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RESEARCH ARTICLE OPEN ACCESS

Knowledge, Attitudes, and Practices Related to Mosquito-borne Viral Diseases among Residents of Ogun State, Nigeria

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Abstract

Mosquito-borne diseases, such as malaria, yellow fever, dengue, and chikungunya, pose significant public health challenges, particularly in regions like Ogun State, Nigeria, where ecological and socio-demographic factors facilitate vector proliferation. This study aims to assess the knowledge, attitudes, and practices (KAP) related to mosquito-borne diseases among Ogun State residents, providing insights to guide targeted interventions. A cross-sectional survey was conducted with 450 respondents selected through a multistage sampling technique. Data on socio-demographic characteristics, knowledge, attitudes, and practices were collected using a structured questionnaire. Statistical analysis, including descriptive statistics, chi-squared tests, and linear regression, was performed using R software to identify associations between demographic factors and KAP indicators. The study population was predominantly young adults (mean age: 25.49 years), with more male participants (65.3%) and a nearly even urban-rural split. While 66.4% of respondents had heard of mosquito-borne diseases, only 34.7% and 36.7% identified Anopheles and Aedes mosquitoes as vectors. Preventive practices such as sleeping under mosquito nets (80.8%) were standard, but other measures, including eliminating stagnant water (46.4%) and using insecticides (40.3%), were less prevalent. Attitudes toward diagnostic testing were limited, with most respondents relying on symptomatic recognition rather than confirmatory testing. Significant associations were observed between demographics and KAP indicators. The findings highlight critical gaps in knowledge, attitudes, and practices related to mosquito-borne diseases in Ogun State. Targeted health education, improved access to preventive tools, and community engagement are essential to bridging these gaps and reducing the public health burden of mosquito-borne diseases.

Keywords: Arboviruses, Dengue, Diagnostics, Mosquito-Borne Diseases, Urbanization, Vectors

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INTRODUCTION

Ogun State, located in Southwestern Nigeria, is a vital link between Lagos and other regions, combining urban centres like Abeokuta with extensive rural communities. Its economy is firmly rooted in agriculture, particularly rice and cocoa, while rapid urbanisation has introduced significant environmental challenges. Poor waste management, stagnant water in rice paddies, and inadequate drainage create ideal breeding sites for mosquito vectors such as Aedes, facilitating arboviral diseases including dengue, chikungunya, and yellow fever.[1-3] Studies have reported arboviruses in high-risk areas such as cattle markets, reflecting a troubling convergence of urban development, agricultural practices, and ecological conditions.[4,5] While these ecological and infrastructural factors have been extensively documented, there remains limited evidence on community-level responses to these risks in Ogun State. Current research focuses on mosquito ecology and disease prevalence without adequately exploring knowledge, attitudes, and practices (KAP) related to arboviral prevention and control. However, successful vector control depends on informed community participation, including preventive behaviors such as eliminating breeding sites or using insecticide-treated nets. Previous KAP studies in other African contexts demonstrate the framework's utility in identifying gaps that hinder effective public health interventions.[6,7] Despite growing recognition of arboviral threats, there is a critical gap in understanding how socio-demographic factors influence awareness, perceptions, and preventive behaviors in Ogun State. Addressing this gap is essential for designing context-specific strategies to improve community engagement and strengthen vector control efforts. This study, therefore, aims to assess KAP concerning mosquito-borne viral diseases, identify key determinants of preventive practices, and provide evidence-based recommendations for improving disease prevention at the community level.

MATERIALS AND METHODS

Study Area

Ogun State is an important economic and cultural center located in the southwest of the country. To the south, Lagos State borders the state, Oyo and Osun to the north. Ondo State to the east, and the Republic of Benin to the west. It spans about 16,762 square miles. The population is above 5 million and includes urban areas like Abeokuta and Sagamu, as well as rural agrarian villages like Alabata and Obantoko. This combination of rural and city environments offers a good sample to examine the demographic and environmental forces affecting the rate of mosquito-borne arbovirus incidence.

Study design

A cross-sectional study in Ogun State assessed knowledge, habits, and attitudes (KAP) regarding arboviruses spread by mosquitoes. This plan enabled one-time data gathering to capture the usual patterns of awareness and behavior among people.

Study population

The study population consisted of individuals residing in six locations within Ogun State: Abeokuta, Alabata, Asero, Lafenwa, Obantoko, and Osiele. Participants were selected using a multistage sampling to ensure representation across urban and rural areas.

