



KNOWLEDGE AND PRACTICES OF HEALTHCARE WORKERS ON ARBOVIRAL INFECTIONS AND DIAGNOSTICS APPROACH IN OGUN STATE, SOUTHWEST NIGERIA

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ABSTRACT

Arboviral infections pose significant public health challenges in tropical and subtropical regions like Nigeria. However, these diseases are often undetected by healthcare workers (HCWs) due to the similarity in the presentation to other febrile illnesses like malaria. This study assessed the knowledge and diagnostic practices of HCWs on arboviral infections in Ogun State. A cross-sectional study was conducted among HCWs in selected secondary and tertiary health facilities in Ogun State from October 2022 to September 2023. A semi-structured questionnaire was administered to collect data on sociodemographic characteristics, knowledge of arboviral infections, and diagnostic practices. Stata was used to analyze the data at a 5% level of significance. Of the 96 participants included in the study, 59.4% were female, and 40.0% were ≥ 35 years old. Nurses constituted the largest cadre (41.7%) while medical doctors (24.0%) were the least represented. Most respondents (68.8%) had never heard of arboviral infections, and 81.3% demonstrated poor knowledge about arboviral infections and diagnosis. Only 6.3% of HCWs had previously suspected or diagnosed an arboviral infection, with clinical diagnosis being more common (66.7%) than laboratory testing (33.3%). Notably, 92.7% of all respondents had no prior training in arboviral infection diagnosis. Good knowledge and previous training received were significantly associated with the diagnosis of arboviral infections among HCWs ($p < .05$). There is a gap in the knowledge and diagnostic practices of HCWs in the detection of arboviral infections in Ogun State. Thus, comprehensive training programs may be significant in improving awareness, and diagnostic capabilities and enhancing prompt detection and management of arboviral infections in Ogun state.

Keywords: Arboviral infections, Arboviral disease, Arboviral diagnosis, Healthcare workers, Ogun State, Nigeria

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INTRODUCTION

Arboviral infections represent a group of diseases that are endemic in tropical and subtropical regions like Nigeria (Ayorinde *et al.*, 2016; Coelho & Codeço, 2019; Asebe *et al.*, 2021; Tajudeen *et al.*, 2022). These diseases are often presented as undifferentiated febrile illnesses and are likely to be clinically misdiagnosed for other predominant febrile diseases like malaria and other common febrile illnesses due to the lack of awareness of the disease and clinical presentations (Kajeguka *et al.*, 2017; Ipadeola, 2020). Thus, HCWs must have comprehensive knowledge and awareness of these diseases including clinical presentations, diagnostic methods, and management protocols. Also, assessing the knowledge and diagnostic capabilities of HCWs can play a crucial role in understanding the limitations of the healthcare system in misdiagnosing febrile illnesses which can be translated to evidence-based strategies for improving disease surveillance, prompt disease detection, and response to disease outbreaks.

In Nigeria, diagnostic challenges are compounded by the limited number and sophistication of laboratory facilities, variability in diagnostic capacity across these facilities, and issues with prompt surveillance and reporting systems to mitigate outbreaks (Adekola *et al.*, n.d.; Adesola & Idris, 2022). Thus, HCWs must navigate these complexities while adhering to national and international guidelines. Furthermore, the diagnostic approach toward arboviral infections necessitates an integrated approach toward clinical evaluation, laboratory testing, and epidemiological surveillance. Thus, serological assays, polymerase chain reaction (PCR), and viral isolation techniques are integral diagnostic methods for detecting these diseases (Kuno, 1998; Licinio & Ayes, 2021). However, the accessibility and reliability of these diagnostic tools in resource-limited settings like Nigeria remain a major health concern.

