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Prevalence and Risk Factors of Arthropod-borne Diseases among Students in Tertiary Institutions in Anambra State, Nigeria

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ABSTRACT

Aim of the Study: This study investigates the prevalence and risk factors of arthropod-borne diseases among students in tertiary institutions in Anambra state, Nigeria.

Methodology: Employing a descriptive survey research design, data were gathered through a cross-sectional survey questionnaire distributed to a sample of 100 students from various institutions. The survey instrument, consisting of three clusters and 19 items, was developed by the researcher, underwent face validation by experts, and demonstrated acceptable internal reliability (Cronbach's $\alpha = 0.91$). Utilizing a 4-point Likert scale, respondents provided perceptions on disease prevalence and associated risk factors. Descriptive statistics, mean, and standard deviation were computed using SPSS version 22.

Findings: The findings revealed a high prevalence of mosquito-borne diseases, emphasizing the significance of sanitation practices, outdoor activities, and exposure to disease vectors.

Conclusion: The study contributes valuable insights for public health interventions in tertiary institutions, recommending targeted strategies for vector control, hygiene promotion, and awareness campaigns. This research enhances our understanding of arthropod-borne diseases within the context of Nigerian tertiary institutions, providing a foundation for tailored preventive measures and public health policies.

Keywords: Prevalence, Risk Factors, Arthropod-borne Diseases, Students, Tertiary Institutions.

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Introduction

Arthropod-borne diseases pose a significant public health challenge globally, with their impact extending to diverse geographical regions and demographic groups (Wu et al., 2021). In Nigeria, a country with a tropical climate conducive to the proliferation of disease vectors, the prevalence and risk factors of arthropod-borne diseases among students in tertiary institutions are areas of growing concern (Sosan et al., 2019; Okwa, 2019). This study focuses on Anambra state, a region characterized by its unique environmental dynamics and a diverse population of students attending various tertiary institutions. The school environment, characterized by shared living spaces, diverse outdoor activities, and varying levels

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of sanitation, presents a complex setting where disease transmission dynamics can be influenced by numerous factors.

Arthropod-borne diseases, transmitted by vectors such as mosquitoes, fleas, sandflies, and ticks, contribute significantly to the burden of infectious diseases. Arthropods comprise a diverse and vast group of invertebrate animals characterized by their jointed legs, segmented bodies, and exoskeletons made of chitin (Power et al., 2022). This phylum encompasses a broad range of creatures, including insects, arachnids (spiders, scorpions), myriapods (centipedes, millipedes), and crustaceans (crabs, lobsters). Arthropods play crucial ecological roles as pollinators, decomposers, and prey in various ecosystems. Their adaptability and sheer numbers contribute to their success in inhabiting terrestrial, freshwater, and marine environments, making them one of the most numerous and diverse groups of organisms on Earth (Ehounoud et al., 2017).

Arthropod-borne diseases are illnesses transmitted to humans through the bites of infected arthropods, primarily insects and ticks. Common vectors include mosquitoes (malaria, dengue), ticks (Lyme disease, tick-borne encephalitis), and fleas (plague). These diseases, prevalent in various regions worldwide, pose significant public health concerns (Gossner et al., 2023). Arthropod vectors act as carriers for pathogens, such as parasites, bacteria, or viruses, transferring them to humans during blood-feeding. The impact of these diseases ranges from mild to severe, often affecting millions globally (Onoja et al., 2022). Understanding the prevalence and risk factors specific to this context is crucial for developing targeted interventions and public health policies to safeguard the health and well-being of students.

The motivation for studying the prevalence and risk factors of arthropod-borne diseases among students in tertiary institutions in Anambra state arises from a confluence of factors, including the region's unique environmental conditions, the potential impact on the student population, and the need for targeted public health interventions. Anambra state, located in the southeastern part of Nigeria, is characterized by a tropical climate that is conducive to the proliferation of arthropod vectors responsible for transmitting various diseases (Eze et al., 2021). The state's diverse geography, including urban and rural areas, may contribute to distinct patterns of vector-borne diseases. However, despite the region's vulnerability to such diseases, there is a noticeable gap in the literature regarding the prevalence and specific risk factors affecting the student demographic within tertiary institutions.

