



(RESEARCH ARTICLE)



Attitudinal exposure to mosquito bites in two rural suburb communities of Ado-Ekiti, Nigeria

Omojola Felix Olorunniyi *

Department of Zoology and Environmental Biology, Faculty of Science, Ekiti State University, Ado-Ekiti, Ekiti State, Nigeria.

International Journal of Science and Research Archive, 2024, 11(01), 2454–2460

Publication history: Received on 02 January 2024; revised on 13 February 2024; accepted on 16 February 2024

Article DOI: <https://doi.org/10.30574/ijrsra.2024.11.1.0262>

Abstract

Presence of infected mosquitoes coupled with poor mosquito avoidance practice of community people have made them predisposed to Mosquito-borne diseases. Attitude and practice that could expose people to mosquito bites were investigated among some volunteer members of two rural suburb communities (Ilokun and Irasa) in Ado-Ekiti, Nigeria. A cross sectional community-based study using questionnaires administration was used to obtain information from respondents and adult mosquitoes were also collected outdoors using light traps in both communities. Data collected were analysed with SPSS version 20 and probability value (p -value) was regarded as significant at $p < 0.05$ for inferential statistics. Four hundred respondents participated in the study, 219 (54.8%) were males while 181 (45.3%) were females. Only three respondents knew mosquitoes could transmit zika virus. Majority of the respondents, 374 (93.5%) associated mosquito bites with malaria. Majority, 281 (71.2%) claimed to sleep under bed nets, few of their houses, 126 (31.4%) had window screened nets, 88 (22.0%) used mosquito repellent and 154 (38.6%) stayed outdoors at dusk. No significant difference ($p > 0.05$) existed in the mosquito avoidance practice among respondents from both communities. Five hundred and thirteen (513) mosquitoes were collected from both communities. *Culex*, 256 (49.9%), *Anopheles*, 205 (40.0%) and *Aedes*, 52 (10.1%). Mosquitoes collected at Ilokun, 292 (56.9%) was higher than 221 (43.1.3%) collected at Irasa. No significant difference ($P = 0.920$) existed in the population distribution of the mosquito genera in both communities. Enlightenment about many diseases transmitted by mosquitoes is needed in the study area.

Keywords: Attitude; Practice; Mosquitoes; Irasa; Ilokun; Ado-Ekiti

1. Introduction

Mosquito-borne diseases (MBDs) are the diseases whose causative agents are transmitted by infected mosquitoes. These diseases are among the diseases that constitute major public health challenges in the world [1]. Almost 17.0% of the total burden of all infectious diseases are associated with mosquito bites [2] thereby threatening over half of the world's population [3]. World Health Organization (WHO) declares more than 300 million new incidence cases related to MBDs, of which more than 700,000 have lethal outcomes [4]. Mosquitoes are spread almost permanently in most tropical and subtropical regions and seasonally in other areas. Through their bite, mosquitos can transmit many dangerous germs causing diseases [5, 6]. These diseases include malaria, bancroftian filariasis, dengue fever, yellow fever, chikungunya, Rift Valley fever, West Nile virus (WNV) and Zika viruses [7]. One of the factors that contribute to the spread of these diseases is the entomological inoculation rates (EIRs) of mosquitoes. EIR depends on the rate at which infected mosquitoes bite in a specific area [8, 9]. Another factor that contributes to the spread of MBDs is the attitude and practice of people that could predispose them to infectious mosquito bites [10]. Mosquito bites are more common in rural areas and during the rainy season. It has been reported that many of the mosquito species that involve in disease transmission show a preference for rural areas [11]. However, mosquito bites can also be a problem in urban areas, especially in areas with poor drainage and sanitation [12].

* Corresponding author: Omojola Felix Olorunniyi

It has been established that people living in rural areas of Nigeria had more resilient attitudes towards mosquito bites than people living in urban areas. People who have resilient attitudes towards mosquitoes may be more likely to take risks that increase their exposure to mosquito bites, such as sleeping outdoors or not using mosquito repellent or bed nets [13].