In Nigeria, states vary in their risk for inter-state and cross-border disease transmission and their capacity to promptly identify and respond to disease outbreaks. In Ogun State, the epidemiology of arboviral diseases such as Chikungunya, Zika, and yellow fever underscores the need for improvement of knowledge and practice of HCWs towards the diagnosis and treatment (Ayorinde *et al.*, 2016; Otu *et al.*, 2020). The ability to differentiate this group of infections from other febrile illnesses is often affected by inadequate training, limited access to diagnostic tools, and poor awareness of emerging arboviral threats all of which may hinder effective patient management and public health interventions as seen in other studies (Bangoura *et al.*, 2023; Ipadeola *et al.*, 2023). Effective disease management hinges upon improving the capability of the healthcare system to correctly diagnose these groups of diseases (Adesola & Idris, 2022). Therefore, there is a need to assess the knowledge and practices of HCWs towards the diagnosis and treatment of arboviral infections. However, only a few studies have been conducted to assess the awareness and practices towards arboviral infections amongst HCWs in other parts of Nigeria (Oche *et al.*, 2021, 2022). As a result, there is little known about the awareness and diagnostic practices of HCWs towards known and emerging arboviral infections in Ogun State, Southwest Nigeria.

This study assessed the awareness and diagnostic practices of HCWs towards arboviral infections in Ogun State, Nigeria to inform targeted interventions that will strengthen diagnostic capacity, improve surveillance systems, and enhance HCWs' preparedness in efficiently managing arboviral outbreaks.

METHODS

Study Design

A cross-sectional study was conducted between October 2022 and September 2023 among HCWs in Ogun state.

Study area and study sampling

Ogun State was purposively selected due to the rapid urbanization and high risk of arboviral disease importation due to the presence of local and international land borders and proximity to high-risk states. A line list of all secondary and tertiary health facilities in Ogun state was obtained from the Ministry of Health. Health facilities were purposively selected based on the daily volume of patients. Thus, Federal Medical Centre Abeokuta, General Hospital Ijebu Ife, and General Hospital Ota were selected for the study. In each health facility, a list of clinical staff was obtained and medical doctors, nurses, and laboratory scientists were recruited for the study.

Eligibility Criteria

Eligible participants include full-time HCWs (medical doctors, nurses, and laboratory scientists), aged ≥ 18 years old, who had worked for at least 12 months before the study and have provided signed informed consent to participate in the study. HCWs with less than 12 months of clinical practice at the health facilities and those who did not consent to participate were excluded from the study.

Study Instrument

A semi-structured questionnaire was utilized to assess the knowledge and practices of HCWs towards arboviral infection. The questionnaire was divided into three sections including socio-demographic characteristics of which gender, age, cadre of practice, level of facility, and years of experience were collected. The second section assessed information about the knowledge of arbovirus infection, clinical presentation, and diagnosis. The last section assessed HCWs' level of training received and practices towards the suspicion and diagnosis of arboviral infections. The total knowledge score for each participant was presented in percentages. Respondents with scores of $\leq 30\%$ were categorized as having poor knowledge while participants with total knowledge score of 31-49% were categorized as having moderate knowledge. Participants with $\geq 50\%$ were categorized to good knowledge. This cut-off was set based on other studies that have been conducted (Dorji *et al.*, 2020; Devipriya *et al.*, 2021; Doan *et al.*, 2022). Before the initiation of the study, the study instrument was pre-tested on randomly selected HCWs within the target population to assess the ease of use, validity, and reliability of the questions.

Data collection

The questionnaires were administered to participants by trained research assistants. Research assistants with field experience in data collection were recruited, trained to effectively administer questionnaires without influencing the choices of participants, and deployed for data collection. Similarly, field supervisors were recruited, trained, and deployed to supervise data collection.

Data analysis

Data from the questionnaires were transcribed into Microsoft Excel for cleaning and coding and data analysis was performed using Stata (version 17). Descriptive statistics were presented in frequency and percentages. A Chi-squared

analysis was performed to test for association between independent variables and the study outcome. Fisher's exact test was however applied when conditions for Chi-squared tests were not met. The analysis was performed using a 5% level of significance.

Ethical Approval

Ethical approval was obtained from the Health Research Ethics Committee of the State Ministry of Health, Ogun State, with protocol approval number HPRS/381/449, and Federal Medical Centre Abeokuta with protocol approval number FMC/470/HREC/01/2022/16. Participants for the study were recruited voluntarily and were required to sign an informed consent form. All information obtained from participants was de-identified to protect the confidentiality of study participants.

