 – 3 days of the symptoms; however, some of the respondents visit drug stores/chemists (23.88%) for treatment. Given the success of the public enlightenment campaign launched by the government on mosquito diseases control, more is needed to be done against self-medication and visiting of medical stores for treatment, to avert the danger of these practices in the areas.

Keywords: *Attitudes, knowledge, mosquito-borne diseases, practices, urban, semi-urban, Niger State.*

INTRODUCTION

Major mosquito-borne diseases such as malaria, dengue fever, and filarial fever that are mainly caused by different species of some members of the Culicidae family: *Anopheles gambiae*, *Aedes egypty* and *Culex, quinquefasciatus* lead to extensive morbidity and mortality and are a major economic burden within disease-endemic countries (Coleman & Hemingway, 2007; Ji *et al* 2018; Fagbohun *et al* 2020). According to reports it is estimated that at least 500 to 700 million people suffer from mosquito-borne diseases and over one million deaths are reported annually across the globe, with Africa being one of the chief hosts of mosquitoes accountable for mosquito-borne diseases that are of great medical importance and contribute to the current global public health risk (Gooch, 2017; Richard *et al* 2017; Makanda *et al* 2019).

In terms of malaria, globally, approximately 219 million cases of the disease and occur annually (Salam *et al* 2018; Safi *et al* 2018), with Nigeria carrying the highest (19%) burden of the estimated death cases and 3.2 billion people are at risk of infection globally, and in Nigeria, also, it accounts for 63% of the diseases reported in health care facilities across the six geographical zones, costing the country >1 billion US$ annually (Ibrahim *et al* 2014; Opara *et al* 2017; Akpan *et al* 2018). Dengue is an acute mosquito-borne viral infection that places a significant socio-economic and disease burden on many tropical and subtropical regions of the world, and it is endemic in at least 128 countries including Nigeria with an estimated four billion people at risk of infections (Hazra *et al* 2017; Mukhtar *et al* 2018; Murhekar *et al* 2019). Currently, about 790 million people are at risk of filarial fever and 68 million are infected, with a further 20 million suffering from chronic morbidity most in African regions Nigeria inclusive

(Michael, 2017; Kelly-Hope *et al* 2018; Rahman *et al* 2019), while, yellow fever virus causes between 51,000 and 380,000 severe cases yearly accounting in around 19,000 to 180,000 deaths (Manica *et al* (2019). According to Olusegun *et al* (2016), Manica *et al* (2019), epidemics of yellow fever have spread from West Africa where 13 of 14 west African countries including Nigeria. The epidemiology and ecology of these diseases are powerfully associated with human habits, these mosquito species breed almost entirely in fresh and dirty water bodies found around households, construction sites, and factories due to the activities done by people (Udoidung *et al* 2020). Community perceptions, beliefs, and attitudes about mosquito-borne diseases, breeding habitats, causation, symptom identification, treatment of any mosquito disease, and prevention influence efforts to address the diseases and are often overlooked in control efforts and it vary from community to community and among individual households (Srinivasa *et al* 2018). Considering these issues, it can be an important step towards developing strategies aimed at controlling mosquito-borne diseases (MBDs). There is a paucity of data on KAP studies on MBDs most especially malaria in some parts of Nigeria. Studies on KAP have demonstrated that direct interaction with community plays an important role in circumventing mosquitoes diseases spread. Health care provider like family physician can focus both on traditional physician patient model and complement it with population-based medicine for primary prevention of any mosquito disease as domiciliary care and primary prevention are defining characteristics of family medicine. So, in order to create a synergy between primary care physician and community efforts and governmental/non-governmental organization about MBDs control interventions in Niger State central north Nigeria in particular, there is an urgent need to determine the people's knowledge, attitude, and practice of these diseases and their control (Singh *et al* 2014).

