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Assessment of Levels of Knowledge of Mosquitoes as Vectors of Viral Diseases among Pregnant Women in Semi-Urban Areas of Abuja, Nigeria

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ABSTRACT

Mosquitoes transmit not only Malaria but also a host of viruses that affect and cause disease in humans. **Objectives:** To assess the level of knowledge pregnant women have about mosquitoes as vectors of viral disease in semi-urban areas of Abuja, Nigeria. **Methods:** Respondents for this study were apparently healthy pregnant women attending three primary health care centers in Abaji, Federal Capital City, Nigeria. Demographic data and necessary information on knowledge levels were collected with the aid of an interviewer-delivered questionnaire. **Result:** The level of Knowledge of mosquitoes as a vector of Malaria and Viruses was 99.2% vs 12.9%. Age ($p<0.001$) and Educational status ($p<0.001$) were significant determining factors of knowledge levels. Parity status ($p=0.171$) and Gravidity ($p=0.312$) were not significant confounders. **Conclusions:** The inclusion of detailed knowledge about the capacity of infectious disease transmission by mosquitoes should be incorporated into regular talks during antenatal clinic visits.

INTRODUCTION

Mosquitoes are ubiquitous with a cosmopolitan distribution [1]. They are found in every region of the world, except Antarctica, a few polar islands in the subpolar climates, and Iceland. It has been observed that the complete absence of mosquitoes from Iceland is a result of quirks of the climate [2]. Thousands of mosquito species feed on the blood of various hosts, including mammals, birds, reptiles, amphibians, and some fish, along with some invertebrates, primarily other arthropods [3]. The mosquito's saliva is transferred to the host during the bite and can cause an itchy rash. In addition, many species can ingest pathogens while biting and transmit them to future hosts [4]. Mosquitoes are important vectors of a range of diseases, such as malaria and filariasis, and arboviral diseases such as yellow fever, Chikungunya, West Nile, dengue fever, and Zika [5]. Mosquitoes serve as vectors for several diseases that cause the death of over 700,000 people each year [6]. The myriads of viral diseases that can be transmitted by mosquitoes are numerous; it will be noteworthy for public knowledge to be high in this regard. Public knowledge of mosquitoes as a vector of malaria in our society is commonplace. Drug abuse is possible when there is a misconception of disease after an intermittent mosquito bite to be Malaria; proper clinical and laboratory

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diagnosis should be the mainstay rather than. This study was a cross-sectional evaluation of awareness and knowledge levels of the capacity and capability of mosquitoes to transmit viral infections. The sole aim of this study is purely to educate society to perform the required preventive actions against mosquitoes in our environment. Abaji is a local government area in the Federal Capital Territory of Nigeria, Abuja. Abaji Area Council is the farthest area council from the city Centre, and occupies about 1,100 square kilometers. Created in 1986, the council has a population of over 46,600 inhabitants according to a 2006 national census.

Despite widespread awareness of mosquitoes as vectors of malaria, knowledge regarding their role in transmitting viral diseases remains critically low among pregnant women in semi-urban areas. Limited studies have specifically evaluated this awareness in Abuja, Nigeria, creating a gap in targeted public health education. Understanding these knowledge levels is essential to design effective antenatal health interventions and reduce the risk of arboviral infections in vulnerable populations. This study aims to assess the level of knowledge pregnant women have about mosquitoes as vectors of viral disease in semi-urban areas of Abuja, Nigeria.