RESULTS

Table 1 presents the demographic profile of the respondents in this study. A total of 96 participants were recruited for the study of which more than half of the respondents were female (59.4%), and 50% were aged 35 years and above. Nurses comprised the largest proportion of HCWs (41.7%), followed by laboratory scientists (34.4%) and medical doctors (24.0%). Most participants were employed at tertiary-level facilities (67.7%), while 32.3% were from secondary-level facilities. Regarding years of experience, 43(44.8%) had less than 5 years, 30(31.3%) had more than 10 years compared to 23(24.0%) that had 6 -10 years of professional experience.

Table 1: Sociodemographic characteristics of the respondents in Ogun state, Nigeria

Variable s	Frequency	Percent
Sex		
Male	39	40.6
Female	57	59.4
Age (years)		
Less than 24	7	7.3
25 to 34	41	42.7
35 and above	48	50
Profession		
Medical doctors	23	24.0
Nurses	40	41.7
Laboratory scientist	33	34.4
Facility level		
Secondary	31	32.3
Tertiary	65	67.7
Year of experience		
Less than 5	43	44.8
6 to 10 years	23	24
More than 10 years	30	31.3

Table 2 summarizes the level of knowledge about arboviral infections and methods for diagnosis among HCWs in Ogun State, Nigeria. More than two-thirds of the respondents (68.8%) reported no prior knowledge about arboviral infections. Similarly, 68.8% of the respondents could not mention at least one arboviral infection. Regarding the symptoms of arboviral infections, less than one-tenth of the respondents (3.1%) were able to identify four to six symptoms while 28.1% (27) reported knowledge of one to three, and 68.8% could not identify a single symptom of arboviral infection. Overall, most respondents (81.3%) demonstrated poor knowledge about arboviral infections and diagnosis, while 14.6% exhibited moderate knowledge and less than one-tenth of the respondents (4.2%) demonstrated good knowledge of arboviral infection and diagnostic methods (Figure 1).

Table 2: Level of knowledge about arboviral infection and diagnosis among healthcare workers in Ogun state, Nigeria

Variables	Frequency	Percent
Heard of arboviral infection before		
Yes	30	31.3
No	66	68.8
Mention Seven types of arboviral infections		
Participants who mentioned four to seven arboviral infections	4	4.2
Participants who mentioned one to three arboviral infections	26	27.1
Participants who mentioned none	66	68.8
Mention Six common symptoms of arboviral infections		
Participants who mentioned four to six symptoms of arboviral infections	3	3.1
Participants who mentioned one to three symptoms of arboviral infections	27	28.1
Participants who mentioned none	66	68.8
Mention two diagnostic methods of arboviral infections		
Participants who mentioned one to two symptoms of arbovirus infections	30	31.3
Participants who mentioned none	66	68.8

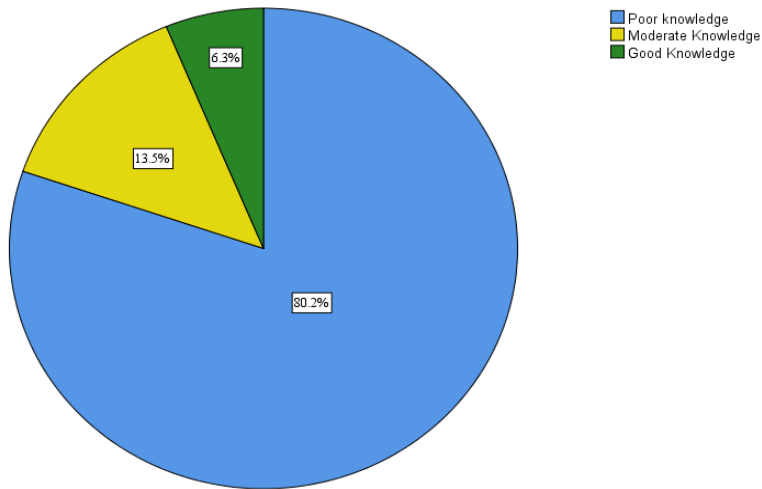


Figure 1: Overall knowledge of respondents about Arboviral Infections among Healthcare workers in Ogun state, Nigeria

