

Lymphatic Filariasis and Malaria Awareness amongst Residents of Port Harcourt Metropolis

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Abstract

A study to determine the knowledge, attitude and perception of malaria and lymphatic filariasis amongst the residents of Port Harcourt metropolis was conducted by administering structured questionnaires randomly to 300 hundred respondents in Port Harcourt metropolis. Questionnaires were handed out to (100) one hundred respondents resident in the three Local Government Areas (LGA) that constitute Port Harcourt metropolis; Eleme, Obio/Akpor, Port-Harcourt. The study showed that respondents between the ages of 21-30 years had the highest response to the questionnaires. On regional basis; Eleme LGA had an overall compliance of 33.5% for malaria and 33.0% for lymphatic filariasis, Obio/Akpor LGA recorded a compliance of 25.9% for malaria and 37.3% for lymphatic filariasis while Port Harcourt LGA had a compliance level of 40.4% for malaria and 29.5% for lymphatic filariasis in the study. Data also showed that a total of 33.6% respondents were aware of malaria, 5(1.6%) were aware of lymphatic filariasis while 63.6% of the respondents were aware of both malaria and lymphatic filariasis in the study. However, 64.5% of the respondents correctly indicated mosquito as the vector of the diseases, 10.8% and 8.0% believed that food poisoning and stepping on charms respectively were responsible for the morbidities. Female respondents were more compliant than males in the study. The study discovered that misconceptions about lymphatic filariasis were due to inadequate knowledge, superstitious beliefs and traditional practices employed by Port Harcourt resident in the study. The result also showed that the socio-economic status of the residents did affect their knowledge about the diseases. The study recommends health education as a strategy of controlling the prevalence of both endemic diseases in the country.

Keywords: Overall compliance; Malaria; Lymphatic filariasis; Vector; Morbidities; Endemic diseases

Abbreviation: LGA: Local Government Area; WHO: World Health Organization; WHA66.12: World Health Assembly Provisional Agenda, Item 13.5 (A66/12 11th March, 2013); NTD's: Neglected Tropical Diseases; LF: Lymphatic Filariasis; DALY's: Disability Adjusted Life Years; MC: Malaria Consortium; HIV/AIDS: Human Immuno Virus/Acquired Immune Deficiency Syndrome; NMFS: Nigerian Malaria Fact Sheet; ADL: Adenolymphagitis; HH: Health Horizon; CCDC: Centre for Disease Control; TETFUND: Tertiary Education Trust Fund; ASTMH: American Society For Tropical Disease and Hygiene

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Introduction

Sustainable for all still a mirage

The World Health Organization (WHO) had been at the fore front of the campaign to realize 'health for all' within a stipulated time frame which is also a key aspect of her millennium development goals [1,2]. Unfortunately, this noble objective has become a mirage yet to be captured due to the over reliance on outdated data by various National Health programs of her member states

[3-5]. Realizing this gap the WHO in her 66th assembly in May 2013 adopted resolution WHA66.12 which mandated her member states to intensify multifaceted measures and plan investments to improve the health and social well-being of affected populations [6]. Major setbacks to this noble projection include; the incidences of novel infectious diseases and the enigma of Neglected Tropical Diseases (NTD's) which are viewed as proxies for poverty and the success of interventions aimed at reducing poverty [5]. To realize health for all by the year 2020 which is a projection of previous failed targets calls for sociocultural specific approaches that are feasible to target populations.

It on this premise that the WHO's focus had shifted from development to sustainable development, from poverty eradication to shared prosperity, and from disease-specific goals to universal health coverage [5]. Recently, the little progress recorded in the battle against NTD's is being threatened by the menacing effect of climate change which has exacerbated the little grounds gained in the battle against diseases of man and animal. For instance theoretical speculations and real situations show a consistent rise in vector transmitted parasitic diseases restricted to tropical regions in subtropical and high altitude regions of the globe [7-9].

The combined scourge of lymphatic filariasis and malaria in Sub Saharan Africa

Lymphatic Filariasis (LF) and Malaria are regarded as the two most important parasitic diseases in the tropics, collectively infecting more than 500 million people globally and perpetuating poverty and underdevelopment in sub Saharan Africa [3,9-15]. The diseases constitute a great public health scourge worldwide due to the heavy Disability Adjusted Life Years (DALY's) they elicit on the infected [16,17]. Also, the combined socio-economic burden of LF and malaria is enormous when the direct cost of treatment and losses resulting from physical incapacitation are considered [18-21]. Statistical records indicate that the prevalence of the diseases is nose dividing in sub Saharan Africa but real life cases contradict global and regional statistics due to the numerous undocumented cases in urban and rural areas [22-26]. Studies show that these infections require consistent implementation of practicable measures and practices such as proper body coverage and sanitation, yet their prevalence soars higher than expected.

