PREVALENCE, CLINICAL MANIFESTATION AND ASSESSMENT OF KNOWLEDGE, PERCEPTION AND PRACTICES OF LYMPHATIC FILARIASIS IN PAIKORO LOCAL GOVERNMENT, NIGER STATE

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ABSTRACT

There are ongoing current efforts of mass drug administration for the interruption of lymphatic filariasis (LF) in Nigeria but the disease is still one of the major disabling filarial diseases of public health significance. Unupdated possible data on the transmission of LF informed this study to elucidate the prevalence of *Wuchereria bancrofti* infection in Paikoro Local Government, Niger State. Immunochromatographic card test (ICT) for detecting circulating filarial antigen (CFA) using whole blood and overt clinical manifestations (Lymphoedema and hydrocoele) were used as diagnostic tools. The demographic characteristics as well as knowledge and perception of participants were determined using structured questionnaire, out of the 1015 randomly selected subjects aged >5years an overall prevalence of 24.33% was established, there was a trend of higher prevalence in males (13.11%) than females (11.22%). *Wuchereria bancrofti* prevalence varies significantly ($p<0.05$) among the age group examined while the highest prevalence was recorded among age group of 16-25 (8.6%) the lowest prevalence was recorded among age group of 56—65years . Participants were aware of the symptoms such as itching, pain, and chill and majority of the respondents acknowledged that the disease is transmitted through mosquito bite and controlled by sleeping under mosquito net. 37.7% of participants were informed by past experience with Lymphatic filariasis, Community health workers, Mass media and Hospitals. On the other hand, the infection varied significantly ($p<0.05$) with respect to marital status and occupational characteristics of the participants in the communities. The results indicated that *W. bancrofti* infection is widely spread in Paikoro Local Government and it is a major health issue, this calls for urgent need for mass drug administration, mass sensitization, sustained intervention program towards the people in the study area.

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1.0. INTRODUCTION

1.1. Background to the Study

Lymphatic filariasis (LF) is a parasitic neglected tropical disease (NTD) targeted for global elimination by the year 2020 as part of the Global Programme to Eliminate Lymphatic Filariasis (GPELF) (WHO, 2017), although the disease is has not yet been eliminated due to unupdated data. Lymphatic filariasis is caused by three parasitic worms: *Wuchereria bancrofti, Brugia malayi,* and *B. timori*, with *W. bancrofti* causing over 90% of the infections which are vectored by *Culex, Anopheles*, and *Aedes* mosquitoes.

One of the GPELF's main strategies is to interrupt transmission through mass drug administration (MDA) using three combinations of antihelminthic medicines: Albendazole plus Diethylcarbamazine (DEC); Albendazole plus ivermectin (onchocerciasis co-endemic areas), or the alternative strategy of albendazole twice yearly plus vector control (WHO, 2016). About 40 million people suffer from clinical manifestations of the disease which usually results into serious disfiguration and incapacitation of the body, where approximately 1.4 billion people are at risk of the infection (Amaechi, 2014)

Elkana *et al.,* (2017) posits that various clinical manifestations of lymphatic filariasis ranges from: itching, elephantiasis, hydrocoele, and lymphoedema of breast at varying rates. Lymphatic filariasis has a major social and economic impact with an estimated annual loss of $1 billion and impairing economic activity up to 88%. Hydrocoele, lymphoedema and elephantiasis are the overt, chronic disabling consequences observed in patients with these damaging parasitic infections of the lymphatic vessels (WHO, 2016).

Lymphatic filariasis is the second leading cause of permanent and long-term disability in the world, inflicting serious public health and socio-economic problem in endemic communities and the disease is usually seen among the poorest of the poor, in the priorities of most of the countries where it is prevalent for many years having a very low public health rating. People living for a long time in tropical or sub-tropical areas where the disease is common are at the greatest risk for infection and about 30% of people at risk reside in the African region while 65% of those at risk reside in South-East Asia Region, with the remainder in other parts of the world (Terranella *et al.,* 2006, Nilmini *et al.,* 2018).

The visible manifestations of the disease are severe and disfiguring, it has been reported that one third of infected individuals present with overt clinical manifestations such as lymphoedema and elephantiasis of the limbs, or genitals, hydrocoele, chyluria, or recurrent infections associated with damaged lymphatic-vessel lives in Africa (Sherchand *et al.*, 2003). According to Person *et al*. (2006)acute attacks of adenolymphangitis (ADL) are characterized by fever, chills, local warmth and inflammation of the inguinal node. Patients are usually weak for 4-7 days while the attack lasts and the swelling later becomes permanent in the form of lymphoedema of lower extremities and at times there is dysfunction of the genital lymphatic that leads to hydrocoeles (WHO, 2010).