Table 3 presents the diagnostic approach for arboviral infections among HCWs in Ogun State, Nigeria. Of all respondents, 89(92.7%) had not received any training on the diagnosis of arboviral infection, while only 7(7.3%) had received such training. Also, only 6(6.3%) reported having ever suspected or diagnosed an arboviral infection during their clinical practice, with clinical diagnosis being the most common diagnostic approach (66.7%) compared to laboratory testing (33.3%). All HCWs who used laboratory testing to diagnose arboviral infection employed the PCR diagnostic method.

Table 3: Diagnostic approach for arboviral infections among healthcare workers in Ogun state, Nigeria

Variable	Frequency	%
Received training on arboviral diagnosis	7	7.3
Yes	89	92.7
No		
Year of training (N=7)		
Less than 3 years	4	57.1
3 years and above	3	42.9
Ever suspected or diagnosed arboviral infections		
Yes	6	6.3
No	90	93.8
Diagnostic approach (N=6)		
Clinical diagnosis	4	66.7
Laboratory testing	2	33.3
Lab arboviral diagnostic method (N=2)		
Rapid test and ELISA	0	0
PCR	2	100

Note: %=percent, N=number, PCR=polymerase chain reaction, ELISA: Enzyme-Linked Immunosorbent Assay

Table 4 illustrates the factors associated with the diagnostic practices of HCWs in Ogun State, Nigeria. Knowledge of arboviral infection and diagnosis was significantly associated with diagnostic practices of HCWs towards arboviral infection diagnosis, as 30.0% with good knowledge compared to 3.5% with poor knowledge had previously diagnosed an arboviral infection ($p = 0.014$). A higher proportion of those who previously received training on arboviral infection diagnosis (57.1%) diagnosed an arboviral infection compared to those who did not (2.2%) ($p < 0.001$). However, sex, age group, profession, facility level, and years of experience were not significantly associated with a prior diagnosis of arboviral infection among HCWs ($p > .05$).

Table 4: Association between respondents' profile, knowledge of Arboviral infection and diagnostics practices of arboviral infections in Ogun state, Nigeria

Ever diagnosed Arboviral infection in your health facility				
Variables	Yes (%)	No (%)	Total (%)	p value[†]
Sex				
Male	4 (10.3)	35 (89.7)	39 (100)	0.220
Female	2 (3.5)	55 (96.5)	57 (100)	
Age group (years)				
Less than 24	0 (0.0)	7 (100.0)	7 (100)	0.621
25 to 34	2 (4.9)	39 (95.1)	41 (100)	
35 and above	4 (8.3)	44 (91.7)	48 (100)	
Profession				
Medical doctors	3 (13.0)	20 (87.0)	23 (100)	0.085
Nurses	0 (0.0)	40 (100.0)	40 (100)	
Lab scientist	3 (9.1)	30 (90.9)	33 (100)	
Facility level				
Secondary	2 (6.5)	29 (93.5)	31 (100)	0.635
Tertiary	4 (6.2)	61 (93.8)	65 (100)	
Year of experience				
Less than 5 years	2 (4.7)	41 (95.3)	43 (100)	0.592
6 to 10 years	1 (4.3)	22 (95.7)	23 (100)	
More than 10 years	3 (10.0)	27 (90.0)	30 (100)	
Knowledge of arboviral infection and diagnosis				
Good	3 (30.0)	7 (70.0)	10 (100)	0.014*
Poor	3 (3.5)	83 (96.5)	86 (100)	
Received training on arboviral diagnosis				
Yes	4 (57.1)	3 (42.9)	7 (100)	<0.001*
No	2 (2.2)	87 (97.8)	89 (100)	