Malaria affects 3.3 billion people which is about half of the world's population, in 106 countries and territories. It is estimated that out of the 214 million cases of malaria recorded in 2015, 81% of the cases were in the African region with 438,000 malaria deaths. It is estimated that 91% of all deaths due to malaria were in the African Region, and 86% were children under 5 years of age 27. Globally, malaria is the 3rd leading cause of death for children under five years after pneumonia and diarrhoea [10,12,13,27]. Alarmingly, thirty countries in Sub-Saharan Africa account for 90% of global malaria deaths. Nigeria, Democratic Republic of Congo (DRC), Ethiopia, and Uganda account for nearly 50% of the global malaria deaths. Malaria is the 2nd leading cause of death from infectious diseases in Africa, after HIV/AIDS with about 1 out of 5 deaths of children under the age of 5 Africa associated with malaria [27,28].

An overview of the malaria epidemiology in Nigeria

In Nigeria, malaria is holoendemic with more than 160 million people at risk. The effect of malaria is particularly noticeable in rural areas where malaria frequently strikes during farming seasons [29-33]. In the rural areas of Africa, over one third of primary school children experience clinical symptoms of malaria and are absent from school at least ones weekly in a school term [34-36]. This all year round high incidence of malaria is due to the numerous suitable breeding sites of the malaria vectors particularly during the rainy season [32,37-39]. In Nigeria, high precipitation drives malaria prevalence in addition to factors

such as unsanitary environmental conditions, poverty, ignorance, unhealthy habits and inadequate infrastructure [40-42].

An overview of banchroftian filariasis in Nigeria

Lymphatic filariasis (LF) is a disease caused by multiple etiologic agents (nematodes) of which *Wuchereria bancrofti* is the most economically important due to the chronicity and debilitating nature of the disease it causes. Mosquitoes in the family: Culicidae and genera: *Culex* Spp, *Anopheles* Spp and *Aedes* Spp. are responsible for the transmission of the infection. LF is an accumulative infection occasioned by repeated exposure to microfilariae, affects about 120 million people worldwide [43-47]. Nigeria is the third most endemic country in the world with about 22.1% of the population infected [48]. In approximately 80 tropical and subtropical countries, a billion people are estimated to be at risk of the infection [43,49]. Although, mortality from lymphatic filariasis is low, the disease is the fourth leading cause of permanent disabilities and is second to malaria in terms of Disability Adjusted Life Years (DALYs) [6,43]. The disease results in damages to the lymphatic system leading to lymphoedema, genital pathology and elephantiasis. Clinical manifestation of LF ranges from reoccurring attacks of localized inflammation, tenderness of the lymph nodes and pain often accompanied by fever, nausea and vomiting known as acute adenolymphagitis (ADL), while asymptomatic cases laden with microfilariae (mf) may suffer internal damages to the lymphatic and renal systems [50,51]. Social stigmatization people with LF and the chronicity of the infection aggravate hardship suffered by the infected on a daily basis [32]. Limited knowledge about this disease does not only have a negative impact on the success of control measures but also on health seeking behaviors. Consequently, community health seeking behaviors are influenced by community beliefs and local practices [39,51].

Rationale for the survey

It is pertinent to determine the awareness and attitude of the Nigerian populace towards the two hydra headed giant parasitic infections; malaria and lymphatic filariasis as Nigeria is a huge contributor to the global prevalence of the diseases. The Nigerian ecosystem being conducive for LF spread with due to the efficiency of arthropod vectors and the compatibility status of *W. bancrofti* well [45,52-55] more people oriented strategies must be adopted to combat the infections. Overcoming the deteriorating sanitary conditions in both urban and rural areas are among the strategies that would drastically reduce the transmission of the disease amongst a myriad of other factors such as health education, distribution of long-lasting insecticidal bed nets, and mass drug administration in Nigeria [23,56]. However, it is envisaged that health education at the grass root and aggressive public enlightenment campaign would be very effective in the reduction of the prevalence of these diseases [57]. The objective of this study is to evaluate the awareness and perception of malaria and lymphatic filariasis in three local Government Areas that constitute the Port Harcourt Metropolis.

Materials and Methods

Study area

The study Area is the metropolitan Port Harcourt city in Rivers State of Nigeria. Port Harcourt city is one of the designated mega

cities in Nigeria besides Lagos, Kanu and Abuja with an estimated population of about 6,689,087 by the 2006 National census. It is located geographically within latitude 4, 45' N, and longitude 6, 50' E. Rivers State of Nigeria is bounded on the south by the Atlantic Ocean, at the North by Anambra, Imo and Abia States, at the East by Akwa Ibom State and Bayelsa and Delta States at the West 67. The inland part of the State consists of the typical tropical rain forest and mangrove swamps forests at the coastal boundries. Data was collected from the three Local Government Areas (LGA) that make up the Port Harcourt metropolis; Obio-Akpor, Port Harcourt and Eleme LGA's.

Obio-Akpor LGA is the economic hub of Rivers State because it harbors more than 50% of the private and all the government owned companies. This characteristic makes it a rendezvous for economic and educational activities. Choba community is one of the communities in the Study Area that enjoys the influence of the private and government establishments attracting a huge influx people. Rumuchakara, Owhipa, Okocha, Rumuolaogu, and the University of Port Harcourt community were sampled from Choba sampling Area. The study area lies between latitude 4' and 5' North and longitude 6' and 7' East with an estimated population of about 25-30,000 residents. The major occupations of Choba inhabitants are farming, fishing and trading.