To illustrate this gap, a study by Okoye et al., (2023) focused on the general prevalence of vector-borne diseases in Anambra state but the study was limited to the awka campus of Nnamdi Azikiwe University Awka Anambra state Nigeria. Similarly, research by Olabimi et al. (2021) explored the distribution of disease vectors in Nigeria but did not specifically address the student population within tertiary institutions. These studies underscore the limited attention given to the unique context of arthropod-borne diseases among students in the state's educational institutions. The student population in tertiary institutions represents a dynamic and susceptible demographic due to shared living spaces, communal activities, and varying levels of awareness about disease prevention. This demographic's distinct lifestyle factors, including communal living in hostels, engagement in outdoor activities, and potential exposure to diverse arthropod vectors, necessitate a focused examination. While there is existing research on vector-borne diseases in Nigeria (Olagunju et al., 2023; Kolawole et al., 2018), there is a notable dearth of studies specifically investigating the prevalence and risk factors within the tertiary education context in Anambra state.

Additionally, a comprehensive understanding of arthropod-borne diseases among students is crucial for public health planning and the development of targeted interventions. The potential impact of these diseases on students' well-being, academic performance, and overall quality of life underscores the urgency of addressing this gap in the literature. For instance, studies by Taylor-Robinson & Omitola (2022) and Wu et al., (2021) emphasize the need for context-specific interventions to curb the spread of arthropod-borne diseases, but these studies do not focus explicitly on the tertiary student population in Anambra state. Furthermore, the global burden of vector-borne diseases is substantial, and Nigeria bears a

significant share of this burden. As highlighted by the World Health Organization (WHO) in its 2020 report on vector-borne diseases, understanding the local context and specific risk factors is essential for effective disease control measures. Therefore, focusing on the tertiary institutions in Anambra state contributes not only to the local public health landscape but also to the broader global efforts in combating vector-borne diseases. The findings are anticipated to inform evidence-based interventions, contributing to the broader efforts in public health and disease prevention within the Nigerian educational landscape.

Research Objectives

The main objective of this study is to examine the prevalence and risk factors of arthropod-borne diseases among students in tertiary institutions in Anambra state. The specific objectives are as follows:

1. Determine the prevalence of arthropod-borne diseases among students
2. Identify the arthropod vectors responsible for transmitting diseases and their distribution within the institution environment
3. Propose evidence-based strategies for disease prevention and control within the Tertiary institutions

Hypotheses

1. Hypothesis 1: There is no statistically significant difference in the prevalence of arthropod-borne diseases among male and female students in the Tertiary institutions.
2. Hypothesis 2: There is no statistically significant difference in the risk factors associated with disease transmission and contraction among students from different age groups in the Tertiary institutions.

Methods

Research Design

The study on the prevalence and risk factors of arthropod-borne diseases among students in tertiary institutions in Anambra state utilized a descriptive survey research design.

Sampling

Quantitative data were collected through a cross-sectional survey questionnaire distributed to 100 students from various institutions in Anambra State, including Nnamdi Azikiwe University, Chukwuemeka Odumegwu Ojukwu University, Anambra State Polytechnic Mgbakwu, Nwafor Orizu College of Education Nsugbe, and Federal College of Education (Technical) Umunze.

Data Collection Tool

The questionnaire, comprising three clusters and a total of 19 items, was developed by the researcher and disseminated electronically via email and social media platforms using Google Forms. Respondents used a 4-point Likert scale to indicate their perceptions. To ensure the survey's validity, three experts conducted face validation, providing feedback for necessary corrections. The instrument's internal reliability, assessed through Cronbach's coefficient alpha, yielded a value of 0.91, indicating acceptable reliability.

Data Analysis Technique

Descriptive statistics were employed for demographic characterization, while mean and standard deviation were computed using SPSS version 22 for data analysis. The study's findings were interpreted based on the data analysis, facilitating a comprehensive understanding of arthropod-borne disease prevalence and risk factors among tertiary institution students in Anambra state.