Identifying types of mosquito present in an area could be very useful for a vector control programme against MBDs. However, to obtain a long lasting sustainable control programme against MBDs, a good knowledge about the attitude and practice of community members that predispose them to mosquito bites is required. Thus, examining the attitude and practice that predispose members of Irasa and Ilokun communities to mosquito bites will be very useful in understanding some attitude and practice that expose many rural communities to mosquito bites in Ekiti State. Irasa and Ilokun communities are rural suburb of Ado-Ekiti in Ekiti State, Nigeria.

2. Material and methods

2.1. Study Area

Two rural suburb communities in Ado-Ekiti, Nigeria constituted the study area. The selection of the study area was based on the previous reports on the distribution of mosquitoes in the area [14]. The two rural communities of the study area are Ilokun (N07°41.292', E005°15.441') and Irasa (N07°41.892', E005°15.331'). Both communities are located along Ekiti State University, Ado-Ekiti (Figure 1). The major occupation of the people in both communities is farming.

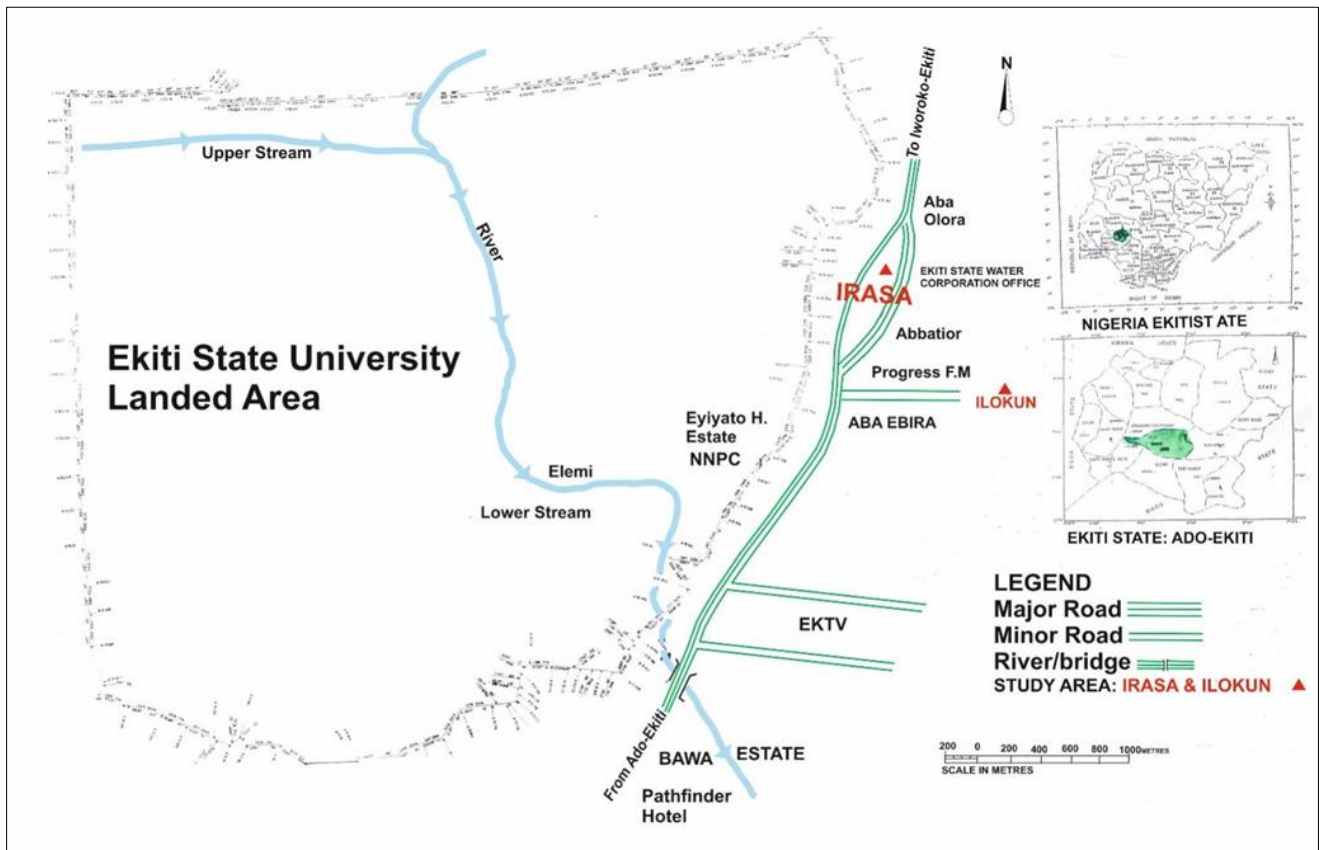


Figure 1 Map of the study area

2.2. Examination of attitude and practice of community members that predispose them to mosquito bites

In order to examine the attitude and practice of the people that predispose them to mosquito bites, a cross sectional community based study using questionnaires administration was carried out in July, 2023. Structured questionnaires were administered to the adult volunteer members (≥ 18 years) of the two communities. The questionnaires were either self-administered (especially for the literate ones), or through interviews when respondents are not literate. The determination of sample size was according to Yemane Table [15]. $P = 0.5$, $CL = 95\%$, $e = \pm 7\%$.

2.3. Collection of mosquitoes in the study area

Adult mosquitoes were collected outdoors in the study area in July, 2023. In each of the communities, mosquitoes were collected five consecutive days. In order to have a widely distributed collection of mosquitoes in each community the households within the area were divided into sections to generate sampling frames for the random selection of houses representatives of the area. A house was selected in each section of the divisions. Mosquitoes were collected in front of the selected houses using miniature Centre for Disease Control [CDC] light traps [Model 512; John W. Hock Company, Gainesville, FL, USA]. The miniature CDC light