Port Harcourt City is the seat of power of the State and harbors all the ministries and headquarters of the major oil companies until recently when Shell moved to Lagos. It is the administrative center of the State. Data was collected from five communities namely; Diobu, Ogbulabali, Nkpoluorworukwo, Rumuibekwe and Rumukalagbo. Port Harcourt LGA covers an area of 360 km square and lies between latitude 4.75' North and longitude 7' East with an estimated population of 1,947,000.

Port Harcourt Eleme which is also one of the study areas is a sub-division of Rivers State Nigeria, located at the east of Port Harcourt. It covers an area of 138 km square meter with a population of 190,884 as at 2006 census. Eleme is geographically located within latitude 4'45'N 7'00'E and longitude 4.75'N 7'E. The main occupations of the people of inhabitants of Eleme include; fishing, farming and trading. Eleme local government area has several communities but the study is restricted to only five communities namely: Alesa, Alode, Ogale, Onne, Okori.

Study population

The sample population consisted of a cross section of people living in three Local Government Areas (Obio-Akpor, Port Harcourt, Eleme). The first group comprised a cross section of Choba residents. The second group consists of people living in five communities in Port Harcourt Local Government Area of Rivers State while comprised of a cross section of people resident in five selected communities in Eleme Local Government Area.

Sampling design/procedure

The Sampling Design used for this research is Cluster sampling. The people were selected randomly in order to avoid bias. The sample size however were 300 people (both male and female) twenty questionnaires were administered in each of the five designated communities, making a total of 300 questionnaires.

Questionnaire administration

The questionnaires administered were used to extract information from the respondents and was done after the study objectives were explained to them. Verbal consent was obtained from respondents following which questionnaires were filled and returned promptly. This included ten major questions to access participants' knowledge, attitude and perception on the cause, transmission and prevention of malaria and lymphatic filariasis. The respondents that were unable to read the questionnaire were assisted by the researchers to complete the questionnaires.

The questionnaire was pre-tested and modified to address identified needs and additional issues following the format recommended. The additional issues were on the influence of socio-cultural beliefs, psychological implications and consequences of the disease on marriage prospects. Descriptive information was collected through discussions with health officers, community leaders, teachers and students. Specific attention was paid to local terminologies used to describe the manifestation of malaria and lymphatic filariasis in the respective sampling areas.

Data analysis

Quantitative and qualitative data were generated and analysed with SPSS (Statistical Package for Social Sciences) software package.

Results

Characteristics of the study population

The study population comprised 300 respondents from the three Local Government Areas that constitute Port Harcourt metropolis. A total of 100 (33.3%) individuals were targeted for each LGA Data showed that more females responded to questions than males ($P > 0.05$). Age related response showed that the 21-30 years age range responded more to questions 142(29.1%) females and 131(26.8%) males than other age ranges in the study. The 41+ years age range also recorded low response of 17(3.4%) and 10(2.05%) females and males respectively (**Table 1**). Amongst the 300 respondents in the 176(58.6%) were single, 109(36.3%) were married and 5(1.5%) were separated. However, the marital status of the respondents was not considered as an associated factor influencing the opinion of the respondents in this the study (**Figure 1**). There was concentration of singles in Eleme and Obio-Akpor communities which was associated with affordable housing, commerce and security. Port Harcourt LGA had the highest population of married individuals indicative of high and middle class families comprising of mostly civil servants. This study opines that the demographic structure displayed in this study is in tandem with expectations in a city that houses the seat of Government also witnesses a population of civil service personnel families. Again, the heavy industrialization in Eleme and Obio-Akpor LGA's serve as magnets for young school leavers and entrepreneurs hence the surge in youth population in these areas.

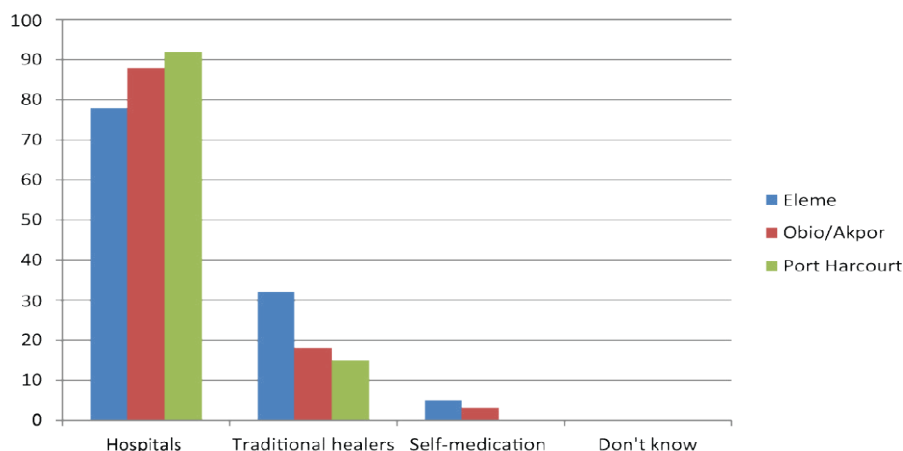


Figure 1 Respondent's marital status.

