Original Article

OPEN ACCESS

*Correspondence: Ekpa Promise Joel and Omudu Edward Agbo

Email:

Specialty Section: *This article was submitted to Sciences section of NAPAS.*
Submitted date: 15th December, 2022
Accepted date: 28th March, 2023
Published date:

Citation: Ekpa Promise Joel and Omudu Edward Agbo (2023) Lymphatic filariasis Prevalence and Related Perception and Beliefs in Kogi East, Nigeria - *Nigerian Annals of Pure & AppliedSciences. 6(1):69 - 76.*
DOI:10.5281/zenodo.7338397

Publisher: *cPrint,Nig.Ltd*
Email: *cprintpublisher@gmail.com*

AccessCode

Lymphatic filariasis Prevalence and Related Perception and Beliefs in Kogi East, Nigeria

Ekpa Promise Joel and Omudu Edward Agbo

Department of Biological Sciences
Benue State University, Makurdi.

Abstract

Filariasis-related clinical manifestations and questionnaire were used to determine the prevalence of filariasis and investigate people's knowledge and beliefs about the disease. Out of the 730 subjects examined, 266 had various clinical manifestations. Hydrocele was recorded in 47(6.4%) of the cases, lymphedema in 129(17.7%), clinical manifestations associated with onchocerciasis such as dermatitis, skin rashes and itching and/or crawling sensation accounted for 90(11.6%) of the total subjects examined. Okenya community had the highest prevalence of clinical manifestations 49(83.1%) and it is statistically significant when compared to others ($\div^{2=}$ 2.76, df = 1, p > 0.05). A total of 1,536 respondents participated in the questionnaire survey. Respondents' Knowledge of the cause, mode of transmission and prevention of filariasis was generally poor and highly influenced by socio-cultural norms and beliefs. Gender-related comparison on knowledge of the true cause of the disease showed a significant difference ($\div^{2=}$ 30.43, df =1, p = <0.05). 63(23.7%) infected respondents and 516(33.7%) affected respondents implicated stepping on charm as the cause of filariasis ($\div^{2=}$ 0.47, df = 1, p > 0.05). The mode of transmission of filariasis was correctly attributed to mosquito/blackfly bites by 187(12.2%) affected respondents while none (0.0%) of the infected respondents mentioned mosquito/blackfly bites as the vehicle of transmission ($\div^{2}$ = 2.47, df = 1, p > 0.05). 27.4% of the infected respondents implicated stepping on charms as the transmission mechanism. There is need for in-depth enlightenment campaign on the true cause, mode of transmission and methods of preventing filariasis in endemic areas, as this would, help to ensure the success of prevention and control programmes.

Key words: Filariasis, lymphedema, hydrocele, prevalence, community perception.

Introduction

Filariasis is a group of vector-borne parasitic diseases of humans and other animals caused by an infection with long, thread-like, roundworms (nematodes) of the superfamily Filarioidae (CDC, 2010). The most important of the three groups of filariasis is lymphatic filariasis (LF) caused by three worms which are *Wuchereria bancrofti, Brugia malayi* and *Brugia timori*. These worms occupy the lymphatic system, including the lymph nodes.

The countries with the highest prevalence of LF in the world are India, Indonesia, and Nigeria. The disease occurrence had been reported in several Nigerian states such as Oyo (Awolola *et al.,* 2004), Ebonyi (Anosike *et al.,* 2005), Plateau (Terranella *et al.,* 2006), Cross River (Braide *et al.,* 2003; Ibanga *et al.,* 2008), among others. The prevalence have been reported to range from 6%-47% (Badaki and Akogun 2000; Mba and Njoku 2000; Braide *et al*., 2003; Eigege *et al*., 2003; Anosike *et al*., 2005; Nwoke *et al*., 2006; Omudu and Okafor 2007; Udoidung *et al*., 2008).

Identification of appropriate and sustainable filariasis treatment and prevention strategies requires a comprehensive understanding of local disease perceptions, including causes, consequences and means of prevention. This is because ignorance and erroneous beliefs are obstacles in preventive and control measures, thereby affecting the much-needed treatment. Community awareness and involvement are considered vital tools for the success and sustainability of any disease control programme (Acka *et al.,* 2010; Dogara *et al.,* 2014). This provides the much-needed epidemiological data that will guide in identifying high risk communities and help develop evidence–based community support and enlightenment strategies.