The main vectors of lymphatic filariasis in Nigeria are mosquitoes of the *An. gambiae* (principally *An. gambiaes.s.* and *An. arabiensis*) and *Anopheles funestus* complexes (Lenhart *et al*., 2007; Sinka *et al.,* 2010). Lymphatic filariasis is prevalent in all states and geopolitical zones of Nigeria before the success of the two states and a total of 241 lymphoedema and 205 hydrocoele cases have been reported from mapping surveys conducted in Nigeria (Okorie *et al*., 2011). Programs to eliminate lymphatic filariasis are

under way in more than 66 countries. These programs are at eradicating transmission of the filarial parasites and reducing the risk of infection amongst people living in or visiting these communities, targeted for elimination and the national programme is scaling up mass drug administration (MDA) across the country to interrupt transmission (Brant *et al.*,2018; CDC, 2018).

Lymphatic filariasis, a neglected tropical disease presently affects the poorest of the poor in most sub-Saharan African countries, Nigeria exclusive having a negative significant impact on the psychological, economic and social life of the affected populace. An understanding of the geographical distribution of LF in Niger State is required to meet national elimination programs. This enables more effective targeting of control efforts on highly endemic areas.

1.2. Statement of the Research Problem

The socioeconomic impact of lymphatic filariasis in endemic areas is prevailing. It leads to loss of labour or work caused by both acute episode of acute adenolymphangitis and chronic diseases thereby affecting dramatically the productivity of affected individuals, households and communities. These disease problems hamper the most important daily activities of the affected individuals and impose transient (in acute disease) or life-long (in chronic disease) limitations on their inputs (Ramaiah *et al.*, 2000). The impact of lymphatic filariasis on marriage and sexual life is a serious problem in endemic areas. Women, more than men, depend on their physical presentation for their self-esteem (World Bank, 1993); and the destruction of the skin and beauty of the physical appearance of adolescent girls and women by lymphedema and elephantiasis seriously affect women, including hindering marriage prospects/opportunities.

Also stigmatization of men with hydrocoele is also observed in some of the endemic countries. Villagers in some parts of Nigeria expressed fear and insecurity towards people with filarial skin lesions and towards men with genital complications and elephantiasis of the extremities (Nwoke *et al.,* 2000). Out of the 128 million people estimated to be globally infected by LF (McCarthy, 2000), 22 million of them (17.2%) are children below the age of 15years school aged children (Michael and Bundy, 1997)). LF is the second leading cause of permanent as well as long term disability (Ottesen *et al.,* 1997). Upon the concerted control efforts by the government and international bodies yet, lymphatic filariasis is still a disease of public health concern in Nigeria, with an estimated 106 million cases, placing the country as one with the highest prevalence in Africa (Okorie *et al.,* 2015)

1.3. Justification for the Study

Lymphatic filariasis, caused by *Wuchereria bancrofti* is widespread in Nigeria with most individuals at risk for LF in Africa and second largest globally behind India, with approximately 120 million of Nigeria's estimated 174 million inhabitants in need of MDA (WHO, 2014). It is a serious public health problem as well as a major cause of acute and chronic morbidity in Nigeria (Nwoke *et al.,* 2010).

It is estimated that there are about 1.2 billion people who are at risk of the disease in the 83 countries (20% of the world population); and over 128 million people are infected or diseased (McCarthy, 2000). About 76 million people in the world are estimated to be suffering from the hidden disease or subclinical renal, respiratory, lymphatic and genital complications associated with LF (Bockarie, 2002). Out of the 128 million people infected globally by LF, 91% of them are due to *W. bancrofti* while *B. malayi* and *B. timori* account for the other 9% burden (Addis, 1998).