MATERIALS AND METHODS

Study Area/Design: A community-based cross-sectional study that utilized a structured questionnaire for the respondents to answer. The questionnaire was administered to 1,350 randomly selected households in four different urban and semi-urban parts of Niger State, from July to September 2019. Out of the total number of administered questionnaires, 967 were responded to by only one adult (male or female) per household. The respondents were the heads of households and in their absence, a responsible adult above 18 years, chosen by the family was allowed to answer. The questionnaire was prepared in English language but translated and communicated in local languages, when necessary, as adapted from (Du *et al* 2018). The KAP survey included approximately 19 questions and include both open and closed questions as well as some that utilize multiple responses. Details of the respondent's residential demographic information including their age, residence, education, and occupation were collected adapted by (Godly *et al* 2017; Walker *et al* 2018). Eligible and willing participants were recruited into the study after being given their informed consent and KAP assessment was done using a scoring system (Ukubuiwe *et al* 2012)

Ethical Clearance: The study protocol was approved by the Universiti Sains Malaysia in collaboration with the Niger State Ministry of Health and Ministry of Education ethic Committees. The objectives of the study were explained to community leaders and local government executives before permission was granted. A full verbal explanation of the study was given to members of selected households and consent was obtained before inclusion as participants. Respondents were given the right to refuse to take part in the study as well as to withdraw at any time during the interview. Privacy and confidentiality were maintained throughout the study.

DATA ANALYSIS: The data were entered into a Microsoft Excel Worksheet and analyzed, descriptive analysis on KAP to measure relative frequencies, percentages, averages, and relative frequencies of the variables using SPSS version 23.

RESULTS

Population and Gender Percentage of Participation of the Community of the Study Areas: The result of the total population and gender percentage of participation on community knowledge status on Mosquito-Borne Diseases was presented in (figure 1). The results showed that, of the 967 respondents, 71.15% of the respondents were males and the remaining 28.65% were females. This population of the respondents was distributed based on the areas with Shiroro having the highest respondents 33.87% males and 28.67% were females, followed by Bosso 26.16% males, while, 28.67% females, followed by Katcha 22.53% males, and 19.71%) females, while the least respondents were Lapai 17.44%, males, and 22.94% females.
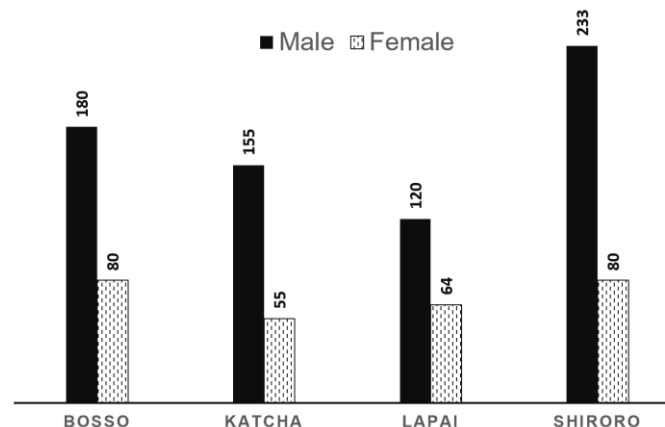

Figure 1:
Gender participation according to the locations.

Socio-demographic characteristics of the study population: The Socio-demographic characteristics of the respondents are detailed in (Table1). The result revealed that, of the 1,350 questionnaires distributed, 967 were responded to and returned. 40.64% of the respondents were within the ages of 21-30 years. 17.27% of the respondents were within the ages of less than 20 years. 18.09% of the population representing the working force was within the age of 31-40 years. 13.44% of the population responded at age 41-50 years while 10.55% of the respondents representing retired and old

ages are within the age of 50 years and above. The number of the household ranges from two individuals 13.34%) to five and above 31.02%. Most of the respondents were married 50.36 % followed by 33.82% that were single and 9.51% who were divorced of widow or widower while 6.31% were children. Occupation of the respondents varied from farming, business, students, and civil servants to unemployed with the range number of the respondents13.24 to 30.0% respectively. 60.29% of the
respondents practice Islam, while Christianity and traditional religious practices account for 39.71%. 78.80% of the respondents had formal education ranging from basic (primary) education to tertiary, while 21.20% were educated or not educated. 77.60% of the population of the respondents leave in urban settlements while 22.44% of the respondents settled in semi-rural (22.44%). Gbagi respondents represent account for 48.60% population, Nupe 27.30% while, Hausa 24.10%..