Materials and Methods

Study Area

The study was conducted in four LGAs in Kogi State. The state occupies a total land area of 29,833 km^2 (11,519 sq mi) and had an estimated population figure of 3,277,487 million as at 2006 (NPC, 2006). The state lies between Latitude 60˚30'N and 70˚40'N and between longitude 50˚35E' and 70˚40'E (Ariyo and Olawepo, 2003). The study area is made up of several villages and settlements and are characterized by the same climatic and environmental features.

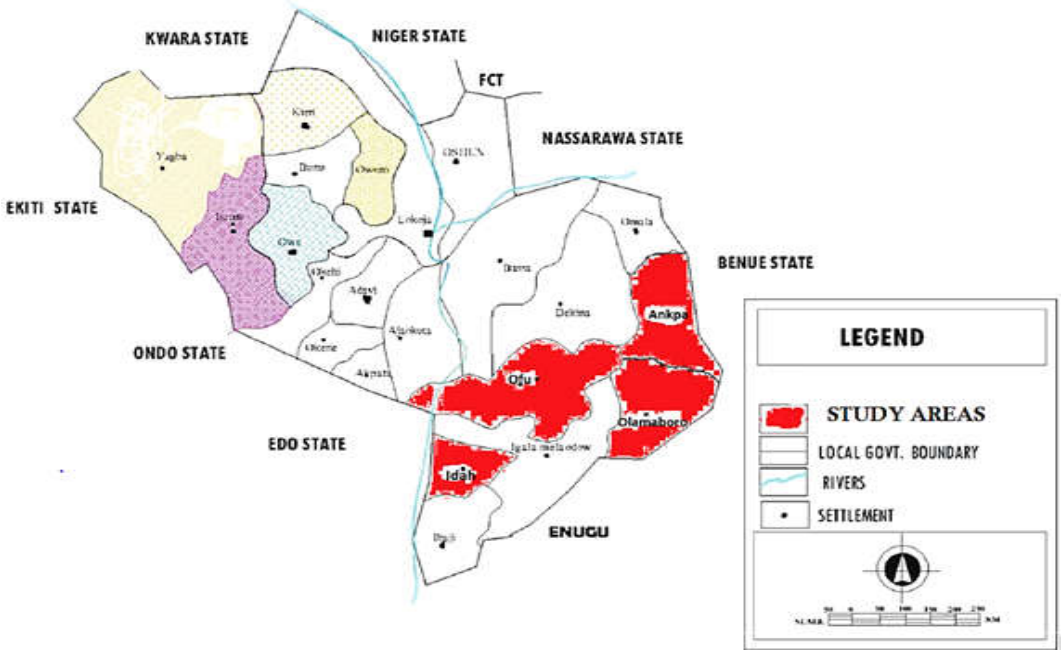

Figure 1: Map of Kogi State showing study L.G.As.

Ethical Considerations

Approval for the study was obtained from the Postgraduate Research Panel of the Benue State University, Makurdi. Permission was also obtained from the various Local Government Onchocerciasis Directorates, after which pre-study visits were made to the communities. The purpose of the study was explained to the chiefs of the various villages and clergymen, in some instances, to secure their consent. Informed verbal consent was obtained from all the participants after the explanation of the procedures and the likely benefits of the study.

Study Instrument and Procedure

The study was conducted by questionnaire administration, and search for clinical manifestations of filariasis among subjects within the study area. The questionnaire was developed taking clues from previous studies by Omudu and Okafor (2008) in Benue State. The questionnaire was then pre-tested in two communities different from the intended study sites and then modified to address additional issues following the format recommended by Gyapong *et al*. (2000). The study instrument was designed to obtain information on demographic characteristics, knowledge, attitude and perception on the cause, transmission, signs and symptoms, and prevention of filariasis.

