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Prevalence of Select Vector Borne Diseases and Knowledge of the Preventive Measures: A Cross-Sectional Analytical Study in Communities in Anambra State, Nigeria

Chibuzo F. Okoye [a], Chinomnso C. Nnebue [a*], Chijioke A. Ezenyeaku [a], Ahoma V. Mbanuzuru [a], Darlington C. Obi [a] and Nkiru N. Ezeama [a]

[a] Department of Community Medicine and Primary Health Care, College of Medicine, Nnamdi Azikiwe University, Awka, Nigeria.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: Knowledge of vector-borne diseases (VBDs) its prevalence, attendant risk factors and effective control practice is a prerequisite for the containment of these disease.
Objective: To determine the prevalence and knowledge of preventive measures against select VBDs among communities in Anambra State, Nigeria.

**Corresponding author: E-mail: nnebnons@yahoo.com, cc.nnebue@unizik.edu.ng;*

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Methods: This is a community-based cross-sectional analytical study conducted in Anambra State. Multistage sampling technique was used for subject selection. Data were collected using a pretested, semi-structured interviewer- administered, questionnaire. Data was exported from kobocollect into Statistical Package for Social Sciences (IBM SPSS) version 27. Descriptivestatistics were used to summarize data on socio-demographic variables. Tests of statistical significance were done using the Chi-square and Fisher tests for proportions as appropriate at p-value ≤0.05.
Results: While 68.24% reported having malaria, rare rarely, 407(95.76%) reported awareness of malaria and 12 (292%), of LF respectively. The commonest sources of awareness include: health institutions, friends. The mean percentage knowledge of respondents about preventive measures against malaria and LF were 53.92±11.51 (fair) and 14.86±24.43 (poor) respectively. There were statistically significant associations between knowledge about malaria and LF with highest level of education attained (p=0.732; p=0.732) and occupation (p<0.001; p<0.01) respectively.
Conclusions: This study reveals apparently high prevalence of malaria, good and poor levels of knowledge of preventive measures against malaria and LF respectively. There should be regular comprehensive health education programs on control of these diseases in health institutions and through peer education.

Keywords: Health education; knowledge; vector borne diseases; Nigeria; communities.

1. INTRODUCTION

Vector-borne diseases (VBDs) are diseases of human caused by pathogenic agents such as bacteria, helminthes, protozoa, and viruses. They are transmitted by hematophagous arthropod vectors, which include mosquitoes, ticks, and fleas [1]. Among the commonest of these VBDs, are malaria and Lymphatic filariasis (LF) [2].

Malaria is transmitted to humans through the bite of an Anopheles mosquito (*Anopheles gambiae*), which requires a high temperature climate to thrive. Thus, malaria is commonly found in warm regions of the world that are close to the equator, including tropical and subtropical countries [3] Lymphatic filariasis is a debilitating Neglected Tropical Diseases prevalent in rural areas, is caused by filarial parasites, is transmitted to humans, through bites from infected mosquitoes lodged in the lymphatic system and grows into adult worms over several years [4].

Mosquito-borne diseases, such as malaria and LF are the largest contributor to human VBDs burden, particularly in the African continent [5]. The WHO estimates 241 million cases and 627,000 deaths in 2021in Sub-Saharan Africa including Nigeria [6]. Nigeria accounts for 26.6.7 According to the National Malaria Control Program in Nigeria, the annual financial loss due to malaria, is estimated to be 132 billion naira in the form of treatment cost, prevention, and loss of man-hours [7].

In West Africa, community awareness of the causes of malaria is generally poor. Excessive alcohol consumption, heat, fatigue, flies and unsafe water were some perceived causes of malaria in Ghana while staying long under the sun, and groundnut consumption was believed to cause malaria in the Benin Republic [8,9]. Findings from a study conducted by Singh, et al., [10] in rural areas of Northern Nigeria revealed that although knowledge about malaria prevention measures was high (90%), but it was poorly reflected in their practices (16%). In some parts of Southern Nigeria, excessive heat, overwork, overindulgence in sexual activities, sunlight, certain foods and drinks, noise, heredity witchcraft and other superstitions were thought to be responsible for malaria [7,9]. This latter study also found poor knowledge and low utilization of malaria prevention measures among the majority of the caregivers in the rural study area though the knowledge was poor. In a study also conducted in Awka North LGA in Anambra state, the respondent's knowledge about the causes of malaria was reported to be high. Vector-borne diseases are among the most important global public health problems and are associated with significant economic burden in affected countries [11]. The results from this evaluation will be useful to health policymakers to make decisions for determining present and future objectives for the healthcare system and its implementation. It will create awareness for the people in the communities about these VBDs and enable them to protect themselves from vector bites. Therefore there is a need for proper assessment of prevalence of and knowledge of preventive

measures against malaria and LF in Anambra state is useful in reducing costs, wastage of resources, and achieving good health and well-being which is in line with the achievement of the 3rd Sustainable Development Goals. Adequate knowledge of the causes and prevention of malaria and LF will reduce the prevalence of some of these VBDs. This study will offer recommendations on preventive strategies in these communities. This study was thus conceptualized to determine the prevalence of and knowledge of preventive measures against malaria and lymphatic filariasis among communities in Anambra State.