Table 1:
The Socio-demographic Characteristics of the Respondents in Niger State, Nigeria

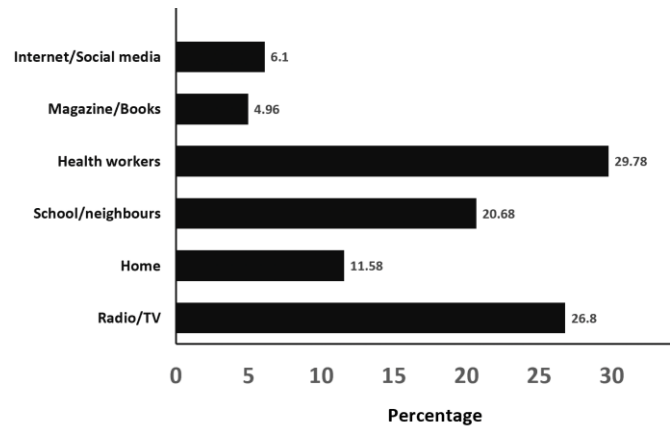| Variables		Frequency	
		Number	%
Age group	a. Less than 20 years	167	17.27%
	b. 21-30 years	393	40.64%
	c. 31-40 years	175	18.09%
	d. 41-50 years	130	13.44%
	e. 50 years above	102	10.55%
Gender	Male	688	71.15%
	Female	279	28.85%
No of people in the house	a. 2	129	13.34%
	b. 3	174	18.00%
	c. 4	180	18.61%
	d. 5	184	19.03%
	e. above 5	300	31.02%
Respondents Status	a. Married	487	50.36%
	b. Single	327	33.82%
	c. Divorce/ Widow/ Widower	92	9.51%
	d. Child	61	6.31%
Occupation	a. Farming	194	20.06%
	b. Business	211	21.82%
	c. Students	291	30.09%
	d. Civil servant	143	14.79%
	e. Unemployed	128	13.24%
Religion	a. Muslim	583	60.29%
	b. Christian	255	26.37%
	c. African religion	129	13.34%
Educational Attainment	a. Non-formal education	205	21.20%
	b. Primary education	150	15.51%
	c. Secondary education	249	25.75%
	d. Tertiary	363	37.54%
Residential Status	a. Urban	750	77.60%
	b. Semi-urban	217	22.44%
Tribe	a. Hausa	233	24.10%
	b. Nupe	264	27.30%
	c. Gbagi	470	48.60%

Figure 2:
Sources of information about Mosquito-Borne Diseases.

Table 2:
Knowledge of mosquito disease types, cause, transmission, and sign/symptoms

Variables		Frequency	
		Number	%
Are you aware of mosquitoes and the diseases it causes?	Yes	687	71.04%
	No	280	28.96%
Are you aware of *Culex, Anopheles,* and *Aedes* mosquitoes?	Yes	667	68.98%
	No	300	30.02%
Which is a common mosquito disease found in your community?	Malaria fever	760	78.59%
	Filarial fever	150	15.51%
	Yellow fever	37	3.83%
	Dengue fever	20	2.07%
Which is the mode of transmission of mosquito?	Mosquito bites	681	70.42%
	Infected to non-infected blood contact	106	10.96%
	Contaminated syringes	112	11.58%
	Do not know	103	10.65%
Do you notice when there is any mosquito disease in the body?	Yes	681	70.42%
	No	286	29.58%
What is the symptom of any mosquito disease in the body?	Dizziness	107	11.07%
	Weakness	430	44.47%
	Vomiting	130	13.44%
	Loss of appetite	165	17.06%
	Cold/Shivering	135	13.96%
Do you know that you can be at risk of mosquito disease?	Yes	656	67.84%
	No	311	32.16%
Do you know that any mosquito disease can cause death?	Yes	613	63.39%
	No	354	36.61%

The common and reliable source of information about mosquitoes and types of diseases cause was from the health workers 29.78% followed by Radio/TV 26.88%, others include those that hard it from school/neighbours 20.68%. Internet and social media 6.10% while, magazines, and books 4.96% (Figure 2).