Results and Discussion

The results of the findings are presented in tables and analyzed using appropriate descriptive statistics

Socio-Demographic Characteristics

Table 1: *Demographic Information of participants in the study.*

Demographics		Frequency	Percentage
Gender			
	Male	46	46.0%
	Female	54	54.0%
	Total	100	100.0%
Age			
	14-16	11	11.0%
	17-20	31	31.0%
	21-22	25	25.0%
	23-25	28	28.0%
	26 and above	5	5.0%
	Total	100	100.0%

Table 1 provides a snapshot of the demographic characteristics of participants in the study. The gender distribution indicates a balanced representation, with 46% male and 54% female participants. In terms of age, the majority of participants fall within the 17-20 age range (31%), followed by 21-22 (25%) and 23-25 (28%). Notably, 11% of participants are in the 14-16 age group, and only 5% are 26 and above. This demographic profile suggests a diverse sample, essential for a comprehensive understanding of arthropod-borne diseases across different age and gender groups within tertiary institutions. The findings underscore the importance of considering demographic factors in the analysis of disease prevalence and risk factors, providing valuable context for the study's outcomes.

Table 2: *The prevalence of arthropod-borne diseases among students within the Tertiary institutions.*

	N	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Q1	100	3.80	.586	.343	-3.319	.241	11.269	.478
Q2	100	3.76	.605	.366	-2.910	.241	8.850	.478
Q3	100	2.18	.845	.715	.669	.241	.098	.478
Q4	100	2.65	1.313	1.725	-.280	.241	-1.686	.478
Q5	100	3.52	.937	.878	-1.900	.241	2.320	.478
Valid N (listwise)	100							

Q1:Mosquito-borne diseases like malaria and dengue are among the most prevalent arthropod-borne diseases affecting students

Q2:Students residing in areas with sanitation practicesare at a higher risk of contracting arthropod-borne diseases.

Q3:The prevalence of these diseases can be affected by factors such as housing conditions and

Q4: Poorly maintained water sources and breeding sites for disease vectors contribute to disease prevalence.

Q5:Arthropod-borne diseases are linked to students' outdoor activities and exposure to disease-carrying vectors.

Table 2 presents statistical measures regarding the prevalence of arthropod-borne diseases among students in tertiary institutions in Anambra state. The mean scores and standard deviations for five key factors (Q1 to Q5) shed light on the varying degrees of influence these factors have on disease prevalence. Q1, with a mean score of 3.80, indicates a high prevalence of mosquito-borne diseases like malaria and dengue among students. Q2, with a mean score of 3.76, suggests that students residing in areas with poor sanitation practices are at an elevated risk of contracting arthropod-borne diseases. Q3, with a mean score of 2.18, implies that housing conditions moderately affect disease prevalence. Q4, scoring 2.65, highlights that poorly maintained water sources and breeding sites for disease vectors contribute to disease prevalence, exhibiting a more varied distribution. Q5, scoring 3.52, links arthropod-borne diseases to students' outdoor activities and exposure to disease-carrying vectors. These scores, combined with skewness and kurtosis values, provide an understanding of the prevalence and variability of factors influencing arthropod-borne diseases among students in the study population.

Table 3: *Arthropod vectors that are primarily responsible for transmitting diseases within the institution environment, and how are they distributed.*

	N	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Q6	100	3.36	.798	.637	-1.354	.241	1.709	.478
Q7	100	3.36	.811	.657	-1.334	.241	1.506	.478
Q8	100	2.39	1.278	1.634	.176	.241	-1.666	.478
Q9	100	2.76	.976	.952	.036	.241	-1.267	.478
Q10	100	2.19	.787	.620	.155	.241	-.469	.478
Q11	100	2.27	.851	.724	.250	.241	-.496	.478
Valid N (listwise)	100							

Q6: Mosquitoes, common in the institution environment, transmit diseases like malaria and dengue, with stagnant water sources as breeding grounds

Q7: Fleas are occasionally found in institution dormitories and can transmit diseases like plague, a severe bacterial infection.

Q8: Sandflies, present in some institution regions, transmit Leishmaniasis, a parasitic disease that affects the skin and organs.

Q9:Horseflies and deerflies, present in outdoor areas, can transmit Tularemia, a bacterial disease.

Q10:Chiggers, common in grassy areas, transmit scrub typhus, a bacterial infection.

Q11:Body lice infestations can occur in crowded living conditions in institution, potentially leading to typhus transmission.

Table 3 provides statistical insights into the distribution and perceived impact of arthropod vectors responsible for transmitting diseases within the institution environment. Mean scores and standard deviations for factors Q6 to Q11 offer a quantitative understanding of the prevalence and variability of these vectors. Q6 and Q7, with mean scores of 3.36, suggest a notable presence of mosquitoes and fleas in the institution environment. These vectors are implicated in transmitting diseases such as malaria, dengue, and plague, emphasizing the importance of managing stagnant water sources and addressing dormitory hygiene. Q8, with a mean score of 2.39, indicates the presence of sandflies in specific institution regions, with potential transmission of Leishmaniasis. Q9, Q10, and Q11, with mean scores ranging from 2.19 to 2.76, highlight the presence of horseflies, chiggers, and body lice, respectively, in outdoor and crowded living conditions, posing risks of transmitting Tularemia and scrub typhus.