2. METHODOLOGY

Study Area: This study was conducted in communities in Anambra State in South-Eastern Nigeria. It has a landmass area of 4,844 km^2, with coordinates between Latitude 6° 20'N and Longitude [12] It has 21 Local Government Areas and about 177 Communities. Anambra has tropical rainforest vegetation, a humid climate with an average temperature of about 30℃, and rainfall between 152cm-203cm [12]. Bureau of Statistics provided the 2020 projected population of Anambra State to be 6,149,744; of which males are 3,124,070 (50.8%) and females 3, 025,674 (49.4%) and a population growth rate of 2.21% per annum [13,14,5]. The residents are mainly traders, civil servants, farmers, and artisans. Their traditional language is Igbo.

Study Design: This was a community-based cross-sectional analytical study.

Study Population: This comprises heads of households or their representative in select urban and rural communities in the State.

Inclusion Criteria: Heads of households or their representatives who were between 18 to 65 years of age, thus ensuring a representative adult population. Heads of households or their representatives, who have resided in the select communities for at least one year prior to the study.

Exclusion Criterion: Heads of households or their representatives who had health conditions (mentally unstable or speech defects) that prevented them from participating in the study.

Determination of Sample Size: This was calculated using the Cochran formula for cross-sectional analytical studies for populations greater than 10,000 [15,16] $n = Z^2pq/d^2$, where; n = Minimum sample size calculated Z = Standard normal deviate at 95% confidence interval =1.96, p= proportion of the target population that had moderate to good knowledge of malaria, q = 1-P, d = tolerable error of margin, set at 0.05, Based on knowledge of malaria, a case study of knowledge, attitude, an\d management practices on malaria in Amansea, Anambra State Nigeria [17] where p= 57% = 0.57, q =1-p (1-0.57) = 0.43 Therefore n = 376.45 An adjustment of the estimate of the sample size to cover for the non-response rate was made by dividing the sample size calculated with a factor f, that is, n/f, where f is the estimated response rate [16]. Therefore, the response rate of 90%, the minimum sample size required for the study was 376.45 individuals, and the study sample size was 376.45 / 0.9 = 418.27= 420 participants

Sampling Techniques: Multistage sampling technique was used in this study to select respondents. In the first stage, the State was split into three (3) according to Senatorial Zones: Anambra North, Anambra Central, and Anambra South, using stratified sampling techniques. Then, each Senatorial Zone was split into urban and rural. Local government areas (LGA Two LGAs (1 urban, 1rural) were selected from each of the zones, giving a total of six (6) LGAs. Secondly, using simple random sampling by balloting, one community was selected from each of the LGAs, giving a total of six communities (each of the communities was considered as a cluster). Finally, using a modified World Health Organization (WHO) cluster sampling technique, a minimum of 70 households were studied from each of the six communities, totaling (70X6) = 420 respondents.

Data Collection Tool: Data were collected using a pretested, semi-structured interviewer-administered, questionnaire. This questionnaire was adapted with modifications from tools of malaria and LF surveys that had been done in Nigeria and elsewhere [10,18]. The questionnaire comprises two sections. Section A: Socio-demographic characteristics of respondents. Example age, gender, occupation, and tribe. Section B: ever diagnosed of malaria and LF. Six individuals (one from each of the selected LGAs who are public health nurses practicing in the selected area) were trained as research assistants. To ensure the quality of the data collected, these research assistants were well trained and a role-play was conducted on the

process of data collection. The principal researcher scrutinized the questionnaire filled out for completeness after each day of data collection.

Data Collection Method: The study questionnaire was deployed through Kobocollect, an electronic mobile data collection platform. During tool design on Kobocollect, necessary validation checks, and logic were built into the forms to minimize data entry errors that could compromise data quality. Data were collected by the trained research assistant, using the Kobocollect app that was installed on Android tablets. A bottle was spun at the central point of each community. This was a way to select the direction for the house-to-house visit in a clockwise direction. Individuals who were eligible to participate were selected. Fully informed consent was obtained before the questionnaire was administered by the research assistant. During the data collection phase, monitoring visits were conducted for data quality and to assess compliance with the study protocol including informed consent requirements.