In Africa, Nigeria has the heaviest LF burden with an estimated 120 million people at risk (Okorie *et al.,* 2013). In 2013, the Nigerian National LF Elimination Programme planned to scale-up MDA based on recent national mapping results, and the use of micro-stratification overlap mapping (MOM) to delineate LF-loasis co-endemicity, Community-directed treatment with ivermectin (CDTI), and insecticide-treated net/long-lasting insecticidal mosquito net (ITN/LLIN) distributions to protect from the main Anopheles vectors (Okorie *et al.,* 2013, 2011). Initial programme work demonstrated successful integration of ITNs with MDA in Central Nigeria (Eigege *et al.,* 2013), links with the malaria program and co-implementation strategies (Federal Ministry of Health, 2013). However, in some LF-loiasis co-endemic areas more refined mapping and definition of risk factors were important where there was uncertainty about the risk of serious adverse events (SAEs) and if CDTI or alternative intervention strategies should be used. In Nigeria, the CDTI strategy was adopted in 1997, and currently more than 45 million people are being treated in more than 36,000 communities during the annual MDA (FMOH, 2017). This research work was carried out in Paikoro Local Government in Niger State with the villages namely; Jazu, Jere, Jeresapai. For total elimination of the disease one must take into account the range of people's knowledge and perceptions for the Global elimination program for lymphatic filariasis (GEPLF) to gain wide acceptance.

1.4. Aim and Objectives of the Study

The aim of this study is to investigate the clinical epidemiology of lymphatic filariasis (LF), knowledge and perceptions among some selected communities in Paikoro Local Government, Niger State.

The objectives of the study were to:

(i) Determine Prevalence and detection of iGg antibody (chromatographic filarial antibody) of LF among communities of Paikoro Local Government, Niger State.

(ii) Clinical signs and symptoms of Lymphatic Filariasis among communities of Paikoro Local Government, Niger State.

(iii) Investigate community's perception, practices and knowledge of lymphatic filariasis (LF) among communities of Paikoro Local Government, Niger State.

CHAPTER TWO

2.0. LITERATURE REVIEW

2.1. Lymphatic Filariasis

In Africa, 34 countries are endemic, and Nigeria is believed to bear the highest burden of LF, with an estimated 80 to 120 million people at risk (Okorie *et al.,* 2018). Nigeria with an estimated population of 170 million people is Africa's most endemic country with approximately 80 to 120 million people at risk (Elkanah *et al.,* 2018). There are three species of thread like worms that causes Lymphatic filariasis, *Wuchereria bancrofti*, *Brugia malayi* and *Brugia timori*. These nematode parasites are transmitted by various species of mosquito vectors from the genera *Anopheles, Aedes, Culex, Mansonia* and *Ochlerotatus* (Cano *et al.,* 2014). Lymphatic filariasis (LF) has been identified since medieval times and portrayal of the disfiguring disease have been found in medieval art, painting and maps of Greek and Roman medical writers (Dimkpa *et al.,*2019). Lymphatic filariasis (LF) is a mosquito-borne disease which in its advanced forms can manifest as severe lymphoedema, hydrocele and elephantiasis (Cano *et al.,*2014). In Africa, LF is transmitted principally by Anopheles species, which is due to the environmental factors that support the survival and distribution of Anopheles mosquitoes across Africa.

2.2. Parasite and its Life Cycle

There are three species of thread like worms that causes Lymphatic filariasis, *Wuchereria bancrofti*, *Brugia malayi* and *Brugia timori*. Filarial nematodes are transmitted by female mosquitoes of *Culex*, *Anopheles, Aedes,* and *Mansonia* species. The infection is transmitted by introduction of third-stage infective larvae (L3) of the parasite into the host by the bites

of L3-bearing mosquitoes (Babu and Nutman 2013). Following deposition on the skin L3 migrates into local lymphatic vessels. After 8 ± 1 day of entry, L3 molt and fourth-stage larvae (L4) appear. Subsequent development of L4 to adult worms occurs over a period of 3–12 months. Sexually mature male and female adult worms reside in afferent lymphatic vessels, copulate and fecund females viviparously produce microfilariae (L1-stage larvae) (Babu and Nutman 2013). These microfilariae are sheathed, exhibit either nocturnal or diurnal periodicity, coinciding with peak feeding time of the mosquito vector. Microfilariae migrate into the lymph and enter the blood stream reaching the peripheral blood and are taken up by the mosquito vector. The larvae take approximately 6-12 months to mature into adult worms. The adult female has the capacity to produce several million microfilariae in its approximate 4-6 years reproductive lifespan Within the mosquito, ingested microfilariae exsheath, penetrate the insect gut wall and migrate to the thoracic muscles where they mature into the third- stage larvae (L3) after two molts and the cycle continues (Figure 2.1).