Sampling

Two communities each, were randomly selected from each of the four L.G.As, making a total of eight (8) communities for the study. Representative communities were selected by the help of the onchocerciasis directors in the various L.G.As who were already familiar with the terrain. A total of 1,536 respondents (192 persons from each community) were randomly selected to fill the questionnaire. Only persons who were 10 years and older, and who had resided in the community for a minimum of 10 years were eligible for the study. A collection of pictures showing different manifestations of filariasis was showed to each participant to get their attention and to help them quickly understand the subject matter.

Clinical Examination for Diagnostic Signs of Filariasis

A total of seven hundred and thirty (730) willing participants were randomly selected and examined for clinical manifestations of filariasis. The assistance of trained health personnel (all of whom were also community distributors of Ivermectin) was sought from the local Primary Health Centers (PHC) in each community to assist in Clinical examination for manifestations of filariasis. Participants were taken to a secluded place, one at a time, and asked to partially disrobe, where the nurse (health personnel), assisted in performing the physical examination.

Search for Hydrocele and Lymphoedema

Hydrocele was diagnosed based on the finding of a non-tender, soft, fluid-filled mass, bigger than the size of an orange. Clinical examination also involved the search for lymphoedema which was easier to conduct than the search for hydrocele. Participants were simply asked to lift their clothing to expose their legs. Swollen limbs were identified and classified based on the degree of swelling as prescribed by Anosike *et al*. (2005), Nwoke *et al*. (2006), and Omudu and Okafor (2007). Dermal manifestations associated with onchocerciasis like Onchocercal dermatitis (creeping eruption) and crawling sensation were also recorded during the clinical examination.

Data analysis

Data was analysed using Frequency distributions, and chi-square was used to test significance at 95% confidence level in determination of the association between the variables.

Results

Demographic characteristics

The age of participants ranged from 10 to 70 years. The study comprised of two groups of persons; those who had any visible clinical manifestations of filariasis (Infected), and those with no visible clinical manifestations but who have been impacted negatively due to their friends and relatives

being infected (Affected). The overall hydrocele prevalence in the study communities was 6.4% (47), while the overall lymphedema prevalence was 17.7% (129), of which 12.6% (46) were men. There was no age difference (age–specific pattern) in sizes of hydrocele and lymphedema, but the disease manifestations were more prevalent in older people (Table 1). Clinical manifestations associated with onchocerciasis were also prevalent in the communities; these include dermatitis, skin rashes and itching and/or crawling sensation 12.3% (90) (Table 2).

Out of the total sample size (1,536), 45.5% of mentioned worms in the body as the cause of filariasis. Majority of infected respondents 63 (23.7%) and a good number of affected respondents 516(33.7%) implicated stepping on charm as the cause of filariasis ($\div^2$= 0.47, df = 1, p > 0.05). But 50(18.8%) of the infected respondents and 142 (9.2%) of affected responded that they did not know the cause of filariasis. (Table 3).

The respondents' perception of the cause of the disease is consistent with their beliefs on mode of transmission, as only 187 (12.2%) of affected respondents knew that filariasis is transmitted through mosquito/ blackfly bites, while none (0.0%) of the infected knew that mosquito/blackfly bites was the vehicle of transmission of filariasis ($\div^2$ = 2.47, df = 1, p > 0.05) (Table 4).

There is a statistically significant difference in the knowledge on the true method of prevention of filariasis between infected and affected respondents ($\div^2$ =12.01, df = 1, p< 0.05) as only 44 (16.5%) infected respondents believe that avoidance of mosquito/blackfly bites can prevent several unspecified diseases (including filariasis) as compared to 342 (22.4%) affected respondents (Table 5).

Most of the infected and affected respondents 100 (37.6%) and 720 (47.1%) respectively cited itching eyes/body as the major signs and symptoms. This is followed closely by lymph enlargement/nodules as pointed out by 33.8% infected and 30.5% affected persons (Table 6).