3. DATA MANAGEMENT AND ANALYSIS

Data Sources and Measurement of Variables: The main outcome/ dependent variable for this study was the prevalence and knowledge of preventive measures against select VBDs among communities in Anambra State, Nigeriaa. It was assessed using prevalence and knowledge among Heads of households or their representatives. The independent variables were the factors influencing the preventive measures against select VBDs among communities in Anambra State, Nigeria. These included the socio-demographics

Data Modification: To assess the overall distribution of factors associated with the level of knowledge of preventive measures against malaria and LF, five knowledge score items were generated. First, a score of one (1) was assigned for those giving correct answers or having some knowledge about malaria and LF, and zero (0) if on the contrary. Then a total was obtained from which a percentage score was calculated. Respondents with 0-50% score was considered as having poor knowledge about the diseases. Respondents with 51-70% score was considered as having a fair knowledge of malaria and LF. While those with 71-100% scores was considered to have a good knowledge of malaria and LF.

Data Analysis: Data was exported from kobocollect into International Business Machine Statistical Package for Social Sciences version 27(IBM SPSS) [19]. Data was cleaned and analyzed. Descriptive statistics of mean, frequency, and percentages (proportions) were used to summarize data on socio-demographic variables, knowledge of preventive measures against malaria and LF. Tests of statistical significance were carried out using the Chi-square test, Fisher test for proportions as appropriate. A p-value less than or equal to 0.05 was considered statistically significant.

Pretesting: The study tool was administered to 20 respondents different from the ones recruited for this study. The essence of pretesting on this was done to check the appropriateness of the wording of the study tool, and the time it takes to administer the questionnaire for one person to enable the researcher to make adjustments accordingly.

4. RESULTS

Four hundred and twenty five questionnaires were distributed to the respondents. All 425 were valid and thus analyzed giving a response rate of 100%. Table 1 shows the sociodemographic characteristics of respondents. The mean age of the respondents in this study was 34.46±10.77 years. Majority of the respondents were females 321(75.5%), while 253(55.3%) were currently married. Three hundred and eighty two (90.1%) respondents attained at least secondary level of education Two hundred and seventy five (64%) of the respondents were self-employed; with 222 (52.2%, earning below the Nigeria monthly minimum wage of 30,000 Naira.

Fig. 1 shows the prevalence of malaria among respondents, where 68.24%reported having malaria, rare rarely.

Fig. 2 (pie chart) displays the awareness of the respondents about malaria. Majority of the respondents, 407(95.76%) reported ever heard of malaria.

Fig. 3 (bar chart) displays the awareness of the respondents about LF. Twelve (292%) of respondents were aware of LF.

Table 1. Socio-demographic profiles of the respondents

Variable	Categories	Frequency	Percentage	Mean ± SD
Age (years)	-	-		34.46±10.77
Sex	Male	104	24.5	-
	Female	321	75.5	
Marital status	Never married	177	41.6	-
	Currently married	235	55.3	-
	Widowed	12	2.8	-
	Divorced	1	0,2	-
Tribe	Igbo	415	97.6	-
	Hausa	2	0.5	-
	Others	8	1.9	-
Religion	Christians	404	95.1	-
	raditionalists	17	4.0	-
	Muslims	3	0.7	-
	None	1	0.2	-
Formal Education	Primary	42	9.9	-
	Secondary	277	65.3	-
	Tertiary	105	24.8	-
Occupational status	Private service	84	19.8	-
	Self-employed	273	64.2	-
	Agriculture	13	3.1	-
	Students	20	4.7	-
	Government service	35	8.2	-
Residence	Rural	232	54.6	-
	Urban	193	45.4	-
Duration respondent	<1 year	12	2.8	-
has resided in the	2-5 years	160	37.6	-
community	>5 years	253	59.5	-
Monthly income	<30,000	222	52.2	-
(Naira)	31,000-50,000	171	40.2	-
	51,000-70,000	22	5.2	-
	71,000-100000	8	1.9	-
	101,000 and above	2	0.5	-

Table 2a displays the Items on the knowledge of the respondents about malaria. Most (95.76%) of the respondents have heard of malaria. The commonest sources of awareness include: 190 (44.7%) health institutions, 135 (31.8%) friends. While 420 (98.8%) of respondents were correct on the causes of malaria, only 46(10.8%) were correct on how malaria diagnosis is confirmed. Breeding sites of causative vectors were correctly answered by most of the respondents except for the tree holes 402(94.6%). About 145(35.1%) of the respondents did not know the correct biting time of the causative vector.

Table 2b displays the items on the knowledge of the respondents about lymphatic filariasis. Only 28% of the respondents were aware of LF and reported that the commonest sources of information on LF were 102 (24%) neighbors/friends and 19 (4.3) health institutions Majority 301 (70.8%) of respondents did not know that LF is transmitted by mosquitoes. Barely a quarter 123(29%) reported that the main symptom of LF was swollen legs. Only 218(51.3%) would visit a hospital or health center in case of having swollen legs.