2.2.1. Manifestation of Lymphatic Filariasis

In areas endemic for lymphatic filariasis, many individuals exhibit no symptoms of filarial infection and yet, on routine blood examinations, demonstrate the presence of significant numbers of parasites or the presence of circulating parasite antigen (a surrogate for viable adultworms) (Ichimori *et al.,* 2019).These individuals are carriers of infection (and for those that are microfilaria+ the reservoir for ongoing transmission). The parasite burdens in these individuals can reach dramatically high numbers exceeding 10,000 microfilariae in one ml of blood. With the availability of imaging techniques (e.g. ultrasound, lymphoscintigraphy, MRI, CT), it has become apparent that virtually all persons with microfilaremia have some degree of subclinical disease.

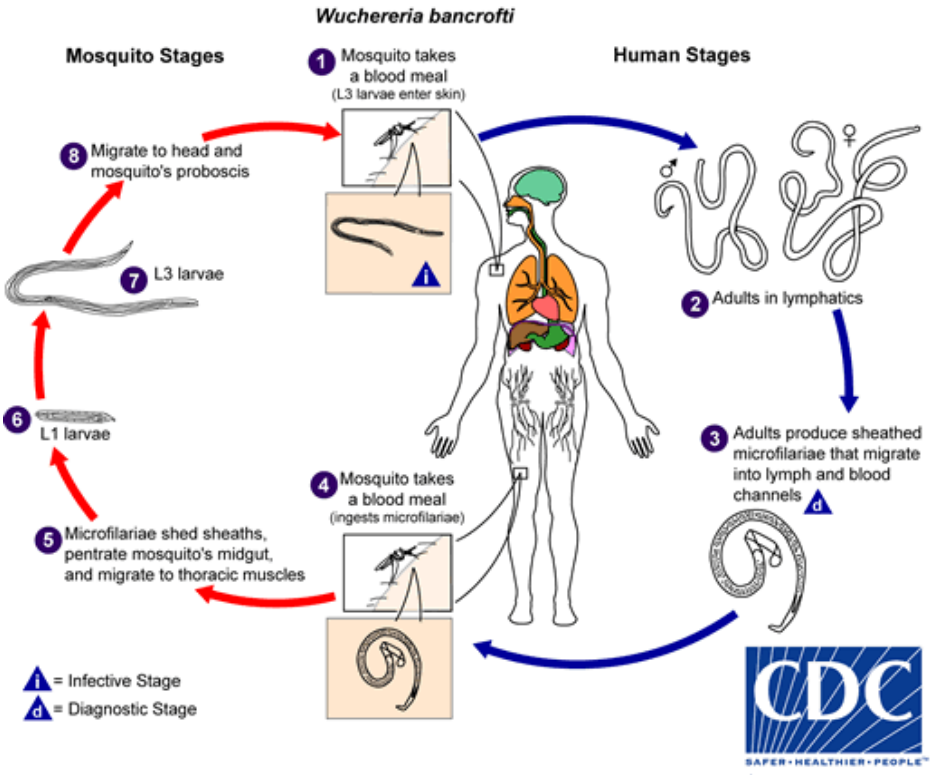

Figure 2.1: Life Cycle of *Wuchereriabancrofti*, a parasite that causes lymphatic filariasis

Source: CDC, (2016)

These include marked dilatation and tortuosity of lymph vessels with collateral channeling, increased flow, abnormal patterns of lymph flow scrotal lymphangiectasis; and microscopic hematuria and/or proteinuria (Babu and Nutman 2013). Thus, while apparently free of overt symptomatology, the subclinical patently infected individuals clearly are subject to subtle pathological changes. The acute manifestations of lymphatic filariasis are characterized by recurrent attacks of fever associated with the inflammation of lymph nodes (lymphadenitis) and lymphatics (lymphangitis). In brugian filariasis, episodes of fever, lymphadenitis and lymphangitis are common, while bancroftian filariasis present more insidiously with fewer overt acute symptoms.

The striking manifestation is a distinct well-circumscribed nodule or cord along with lymphadenitis and retrograde lymphangitis. Funiculoepididymoorchitis is the usual presenting feature when the attacks involve the male genitalia(Babu and Nutman, 2013). Fever is not usually present but pain and tenderness at the affected site is common. The other has been termed acute dermatolymphangitis, a process characterized by development of a plaque-like lesion of cutaneous or sub-cutaneous inflammation and accompanied by ascending lymphangitis and regional lymphadenitis (Khieu *et al.,* 2018). There may or may not be edema of the affected limbs. These pathological features are accompanied by systemic signs of inflammation including fever and chills. This manifestation is thought to result primarily from bacterial and fungal superinfections of the affected limbs (Elkanah *et al.,* 2017).