Knowledge of mosquito disease types, cause, transmission, and sign/symptoms among residents: When asked about "mosquito diseases and types of mosquitos" (Table 2). 71.04% of the respondents were aware of mosquitoes and diseases it causes while, 28.96% were not, 68.96 % were aware of different types of mosquitoes (Culex, Anopheles, Aedes), while respondents 30.02% were not aware. 78.59% of the respondents knew malaria fever, 15.51% responded to filarial fever 3.83 and 2.07% responded to yellow and dengue fever, respectively. In terms of mode of transmission and common disease found in the community, the majority knew mosquito bite 66.80% followed by contaminated syringes 11.58%. 10.96% of the respondents indicated infected blood contact while 10.65% of the respondent lacked any idea. On the signs and symptoms, 70.42% of the respondents noticed when they have any mosquito disease while 29.58% had no idea. 44.47% identified weakness as the most common symptom of mosquito disease, followed by loss of appetite 17.06%, cold/shivering 13.96%, vomiting 13.44%) while dizziness 11.07%. 67.84% and 63.39% of the respondents knew the risk and the death caused by mosquitoes while, 32.16% and 36.615%, respectively of the respondents were not.

Table 3:
Attitude towards the treatment of mosquito diseases by the respondents

	Variables	Number	%
How long do you notice fever remain in your body?	1 day	200	20.68%
	1-3 days	371	38.37%
	4-5 days	170	17.58%
	6-7 days	115	11.89%
Your consideration before treatment of any fever caused by a mosquito?	Condition of the body	479	49.53%
	Time of sickness	187	19.34%
	Cost of treatment	184	19.03%
	Distance from health care centre	117	12.10%
Your first action if you notice any fever caused by mosquitoes?	Visit the hospital	509	52.64%
	Seek care for fever from any person	129	13.34%
	Visit the chemist/Drug store	231	23.88%
	Take medicine on your own	98	10.13%

Attitudes towards the treatment of mosquito diseases among residents: The results of attitudes toward the treatment of mosquito diseases were presented in (Table 3). In terms of "durations of the fever stay in the body", three hundred and seventy-one (38.37%) of the respondents reported 2-3 days, followed by 1 day 20.68%, 4-5 days 17.58%, 6-7 days 11.58% and 7days 11.48% respectively as

the durations of fever noticed in the body of the respondents. On the treatment consideration, the condition of the body 49.53% was the deciding factor for seeking fever treatment this was followed by a time of the sickness 19.34%, 19.03% of the respondents said they will consider the cost of the treatment while 12.10% of the respondent said they will consider the distance of the health care center. On the treatment of any mosquito diseases, when asked, "What would be your first action if you notice any fever caused by mosquito"? 52.64% of respondents reported that they will go to the hospital immediately after the onset of symptoms. 23.88% of the respondent will go to the chemist/drug store, 13.34% will seek care from any person while 98 equivalent to 10.13% of the respondents would like to do self-medication.

Practice towards prevention and control measures of mosquito-borne diseases among Residents: The results of practice towards prevention and control measures of mosquito diseases are presented in (Table 4). The results showed different thoughts and measures adopted by the respondents to protect themselves from mosquito diseases. When asked, "about the proper disposal of empty contains, use of electric fan and repellent creams against mosquito"; 76.84%, 68.87%, and 76.53%, respectively agreed while the remaining respondents 23.16%, 31.22%, and 23.47% disagreed in responding to the asked questions. More than 50% of the respondents used treated bed nets in their homes. 20.57% of the respondents used mosquito coil, 11.79% used window screen net, while the remaining of the respondents claimed that they covered their body with cloth (7.50%) and used traditional repellents plants 6.83% at home.