Table 3 shows the levels of knowledge of the respondents about preventive measures against malaria and lymphatic filariasis. The mean percentage knowledge of the respondents about preventive measures against malaria and LF were 53.92±11.51 (fair) and 14.86±24.43 (poor) respectively. As follows: 46.4% and 95.5% of the respondents had poor knowledge about preventive measures against malaria and LH respectively.

Table 4 shows Spearman rank order correlation of the relationship between respondents knowledge and preventive measures against malaria and lymphatic filariasis There was no correlation with Knowledge about malaria (Rho-0.017; p=0.732), but there was correlation between and knowledge about LF Rho 0.217, p=0.001).

Table 5a cross-tabulation of the bivariate analysis of association between some of their socio-demographic profiles of respondents and knowledge about malaria. There were statistically significant associations between Knowledge about malaria and highest educational level attained (χ2= 0.017, p=0.732) as well as occupation (χ2 F 0.217, p= <0.001).

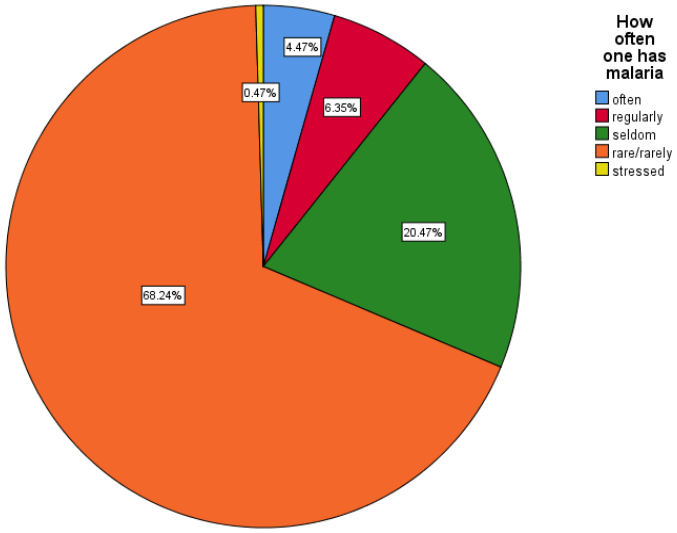

Fig. 1. A pie chart showing the prevalence of malaria among the respondents

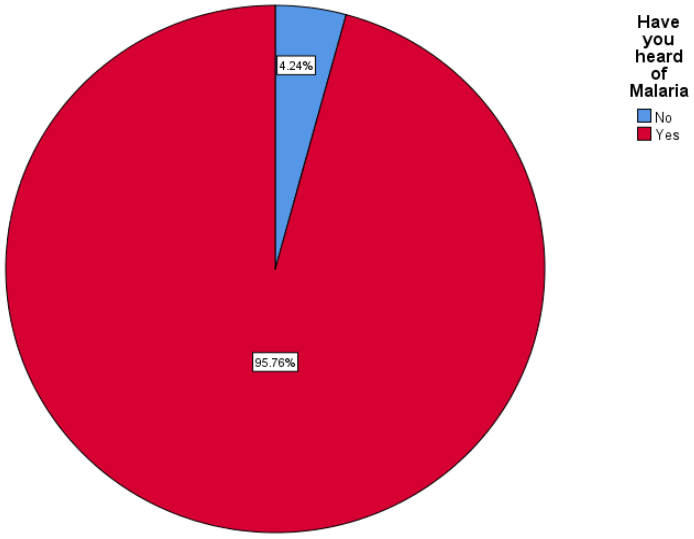

Fig. 2. A pie chart displaying the awareness of the respondents about malaria

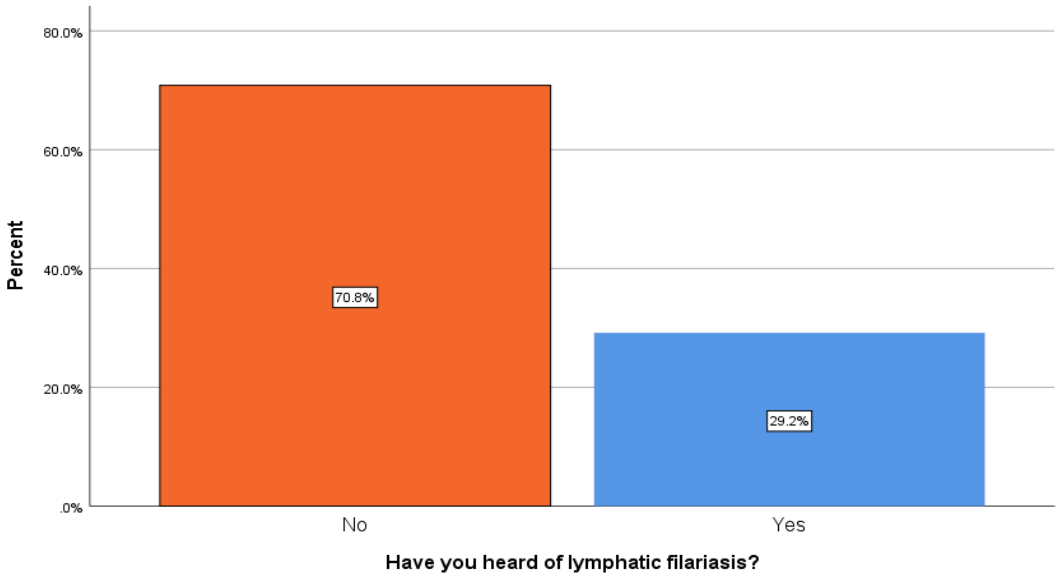

Fig. 3. A bar chart displaying the awareness of the respondents about lymphatic filariasis

Table 2. Wareness, and knowledge of the respondents about malaria and lymphatic filariasis

Table 2a. Items on the knowledge of the respondents about malaria

Items	Response category	Frequency	Percentage
If you have heard of malaria, from what source	Neighbors/friends	135	31.8
	Health institutions	190	44.7
	Radio/television	80	18.8
	health extension worker	2	0.5
	No response	18	4.2
What causes Malaria?	Bites from mosquito	420	98.8
	Strenuous work in the sun	4	0.9
	Drinking untreated water	1	0.2
How do you confirm malaria?	Laboratory test	46	10.8
	Chills and cold	181	42.6
	Body weakness	197	46.4
	Yellowish eyes	1	0.2
Do you know the breeding sites of the causative vector?	bushes/grasses	9	2.1
	stagnant water	24	5.6
	dirty environment	37	8.7
	Two of the above	105	24.7
	Three of the above	230	58.8
Knowledge of stagnant water as a breeding site of the causative vector	Wrong	57	13.4