Table 4: *Strategies to effectively prevent and control arthropod-borne diseases within the Tertiary institutions.*

	N	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Q12	100	3.41	.767	.588	-1.406	.241	1.948	.478
Q13	100	2.98	.964	.929	-.581	.241	-.658	.478
Q14	100	2.36	.785	.617	-.225	.241	-.606	.478
Q15	100	3.24	.767	.588	-.715	.241	-.066	.478
Q16	100	3.90	.461	.212	-5.444	.241	31.275	.478
Q17	100	3.83	.493	.244	-3.449	.241	13.444	.478
Q18	100	2.87	1.178	1.387	-.311	.241	-1.534	.478
Q19	100	3.81	.486	.236	-3.140	.241	12.138	.478
Valid N (listwise)	100							

Q12: Students should be cautious and maintain clean living conditions to reduce the risk of flea infestations.

Q13: Surveillance for tsetse fly presence is essential for disease control in affected institution areas.

Q14: Monitoring for kissing bugs is vital in regions where they may be present.

Q15: Control measures can reduce the risk of disease transmission in institution areas near rivers or streams.

Q16: Outdoor activities should include precautions to minimize contact with these flies.

Q17: Students engaged in fieldwork should be aware of chigger-borne disease risk.

Q18: Personal hygiene is important for preventing head lice infestations among students.

Q19: Sanitation efforts is essential to prevent body lice outbreaks.

Table 4 outlines strategies for the effective prevention and control of arthropod-borne diseases within tertiary institutions. Mean scores and standard deviations for factors Q12 to Q19 provide insights into the perceived effectiveness and variability of these strategies. Q12, with a mean score of 3.41, emphasizes the importance of students maintaining clean living conditions to reduce the risk of flea infestations. Q13 and Q14, with mean scores of 2.98 and 2.36, underscore the need for surveillance and monitoring of tsetse flies and kissing bugs, respectively, in affected institution areas. Q15 to Q19, with mean scores ranging from 3.24 to 3.81, advocate for control measures, precautions during outdoor activities, awareness among students engaged in fieldwork, personal hygiene, and sanitation efforts to prevent diseases transmitted by various arthropod vectors.

Hypotheses

Hypothesis 1: There is no statistically significant difference in the prevalence of arthropod-borne diseases among male and female students in the Tertiary institutions.

Table 5: *Analysis of Variance on the prevalence of arthropod-borne diseases among male and female students in the Tertiary institutions.*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	168.418	1	168.418	29.795	.000
Within Groups	553.942	98	5.652		
Total	722.360	99			

Table 5 presents the results of an Analysis of Variance (ANOVA) on the prevalence of arthropod-borne diseases among male and female students. The F-statistic is 29.795 with a corresponding p-value of .000,

indicating statistical significance. The p-value is less than the conventional significance level of 0.05. Given that the p-value is below the threshold, there is sufficient evidence to reject the null hypothesis. Therefore, it can be inferred that there is a statistically significant difference in the prevalence of arthropod-borne diseases between male and female students in tertiary institutions. The observed F-statistic of 29.795 suggests that the variability in disease prevalence between the two gender groups is unlikely to have occurred by chance alone.

Hypothesis 2: There is no statistically significant difference in the risk factors associated with disease transmission and contraction among students from different age groups in the Tertiary institutions.

Table 6: *Analysis of Variance on the risk factors associated with disease transmission and contraction among students from different age groups in the Tertiary institutions.*

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	1291.482	4	322.870	81.464	.000
Within Groups	376.518	95	3.963		
Total	1668.000	99			

Table 6 displays the results of an Analysis of Variance (ANOVA) on the risk factors associated with disease transmission and contraction across different age groups of students. The F-statistic is 81.464 with a corresponding p-value of .000, indicating statistical significance. The p-value is less than the conventional significance level of 0.05. The obtained results provide strong evidence to reject the null hypothesis. Therefore, it can be inferred that there is a statistically significant difference in the risk factors associated with disease transmission and contraction among students from different age groups in tertiary institutions. The F-statistic of 81.464 suggests that the variability in risk factors between the age groups is unlikely to have occurred by chance alone, supporting the alternative hypothesis.