Inclusion criteria

Adults aged 18 and above who had lived in the study area for at least one year and were willing to provide informed consent.

Exclusion criteria

Individuals who did not give their consent and had not lived in the area for at least one year.

Sample size

450 participants were recruited, ensuring statistical power for subgroup analyses across locations and demographic factors.

Data collection

Data were collected through structured questionnaires to assess knowledge, attitudes, and practices regarding mosquito-borne arboviruses. The questionnaire covered topics such as awareness of diseases (e.g., yellow fever, dengue, chikungunya), understanding of mosquito vectors

(*Aedes* and *Anopheles* species), and preventive practices (e.g., use of insecticides, elimination of stagnant water). The questionnaire was divided into three KAP domains: Knowledge, Attitudes, and Practices, with a structured scoring system. Knowledge questions were scored 1 point for correct answers and 0 for incorrect or "Don't know" responses, while multiple-response items awarded 1 point for each correct option. Attitudes were assessed on a 3-point Likert scale (Agree = 2, Neutral = 1, Disagree = 0), and preventive practices were scored 1 point for positive behaviours and 0 for negative ones. Composite scores were categorised as good (≥75th percentile), moderate (50th-74th percentile), or poor (<50th percentile). Content validity was ensured through expert review and adaptation from WHO guidelines and validated KAP surveys.[8] A pre-test on 10% of the sample helped refine clarity and cultural appropriateness. Reliability was confirmed using Cronbach's alpha, with coefficients of 0.81 (Knowledge), 0.78 (Attitude), and 0.74 (Practice), indicating good internal consistency. Test-retest reliability on a subset after two weeks showed a correlation of 0.85, demonstrating stability over time. These measures collectively ensured the questionnaire was valid, reliable, and appropriate for assessing community-level knowledge, attitudes, and practices toward arboviral disease prevention in Ogun State.

Ethical considerations

This study was conducted under the approval of the Covenant Health Research Ethics Committee (CHREC) with approval number CU/HREC/OO and OA/432/24; the study adhered to national and international ethical standards. Written consent was sought from all participants, and anonymity was preserved while omitting the names and using unique codes for the participants. Community leaders in each study area were engaged to facilitate participant recruitment and ensure cultural appropriateness.

Data analysis

The data were analysed using R software, leveraging its advanced statistical and graphical capabilities.

Table 1. Socio-Demographic Characteristics of Respondents

Characteristics	Frequency	Percent
Location and Town		
Abeokuta	1	0.2
Alabata	107	23.8
Asero	105	23.3
Lafenwa	4	0.9
Obantoko	112	24.9
Osiele	120	26.7
Undisclosed Residence	1	0.2
What part of Abeokuta do you reside in?		
Rural	222	49.3
Urban	226	50.2
Undisclosed Age	2	0.4
Gender		
Female	145	32.2
Male	294	65.3
Undisclosed Gender	11	2.4
Age		
Mean	25.49	
Median	24.00	
Std. Deviation	12.463	
Range	68	
Minimum	7	
Maximum	75	
N	450	

Descriptive statistics

Summary statistics (e.g., mean, median, and percentages) were calculated for demographic variables and KAP indicators.

Cross-tabulations and chi-squared tests

Associations between variables, such as location, disease awareness, occupation, and vector knowledge, were assessed using chi-squared tests.

Regression analysis

Linear regression models were employed to identify predictors of knowledge and preventive practices, with demographic factors such as age, education, and occupation as independent variables.

Visualization

Graphs and tables were generated to illustrate key findings, such as the percentage of participants aware of specific diseases or the

Table 2. Socio-Economic Characteristics of Respondents

Characteristics	Frequency	Percent
Educational Background		
Valid	3	0.7
College/University	104	23.1
Secondary education	258	57.3
Primary education	61	13.6
None	24	5.3
Occupation		
Valid	2	0.4
Civil servant	16	3.6
Farmer	15	3.3
Retired	4	0.9
Student	233	51.8
Trading	140	31.1
Transporter	40	8.9

Table 3. Relationship between Demographics and Malaria Knowledge

Predictor	Coefficient	t-value	p-value
Age	0.0086	2.59	0.01
Gender (Male)	0.0503	1.53	0.13
Educational Background	-0.0333	-2.51	0.01
Occupation	-0.0635	-4.69	<0.001
Marital Status	-0.0775	-2.31	0.02
Religion	-0.0468	-1.43	0.15

prevalence of preventive practices in different locations.