	Correct	368	86.6
Knowledge of bushes/grasses as a breeding site of the causative vector	Wrong	102	24.0
	Correct	323	76.0
Knowledge of dirty environment as a breeding site of the causative vector	Wrong	83	19.5
	Correct	342	80.5
Knowledge of container that holds water as a breeding site of the causative vector	Wrong	386	90.8
	Correct	39	9.2
Knowledge of tree holes as a breeding site of the causative vector	Wrong	402	94.6
	Correct	23	5.4

Items	Response category	Frequency	Percentage
What time does the causative vector bite?	During the night	149	35.1
	Any time of the day	254	59.8
	Don't know	22	5.2
Is Malaria preventable?	No	33	7.8
	Yes	392	92.2
If malaria commonly affects pregnant women more	Wrong	12	2.8
	Correct	413	97.2
If malaria commonly affects children under 5 more	Wrong	15	3.5
	Correct	410	96.5
If malaria commonly affects men more	Wrong	424	99.8
	Correct	1	0.2
If malaria commonly affects adults more	Wrong	248	58.4
	Correct	177	41.6
If malaria commonly affects sicklers more	Wrong	425	100.0
	Correct	0	0.0

Table 2b. Items on the knowledge of the respondents about lymphatic filariasis

Items	Response category	Frequency	Percentage
If you have heard of lymphatic filariasis, from what source	Neighbors/friends	102	24.0
	Health institutions	19	4.5
	Radio/television	1	0.2
	Multiple sources	2	0.5
	No response	301	70.8
What causes lymphatic filariasis?	Bites from mosquito	123	28.9
	Bite of tse tse fly	1	0.2
	No response	301	70.8
Do you know the breeding sites of the causative vector?	bushes/grasses	25	5.9
	stagnant water	82	19.3
	dirty environment	17	4.0
	No response	301	70.8
What are the common features of LF?	Swelling of the Hand	0	0.0
	Swelling of the Leg	124	29.0
	Swelling of the scrotum	0	0.0
	Swelling of the Stomach	0	0.0
	No response	301	70.8
What do you think is the cause of swollen legs and scrotum	Worms	18	4.2
	Spiritual projection	19	4.5
	No idea	312	73.4
	Poison	75	17.6
	Flies	1	0.2
At the notice of a swollen scrotum or swollen leg, what do you do next?	Visit hospital/health center	218	51.3
	Visit traditionalist	98	23.1
	No idea	17	4.0
	Cook herbs or buy traditional medicine	12	2.8
	No response	80	18.8
Is lymphatic filariasis curable?	Yes	123	28.9
	No	1	0.2
	No response	301	70.8
Have you been privileged to receive health education on preventive measures of the LF?	No	408	96.0
	Yes	17	4.0