2.3. Global Burden of Lymphatic filariasis.

The Global Burden of Disease (GBD) study by (World Bank, 1993) showed an estimated lymphatic filariasis (LF) prevalence rate of 3.4 %. It is estimated that there are about 1.2 billion people who are at risk of the disease in the 83 countries (20 % of the world population); and over 128 million people are infected or diseased (Nwoke *et al.,* 2010). About 76 million people in the world are estimated to be suffering from the hidden disease or subclinical renal, respiratory, lymphatic and genital com- plications associated with LF (Nwoke *et al.,* 2010). Of the 128 million people infected globally by LF, 91% of them are due to *W. bancrofti* while *B. malayi* and *B. timori* account for the other 9% burden (Nwoke *et al.,*2010). The highest LF problem in the world is in India, Indonesia and Nigeria. It is estimated that out of the 120 million individuals infected worldwide, about one third live in sub-Saharan Africa (Njomo, 2011).In sub-Saharan Africa, an estimated 28 million people are infected with lymphatic filariasis while 512 million people are at risk of infection (Elkanah *et al.,*2018) (Figure 2.2). The distribution of Lymphatic filariasis is dependent on environmental conditions, some countries in Africa have unsuitable environmental condition for the survival and development the parasite and it vector (Eneanya *et al.,* 2018).

2.3.1. Chronic pathology

The chronic sequelae of lymphatic filariasis develop years after initial infection. In bancroftian filariasis, the main clinical features are hydrocele, lymphedema, elephantiasis and chyluria. The manifestations are hydrocele and swelling of the testis and / or lymphedema of the entire lower limb, the scrotum, the entire arm, the vulva, and the

breast (Babu and Nutman 2013). In Brugian filariasis, the leg below the knee and the arm below the elbow are commonly involved but not the genitals (Davis *et al.,* 2019). The development of pathology is thought to be dependent on the presence of the adult worm. Histologically, the worm elicits little reaction as long as it is alive; however, upon death of the adult worm, a granulomatous reaction ensues (Davis *et al.,* 2019). The granulomas are characterized by macrophages (which develop into giant cells), plasma cells, eosinophils, neutrophils and lymphocytes. There is endothelial and connective tissue proliferation with porosity of the lymphatics and damaged or incompetent lymph valves (Ladan *et al.,* 2019). This typically results in lymphatic dilatation and subsequently lymphatic dysfunction and compromise, leading to lymphoedema (Davis *et al.,* 2019). Early pitting edema can give rise to subsequent brawny edema with hardening of tissues and later hyper- pigmentation and hyper-keratosis with wart-like protuberances which, on histological examination, reveal dilated loops of lymphatic vessels within nodular lesions (Babu and Nutman, 2013). Very important in the progression of these lesions is the fact that redundant skin folds, cracks and fissures in the skin provide havens for bacteria and fungi to thrive and intermittently penetrate the epidermis to lead to either local or systemic infections. Sometimes, the skin over the nodules breaks down, causing the dilated lymphatic within to rupture and discharge lymph fluid directly into the environment, at the same time serving as a pathway for entry of microorganisms into the lymphatic's (Ladan *et al.,* 2019)