Table 1 Characteristics of the study population.

Age Range		Sex		Characteristics of the study Population in L.GA's (%)					
				Fleme		Obio/Akpor		Port-Harcourt	
		M	L.F	Total	M	L.F	Total	M	L.F
14-20	Male	12(52.1)	11(47.8)	23(35.9)	14(66.6)	7(33.3)	21(32.8)	14(70.0)	6(30.0)
	Female	11(78.5)	3(21.4)	14(36.8)	6(66.6)	3(33.3)	9(23.6)	9(60.0)	6(40.0)
21-30	Male	25(56.8)	18(40.9)	44(33.5)	25(73.5)	9(26.4)	34(25.9)	31(58.4)	22(41.5)
	Female	28(59.5)	19(40.4)	47(33.0)	33(62.2)	20(37.7)	53(37.3)	23(54.7)	19(45.2)

M: Malaria; L.F: Lymphatic Filariasis

Respondent's awareness about the diseases

The study observed that awareness of the diseases generally was low considering the endemicity of the two diseases in the study areas ($P < 0.05$). There was variability in opinion amongst the respondents about the two diseases however the awareness of malaria 35.3% amongst the respondents was more than the awareness for Lymphatic filariasis 36.6% Obio/Akpor LGA recorded more awareness for malaria while Eleme LGA recorded more awareness for Lymphatic filariasis (Table 2). The study believes that the increase in awareness level 42.0% of Obio Akpor is associated with the population growth of the area due to its infrastructural evolution and overlap into the Port Harcourt City center which has augmented the flow of information and magnified the level of cultural integration.

Knowledge about the cause of the diseases

Knowledge about the etiology of the diseases was relatively high in the study especially in Obio Akpor and Port Harcourt study areas. The study reveals that the educational status of the respondents was a contributing factor to this level of awareness. Port Harcourt and Obio Akpor houses a huge chunk of the educational establishment and government ministries which directly influenced the information dissemination. On the other hand, Eleme respondents' relatively low knowledge about the diseases to relatively poor infrastructural state and the socioeconomic status of the respondents. There was relatively

high occurrence of the lack of knowledge about the etiology of filariasis. It was suggests that the ignorance about the filarial infection was due to the infrequent manifestation of clinical symptoms in infected hosts in the study areas. However, the knowledge about lymphatic filariasis was relatively high in Eleme which deviates from what it had been in malaria and the social economic status of the indigenes that has been stressed upon earlier (Table 3).

Mosquito bite as source of infections

Data shows that most of the respondents in the study areas believed that mosquito bite was the mode of transmission of the diseases. In Eleme LGA, 83.0% of the respondents indicated that mosquito bite was the mode of transmission of malaria while 53.0% indicated the same for lymphatic filariasis. However, in Obio/Akpor LGA, 95.0% of the respondents indicated that mosquito bite was the mode of transmission of malaria, while 25.0% indicated the same for lymphatic filariasis. In Port Harcourt, 90.0% respondents believed that mosquito bite was the means of transmitting malaria while 65.0% indicated the same for lymphatic filariasis.

Sexual intercourse or body contact as source of infections

Data reveals that 12.0% of Eleme respondents indicated that sexual intercourse or body contacts are the mode of transmission

Table 2 Respondents awareness of the disease in study areas.

Respondents' awareness of the disease (%)							
Awareness	Eleme		Obio/Akpor		Port Harcourt		Overall Response (%)
	M	LF	M	LF	M	L.F	
Yes*	32(86.4)	5(12.5)	42(42.0)	0	27(96.4)	0	106 (35.3)
No**	5(6.0)	33(82.5)	0	42(42.0)	1(3.5)	28(28.0)	110 (36.6)
Ignorant	0	2(5.0)	0	0	0	0	5(0.66)

M: Malaria; LF: Lymphatic filariasis; *0.023553 (p<0.05) and **0.021698 (p<0.05).

Table 3 Knowledge about the cause of the disease.

Knowledge about the cause of the diseases (%)							
Knowledge of Cause of Diseases		Eleme		Obio/Akpor		Port Harcourt	
		Yes					
		No					
	Yes	94(94.0)	67(67.0)	100 (100)	52(52.0)	100 (100)	64(64.0)
	No	6 (6.0)	33(33.0)	0	48(48.0)	0	36(36.0)

of malaria and 19.0% respondents indicated the same for lymphatic filariasis. However, in Obio/Akpor study area some of the respondents believed that food poisoning or stepping on charms is are the means of transmitting the diseases with 6.0% of the respondents for malaria and 34.0% for lymphatic filariasis. In Port Harcourt, 9.0% of the respondents indicated that sexual intercourse or body contact was the means of transmitting malaria while 20.0% respondents indicated the same for lymphatic filariasis.