Table 4:
Practice towards prevention and control measures of Mosquito-Borne Diseases

Variables		Frequency	
		Number	%
Would you encourage the proper disposal of empty containers in your community?	a. Yes	743	76.84%
	b. No	224	23.16%
Do you think an electric fan can drive mosquitoes away from your room?	a. Yes	666	68.87%
	b. No	301	31.22%
Would you allow your family to use mosquito repellent creams?	a. Yes	740	76.53%
	b. No	227	23.47%
What do you use to prevent mosquito bites in your house?	a. Use of treated bed net	513	53.05%
	b. Use of window screen net	114	11.79%
	c. Use of mosquito coil	199	20.57%
	d. Cover your body with cloths	75	7.80%
	e. Traditional repellents plants	66	6.83%

Knowledge of breeding habitats and behaviors of mosquito vectors among Residents: On the knowledge of breeding habitats and behaviors of mosquitoes (Table 5), the respondents acknowledge stagnant water 46.54% as the most popular habitats that mosquitoes breed and lay eggs, followed by gutters 31.54%, river/pounds 11.69% while, 10.24% were the pools. On the hidden place of the mosquito, 48.50% said at dark places, 27.71% said in dirty places. 12.31% reported toilets and latrines while 11.48% of the respondents reported tall grasses/bushes as the hidden places of mosquitoes. A majority reported that mosquitoes usually bite at night 76.11%, while 10.03, 7.50, and 6.31%, respectively of the respondents said mosquito usually bites during the day, afternoon, and all the time. On the" keep of mosquitoes", four hundred and twenty-four 42.85% of the respondents said lack of cleaning house surrounding keeps mosquito more. 24.30%, 20.06%, and 11.79% of the respondents reported a lack of draining gutters, clearing of bushes, and discarding dirty empty containers, respectively keep mosquitoes the more.

Table 5:
Knowledge of Breeding Habitats and Behaviors of Mosquito Vector

Variables		**Frequency**	
		Number	**%**
Where are mosquitoes found and lay eggs?	a. Stagnant water	550	46.56%
	b. River/ Pounds	113	11.69%
	c. Pools	99	10.24%
	d. Gutters	305	31.54%
Do you know where mosquitoes hide?	a. In dark place	469	48.50%
	b. Dirty places	268	27.71%
	c. Tall grasses/Bushes	111	11.48%
	d. Toilets/ Latrines	119	12.31%
When do you experience mosquito bites?	a. Day time	73	7.50%
	b. At night	736	76.11%
	c. In the afternoon	61	6.31%
	d. All the time	97	10.03%
Which among these keeps more mosquitoes?	a. Lack of cleaning house surroundings	424	43.85%
	b. Lack of draining of gutters	235	24.30%
	c. Lack of clearing of bushes	194	20.06%
	d. Lack of discarding dirty empty containers	114	11.79%

DISCUSSION

In Niger State, this is the first study that has been carried out to provide baseline information about urban and semi-urban community knowledge status on mosquito-borne diseases. The selected study areas (i.e., Bosso, Katcha, Lapai and Shiroro) and the populations of the wards account for 15.57% and 2.02% of people out of the overall population. Of the 1,350-sample size, 71.63% comprising of 71.15% males and 28.65% females responded, with Shiroro having 32.37%. The distribution of these populations is attributed to the complex dynamic of social and environmental factors such as, interstates migration for settlement, trades, and climate change, making the chosen places to be centres for

anthropogenic activities that lead to the creation of different suitable breeding habitats of different mosquitoes (Caminade *et al* 2014). According to (Mouchet *et al* 1998; Minakawa *et al* 2006), as human population increases, urbanization and environmental changes due to an expansion of land will result in creating different breeding habitats of mosquitoes at a faster pace, hence participating in the increase of malaria and other Mosquito-Borne Diseases, as demonstrated in African.