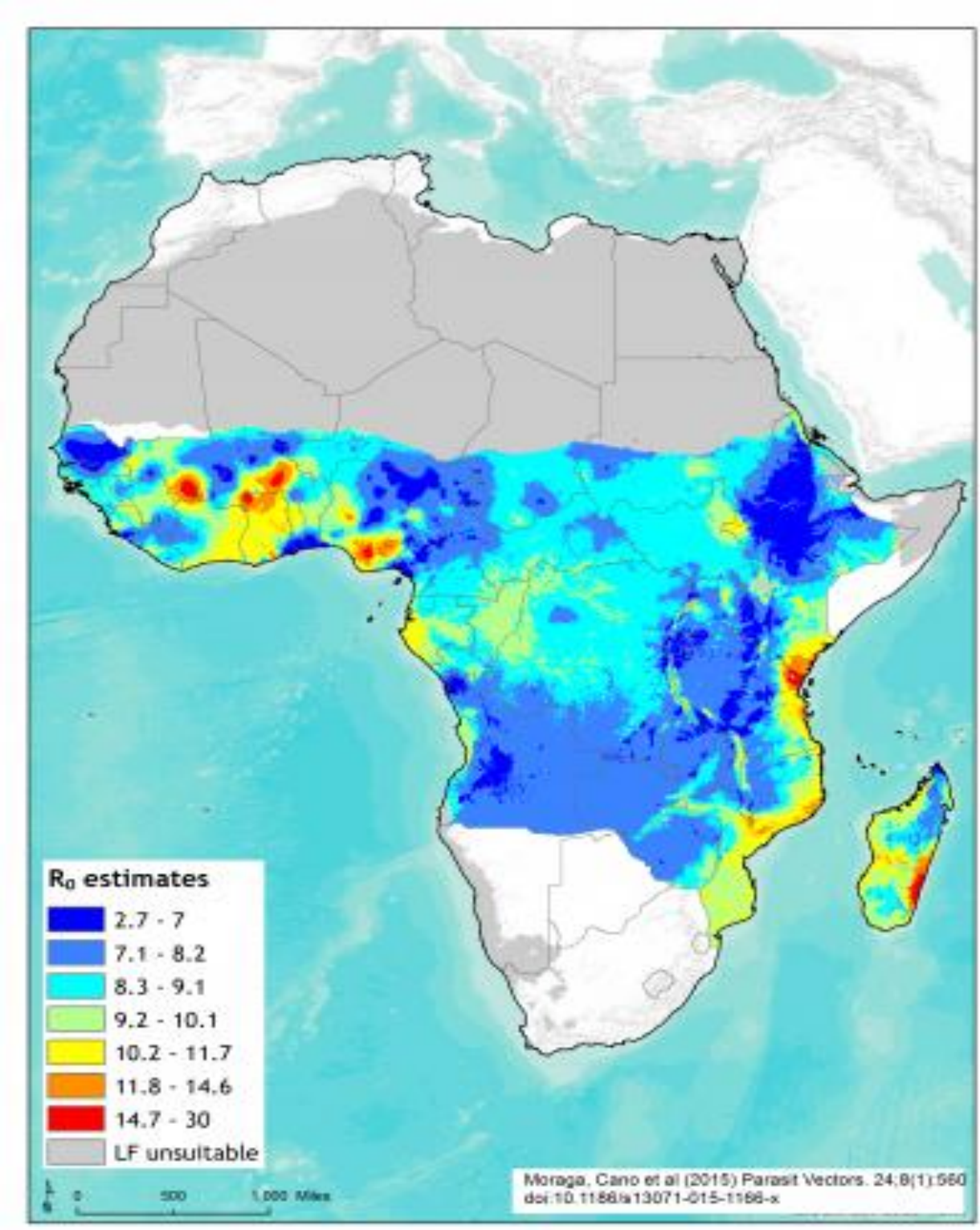

Figure 2.2: Distribution of Lymphatic filariasis in Africa (CDC, 2016)

In men, scrotal hydrocoele is the most common chronic clinical manifestation of bancroftian filariasis. It is uncommon in childhood but is seen more frequently post-puberty andIn some endemic communities, 40–60% of all adult males have hydrocoeles. Hydrocoeles are due to accumulation of edematous fluid in the cavity of the tunica vaginalis testis. Though the mechanism of fluid accumulation is unknown, direct ultra-sonographic evidence indicates that in bancroftian filariasis, the scrotal lymphatics are the preferred site of localization of the filarial worms and their presence may stimulate not only the proliferation of lymphatic endothelium but also a transudation of hydrocele fluid whose chemical composition is not dissimilar to serum.

2.4. Lymphatic Filariasis in Nigeria

Nigeria is a Federal Republic comprising 36 States and its Federal Capital Territory, Abuja. The states are grouped into six geopolitical zones, the North Central (NC), North East (NE), North West (NW), South West (SW), South East (SE) and South (SS). Nigeria covers an area of approximately 923,768 sq. km, and has a large low plateau intersected by two major rivers, the Niger and Benue, in the central region of the country. It shares borders with Benin in the west, Chad and Cameroon in the east, and Niger in the north. Its coast in the south lies on the Gulf of Guinea on the Atlantic Ocean and Lagos, the former capital, is an important port city. Nigeria is Africa's most populous country with the total population estimated to be 160 million in 2012, with approximately 50% living in urban areas.