RESULTS

Respondents' demographic and economic status show several variations and backgrounds influencing knowledge of sickness and prevention methods. Respondents are mainly from Osiele (26.7%), Obantoko (24.9%), and Alabata (23.8%), with little representation from Lafenwa (0.9%) and Abeokuta proper (0.2%), according to Table 1. Almost equally, the rural-urban split has some little more urban respondents (50.2%) than rural ones (49.3%). Males make up 65.3% of the gender distribution, whereas women account for 32.2% of the sample. With a mean age of 25.49 years and a standard deviation of 12.46, showing a young and diverse group, the range of respondent ages is wide. Given the youth population's preeminence,

Table 4. Different Location and the level of Arboviral Disease Awareness

	Awareness about Arboviral Disease			
	Yes	No	Undisclosed	Total
Abeokuta	1	0	0	1
Alabata	49	58	0	107
Asero	94	11	0	105
Lafenwa	3	1	0	4
Obantoko	91	19	2	112
Osiele	60	59	1	120
Town Undisclosed	1	0	0	1
Total	299	148	3	450

Table 5. General Level of Disease Awareness and Knowledge of Anopheles/Aedes Mosquito

Response	Anopheles	Aedes	Disease Awareness Frequency
0 (No)	281	277	148
1 (Yes)	156	165	299

this demographic distribution indicates the need for customized awareness and intervention initiatives in rural and urban areas.

With 57.3% attaining secondary education, followed by college/university attendance (23.1%), followed by college/university attendance (23.1%), 5.3% of respondents said no formal education, Table 2 stresses respondents' educational and professional profiles. In terms of employment, students (51.8%) and traders (31.1%) make up most of the sample; smaller groups are made up of transporters (8.9%), farmers (3.3%), and government employees (3.6%).

The findings on knowledge reveal significant associations between demographics and disease awareness, as well as essential gaps in vector knowledge among respondents. Table 3 highlights that age is positively associated with malaria knowledge ($p = 0.01$), suggesting that older participants understand malaria-related topics better. Conversely, educational background ($p = 0.01$), occupation ($p < 0.001$), and marital status ($p = 0.02$) negatively correlate with knowledge, indicating potential disparities in awareness among specific educational and occupational groups. For example, those with

Table 6. Relationship between some Selected Factors and Attitudes towards Mosquito-borne Diseases

Test	χ^2	df	p-value	Cramer's V	95% CI (Lower, Upper)
Location/Disease Awareness	73.351	5	2.05×10^{-14}	0.39	(0.31, 0.46)
Education/Anopheles Knowledge	12.081	3	0.00711	0.16	(0.06, 0.26)
Occupation/Aedes Knowledge	25.981	5	8.99×10^{-14}	0.23	(0.14, 0.32)

Table 7. Attitude towards Disease Diagnosis by Participants

Method	Frequency
Tests were conducted to confirm the disease	21
I had symptoms of malaria	148
Tests were conducted for the symptoms of malaria	26
I had symptoms of other diseases	7
Others	24

lower educational levels or engaged in certain occupations might have limited access to accurate health information. Gender and religion, however, did not significantly influence malaria knowledge, as indicated by their higher p-values (p = 0.13 and p = 0.15, respectively).

Regarding disease awareness, Table 4 and Table 5 shows that 66.4% of respondents had heard of arboviral diseases, with substantial variation across locations. Awareness was highest in Asero (89.5%) and Obantoko (81.3%), while Osiele (50.4%) and Alabata (45.8%) reported lower awareness levels. Table 6 highlights a significant knowledge gap concerning mosquito vectors, with only 34.7% and 36.7% of respondents identifying *Anopheles* and *Aedes* mosquitoes, respectively. It also shows that 33.6% of respondents were unaware of the diseases, underscoring the prevalence of misinformation or lack of information within the community. These findings emphasize the critical need for targeted educational initiatives to bridge knowledge gaps, particularly in underrepresented locations and demographics with limited awareness.