traps were positioned next to a person lying on a bench or sitting down in a resting chair under a bed net. Traps were set at 6:00 PM and removed at 9:00 PM which is the time people usually stay outdoors for relaxation in rural communities in Ekiti State before going to bed [16]. The captured mosquitoes were taken to the Zoology laboratory at Ekiti State University, Ado-Ekiti where they were sorted into sexes and genera using the morphological keys [17].

2.4. Data Analysis

Data were analyzed with SPSS version 20. Statistics involved were descriptive and chi-square. A probability value (p -value) was regarded as significant at $p < 0.05$ for inferential statistics.

3. Results

The results of this study show that a total number of four hundred respondents participated and out of these 219 (54.8%) were males while 181 (45.3%) were females. Majority of the respondents were between 18 to 23 years old (28.5%) while the least age group was between 39 to 43 years old (Table 1). Apart from two respondents at Ilokun and one respondent in Irasa who knew that mosquitoes could transmit zika virus, all the remaining respondents from the two communities did not know that mosquitoes could transmit other disease causing agents apart from malaria parasites. However, almost all the respondents 374 (93.5%) associated malaria parasite infection with mosquito bites. The mosquito avoidance practice among the respondents in the study area is shown in Table 2. While majority of the respondents, 281 (71.2%) claimed to be sleeping under bed nets only few of their houses, 126 (31.4%) had window screened nets (Table 2). Few of the respondents, 88 (22.0%) said they used mosquito repellent and 154 (38.6%) said they stay outdoors at dusk between 6:00pm and 9:00 pm (Table 2). However, there was no significant difference ($P > 0.05$) between the respondents of the two communities about their predisposed attitude and practice toward mosquito bites investigated (Table 2).

The number of mosquito genera collected in the study area is presented in Table 3. A total number of five hundred and thirteen (513) mosquitoes were collected in both communities. *Culex* mosquitoes had the highest population 256 (49.9%), *Anopheles*, 205 (40.0%) and the least population recorded 52 (10.1%) was in *Aedes*. The overall population of mosquitoes collected at Ilokun, 292 (56.9%) was higher than 221 (43.1.3%) mosquitoes collected at Irasa. However, no significant difference ($P = 0.920$) existed in the population distribution of the mosquito genera in the two communities of the study area (Table 3).