Discussion

Research question 1 examined the prevalence of arthropod-borne diseases among students within the Tertiary institutions. A significant finding is the high prevalence of mosquito-borne diseases like malaria and dengue among students, emphasizing the pervasive impact of these vectors. This aligns with studies conducted by Chandra et al., (2023) and Bedoya-Rodriguez et al., (2022), who also identified mosquitoes as major disease vectors in similar settings. In contrast, the association between poor sanitation practices and an elevated risk of arthropod-borne diseases resonates with the findings of Power et al., (2022), highlighting the critical role of environmental factors in disease transmission. Additionally, the contribution of poorly maintained water sources to disease prevalence, exhibiting varied distribution, is in line with the observations of Alegbeleye and Sant'Ana (2020). Furthermore, the linkage of arthropod-borne diseases to students' outdoor activities and exposure to disease-carrying vectors aligns with the work of Arthur et al., (2017), who emphasized the importance of understanding human behavior and environmental interactions in disease dynamics.

Research question 2 covered the arthropod vectors that are primarily responsible for transmitting diseases within the institution environment, and how are they distributed Notably, there is a significant presence of mosquitoes and fleas, common vectors for diseases like malaria, dengue, and plague. This finding aligns with the work of Swei et al., (2020) and Giunti et al., (2023), who also identified mosquitoes and fleas as prominent disease vectors in comparable environments, stressing the need for effective vector management strategies. In contrast, the presence of sandflies in specific regions of institutions, with potential transmission of Leishmaniasis, introduces a different set of disease vectors. This observation corresponds with the findings of Ikpeama & Obiajuru (2018) and Ajero-Chigbo (2020) in a related study on sandfly-borne diseases in Nigeria, highlighting the geographical variability in vector distribution. Moreover, the identification of horseflies, chiggers, and body lice in outdoor and crowded living conditions aligns with the broader understanding presented by Adeogun et al., (2023) and Omar (2021), emphasizing the diverse array of vectors in different ecological niches.

Research question 3 examined the strategies to effectively prevent and control arthropod-borne diseases within the Tertiary institutions. Firstly, stressing the importance of students maintaining clean living conditions to reduce the risk of flea infestations resonates with the findings of Azrizal-Wahid et al., (2022) and Dahm et al., (2021), both highlighting the significance of personal hygiene in mitigating vector-related health risks. In contrast, the emphasis on surveillance and monitoring of tsetse flies and kissing bugs aligns with the works of Ta (2021) and Kaba (2017), who emphasize the critical role of vector monitoring in disease control, particularly in regions prone to specific vectors. Additionally, the advocacy for control measures, precautions during outdoor activities, and awareness among students engaged in fieldwork correlates with the broader recommendations by Fritzell et al., (2016) and Wu et al., (2021). These studies emphasize the necessity of comprehensive strategies, including personal hygiene and sanitation efforts, to effectively prevent diseases transmitted by diverse arthropod vectors in institutional settings.

Conclusion

In conclusion, this study has provided perspective into the prevalence and risk factors of arthropod-borne diseases among students in tertiary institutions in Anambra state. The findings underscore the significant impact of mosquito-borne diseases, emphasizing the need for targeted interventions in managing stagnant water sources and improving dormitory hygiene. The association between poor sanitation practices and an elevated risk of arthropod-borne diseases highlights the importance of environmental factors in disease transmission. Furthermore, the identification of specific vectors such as sandflies, horseflies, chiggers, and body lice in distinct ecological niches emphasizes the diverse nature of disease transmission within the institutional environment. These findings contribute to a nuanced understanding of the complex dynamics of arthropod-borne diseases, providing a foundation for informed public health strategies. The study recommends comprehensive preventive measures, including maintaining clean living conditions, vector surveillance, and awareness campaigns targeting specific age groups. Additionally, strategies such as outdoor activity precautions and personal hygiene interventions are crucial in mitigating the risks associated with arthropod-borne diseases among students. Overall, this research contributes to the existing knowledge base on arthropod-borne diseases in Nigerian tertiary institutions, offering practical insights for public health interventions and emphasizing the importance of context-specific strategies in disease prevention and control.

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