Food poisoning/stepping on charms as a source of infections

The study revealed a strong influence of superstitious believes on the knowledge and practice of the respondents in the study. It was observed that Eleme LGA which is the study area with the most village or primitive status had the highest misconceptions of about the diseases. However, there was a gradual decline in the misconceptions as the municipality status of the sampling area increased (Table 4). Data shows that 6.0% of respondents from Eleme believed that food poisoning or stepping on charms were the means of transmitting malaria while 34.0% respondents indicated that the same were responsible for the transition of lymphatic filariasis. In Obio/Akpor, 11.0% and 28.0% respondents indicated that food poisoning or stepping on charms were the means of transmitting malaria and lymphatic filariasis respectively. However, 14.0% and 27.0% of the respondents in Port Harcourt indicated that the lymphatic filariasis and malaria respectively were transmitted through food poisoning or stepping on charms.

Witchcraft as a source of infections

In Eleme LGA, none of the respondents responded on witchcraft as a mode of transmission of malaria but 13.0% respondents responded to it as a mode of transmission of lymphatic filariasis. However, in Obio/Akpor LGA, 1.0% and 5.0% respondents indicated that malaria and lymphatic filariasis respectively are transmitted through witchcraft, while 2.0% of the respondents from Port Harcourt study area indicated witchcraft as the mode

of transmitting malaria while 6.0% respondents indicated the same for lymphatic filariasis.

Respondent's knowledge and experience on the diseases

The study noted that some of the respondents had some experiences about the diseases. Data showed that in Eleme, all the respondents 100% had experienced malaria and 33% individual's lymphatic filariasis. However, 98.0% of the respondents in Obio/Akpor indicated suffering from malaria while 20.0% indicated experiencing lymphatic filariasis. Similarly, 99.0% and 25.0% of the respondents in Port Harcourt study area stated experiencing malaria and lymphatic filariasis respectively (Table 5).

Respondent's knowledge on signs and symptoms of the diseases

Body malaise as a symptom of the infections: Data showed that in Eleme study area 43.0% of the respondents indicated body malaise as a common a symptom of malaria while 4.0% of the respondents stated that body malaise was a symptom of lymphatic filariasis. In Obio/Akpor study area 38.0% of the respondents responded on body malaise as a symptom of malaria while 8.0% respondents indicated the same for lymphatic filariasis. However, in Port Harcourt study area 63.0% of the respondents indicated body malaise a symptom of malaria while 3.0% responded on it as a symptom of lymphatic filariasis (Table 6).

Lymph enlargement as a symptom of the infections: Data revealed that 3.0% respondents in Eleme study area indicated lymph enlargement as a common symptom of malaria while 28.0% respondents indicated lymph enlargement as a symptom of lymphatic filariasis. However, in Obio/Akpor study area 2.0% of the respondent stated that lymph enlargement was associated with malaria while 38.0% responded to it as a symptom of lymphatic filariasis. In the Port Harcourt study area, 4.0% and 5.0% of the respondents indicated that lymph enlargement was a symptom of malaria and lymphatic filariasis respectively.

Table 4 Respondents' knowledge on mode of transmission of the diseases.

Respondents' Knowledge on Mode of Transmission of the Diseases (%)									
Mode of transmission	Eleme			Obio/Akpor			Port Harcourt		
	M	L.F	Total	M	L.F	Total	M	L.F	Total (%)
Sexual intercourse or Body Contact	12(12.0)	19(19.0)	31(31.0)	17(17.0)	16(16.0)	33(33.0)	9(9.0)	20(20.0)	29(29.0)
Mosquito bite	83(83.0)	53(53.0)	136(33.0)	95(95.0)	25(25.0)	120(29.1)	90(90.0)	65(65.0)	155(37.7)
Food poisoning or Stepping on charms	6(6.0)	34(34.0)	40(40.0)	11(11.0)	28(28.0)	39(39.0)	14(14.0)	18(18.0)	32(32.0)
Witch craft	0	13(13.0)	13(48.1)	1(1.0)	5(5.0)	6(22.2)	2(2.0)	6(6.0)	8(29.6)

Table 5 Respondents' experiences about the diseases.

Experiences about infections (%)									
Experiences or infections	Eleme			Obio Akpor			Port Harcourt		
	M	L.F	Total	M	L.F	Total	M	L.F	Total
Yes	100(100)	33(33.0)	133(54.4)	98(98.0)	20(20.0)	118(31.4)	99(99.0)	25(25.0)	124(33.0)
No	-	67(67.0)	67(29.7)	2(2.0)	80(80.0)	82(36.4)	1(1.0)	75(75.0)	76(33.7)

Table 6 Respondents' knowledge on signs and symptoms of the diseases.