The epidemiology of the disease in Nigeria is complicated because of the diversity of environmental conditions of the different regions. Recently, large-scale dam and

irrigation projects in addition to deteriorating drainage systems have created suitable breeding sites for filarial vectors in various parts of Nigeria (Braide *et al.,* 2011). Studies in Nigeria have reported prevalence rates ranging from 6% -47% with highest prevalence in the Northeastern states of Nigeria. Several Mapping survey have been done to properly document the prevalence of lymphatic filariasis in Nigeria (Figure 2.4). An epidemiological survey in cross river state revealed a prevalence of 6.1 % from Yakurr local government (Iboh *et al.,* 2012). The high endemicity of lymphatic filariasis in these communities could be due to several factors, especially the local environmental conditions like the availability of numerous domestic and peri-domestic mosquitos 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. In Yorro local government of Taraba state an overall prevalence of 30.8% was recorded (Elkanah *et al.,* 2018).

A rapid epidemiological mapping survey (REM-LF) was conducted across 25 States and 536 villages in Nigeria. It was found that hydrocele was absent in 339 (63.3%) villages, and present in 197 (36.8%) villages, which were found to have different levels of hydrocele severity (Eneanya *et al.,* 2019). Hydrocoele was absent in Jigawa and Kano (NW), and Ogun (SW) States. Very few hydrocoele cases (1–3%) were found in northern Borno (NE), Kaduna and Zamfara (NW), Edo (SS), Imo (SE), and in Ekiti, Ondo, Osun, and Oyo (SW) States. The highest hydrocoele rates were found in the NE States of Adamawa, Bauchi, Gombe, Taraba and southern Borno, in the NC states of Kogi,

Plateau, Nassarawa, and in the northern part of Akwa Ibom State in the South- South area of Nigeria (Eneanya *et al.,* 2019).

Figure 2.3: A woman suffering from lymphatic filariasis in brazil.

Source: (Joshua, E. C. 2015)

2.5. Elimination Program for Lymphatic filariasis

Lymphatic Filariasis is one of the nine neglected tropical disease set to be eradicated by global programme for the elimination of lymphatic filariasis (GPELF) in 1997, leading to over 7.1 billion treatments delivered as part of mass drug administration's (MDAs) since 2000 (Molyneux, 2003). The principal elimination strategy is to interrupt transmission using Mass Drug Administration (MDA) with the combinations of albendazole plus ivermectin or albendazole plus diethylcarbamazine (DEC) administered once a year for at least five consecutive years (Okorie *et al.,* 2013). Providing access to Mass drug administration to every single person in communities where mapping survey shows that

prevalence is more than 1% is very essential to elimination of the disease (Ichimori *et al.,* 2014).