METHODS

This was a cross-sectional study conducted for three months from January to March 2023. This study was part of the Viral Diseases, Malaria and Cholera Prevention Alert (VDCPA) program, an infectious disease enlightenment program in underserved populations of Nigeria. A convenience sampling technique was used to recruit participants from the three primary health care centers. All eligible pregnant women attending the clinics during the study period were invited to participate until the target sample size was achieved. This study was carried out in three primary health care centers in the suburban communities of Abaji Local Government Area of Abuja, Federal Capital Territory, Nigeria. The initial sample size calculated was 246. However, to enhance the statistical power of the study, account for potential non-response or incomplete data, and ensure robust subgroup analyses (e.g., by age, education level), the final sample size was increased to 395. This adjustment aligns with methodological recommendations for improving accuracy and generalizability in cross-sectional studies. The sample size for this study was determined using the formula for finite population correction: $n=N/(1+N(e)^2)$. Where: N = Total population size (estimated annual number of pregnant women attending the three primary health care centers = 800), e = Margin of error (0.05), and n = Required sample size. Calculation: $n = 800 / (1 + 800 \times (0.05)^2) = 246$. To improve statistical power and account for potential non-response, the final sample size was increased to 395 respondents. To increase accuracy, the sample was doubled to 395 respondents. Ethical approval was received from the Local Health Authority Ethics Committee of Abaji Local Government, FCT Abuja. Written or verbal informed consent was obtained from respondents. The interviewer-administered questionnaire was pre-tested for clarity and relevance. Its reliability was confirmed using Cronbach's alpha ($\alpha = 0.78$), indicating good internal consistency. This process ensured the tool was both valid and reliable for data collection. In total, three hundred and ninety-five pregnant women of the 543 that were approached provided consent to be part of this study. They were administered an interviewer-delivered questionnaire, and questions were asked in relation to their knowledge of mosquitoes as a disease vector of both Malaria and Viruses. Data on demographics were collected only from respondents who provided consent for inclusion in this study. Data collected included Age, Educational status, economic status, marital status, parity, and Primigravidae.

RESULTS

The majority of study participants were in the age bracket of 26-30 years, with a population prevalence of 43.0%. Data on the educational status, economic status, marital status, parity, and gravidity status are also summarized (Table 1).

Table 1: Demographic Characteristics of Study Participants

Variables	Frequency (%)
Age	
16-25	113 (28.7%)
26-30	170 (43.0%)
31-40	89 (22.5%)
41-50	23 (5.8%)
Educational Status	
No education/Primary	54 (13.7%)
Secondary	258 (65.3%)
Higher education	83 (21.0%)
Economic Status	
Working	230 (58.0%)
Non-Working	165 (42.0%)
Marital status	
Married	228 (57.7%)
Living Together	137 (34.7%)
Single	30 (7.6%)
Parity	
1st Trimester	136 (34.4%)
2nd Trimester	196 (49.6%)
3rd Trimester	63 (16.0%)
Gravidity	
Primigravidae	160 (40.5%)
Multigravidae	235 (59.5%)

In this study, the overall percentage of respondents (pregnant women) interviewed who knew that Malaria could also transmit viruses was 12.9%, which was found to be

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significantly lower than the majority of respondents, 87.1% who responded negatively (Table 2).

Table 2: Knowledge of Mosquitoes as Vectors of Viral Diseases

Parameter	Respondents (n=395)			
Mosquitoes as Vectors	Malaria	Virus	Chi	p-Value
Yes	392 (99.25%)	51 (12.9%)	597.5891	<0.001
No	3 (0.8%)	344 (87.1%)		

The association between factors responsible for the level of knowledge of Mosquitoes as vectors of Virus transmission is summarized. It was found that respondents with low educational status were significantly more unaware of the capacity of mosquitoes to transmit viruses (Table 3).

Table 3: Factors of Knowledge of Mosquitoes as Vectors of Viral Diseases

Factors	Yes (%)	No (%)	p-Value
Age (Years)			
16-25	3 (2.7%)	110 (97.3%)	<0.001
26-30	15 (8.8%)	155 (91.2%)	
31-40	28 (31.4%)	61 (68.6%)	
41-50	5 (21.7%)	18 (78.0%)	
Educational Status			
No education/Primary	2 (3.7%)	52 (96.3%)	<0.001
Secondary	13 (5.0%)	245 (95.0%)	
Higher education	36 (43.0%)	47 (57.0%)	
Economic Status			
Working	29 (12.6%)	201 (87.4%)	0.832
Non-Working	22 (13.3%)	143 (86.7%)	
Marital status			
Married	37 (16.2%)	191 (83.8%)	0.685
Living Together	11 (8.0%)	126 (92.0%)	
Single	3 (10.0%)	27 (90.0%)	
Parity			
1st Trimester	19 (14.0%)	117 (86.0%)	0.171
2nd Trimester	20 (10.2%)	176 (89.8%)	
3rd Trimester	12 (19.0%)	51 (80.1%)	
Gravidity			
Primigravidae	14 (8.8%)	146 (91.2%)	0.312
Multigravidae	37 (15.7%)	198 (84.3%)	