The results further revealed that most of the respondents were knowledgeable about mosquito diseases, types of mosquitos, risk, and death it causes. This is consistent with the study conducted in India that found most of the respondents knew mosquitoes as the vector of the diseases (Srinivasa *et al* 2018). Also, the high number of youth respondents in the study areas with relative formal education contributed greatly and thus, advantageous ineffective education of the population on danger and prevention of the diseases. The main source of information about mosquitoes was the health workers. The fact that 29.78% received information from health officers means that they had the right knowledge of mosquitoes and their diseases. Also, this could be relatively influenced by the presence of formal educated people and education in the areas. This result is in agreement with the work of earlier authors on knowledge of mosquito diseases most especially malaria in Nigeria, who reported that the majority of the respondents, are aware of diseases and attributed this to the right education received by the population (Singh *et al* 2014; Michael *et al* 2017; Boussougou- Sambe *et al* 2018)

On the common disease found in the community, 78.59% of the respondents believed it to be associated with malaria. This could be possible, the fact that the study areas are centres for anthropogenic activities that resulted in the expansion of several breeding places for mosquitoes, most especially malaria vectors. Also, could be due to the adaptability of mosquitoes to the breeding habitats which results in the endemic nature of the disease in the areas. In conformity with this assertion, Olayemi *et al* (2014), established that mosquito species are well adapted to the ecological conditions of the study area (Niger state), and will require consistent aggressive interventions for effective control. In agreement with the work of Manawadu *et al* (2005) who testified that urban sites were much favorable for breeding of mosquitoes because of the anthropogenic activities in the areas that filled natural and man-made containers with rainwater and polluted water. Other common mosquito diseases as mentioned by the respondents include filarial fever, yellow fever and dengue fever were moderately or not much common, thus, less significant to the respondents.

On the mode of transmission, the majority identified mosquito bites, which is dependable with the work of Dambach *et al* (2018), who reported that generally, there was good knowledge about mosquito as vector especially for malaria and how is transmitted in the study area of Burkina Faso. This high response was an indication of having correct knowledge about the mosquito that causes diseases especially malaria which is endemic in the study areas but did not always mean well equipped with the idea of other modes of transmission. The low and lack of responses of the other modes of transmission by the respondents may be attributed to restricted knowledge had among the respondents and the fact

that respondents are told that disease transmission is through bites by the health worker in their respective areas.

Signs and symptoms are of great importance in seeking timely medical help and preventing morbidity and mortality. Almost all the respondents were able to notice and identify the most common signs and symptoms of which weakness, loss of appetite, cold/shivering, vomiting, and dizziness. This is an important result as these are the early symptoms experienced by individuals who are infected with any mosquito disease. This is a similar observation of other studies conducted by the majority of the earlier authors (Abate *et al* 2013; Singh *et al* 2014). It is also following findings in other studies in endemic settings (Manana *et al,* 2018). According to Singh *et al* (2014), this might reflect the accessibility and quality of health care facilities in the area.

Adequate knowledge of signs and symptoms of mosquito diseases demonstrated by most of the respondents as well as the right attitude to treatment care within the appropriate time (1 – 3 days) and the condition of the body (49.53%) is encouraging and is an indication of a good understanding of risk and consequences of the disease on individual health. This agrees with the work of Godly *et al* (2018), who reported that respondents visit health facilities whenever they notice symptoms resembling especially those of malaria as deciding factors for seeking treatment among respondents was the condition of the sickness. This, however, contradicts Dida *et al* (2015), that 89.3% of the respondent's sought treatment of mosquito disease for especially malaria within 24hours reflects their knowledge and access to the health facility. The most preferred place for the treatment of any mosquito disease was the visit to the hospital. This is consistent with the works of Abate *et al* (2013), Singh *et al* (2014), but contrary to the works of Deressa *et al* (2003), Xu *et al* (2012), who reported that their respondents preferred home remedy and medical sellers respectively. Although visiting chemists/drug stores, seeking care from individuals, and self-medication were indicated as the next options by the respondents, but a closer look reveals that these respondents take these options for the treatment of any mosquito disease the knowledge of whom may be questionable. This might result in worsening of the situation and some cases death of the individual. Thus, public enlightenment campaign against self-medication and visiting medical stores for treatment is needed in the areas, to avert the danger of these practices in the areas. Godly *et al* (2018) had earlier reported the most respondent preferred drug store/chemist for treatment, might worsen the situation and in some cases led to the death of the individual.