Note: * =statistical significance, %=percent, lab=laboratory

DISCUSSION

The study assessed factors associated with the diagnostic practices of HCWs towards arboviral infections in Ogun state. In this study over 90% of the HCWs had sub-optimal knowledge about arboviral infection and diagnosis. More than two-thirds of the respondents had no prior knowledge about arboviral infections. This lack of awareness is concerning, given the global health impact of arboviral diseases like Dengue, Yellow fever, Zika, and Chikungunya especially in tropical regions where there is a disproportionate burden of the disease (WHO, 2020). Furthermore, the majority of the participants could not mention a single arboviral infection and only <5.0% were able to mention four to seven of these diseases. Our finding is consistent with another study conducted in the Republic of Guinea which reported good knowledge about arboviral infection in only 1% of HCWs (Bangoura *et al.*, 2023). Another study conducted in Northern Tanzania also found that while 53% of the HCWs had prior knowledge about DenV, only 2.4% of the HCWs had good knowledge about ChikV (Kajeguka *et al.*, 2017). This demonstrates a critical need for educational initiatives to improve awareness and understanding of these groups of infections among HCWs.

The study also highlighted deficiencies in the diagnostic approach for arboviral infections. In our study, over 90% of the HCWs never suspected or diagnosed an arboviral infection previously, of which clinical diagnosis was the predominant method for diagnosis among those who were diagnosed compared to laboratory testing. The low index of suspicion recorded among HCWs in this study could be attributed to misidentification of arboviral infection for other febrile illnesses like malaria which is predominant within the region. Notably, arboviral diseases are clinically presented as undifferentiated febrile illnesses. Consequently, HCWs may likely overlook the possibility of infections other than malaria in patients presenting with fever at the healthcare facility (Kajeguka *et al.*, 2017; Adam & Jassoy, 2021). This has also been seen in a previous study conducted in Tanzania where some of the HCWs thought arboviral diseases were new diseases that had occurred within the population (Kajeguka *et al.*, 2017). Also, this can be attributed to the lack of training on arboviral infections as our study also found that the majority of the HCWs had no prior training on arboviral infection and diagnosis. It is important that surveillance and response to arboviral infection is strengthened and arboviral infection is investigated routinely within the healthcare system.

The study found that knowledge of arboviral infections was associated with better diagnostic practices toward arboviral infection among HCWs. This highlights the importance of targeted education and training programs to improve the knowledge of HCWs about this group of diseases as this may help improve practices toward disease detection and management. Additionally, prior training of HCWs was associated with arboviral disease diagnosis by HCWs. It is expected that training will improve the knowledge about the disease and thus improve the index of suspicion of HCWs as well as their ability to diagnose the disease when presented at the healthcare facility. Similarly, previous studies conducted in Togo, Taiwan, and Singapore have reported a significant association between knowledge and training of HCWs on arboviral diseases and diagnostic practices of arboviral diseases (Lee *et al.*, 2011; Ho *et al.*, 2013; Zida-Compaore *et al.*, 2022). Therefore, evidence-based actions that are targeted at improving the knowledge of HCWs must be implemented especially in Ogun state where there is poor knowledge about this group of diseases.

Limitations of the Study

Some limitations were identified in this study. First, the study's cross-sectional design captures information at a single point in time, which may not reflect changes in knowledge and practices over time. Also, the sample size for this study was small which limits the possibility of generalizing our findings on the study population. The reliance on self-reported data may introduce bias, as participants might overestimate or underestimate their knowledge and practices as assessed in this study. To address this limitation, further questions were asked to ensure correct responses.

CONCLUSION

The study reveals a substantial gap in the knowledge and diagnostic practices regarding arboviral infections among HCWs in Ogun State, Nigeria. These findings underscore the critical role of training and awareness programs in enhancing the knowledge of arboviral diseases among HCWs and their capacity to efficiently suspect and diagnose arboviral diseases within the healthcare facility. Such initiatives are crucial for enhancing the early detection and management of arboviral infections, ultimately contributing to better patient outcomes and public health. Addressing this knowledge gap can help equip HCWs with the necessary tools to effectively combat the threat of arboviral diseases, especially in endemic regions like Nigeria.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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