Respondents' knowledge on signs and symptoms of the diseases (%)									
Symptoms	Eleme			Obio/Akpor			Port Harcourt		
	M	L.F	Total	M	L.F	Total	M	L.F (%)	Total
Abnormal sleep	23(23.0)	3(3.0)	26(32.0)	40(40.0)	2(2.0)	42(51.8)	12(12.0)	1(1.0)	13(16.0)
Fever	35(35.0)	6(6.0)	41(43.1)	32(32.0)	3(3.0)	35(36.8)	18(18.0)	1(1.0)	19(20.0)
Body malaise	43(43.0)	4(4.0)	47(29.5)	38(38.0)	8(8.0)	46(28.9)	63(63.0)	3(3.0)	66(41.5)
Pain	13(13.0)	18(18.0)	31(28.0)	42(42.0)	12(12.0)	54(50.0)	20(20.0)	3(3.0)	23(21.2)
Lymph enlargement	3(3.09)	28(28.0)	31(38.0)	2(2.0)	38(38.0)	40(50.0)	4(4.0)	5(5.0)	9(11.2)
Itching/scratching	15(15.0)	32(32.0)	47(46.0)	12(12.0)	23(23.0)	14(13.7)	6(6.0)	14(14.0)	20(19.6)
Vomiting	28(28.0)	9(9.0)	37(43.5)	17(17.0)	6(6.0)	23(27.0)	16(16.0)	9(9.0)	25(29.4)
Others	5(5.0)	0	5(41.6)	3(3.0)	3(3.0)	6(50.0)	1(1.0)	0	1(8.3)

Abnormal sleep as a symptom of the infection: Data revealed that 23.0% of the respondents from Eleme study area associated abnormal sleep patterns as symptom of malaria while 3.0% respondents associated behavior with lymphatic filariasis. Also, in Obio/Akpor, 40.0% of the respondents associated abnormal sleep patterns as a symptom of malaria while 2.0% respondents believed it was a symptom of lymphatic filariasis. However, 12.0% and 1.0% respondents indicated that abnormal sleep was a symptom of malaria and lymphatic filariasis respectively in Port Harcourt.

Pain as a symptom of the infections: Data showed that in Eleme study area 13.0% and 18.0% of the respondents indicated that body pain as being common with malaria and lymphatic filariasis infections respectively. Similarly, body pain was associated with both diseases in Obio/Akpor study but with variations in the populations that indicated malaria 20.0% and lymphatic filariasis 12.0%. However, in the Port Harcourt study area 20.0% of the respondent also associated pain with malaria while only 3.0% of the respondents related it with lymphatic filariasis.

Fever as a symptom of the infections: Data revealed that 35.0% and 6.0% of the respondents from the Eleme study area indicated fever as a common symptom of malaria and lymphatic filariasis respectively. 32.0% and 3.0% of the respondent from Obio/

Akpor study area stated that fever was common with malaria and lymphatic filariasis respectively. However, 18.0% of the respondents from Port Harcourt study area indicated that fever was a common symptom of malaria while 1.0% stated the same for lymphatic filariasis.

Itching and scratching as a source of infections: Data shows that in Eleme study area 15.0% of the respondents indicated that itching and scratching of the body was a symptom of malaria while 32.0% respondents indicated the same for lymphatic filariasis. However, in Obio/Akpor study area 12.0% and 23.0% of the respondents indicated that itching and scratching were symptoms of malaria and lymphatic filariasis respectively. In Port Harcourt study area 6.0% of the respondents indicated that itching and scratching were symptoms of malaria while 14.0% of the respondents indicated the same for lymphatic filariasis.

Vomiting as a source of infections: Data shows that in Eleme study area 28.0% of the respondents indicated that vomiting was a symptom of malaria while 9.0% respondents indicated the same for lymphatic filariasis. However, in Obio/Akpor study area 17.0% and 6.0% respondents indicated that vomiting was a symptom of malaria and lymphatic filariasis respectively. Also in Port Harcourt study area 16.0% and 9.0% of the respondents

indicated that vomiting was a symptom of malaria and lymphatic filariasis respectively.

Respondent's attitude to control measures

Avoidance or abstinence from sexual intercourse: Data showed that in Eleme study area, 8.0% of the respondents indicated that avoidance of sexual contact was a control measure for malaria while 23.0% of the respondents believed the similar disposition was effective for lymphatic filariasis control. Also, 5.0% of the respondents in Obio/Akpor, study area indicated abstinence from sexual activities as effective control measure for malaria while 15.0% indicated the same attitude as effective control strategy for lymphatic filariasis. However, 12.0% and 18.0% of the respondents in the Port Harcourt study area indicated abstinence from sexual intercourse as a control measure for malaria and lymphatic filariasis respectively (**Table 7**).

Personal hygiene as a control measure of the infections: Data reveals that 63.0% of the respondents in Eleme study area indicated that personal hygiene was a control measure for malaria while 58.8% mentioned the practices as effective measures against lymphatic filariasis. In Obio/Akpor study area, 74.0% and 72.0% of the respondents indicated that personal hygiene was an effective control measure against malaria and lymphatic filariasis respectively. However, in Port Harcourt study area, 77.0% of the respondents indicated that the observance of personal hygiene was a control measure for malaria while 42.0% indicated the same practice an effective strategy for the control of lymphatic filariasis.