Knowledge of mosquito breeding habitats and behaviors is important for the development of effective control and prevention of mosquito bites hence mosquito-borne diseases (Godly *et al* 2018). Respondents of this study identified stagnant water, gutters, river/ponds, and pools as the potential breeding places for mosquitoes. Dark places, dirty places, toilets/latrines, and tall grasses/bushes were identified as the resting places for mosquitoes. This opinion might be partially attributable to the fact that people observed high mosquito nuisance near breeding places such as earlier mentioned. The majority 76.11% of the respondent's experience mosquito bites at the night. The time frame mentioned by most of the respondents corresponded to their knowledge and ideas that

mosquitoes do bites at the night. Although, other times said by the remaining respondents might be due to expanded information about biting times. Adequate knowledge of mosquito breeding habitats and their mode of feeding reflected in the study could aid in the prevention and development of mosquito control programmes in the state. In line with this statement, DePina *et al* (2019), reported that health education through community engagement leads to good participation in interventions for malaria and other mosquito diseases control and enhances the knowledge and awareness in a population.

Lack of Proper environmental sanitation (i.e., clearing of the house surrounding 43.85%), bush clearing 20.06%, draining of gutter 24.30% and discouraging of indiscriminate disposal of containers 17.79% which could serve as breeding habitats for, thus, proper knowledge is required by common practice in the area aid in the improvement of the environment and individual health. This assertion confirms the report that the greatest challenge posed by mosquitoes to man is their ability to breed in any collection of stand water. This result is contrary to the report of Srinivasa *et al* (2018) that prevention practices noted in their study in India were more toward personal protection than the environmental control of the vector. Similar, to the result of this study non-adherent 23.78% of the respondents had been attributed to laziness, believing that is the authorities' responsibility (those living in government houses) and nonchalance of neighbors as reasons for this behavior. 68.87% and 76.53%, respectively, agreed with the use of electric fans and repellent creams as other measures for preventing and control of any mosquito disease.

This is because mosquito-treated bed net as a common measure of mosquito bite prevention adopted in the study areas indicated their adequate and rightful knowledge on mosquito disease prevention. This could be attributed to the effective mosquito disease most especially malaria prevention education campaign launched by the government and free (Not for sale) distribution of mosquito-treated bed nets in the state. In conformity with this statement David *et al* (2018), who worked on the prevalence of malaria in Lagos attributed the awareness to the renewed commitment by the government to decrease the prevalence of malaria by distributing free long-lasting insecticide-treated nets (LLINs). Also in corresponding with the work of Dambach *et al* (2018), who reported that Most stated mosquito bed nets were their first choice in personal protection against mosquitoes. As reported, among those who did not own treated bed nets, were reasons for not owning the nets, therefore, depended on the use of window screen net, covering the body with cloths and traditional repellent plants as their options. Similar studies agree with unavailability and inconsistency in distribution and cost as barriers to ownership of bed nets (Musa *et al* 2009; Iriemenam *et al* (2011). Since it is now understood that cost and no availability are reasons for no ownership of the nets, it will be appropriate for the government to consider subsidizing the nets while also, ensuring regular distribution to enable all families to have access to treated bed nets. Others trusted mosquito coils, nonetheless, vector control practices predominantly included measures against the adult vector and to a lesser extent against vector larvae. Others include general hygienic precautions such as washing hands and not walking without shoes, thus, hinting at a less profound understanding

of mosquito transmission modes probably influenced by awareness campaigns on other diseases (Dambach *et al* 2018).

From the findings of this current study, it is observed that with the success of the public enlightenment campaign launched by the government and knowledge acquired by the respondents on mosquito-borne diseases eradication and control, most of the people in the areas studied understood the danger pose by mosquito regarding disease transmission. However, more is needed to be done against self-medication and visiting of medical stores for treatment, to avert the danger of these practices in the areas.

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