Table 3. Levels of knowledge of the respondents about malaria and lymphatic filariasis and of preventive measures against malaria and lymphatic filariasis

Variable	Levels	Frequency(percentage)	Mean±SD (%)
Knowledge about malaria	Poor	197(46.4)	53.92±11.51
	Fair	193(45.4)	
	Good	35(8.2)	
Knowledge about lymphatic filariasis	Poor	406(95.5)	14.86±24.43
	Fair	7(1.6)	
	Good	12(2.8)	

Table 4. Spearman rank order correlation of the relationship between respondents, knowledge, of preventive measures against malaria and lymphatic filariasis

Variable	Rho	P-value
Knowledge about malaria	0.017	0.732
Knowledge about LF	0.217	<0.001*

**=significant at p<0.05*

Table 5a. Cross-tabulation of the bivariate analysis of association between some of their socio-demographic profiles of respondents and knowledge about malaria

Variable	Class	Knowledge about malaria (f (%))			χ2	p-s value
		Poor	Fair	Good		
Gender	Male	53(51.0)	45(43.3)	6(5.8)	1.79	0.41
	Female	144(44.9)	148(46.1)	29(9.0)		
Marital status	Single	74(41.8)	89(50.3)	14(7.9)	9.73	0.14
	Married	119(50.6)	95(40.4)	21(8.9)		
	Widowed	3(25.0)	9(75.0)	0(0.0)		
	Divorced					
Education	Primary	33(78.6)	9(21.4)	0(0.0)	95.74	<0.01*
	Secondary	147(53.1)	122(44.0)	8(2.9)		
	Tertiary	16(15.2)	62(59.0)	27(25.7)		
	Others					
Religion	Christianity	187(46.3)	183(45.3)	34(8.4)	5.88	0.44
	Traditional	6(35.3)	10(58.8)	1(5.9)		
	Islam	3(100.0)	0(0.0)	0(0.0)		
	None	3(100.0)	0(0.0)	0(0.0)		
Occupation	Private practice	34(40.5)	46(54.8)	4(4.8)	111.22	<0.01*
	Self-employed	144(52.7)	116(42.5)	13(4.8)		
	Agriculture	10(76.9)	3(23.1)	0(0.0)		
	Students	7(35.0)	13(65.0)	0(0.0)		
	Govt service	2(5.7)	15(42.9)	18(51.4)		
Residence	Rural	117(50.4)	99(42.7)	16(6.9)	3.79	0.15
	Urban	80(41.5)	94(48.7)	19(9.8)		

*Key: *= significant at p<0.05*

Table 5b. Cross-tabulation of the bivariate analysis of association between some of their socio-demographic profiles of respondents and knowledge about lymphatic filariasis

Variable	Class	Knowledge about Filariasis (f (%))			χ2s	p-Vaalue
		Poor	Fair	Good		
Gender	Male	101(97.1)	1(1.0)	2(1.9)	0.83	0.66
	Female	305(95.0)	6(1.9)	10(3.1)		
Marital status	Single	171(96.6)	3(1.7)	3(1.7)	2.31	0.89
	Married	222(94.5)	4(1.7)	9(3.8)		

Table 5b continued…

	Widowed	12(100.0)	0(0.0)	0(0.0)		
	Divorced	1(100.0)	0(0.0)	0(0.0)		
Education	Primary	42(100.0)	0(0.0)	0(0.0)	39.56	<0.01*
	Secondary	273(98.6)	4(1.4)	0(0.0)		
	Tertiary	90(85.7)	3(2.9)	12(11.4)		
Religion	Christianity	385(95.3)	7(1.7)	12(3.0)	1.03	0.98
	Traditional	17(100.0)	0(0.0)	0(0.0)		
	Islam	3(100.0)	0(0.0)	0(0.0)		
	None	1(100.0)	0(0.0)	0(0.0)		
Occupation	Private practice	80(95.2)	3(3.6)	1(1.2)	117.76	<0.01*
	Self-employed	270(98.9)	3(1.1)	0(0.0)		
	Agriculture	13(100.0)	0(0.0)	0(0.0)		
	Students	20(100.0)	0(0.0)	0(0.0)		
	Govt service	23(65.7)	1(2.9)	11(31.4)		
Residence	Rural	221(95.3)	3(1.3)	8(3.4)	1.10	0.58
	Urban	185(95.9)	4(2.1)	4(2.1)		

*Key: *= significant at p<0.05*

Table 5b cross-tabulation of the bivariate analysis of association between some of their socio-demographic profiles of respondents and knowledge about lymphatic filariasis There were statistically significant associations between knowledge about LF and highest educational level attained ($\chi 2$= 0.017 p=0.732) cum occupation ($\chi 2$ 0117.76; p<0.01*).