The results on attitudes highlight significant associations between demographics and disease awareness, as well as respondents' behaviour toward diagnosis and testing. Table 6 demonstrates statistically significant relationships between location and disease awareness ($p < 0.001$), education and knowledge of *Anopheles* mosquitoes ($p = 0.007$), and occupation and knowledge of *Aedes* mosquitoes ($p < 0.001$). These findings suggest that geographical, educational, and occupational factors influence attitudes toward mosquito-borne diseases and preventive measures. For instance, individuals in urban locations or those with higher education levels may have more proactive attitudes toward understanding and addressing these diseases than their rural or less educated counterparts. This indicates the potential for tailored interventions to align with demographic nuances.

Table 7 provides insight into diagnostic attitudes, revealing that most respondents (148) self-identified symptoms of malaria but did not seek confirmatory tests, while only 21 participants reported tests explicitly conducted for diagnosis. Additionally, a small proportion (26) sought testing after experiencing symptoms, reflecting a gap in proactive health-seeking behaviour. These trends highlight a reliance on symptomatic recognition rather than diagnostic confirmation, which may contribute to underdiagnosis or misdiagnosis, particularly in cases where symptoms overlap with other diseases. This underscores the importance of improving attitudes toward diagnostic testing through awareness campaigns emphasizing the value of confirmatory tests in managing mosquito-borne diseases.

The findings on practices reveal disparities in adopting arbovirus and malaria prevention measures among respondents. Table 8 highlights that sleeping under mosquito nets is the most commonly practiced and effective preventive measure, with 80.8% of respondents reporting its use. However, other practices, such as eliminating stagnant water (46.4%), chemoprophylaxis (27.1%), and wearing long, loose clothing (26.8%), show significantly lower adoption rates. The low uptake of these practices underscores the need for awareness campaigns to

Table 8. Protective Measures against Arboviral Diseases

Measure	Yes (Effective)	No (Not Effective)	Total	Valid Percent	Decide not to say
Sleeping under a mosquito net	235 (80.8%)	56 (19.2%)	291	64.7%	159
Eliminating stagnant water	135 (46.4%)	156 (53.6%)	291	64.7%	159
Chemoprophylaxis	79 (27.1%)	212 (72.9%)	291	64.7%	159
Wearing long, loose clothing	78 (26.8%)	213 (73.2%)	291	64.7%	159

Table 9. Awareness of Vaccine Availability for Arboviruses

Disease	Vaccine Available (Yes)	Vaccine Unavailable (No)	Total	Valid Percent	Decide not to Say
Yellow Fever	265 (98.1%)	5 (1.9%)	270	60%	180
Chikungunya	4 (1.5%)	266 (98.5%)	270	60%	180
Dengue	6 (2.2%)	264 (97.8%)	270	60%	180
Rift Valley Fever	3 (1.1%)	267 (98.9%)	270	60%	180

Table 10. Malaria Prevention Practices

Measure	Effective (Yes)	Not Effective (No)	Total	Valid Percent	Decide not to say
Wearing protective clothing	158 (53%)	140 (47%)	298	66.2%	152
Using Long-Lasting Insecticidal Nets (LLINs)	55 (18.5%)	243 (81.5%)	298	66.2%	152
Avoiding outdoor stays in the evening	96 (32.2%)	202 (67.8%)	298	66.2%	152
Keeping doors closed	93 (31.2%)	205 (68.8%)	298	66.2%	152
Using insecticides	120 (40.3%)	178 (59.7%)	298	66.2%	152
Door/window nets	104 (34.9%)	194 (65.1%)	298	66.2%	152
Cutting bushes	138 (46.3%)	160 (53.7%)	298	66.2%	152
Clearing drainages	129 (43.3%)	169 (56.7%)	298	66.2%	152
Avoiding large gatherings	45 (15.1%)	253 (84.9%)	298	66.2%	152
Discarding unused water/containers	96 (32.2%)	202 (67.8%)	298	66.2%	152
Other methods	10 (3.4%)	288 (96.6%)	298	66.2%	152

promote their importance in reducing mosquito-borne disease transmission. Furthermore, Table 9 shows that vaccines for arboviruses like yellow fever are widely available and utilized by 98.1% of respondents. Still, awareness and availability of vaccines for chikungunya, dengue, and Rift Valley fever remain minimal, with less than 2.5% reporting access to these vaccines.