DISCUSSION

In a population of three hundred and ninety-five women, those aware that Mosquitoes are vectors of Viral diseases were 51/395 (12.9%), as compared to Malaria, which was 392/395 (99.2%). It is observed that in the study population, there was a high level of unawareness of the capacity to transmit Viral infections. There is a possibility that these respondents assume that all diseases post persistent mosquito bites are Malaria, these may lead to increased and irrational abuse of malaria medications without seeking proper medical diagnosis and examinations. There is evidence of increasing prevalence of mosquito-transmitted viral diseases in Nigeria [7-9]. Arbovirus prevalence has been investigated among pregnant women in Ibadan with a sero-prevalence rate of 55.6%, 38.9% and 25% for Zika, Dengue, and Chikungunya viruses [9]. Also studies on viruses transmitted by Mosquitoes with varying prevalence in various part of the country abounds, example a prevalence of 2% and 1.4% pregnant women were sero-positive for Zika antibodies in Lagos Nigeria [10], a 19% IgM Zika virus was also found in Nassarawa State [11], and finally Ifeorah and colleagues [12], found a prevalence of 1.6% Igm Zika virus prevalence in 2021. Dengue fever has also been recognized as a major cause of fever of unknown origin among pregnant women in Nigeria [13-15]. A 2% dengue prevalence has been reported among ante-natal attendees in Bauchi State [16], 16.8% Dengue IgM in a pooled study in Nigeria [17], and Onyedibe reported a 23.9% IgM dengue Virus in North-Eastern Nigeria [18]. Chikungunya has also been studied in Nigeria with varying prevalence reports. A 2020 meta-analytical study found a chikungunya pooled prevalence of 26.7% IgG [19]. The findings of this study have also been corroborated by the studies of Asaga et al. [20]. Educating expectant mothers on the other diseases that can be transmitted by Mosquitoes will reduce the inordinate use of drugs and further appreciate the need for them to seek proper malaria protection by ensuring they consistently use standard mosquito-treated nets and ensuring cleanliness around their surroundings and homes. The economic importance of mosquitoes other than Malaria should constitute part of the talks when pregnant women visit antenatal clinics in primary health care centers and in obstetric care homes. Health workers need to include basic vector biology in the seminars in medical symposiums and lecture series. As observed in this study, matured antenatal attendees were more aware that mosquitoes can transmit Viruses. The educated class was also more aware; being educated could increase curiosity and the search for knowledge. Parity status and Gravidity were not significantly associated with the knowledge level of Mosquitoes as vectors of viral diseases.

This study was limited to three primary health care centers in a single semi-urban area, which may not fully represent the broader population. Future studies should include diverse geographic regions and incorporate longitudinal assessments to evaluate changes in awareness over time. Additionally, interventions aimed at improving knowledge on mosquito-borne viral diseases could be implemented and their effectiveness systematically assessed to enhance maternal and community health outcomes.

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CONCLUSIONS

This study provides an elaborate knowledge base for pregnant women; however, emphasized; pregnant women should be taught mosquito prevention modalities and techniques, including the extended capacity of mosquitoes as vectors other than Malaria, which has become very essential with the increasing prevalence of arbovirus diseases in our study area.

Authors' Contribution

Conceptualization: FO, AUD
Methodology: FO, AUD
Formal analysis: FO, AUD
Writing and Drafting: FO, AUD
Review and Editing: FO, AUD

All authors approved the final manuscript and take responsibility for the integrity of the work.

Conflicts of Interest

All the authors declare no conflict of interest.

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