Table 1: Sex and Age-related Prevalence of Hydrocele, Lymphedema and Onchodermatitis among subjects in the study area

Age Group	Male No examined	No. with HYDC (%)	No. with LYMA (%)	No. with ONDE (%)	Female No. examined	No with LYMA (%)	No. with ONDE (%)	TOTAL No Examined	Percentage with HYDC (%)	Percentage with LYMA (%)	Percentage with ONDE (%)	Number with clinical signs (%)
10-19	75	0(0.0)	9(12.0)	0(0.0)	76	6(8.0)	0(0.0)	151	0(0.0)	15(9.9)	0(0.0)	15(9.9)
20-29	76	0(0.0)	7(9.2)	0(0.0)	75	12(16.0)	0(0.0)	151	0(0.0)	19(12.6)	0(0.0)	19(12.6)
30-39	60	20(33.3)	13(21.7)	0(0.0)	60	12(20.0)	9(15.0)	120	20 (16.7)	25(20.8)	9(7.5)	54(45.0)
40-49	90	13(14.4)	10(11.1)	0(0.0)	90	20(22.2)	17(18.9)	180	13(7.2)	30(16.6)	17(9.4)	60(33.3)
50 >	63	14 (22.2)	17(26.9)	41(65.1)	65	23(35.4)	23(35.4)	128	14(10.9)	40(31.2)	64(50.0)	118(92.2)
Total	364	54 (14.3)	46(12.6)	41(11.3)	366	73(19.9)	49 (14.8)	730	47(6.4)	129(17.7)	90(12.3)	266(36.4)

Keys: HYDC Hydrocele. LYMA lymphedema. ONDE Onchodermatitis,

Table 2: Distribution of Hydrocele, Lymphedema and Onchodermatitis among Subjects across the Study Communities.
(χ2= 2.76, df = 1, p > 0.05

Community	Number Examined	Number with Hydrocele (%)	Number with Lymphedema (%)	Number with Onchodermatitis (%)	Total (%)
Emakpe	75	11(14.7)	33(44.0)	14(18.7)	58(77.3)
Ikelekwu	94	0(0.0)	28(29.8)	12(12.8)	40(42.6)
Onicha– Igo	105	3(2.9)	13(12.4)	10(9.5)	26(24.8)
Allome	102	10(9.8)	16(15.7)	13(12.7)	39(38.2)
Okenya	59	13(22.0)	22(37.3)	14(23.7)	49(83.1)
Egah	120	10(8.3)	17(17.2)	17(14.2)	44(36.7)
Odo-eto	132	0(0.0)	0(0.0)	10(7.6)	10(7.6)
Odo-efofe	43	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Total	730	47(6.4)	129(17.7)	90(12.3)	266 (36.4)

Table 3: Perceived Cause of Filariasis by Infected and Affected.
(χ^2= 0.47, df = 1, p > 0.05)

Causes	Infected (n=266) Yes	Affected (n=1270) Yes	Total (n=1536) Yes
Worms in the body	45 (16.9)	697 (45.6)	699 (45.5)
Embarking on evil mission	0 (0.0)	10 (0.7)	10 (0.7)
Heredity	43 (16.2)	43 (2.8)	44 (2.9)
Sexual intercourse	0 (0.0)	117 (7.7)	117 (7.6)
Stepping on charm	63 (23.7)	516 (33.7)	519 (33.8)
Committing abomination/ sacrilege.	0 (0.0)	27 (1.8)	27 (1.8)
Ancestral spirits/witchcraft attack.	30 (11.3)	361 (23.6)	362 (23.6)
Working in the sun	0 (0.0)	90 (5.9)	90 (5.9)
Contaminated food	0 (0.0)	108 (7.1)	108 (7.0)
Excessive labour	0 (0.0)	34 (2.2)	34 (2.2)
Spontaneous	0 (0.0)	74 (4.8)	74 (4.8)
Bee sting	35 (13.2)	0 (0.0)	1 (0.1)
Don't know	50 (18.8)	140 (9.2)	142 (9.2)

Table 4: Belief on mode of transmission by Infected and Affected
(χ2 = 2.47, df = 1, p > 0.05)