Table 1 Demography of respondents in the study area

Variables	Respondents Characteristics	Frequency	Percentage (%)
Sex	Male	219	54.8
	Female	181	45.2
Total Number Examined		400	100
Age group (years)	18-23	114	28.5
	24-28	95	23.8
	29-33	66	16.5
	34-38	46	11.5
	39-43	35	8.8
	44 and above	44	11.0
Total Number Examined		400	100

Table 2 Mosquito avoidance practice among the respondents in study area

Predisposed attitude to mosquito bites	Community	Status respondents	Number respondents	P-value
Bed nets	Ilokun	User	139 (69.5%)	0.743
		Non user	61 (30.5%)	
	Irasa	User	142 (71%)	
		Non user	58 (29%)	
	Total examined number	User	281 (71.2%)	
		Non user	119 (29.8%)	
Windows with screened nets	Ilokun	Yes	58 (29.0%)	0.190
		No	142 (71.0%)	
	Irasa	Yes	68 (34.0%)	
		No	132 (66.0%)	
	Total examined number	Yes	126 (31.4%)	
		No	274 (68.5%)	
mosquito repellent	Ilokun	User	36 (18.0%)	0.053
		Non user	164 (82.0%)	
	Irasa	User	52 (26.0%)	
		Non user	148 (74.0%)	
	Total examined number	User	88 (22.0%)	
		Non user	45 (4%)	
mosquito coil	Ilokun	User	120 (60%)	0.312
		Non user	80 (40%)	
	Irasa	User	110 (55%)	
		Non user	90 (45%)	
	Total examined number	User	230 (57.5%)	
		Non user	170 (42.5%)	
Staying outdoors at dusk	Ilokun	Yes	74 (37.2)	0.564
		No	125 (62.8%)	
	Irasa	Yes	80 (40.0%)	
		No	120 (60.0%)	
	Total examined number	Yes	154 (38.6%)	
		No	245 (61.4%)	

Table 3 Distribution of mosquito genera in the two communities of study area

Community	<i>Anopheles</i>	<i>Culex</i>	<i>Aedes</i>	Total
Ilokun	115 (39.4%)	148 (50.7%)	29 (9.9%)	292 (51.9%)
Irasa	90 (40.7%)	108 (48.9%)	23 (10.4%)	221 (43.7%)
Total	205 (40.0%)	256 (49.9%)	52 (10.1%)	513

$$\chi^2 = 0.168^a, df = 2, P\text{-value} = 0.920$$

4. Discussion

In this study, almost all the respondents knew the mode of malaria transmission as majority associated malaria parasite infection with mosquito bites. The good knowledge of the respondents on malaria transmission is probably due to the familiarity of the respondents with malaria, being the most common and important febrile illness in sub-Saharan Africa [18, 19]. Some people who suffer for other ailments in Nigeria are at times mistaken for malaria and such people are presumptively treated with antimalarial drugs [18]. However, the policy of presumptive treatment of malaria for all febrile illnesses was widely advocated in sub-Saharan Africa, especially in young children [20, 21]. One of the reasons for such presumptive treatment is the fear of rapid mortality of untreated malaria, especially in young children [18]. However, over-prescription of antimalarial drugs may result into developing drug resistance [22]. In addition, blind treatment of malaria without parasitological confirmation of the parasite deviates from best practices. In Nigeria, many people may not know that mosquitoes can transmit other diseases besides malaria which was also observed in this study. Only three respondents knew that mosquitoes could transmit zika virus in this study and whereas various genera of mosquitoes could transmit wide varieties of disease causing agents including malaria parasites, filariae such as *Wuchereria bancrofti* that causes elephantiasis in humans, variety of arboviruses that cause yellow fever, dengue, chikungunya, Rift Valley fever and Zika viruses [7]. The people in this study area as well as other people in the rural communities of Ekiti State may need to be enlightened about other diseases transmitted by mosquitoes. This will enhance their carefulness on the need to avoid mosquito bites.