5. DISCUSSION

This cross-sectional analytical research assesses the prevalence and knowledge of preventive measures against malaria and lymphatic filariasis in select communities in Anambra State, Nigeria. The current study also highlights select socio-demographic characteristic of the participants. This indicates that the study involves a relatively young population, whose health-related knowledge may differ from those of older people. Previous studies have shown that age can significantly influence healthcare-seeking behavior and adherence to preventive measures [20]. More than half of the participants are currently married, This is in line with the works of Ukpai [21]; and Degarege [22] who reported that 90% and 52.14%, respectively, of their participants were married. It is believed that marriage confers some maturity and level of responsibility on those in the institution. This probably extends to their having knowledge of ill health, especially in children using bodily and behavioral changes and consequently seeking treatment and managing sick persons appropriately.

The index study shows that the participants attained various levels of education with about sixty-five in every hundred participants attaining a secondary level of education; then another twenty-four in every hundred participants attaining tertiary education. This probably allows for an easier effective communication and possible understanding of the health implications of malaria. This concurred with the finding of the work of Amaechi and Ukpai [21] where more of the participants (54.58) had a secondary level of education, but disagreed with the findings of Dawaki et al., [23] in Kano, where 62.1%, of participants had a primary level of education. Educational messages should be tailored on the positive beliefs and behaviors that already exist in local communities and religious settings.

The findings of the present study summarize the occupation of the participants as follows: the majority were self-employed; then Private service and followed by Public service. This finding is in line with the findings of the work by Amaechi and Ukpai [21] who reported that 45.82% were traders or businesswomen. The dominance of self-employment indicates a potentially entrepreneurial community. This information is crucial for understanding the economic capacities of the participants, which can influence their ability to afford preventive measures.

The current study reports that more than half of the participants were rural dwellers with the remaining 45.4% of the participants who resided in the urban area. Most of them lived in the community for more than five years; 37.6% lived there for two to five years while the remaining 2.8% lived there for less than a year. Less than one in every hundred participants earns above a

hundred thousand Naira monthly. This is a critical finding and it indicates potential financial barriers to accessing preventive measures and healthcare services.

The findings of the index study reveals that the prevalence of malaria among participants, with, where 68.24%reported having malaria, rare rarely. The high prevalence of malaria in sub-Saharan Africa is likely influenced by socioeconomic characteristics such as household size, income, employment and education [23]. Homes with poor construction make it easier for vectors to enter, increasing the risk of infection for family members.

The findings of the current study shows that more than ninety per hindered participants, were aware of malaria. This finding suggests that the previous malaria campaigns done in the State were somewhat impactful, as they reached various people across the area of interest. This is in contrast to the finding of the study conducted by Onyido et al., [8,9] which noted poor awareness among the participants. The awareness of LF is low, and similar to that of other studies. For instance, the study carried out in Kwara State, Nigeria by Amaechi et al. [21] also revealed that 82% of the participants were not aware of LF which indirectly meant that their awareness level was 9.18%.

On findings of the present study that the commonest sources of information on malaria and LF were health institutions, neighbors/friends and media, these sources of information would serve as the means of communication to the general public in subsequent programs and campaigns. This finding is consistent with findings of other studies conducted in Nigeria [10,24].

This study also reveals that about 98.8% of the participants agreed that mosquito bites are the cause of malaria. The finding about mosquito bites being associated with malaria was high among the participants which could be because malaria is a common disease and affects most people in the country and state. This good level of knowledge could also be due to the higher educational level attained, easier access and control to the internet and social media, and contact with modern health facilities. This finding is in keeping with studies carried out by Bamidele et al., [25] in Southwestern Nigeria and Mahesh et al., [25] in India, However, these findings also contrast with that of the study carried out by Fuge et al., [26] in Ethiopia where only 15.6% of the participants could link mosquito bites as the cause of malaria, and another study done by Oladepo et al., [26] in Nigeria where only 12.4% participants knew the cause of Malaria. There was also a contrast to the studies conducted by Onyido et al., [8] and Onyido et al., [9] which noted poor knowledge of malaria with causes ranging from alcohol consumption, heat, fatigue, flies, and unsafe water in Ghana to long stay under the sun and groundnut consumption in Benin-Republic. The finding of this study also runs contrary to that of a study conducted in the Awka North area of Anambra State by Iwueze et al., [17] who revealed 57% knowledge of the causes of malaria with 69.9% of the participants associating mosquito bites with malaria transmission. However, the majority of participants were incorrect about how malaria is confirmed. This suggests a potential gap in knowledge regarding the process for confirmation of malaria.