Avoidance of mosquito bite as a control measure against the infections: In Eleme study area, 85.0% of the respondents stated that avoidance of mosquito bites was effective against malaria infection spread while 37.0% of the respondents indicated mosquito control as an effective measure against lymphatic filariasis spread. However, 72.0% of the respondents in Obio/Akpor study area stated that avoidance mosquito bites was a control measure for malaria out of 43.0% of the respondents that stated practice as being effective for lymphatic filariasis. 93.0% and 41.0% of the respondents in Port Harcourt study area stated that avoiding mosquito bite was an effective control measure for malaria and lymphatic filariasis respectively.

Avoid body contact as a control measure of the infections: Data show that none of the respondents in Eleme study area indicated that avoidance of body contact was effective against malaria but 22.0% of the respondents indicated avoidance of body contact as being effective against lymphatic filariasis. In Obio/Akpor

study area data reveals that none of the respondents believed that avoidance of body contact was a control measure for both malaria and lymphatic filariasis. However, in Port Harcourt study area none of the respondents believed that avoidance of body contact was a control measure for malaria but 6.0% indicated that it was a control measure for lymphatic filariasis.

Avoidance of eating with an infected person: Data revealed that none of the respondents in Eleme study area responded on avoidance of eating with an infected person as a control measure for malaria while 2.0% respondents believed that avoidance of eating with an infected person was a control measure for lymphatic filariasis. However, in Obio/Akpor study area, 1.0% respondents believed that avoidance of eating with an infected person was a control measure for malaria while none of the respondents believed that for lymphatic filariasis. Also in Port Harcourt study area, none of the respondents believed that avoid eating with an infected person was a control measure of both malaria and lymphatic filariasis.

Sacrifices to gods as a control measure of the infections: Data show that Eleme study area had 2.0% respondents indicating that sacrifice to appease gods was a control measure while 11.0% of the respondents indicated the same for lymphatic filariasis. In Obio/Akpor study area data revealed that 7.0% and 18.0% respondents indicated that sacrifice to appease gods was a control measure of malaria and lymphatic filariasis respectively. However, in Port Harcourt study area 4.0% respondents indicated that sacrifice to appease gods was a control measure for malaria while 21.0% respondents indicated the same for lymphatic filariasis.

Respondent's knowledge on socio-economic and physiological consequences

Data showed that the overall total of 161(31.2%) believed that the socio-economic and physiological consequences will increase spending on health on the affected individuals while 128(24.8%) believed that the consequences will lead to loss of self-esteem. 82(15.9%) believed that it hinders daily income while 64(12.4%) believed that it is a way of losing their source of income. 47(9.1%) and 33 (6.4%) respondents respectively believed that avoiding social gathering and absenteeism from school or work are the consequences (**Figure 2**).

Respondent's knowledge on best health care services: Data showed that a good number of respondents from the study areas believed that hospitals is the best health care services for these infections with the overall total of 258(77.9%) followed by

Table 7 Respondent's attitude to various control strategy.

Control measure	Respondents' Attitude to control (%)								
	ELEME			OBIO/AKPOR			PORT HARCOURT		
	M (%)	L.F (%)	Total (%)	M (%)	L.F (%)	Total (%)	M (%)	L.F (%)	Total (%)
Avoid sexual contact	8(8.0)	23(23.0)	31(38.2)	5(5.0)	15(15.0)	20(24.6)	12(12.0)	18(18.0)	30(37.0)
Good personal hygiene	63(63.0)	58(58.0)	121(31.3)	74(74.0)	72(72.0)	146(37.8)	77(77.0)	42(42.0)	119(30.8)
Avoid body contact	-	22(22.0)	22(78.5)	-	-	-	-	6(6.0)	6(21.4)
Sacrifice to appease God	2(2.0)	11(11.0)	13(20.6)	7(7.0)	18(18.0)	25(39.6)	4(4.0)	21(21.0)	25(39.6)
Avoid mosquito bite	85(85.0)	37(37.0)	122(32.8)	72(72.0)	43(43.0)	115(30.9)	93(93.0)	41(41.0)	134(36.1)
Avoid eating with an infected person	-	2(2.0)	2(66.6)	1(1.0)	-	1(33.3)	-	-	-

traditional healers with 65(19.6%), while 8(2.4%) believed that self-medication is the best health care for these diseases (Figure 3).

Discussion

It was found in this study that there was a high level of awareness (80.3%) among respondents in the Study Areas. The ability of community members to protect themselves from malaria and lymphatic filariasis was based on their access to proper information about the diseases through health education [58-61]. The study reveals that the high awareness level in the study areas may be attributed to the closeness to the Port-Harcourt metropolis which has numerous agents of enlightenment (Figure 4).