In the context of malaria prevention (Table 10), less than half of the respondents engage in practices such as wearing protective clothing (53%), clearing drainages (43.3%), or cutting bushes (46.3%). Even lower adoption rates are seen for measures like using long-lasting insecticidal nets (LLINs) (18.5%) and avoiding outdoor activities in the evening (32.2%). Additionally, only 34.9% reported using door or window nets, and just 40.3% use insecticides effectively. These findings indicate a gap between knowledge and practice, possibly driven by barriers like cost, accessibility, or insufficient awareness. Efforts to improve these practices should focus on increasing accessibility to preventive tools and educating communities on the effectiveness of comprehensive vector control strategies.

DISCUSSION

This study reveals important findings about knowledge, attitudes, and practices regarding mosquito-borne diseases among Ogun State residents. Results confirm and contrast with earlier research, providing detailed insights into factors affecting arboviral disease prevention and control. The population was mainly young and male, with strong representation from urban areas like Osiele and Obantoko. This urban focus may indicate better information and healthcare access, matching Shehu et al.'s observations of higher urban awareness due to superior infrastructure and health services.

Despite most respondents having secondary education or higher, disease awareness remained relatively low, showing a disconnect between formal schooling and health knowledge. Similar gaps in Lagos informal settlements, where moderate education did not translate to adequate mosquito vector and transmission knowledge.[9] This reveals ongoing weaknesses in health communication approaches. Additionally, only about one-third correctly identified Anopheles and Aedes mosquitoes as disease carriers, reflecting patterns from previous outbreaks where vector recognition stayed poor even in high-risk areas.[4,10] Demographic correlations with knowledge were significant for age but negative for education and occupation, questioning the effectiveness of targeted health education. Similar inconsistencies, emphasizing how socioeconomic inequalities influence malaria prevention behaviors.[10] In this research, diagnostic testing misconceptions and reliance on symptoms rather than confirmatory testing further highlight these gaps. Diagnostic difficulties among Ogun State healthcare workers, showing systemic testing barriers for arboviral infections.[11]

Prevention behaviors showed mixed results. While many respondents used mosquito nets (80.8%), other measures like removing standing water (46.4%) and applying insecticides (40.3%) were underused. These differences match other observations, attributing low uptake of specific prevention methods to logistical constraints and socio-behavioral factors which can cause increased resistance and adaptation in the new environment.[9,12] The awareness and use of arboviral disease vaccines like dengue and chikungunya were minimal, reflecting global worries about poor vaccine distribution and community communication.[4] These results emphasize urgent needs for context-specific health education programs, better diagnostic access, and stronger prevention interventions. As recent studies recommend, including risk communication and community participation in health policies[9,11] could substantially improve disease control efforts. Moreover, public-private partnerships targeting structural barriers like cost, vaccine distribution, and waste management are vital for achieving sustainable vector control and reducing arboviral disease burden in Ogun State.

CONCLUSION

Residents of Ogun State have in-depth insights into the socioeconomic attitudes, knowledge, and behavior surrounding mosquito-borne diseases. Even if formal education is relatively high, the research shows important discrepancies in disease awareness, vector knowledge, and preventive measures. Differences in disease knowledge and underutilization of diagnostic testing and preventive methods between urban and rural areas point to systematic and community-level obstacles in the fight against arboviral diseases. Although sleeping under mosquito nets is a widely followed preventive measure, others, including removing stagnant water and using insecticides, are still underused. These holes highlight the critical need for focused initiatives addressing particular circumstances and encouraging sustainable health behaviors. The research highlights the need to include health education, enhance access to preventive equipment, and increase diagnostic capability. Dealing with these difficulties will enable policymakers, healthcare professionals, and local stakeholders to cooperate to lessen the burden of mosquito-borne diseases and improve public health outcomes in Ogun State and comparable surroundings. Effective prevention and control of vector-borne diseases should ideally entail properly using increased health education campaigns, improved diagnostic ability,

better access to preventive tools, community engagement, policy coordination, and monitoring.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORS' CONTRIBUTION

TAO, SUO and AOA conceptualized the study. SUO and AOA supervised the study. TAO wrote the original draft. SUO, AOA and TAO wrote, reviewed and edited the manuscript. All authors read and approved the final manuscript for publication.

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DATA AVAILABILITY

All datasets generated or analyzed during this study are included in the manuscript.

ETHICS STATEMENT

This study was approved by the Ethical Committee, Covenant University, Nigeria, vide approval number CU/HREC/OO & OA/432/24.

INFORMED CONSENT

Written informed consent was obtained from the participants before enrolling in the study.

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