Good knowledge about certain breeding sites of causative vectors was confirmed. They were correct about stagnant water, bushes/grasses, and dirty environments being breeding sites, and this is by the findings of Irukannu et al., [27]. This study percentage shows a good knowledge of the subject matter. However, it is still lower than that obtained in the study by Selam et al., [28] in Southwestern Ethiopia where 96.4% of the participants were aware of that information. However, another study by Mahesh et al., [24] which was carried out in India showed a contrary knowledge level on the breeding site as showing stagnant water by only 32.7% of the participants. There were misconceptions regarding containers holding water and tree holes as breeding sites which would further emphasize the need for targeted health education on breeding sites of various vectors. Over 40% of the participants did not possess accurate knowledge about the biting times of the causative vector. This signifies a potential gap in understanding the behavior of the vectors. With regards to the question to find out if malaria is a preventable disease, 92.2% of the participants agreed to the fact that it is preventable which is also in keeping with the study in Ethiopia by Abate et al., [29] where about 90% also made that response.

This study also reveals that more than 95% of the participants affirmed that malaria mostly affected pregnant women and under-five children than other groups of people. This finding is similar to that conducted by Oladepo et al., [26]

in Oyo Nigeria, in which there was also a high response in favor of the same group of individuals. This finding can be because of the immunity among that same population. Pregnant women usually have reduced immunity due to their nature and the added burden of the fetus she is carrying. Under five children also have malaria infection which can also be attributed to the fact that their immunity is also reduced or non-existent at the time of delivery and they have to acquire immunity with time.

The findings of the present study shows that more than seven in every ten of participants did not know that LF is transmitted by mosquitoes. Barely a quarter reported that the main symptom of LF was swollen legs. Only 218(51.3%) would visit a hospital or health center in case of having swollen legs Also, the mean percentage knowledge of the participants about preventive measures against malaria and lymphatic filariasis were 53.92 ±11.51 (fair) and 14.86±24.43 (poor) respectively. The association noted with the highest level of education could be attributed to the fact that those with primary or no formal education find it difficult to understand and have access to various health institutions and places where health education is usually given leading to their poor knowledge level There is a statistically significant relationship between their lymphatic filariasis knowledge level and highest level of education. It was noted that everyone with primary school as their highest level of education had poor knowledge and most of the people with good knowledge had tertiary education as their highest level of education. This can be attributed to the fact that they have more experience in school where they were exposed to such formal education on the topic. Another study by Ogbonnaya et al., [30] carried out in Taraba State showed the contrary opinion where no correlation was noted. A similar contrast was also seen in the study in Kogi State by Medoju et al., [31] No association was noted between the lymphatic filariasis knowledge level and religion with a p-value of 0.98. The lymphatic filariasis knowledge level of the participants was seen to be significantly associated with their occupation with a p-value of <0.01.

The findings of the index study show that about three in every hundred participants had a good knowledge level of lymphatic filariasis generally; 1.6% had fair knowledge and the remaining majority of about ninety-five people in every hundred participants had poor knowledge. The knowledge of lymphatic filariasis is generally low in the country and globally as seen in this study and other previous studies conducted. It indirectly constitutes a threat to disease and vector control. Therefore, it would be nice to prepare proper health education on lymphatic filariasis. This poor knowledge of lymphatic filariasis as seen in my study is also in keeping with the study by Dogara et al*.,* 2014 done in Kano State where they also noted poor knowledge levels among the participants. The study by Bolatito et al., [31] also revealed a low knowledge level among participants in Southwestern Nigerian rural communities. The poor knowledge will cause problems when handling preventive measures against the worm, causative vector, or the disease itself.

Strengths and limitations of the study: This study achieved 100% response rate. It is a community-based study in Anambra State, Nigeria. However, qualitative aspect to this study will provide a comprehensive picture of the situation in the household. Some of the information obtained from the participants were subject to bias from recall and self-reporting. More research is therefore warranted in order to accommodate this and provide more evidence for policy making [32-34].

6. CONCLUSIONS

The findings of this study reveal apparently high prevalence of malaria, good and poor knowledge of preventive measures against malaria and lymphatic filariasis in Anambra State. The commonest sources of awareness for malaria and LF were health institutions and, friends. There was correlation between knowledge about malaria and L. There were relationships between Knowledge about malaria and LF and highest educational level attained as well as occupation. There should be comprehensive sustained and targeted health education programs in health institutions as well as via peer educators across the State on malaria and lymphatic filariasis ensuring control of these VBDS.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Authors hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

ETHICAL APPROVAL AND CONSENT

The study has been examined and approved by the Nnamdi Azikiwe University Teaching Hospital Ethics Committee. Permission to conduct this study was obtained from the State Ministry of Health and the selected Local Government Authorities. Verbal informed consent was obtained from each participant for the conduct and publication of this research study and assurance of confidentiality given. Study participants were free to refuse or withdraw from the study at any time without any penalty. The study's purpose and objectives were explained to each participant prior to interview. All authors hereby declare that the study has therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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