Mode of transmission	Infected (n=266) Yes (%)	Affected (n=1270) Yes (%)	Total (n=1536) Yes (%)
Mosquito/blackfly bites	0 (0.0)	187 (12.2)	187(12.2)
Body contact with infected person	0 (0.0)	17 (1.1)	17(1.1)
Spider bites	0 (0.0)	121 (7.9)	121(7.9)
Stepping on charm	73 (27.4)	376 (24.6)	379(24.7)
Heredity	28 (10.5)	150 (9.8)	151(9.8)
Sexual intercourse with infected person	0 (0.0)	176 (11.5)	176(11.5)
Ancestral spirits	0 (0.0)	228 (14.9)	228(14.8)
Lack of hygiene	0 (0.0)	107 (7.0)	107(7.0)
Walking barefoot on cold, damp soil	0 (0.0)	90 (5.9)	90(5.9)
Bathing in stagnant water	0 (0.0)	106 (6.9)	106(6.9)
Eating contaminated food	0 (0.0)	89 (5.8)	89(5.8)
Stepping on ground where people bathe	0 (0.0)	104 (6.8)	104(6.8)
Food poisoning	50 (18.8)	85 (5.6)	86(5.6)
Spontaneous	0 (0.0)	150 (9.8)	150(9.8)
Bee sting	50 (18.8)	0 (0.0)	1(0.1)
Don't know	65 (24.4)	138 (9.0)	140(9.1)

Table 5: Belief on method of prevention of filariasis by Infected and Affected

Prevention methods	Infected (n=266) Yes (%)	Affected (n=1270) Yes (%)	Total (n=1536) Yes (%)
Avoid mosquito/blackfly bites	44 (16.5)	342 (22.4)	344 (22.4)
Avoid body contact with infected person	0 (0.0)	386 (25.2)	386 (25.1)
Avoid sexual intercourse with infected person	0 (0.0)	334 (21.8)	334 (21.7)
Avoid stepping on ground where people bathe	0 (0.0)	72 (4.7)	72 (4.7)
Good personal hygiene	0 (0.0)	338 (22.1)	338 (22.0)
Avoid walking barefoot on cold, damp soil	0 (0.0)	104 (6.8)	104 (6.8)
Eat good food	0 (0.0)	77 (5.0)	77 (5.0)
Avoid abominable acts	0 (0.0)	174 (11.4)	174 (11.3)
Prayers	102(38.3)	90 (5.9)	91 (5.9)
Disease can't be prevented	0 (0.0)	123 (8.0)	123 (8.0)
Don't know	120(45.1)	0 (0.0)	0 (0.0)

(χ^2=12.01, df = 1, p< 0.05)

Table 6: Most worrisome signs and symptoms of filariasis by Infected and Affected.

Signs and Symptoms	Infected (n=266) Yes (%)	Affected (n=1270) Yes (%)	Total (n=1536) Yes (%)
Abnormal Sleep	38 (14.3)	492 (32.2)	493 (32.1)
Fever	0 (0.0)	490 (32.0)	490 (31.9)
Visual impairment and blindness	0 (0.0)	190 (12.4)	190 (12.4)
Body pains	38 (14.3)	502 (32.8)	503 (32.7)
Lymph enlargement/nodules	90 (33.8)	466 (30.5)	470 (30.6)
Itching eyes/body	100 (37.6)	720 (47.1)	725 (47.2)
Numbness	29 (10.9)	93 (6.1)	93 (6.1)

Discussion

This study revealed that filariasis is still a burden in parts of Kogi State, with an overall prevalence of 36.4%. This prevalence rate is high when compared with previous studies from Kogi State (Nwoke *et al*., 2006) and other parts of Nigeria such as Cross River State (Braide *et al*., 2003; Udoidung *et al*., 2008), Plateau State (Eigege *et al*., 2003), Benue state (Omudu and Okafor, 2007; Omudu and Ochoga, 2011), Anambra State (Mba and Njoku, 2000) and Taraba State (Badaki and Akogun, 2000).

The high endemicity of filariasis in these communities could be due to a combination of factors, especially the local environmental conditions like the availability of numerous domestic mosquito-breeding sites and deteriorating sanitary conditions. The various activities of the local population such as rice farming, cassava processing, fishing and other outdoor-related activities tend to increase man-mosquito contact rates in different communities. The presence of clear, highly-oxygenated and fast flowing water bodies like Ubele, Egane and various waterfalls in these locations provide favorable breeding grounds for black flies (vector of onchocerciasis).