Even though, majority of the people in the study area claimed to be sleeping under bed nets, this might not be absolutely true. This is because majority of people who claimed to be sleeping under bed nets in the past studies were observed to be highly infected with malaria parasite infection [23, 24] and further investigations revealed that they only owned bed nets but were not regular users [23]. As regard the number of houses that were without window screened nets in the study area which were few could be connected with the socioeconomic status of the people in the area being rural communities. Generally, the socioeconomic status of most rural dwellers in Nigeria is relatively poor compared with urban dwellers. World Bank [25] reported that poverty in Nigeria is concentrated in the rural area. Similarly, National Bureau of Statistics (NBS) reported that absolute poverty in rural Nigeria is higher (61.1%) as against 52.0% in urban area [26]. It should be noted that the availability of different mosquito genera in the study area suggest that people in this area are predisposed to mosquito bites and if such mosquitoes are infectious they could be good vectors to transmit mosquito-borne diseases.

5. Conclusion

Majority of the respondent did not know mosquitoes could transmit other diseases besides malaria. The mosquito avoidance practice of most respondents in the study area is not good enough to prevent them from mosquito bites. This might be the practice of most community members of the study area and possibly a common occurrence in most rural communities in Ekiti State. There is, therefore, a need to enlighten the people in the study area and all other rural communities in Ekiti State about the importance of good mosquito avoidance practice.

Compliance with ethical standards

Acknowledgments

Author thanks all members of the communities where this study was carried out for their cooperation

Statement of ethical approval

The ethical approval (EKSUTH/A67/2023/08/011) to conduct this study was obtained from Ethics and Research Committee, Ekiti State University Teaching Hospital, Ado-Ekiti, Ekiti State, Nigeria.

Statement of informed consent

The consents of volunteers were obtained before enrolment for the study. The volunteers who were not interested during the course of the study were allowed to opt out.

Funding

This study did not receive external funding.

References

- [1] World Health Organization (2022). Report on malaria in Nigeria 2022. <https://www.afro.who.int/countries/nigeria/publication/report-malaria-nigeria-2022>
- [2] Bamou R, Mayi MPA, Djiappi-Tchamen B, NanaNdjangwo SM, Nchoutpouen E, Cornel AJ et al. An update on the mosquito fauna and mosquito-borne diseases distribution in Cameroon. *Parasit Vectors*. 2021; 14(1): 527.
- [3] Zerbo A, Castro Delgado R, Arcos González P. Aedes-borne viral infections and risk of emergence/resurgence in Sub-Saharan African urban areas. *J Biosaf Biosecurity*. 2020; 2(2): 58- 63.
- [4] World Health Organization. World Malaria Report 2021. Geneva, Switzerland, 2021.
- [5] Lee H, Halverson S, Ezinwa N. Mosquito-borne diseases. *Prim Care: Clin off Pract.*, 2018; 45(3): 393-407.
- [6] Franklins LHV, Jones KE, Redding DW, Abubakar I. The effect of global change on mosquito-borne disease. *Lancet Infect Dis.*, 2019; 19(9): e302-e312.
- [7] Tandina F, Doumbo O, Yaro, AS, Traoré SF, Parola P, Robert V. (2018). Mosquitoes (Diptera: Culicidae) and mosquito-borne diseases in Mali, West Africa. *Parasites & Vectors*, 2018; 11: 467.
- [8] Kelly-Hope LA, McKenzie FE. The multiplicity of malaria transmission: a review of entomological inoculation rate measurements and methods across sub-Saharan Africa. *Malaria Journal*, 2008; 8:19, Doi:10.1186/1475-2875-8-19
- [9] Olorunniyi OF., Idowu OA., Idowu AB., Pitan O. R. Oyeniyi T. S. and Adesalu O. Seasonal Transmitting Potential of Malaria Vectors in Six Communities in Ekiti State, Nigeria. *Nigerian Journal of Parasitology*, 2021; 42(1): 107-114.
- [10] Ogah OO, Ogbu OA, Eze SC. Attitudinal exposure to mosquito bites and the spread of mosquito-borne diseases in Nigeria: A review. *Journal of Public Health in Africa*, 2022; 13(1), e1-e10.
- [11] Alenou LD, Nwane P, Mbakop LR, Pameu M, Ekoko W, Mandeng S, Bikoy EN, Toto JC, Hugues OH, Etang J. (2023). Burden of mosquito-borne diseases across rural versus urban areas in Cameroon between 2002 and 2021: prospective for community-oriented vector management approaches. *Parasites & Vectors*, 2023; 16:136. <https://doi.org/10.1186/s13071-023-05737-w>.
- [12] World Health Organization. Vector-borne diseases. Fact sheet. 2023.
- [13] Adedokun, A. A., Afolayan, A. A., & Ojo, O. O. (2018). Attitudes towards mosquito bites and associated factors among rural dwellers in Ekiti State, Nigeria. *Malaria Journal*, 2018; 17(1): 1-10. <https://pubmed.ncbi.nlm.nih.gov/>
- [14] Olorunniyi O. F. (2016). Abundance and diversity of mosquito genera at Ilokun and Irasa communities, Ado-Ekiti, Nigeria. *J. Bio. Innov*, 2016; 5(3): 379-385
- [15] Yemane T. Table of sample size for 3%, 5%, 7% and 10% precision levels where confidence level is 95% and P = .5. (1967). In: Israel GD. Determining sample size. Fact Sheet PEOD-6. Gainesville, FL: University of Florida, 1992, revised 2009, reviewed 2013.
- [16] Olorunniyi O. F. (2020). Distribution of Outdoors Mosquito Genera in Six Communities in Ekiti State, Nigeria. *Haya Saudi Journal of Life Science*, 2020; 5(3): 23-27