The knowledge of vector species is important in understanding the epidemiology of malaria and Bancroftian filariasis. Majority of the respondents were familiar with malaria and lymphatic filariasis manifestations, however, their awareness on the cause and transmission was poor. This study revealed that preventions were based on superstitious beliefs. These diseases distorted awareness on the true causes of the infections and the control measure is believed to be a primary risk factor in new infections as much of the information about the diseases were based on speculations or mythical beliefs, attributing transmission to witchcraft, sorcery and some evil spell [58-64]. Despite the endemic statuses of the Study Areas (64.5%), of the respondents were aware that the diseases are spread by mosquito bites. The role of mosquito in the transmission of parasitic agents of filariasis was poorly appreciated in many of the communities investigated

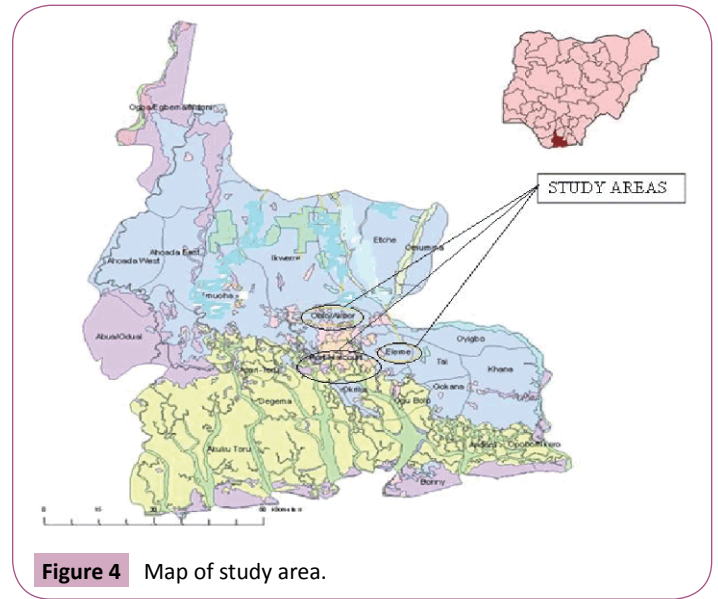


Figure 4 Map of study area.

and thus it was not surprising that there was little awareness of the importance of minimizing mosquito contacts for preventing infections. This result is in agreement with [58,59,62,64].

Respondents in the three local government areas were knowledgeable on the consequences of the diseases in households and the stigmatization that infected people are faced with which hampers economic and marriage prospects and matrimonial stability. Findings from descriptive data suggested that patients with chronic malaria avoided social gatherings which also declined their daily incomes while patients with advanced stages of lymphedema and hydrocele were noted to be isolated. This behavior is highly influenced by community perception on the causes, transmission and prevention of these diseases. Some of these cultural beliefs were due to ignorance and illiteracy [47,58,63,64].

Health education can therefore be designed to persuade the communities and individuals to correct the misconceptions associated with malaria and lymphatic filariasis. This study suggests that the responses from the three Local Government Areas appeared to be more influenced by superstition. It was observed that misconceptions about the infections can adversely affect any meaningful control measures against mosquito. In addition the use of appropriate health facilities and treatments are recommended [65-67].

Conclusion

In view of the active transmission of malaria and lymphatic filariasis in these Local Government Areas, with chances of prevalence, intensity and clinical symptoms increasing over time, there is urgent need for control. It is therefore recommended that more comprehensive epidemiological and entomological studies should be carried out in other communities of the Local Government Areas and the entire state to really establish the disease profile before control.

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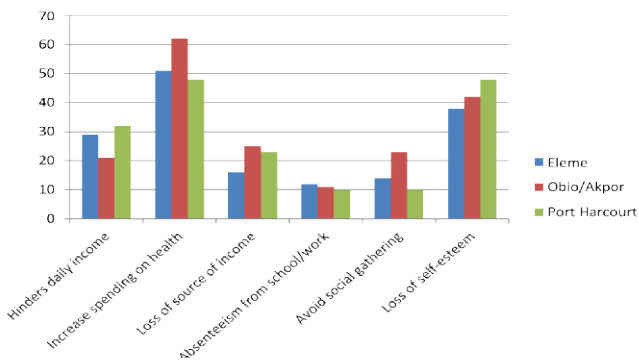


Figure 2 Respondents' knowledge on socio-economic and physiological consequences.

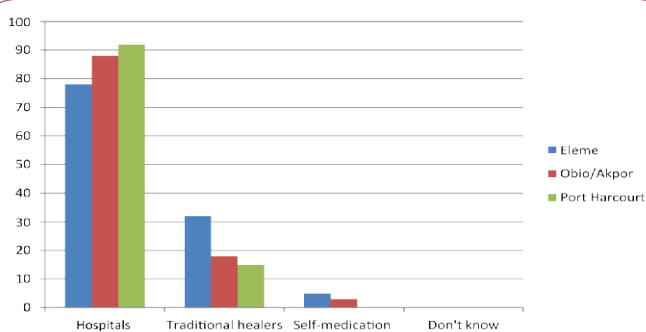


Figure 3 Respondent's knowledge on best health care services.

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Author's Contribution

Sidney O Nzeako designed the study, supervised the collection of

data and produced the final draft. Florence O Nduka assisted in the design and proof reading of the final draft. Oyenike H Okunnuga and Chinonye N Ezenwaka collected data and produced the initial draft.

Conflict of Interest

Authors declare no conflict of interest.

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