The finding that the prevalence of clinical manifestations of filariasis increased with age, a fact which is in tandem with previous findings such as Eigege *et al*., (2003), Anosike *et al*., (2005), Nwoke *et al*., (2006), Omudu and Okafor (2007), and Omudu and Ochoga (2011). Apart from immunological reasons, duration of exposure to vectors in the active, middle farming age groups may be the major reason, as also observed by Eigege *et al*., (2003) and Anosike *et al*.,(2005).

Respondents' knowledge of the cause, mode of transmission and prevention of filariasis was generally poor. This might have been influenced by socio-cultural norms and superstitious beliefs that lack any scientific

foundation. Similar perceptions on filariasis where the true cause, mode of transmission and prevention of the disease are replaced with superstitious and unscientific beliefs have been reported in Nigeria (Braide *et al*., 2003; Onwuliri *et al*., 2005) and other parts of the world (Krishna *et al*., 2005; Kelias *et al*., 2010. Disease control programmes in many developing countries are often unsuccessful or unsustainable (Wynd *et al*., 2007). This is attributable to the inappropriateness of strategies pursued for the local community or the incompatibility of such strategies with local perceptions on etiology, transmission, treatment, and prevention of that disease (Ramaiah and Ottesen, 2014).

The local views and perceptions regarding cause, transmission, management (or treatment), prevention and control of filariasis influence treatment seeking behaviour. This report is expected to help policy makers to factor such local experiences, views, and perceptions into control efforts towards augmenting the Mass Drug Administration (MDA) programme for successful filariasis control.

References

Acka, C.A., Raso, G., N'goran, E.K., Tschannen, A.B., Bogoch, I.I. and Seraphim, E., (2010). Parasitic worms: knowledge, attitudes, and practices in western Cote d'Ivoire with implications for integrated control. *PLoS Negl TropDis*; 4(12): e910.

Anosike, J. C., Nwoke, B. E., Ajayi, E. G., Onwuliri, C. O., Okoro, O. U., Asor, J. E., Amajuoyi, O. U., Ikpeama, C. A., Ogbusu, F. I., and Meribe, C. O. (2005). Lymphatic filariasis among the Ezza people of Ebonyi State, Eastern Nigeria. *Annals of Agricultural and Envrionmental. Meicine;* 12(2), 181-186.

Ariyo, and Olawepo, R. A. (2003). Facilitating Rural Transformation through Community Banking: An Example of Kogi State, Nigeria. *International Journal of Business and Social Sciences*. Department of Geography and Environmental Management University of Ilorin, Nigeria.

Awolola, T. S., Manafa, O. U., Idowu, E. T., Adedoyin, J. A. and Adeneye, A. K., (2004). Epidemiological Mapping of Lymphatic filariasis in Southern Nigeria; Preliminary Survey of Akinyele Local Government Area. *Afr. J. Clin. Experimental Microbiology*.; 5(3), 234-238.

Badaki, J. A. and Akogun, O. B. (2000). Severe Morbidity due to lymphatic filariasis in Taraba State, Nigeria. *Nigerian Journal of Parasitology;* 22: 105-112.

Braide, E. I, Ikpeme, B., Edet, E., Atting, I. and Kale, O. O. (2003). Preliminary observations on the occurrence of lymphatic filariasis in Cross River State, Nigeria. *Nigerian Journal of Parasitoogyl*; 24:9-16.

CDC (Center for Disease Control and prevention) (2010). "Lymphatic filariasis".

Dogara, M.M., Nock, H.I., Agbede, R.I.S. and Ndams, I.S. (2014). Survey of knowledge, attitudes and perceptions (KAPs) of lymphatic filariasis patients in Kano State, Nigeria. *Int Res J Publ Environ Health*; 1: 207-10.

Eigege, A., Richards, F. O., Blaney, D. D., Miri, E. S., Gontor, I., Ogah, G., Umaru, J., Jinadu, M. Y., Mathai, W., Amadiegwu, S., and Hopkins, D. R. (2003). Rapid assessment for lymphatic filariasis in Central Nigeria: A comparison of the Immunochromatographic card test and hydrocele rates in an area of high endemicity. *Am. J. Trop. Med. Hyg.*, 68(6), 643-646.

Gyapong, M., Gyapong, J., Weiss, M. and Tanner, M. (2000). The burden of hydrocele on men in Northern Ghana. *Acta Trop*.; 77:287–94.