- [17] Gillies MT, de Meillon B. The Anophelinae of Africa south of the Sahara (Ethiopian Zoogeographical Region, 2nd edn). Publications of the South African Institute for Medical Research, 1968; 54, 1-343.
- [18] Greenwood BM, Bojang K, Whitty CJ, Targett GA. Malaria. *Lancet*, 2005; 365: 1487-1498. <http://www.malariajournal.com/content/8/1/19>
- [19] Okoro CI, Chukwuocha UM, Nwakwuo GC, Ukaga CN. (2015). Presumptive Diagnosis and Treatment of Malaria in Febrile Children in Parts of South Eastern Nigeria. *Journal of Infectious Diseases and Therapy*, 1015; 3(5): 1-6. DOI: 10.4172/2332-0877.1000240.
- [20] Gosling RD, Drakeley CJ, Mwita A, Chandramohan D (2008) Presumptive treatment of fever cases as malaria: help or hindrance for malaria control? *Malaria Journal*, 2008; 7: 132.
- [21] English M, Reyburn H, Goodman C, Snow RW. “Abandoning presumptive antimalarial treatment for febrile children aged less than five years—a case of running before we can walk?” *PLoS Med*, 2009; 6: e1000015.
- [22] Oladosu OO, Oyibo WA. Overdiagnosis and Overtreatment of Malaria in Children HDt Presented with Fever in Lagos, Nigeria. *ISRN Infectious Disease*, 2013: 1-6.
- [23] Olorunniyi OF, Idowu OA. Influence of knowledge, attitude and practice (KAP) on malaria parasite infection in six communities in Ekiti State, Nigeria. *Int Public Health J* 2021;13(1):89-98.
- [24] Olorunniyi OF, Alo KO, Awelewa IO. Malaria parasite infection among the pregnant women who attended antenatal care at Oke Iyinmi Primary Health Care Facility, Ado-Ekiti, Nigeria. *Int Public Health J*, 2022; 14(2):165-173.
- [25] World Bank 2006. *World Development Report 2007: Development and the Next Generation*. The World Bank, Washington DC.
- [26] National Bureau of Statistics (NBS). *Nigeria poverty profile 2010*. Abuja: NBS, 2012 Publication.