Ibanga, U. N., Braide, E. I., Opara, K. N., Atting, I. A., and Adie, H. A. (2008). Current status of bancroftian Filariasis in rural communities of the lower cross river basin, Nigeria: parasitological and clinical. *Journal of Public Health,* 16(6): 383-388.

Kelias, M., Bagrey, N., Richard, B., Square,

M. and Bernard, B. (2010). Schistosomiasis, Soil transmitted helminthes and malaria in rural southern Malawi. *Medical Journal*; 22(1):12-14.

Krishna, K. A., Harichandrakumar, K. T., Das, K. L. and Krishnamoorthy, K. (2005). Physical and psycho-social burden due to lymphatic fialriasis as perceived by patients and medical experts. *Trop Med Int Health*; 10:567–73.

Mba, D. C. and Njoku, O. O. (2000). Prevalence of lymphatic filariasis in Oraeri, Anambra State, Nigeria. *Nigerian J Parasitol,* 21:95-102.

Noma, M., Nwoke, B. E. B., Nutall, I., Tambala, P. A, and Enyong, P. (2002). Rapid epidemiological mapping of onchocerciasis (REMO): its application by the African Programme for Onchocerciasis Control (APOC). *Annals of Tropical Medical Parasitology;* 96(1), 29–39.

NPC (National Population Commission) (2006). "The 2006 Provisional Report" NPC, Abuja.

Nwoke, B. E. B., Dozie, I. N. S., Jiya, J., Saka, Y., Ogidi, J. A., Istifanus, W. A., Mafiana, C. F., Oyene, U., Amali, O., Ogbu-Pearce, P. and Nutall, I. (2006). The prevalence of hydrocele in Nigeria and its implication on mapping of lymphatic filariasis. *Nigerian J Parasitol*, 27: 29-35.

Omudu, E. A and Ochoga J. O. (2011). Clinical epidemiology of lymphatic filariasis and community practices and perceptions amongst the ado people of Benue state, Nigeria. *African Journal of Infectious Diseases;* 5(2): 47-53.

Omudu, E. A. and Okafor, F. C. (2007). Rapid Epidemiological and sociocultural appraisal of lymphatic filariasis amongst the Igede ethnic group in Benue State, Nigeria. *Nigerian Journal of Parasitology*; 28(2), pp 118-124.

Omudu, E. A. and Okafor, F. C. (2008). Perception, practices, and health seeking behaviour of Lymphatic filariasis patients in some endemic communities in Benue State. *Nigerian Journal of Parasitology*; 29(2): 140-146.

Onwurili, C. O. E., Anosike, J. C., Oguoma, C., Onwurili, V. A., Nwoke, B. E. B., Dozie, I. N. S. and Iwuala, M. O. E. (2005). The impact of cultural limitations, local beliefs and practices on emerging parasitic diseases in tropical Africa. *International Journal of Natural and Applied Sciences,* 1(2): 153-164.

Ramaiah, K. D. and Ottesen, E. A. (2014). Progress and impact of 13 years of the Global Programme to Eliminate Lymphatic filariasis on reducing the burden of filarial disease. *PLoS. Neglected Tropical Diseases,* 8(11).

Terranella, A., Eigege, A., Gontor, I., Dagwa, P., Damishi, S. and Miri, E. (2006). Urban Lymphatic filariasis in Central Nigeria. *Annals of Tropical Medicine and Parasitology*, 100(2), pp 163-172(10).

Udoidung, N. I., Braide, E. I., Opara, K. N., Atting, I. A. and Adie, H. A. (2008). Current status of bancroftian filariasis in rural communities of the lower cross river basin, Nigeria: parasitological and clinical aspects. *Journal of Public Health,* 16: 383-388.

Wagbatsoma and Aigbe, E. E. (2010). ITN utilization among pregnant women attending ANC in Etsako West L.G.A, Edo State, Nigeria. *Nigerian Journal of Clinical practice*, 13(2): 144-8.

Wynd, S., Melrose, W. D., Durrheim, D. N., Carron, J. and Gyapong, M. (2007). Understanding the community impact of Lymphatic Filariasis : a review of sociocultural literature. *Bulletin of the World Health Organization*; 85,(6), 421-500.