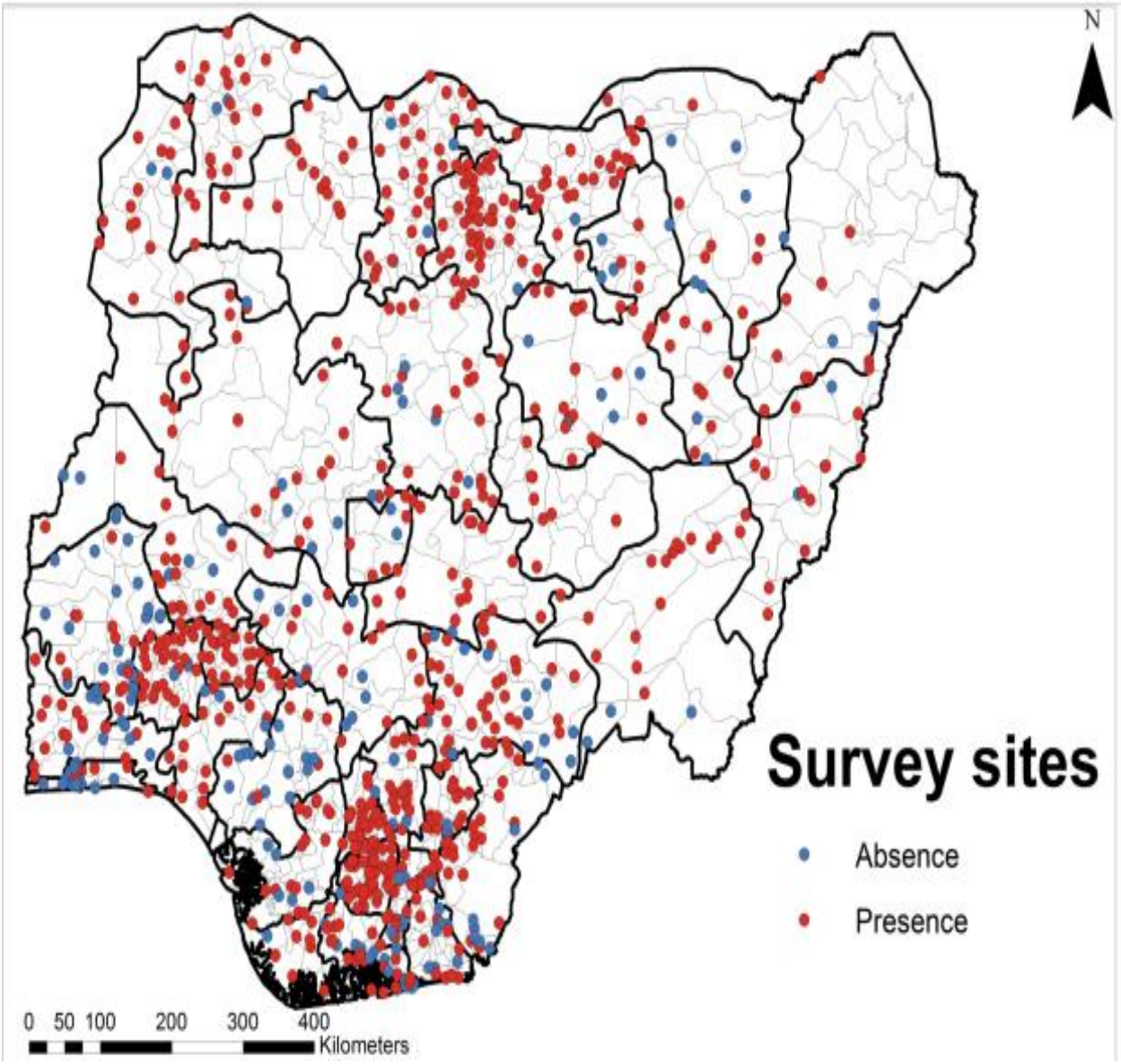

Figure 2.4: Distribution of Lymphatic filariasis in different study sites in Nigeria (Eneanya *et al.*, 2019)

After 13 years of program implementation of the GPELF (2000-2012), a cumulative total of 6.37 billion treatments have been delivered to more than 820 million people in 63 endemic countries at least once, out of which 4.45 million have been consumed by population in endemic areas. Since the inception of the GPELF, approximately 97 million cases ofLF have been prevented or cured. This includes 79.20 millionmf carriers, 18.73 million hydrocoele cases and 5.49 millionlymphoedema cases. Also, 10.98 million and 1.17 million cases of microflaraemia and lymphoedema due to *Brugia* specieshave been prevented or cured by the GPELF's efforts. Also,10.98 million and 1.17 million cases of microflaraemia andlymphedema due to *Brugia* species have been prevented. The estimated fall in LF prevalence was 59%, that is, from 3.55% to 1.47%. After 13 years of MDA, there was still the high figure of 36.45 million mf cases, but this would have been an astounding 115.65 million cases in the absence of the GPELF's MDA program. This means the progression of LF to chronic disease has been averted in 79.20 million people (Ramaiah *et al.*, 2014).

In 2003, the National Lymphatic Filariasis Elimination Program (NLFEP started LF mapping in the country and 35 States and Federal Capital Territory (FCT) were completely mapped in all their LGAs using Immuno-Chromatographic Test (ICT) cards (Tropical and Plan 2015) (Figure 2.4). LF prevalence has been determined in 761 out of 774 LGAs of 36 States and FCT. Out of the mapped LGAs, 574 LGAs are endemic and 187 LGAs are non-endemic. As at 2013, 239 lymphedema and 290 hydrocele cases have been reported from mapping surveys carried out in the country (Tropical and Plan 2015). The National Lymphatic Filariasis Elimination Program (NLFEP) was established in 1997 in response to World Health Assembly Resolution (May, 1997) urging member States to eliminate Lymphatic Filariasis (LF) as a Public Health problem. A total of 558 LGAs are targeted for

Mass Drug Administration (MDA) with free donated Ivermectin and Albendazole tablets in 35 States and FCT. As at 2013 MDA is ongoing in 179 LGAs of 18 States and FCT. Treatment has been discontinued in Plateau and Nassarawa States after the TAS 1 results indicated interruption of transmission (Tropical and Plan 2015).

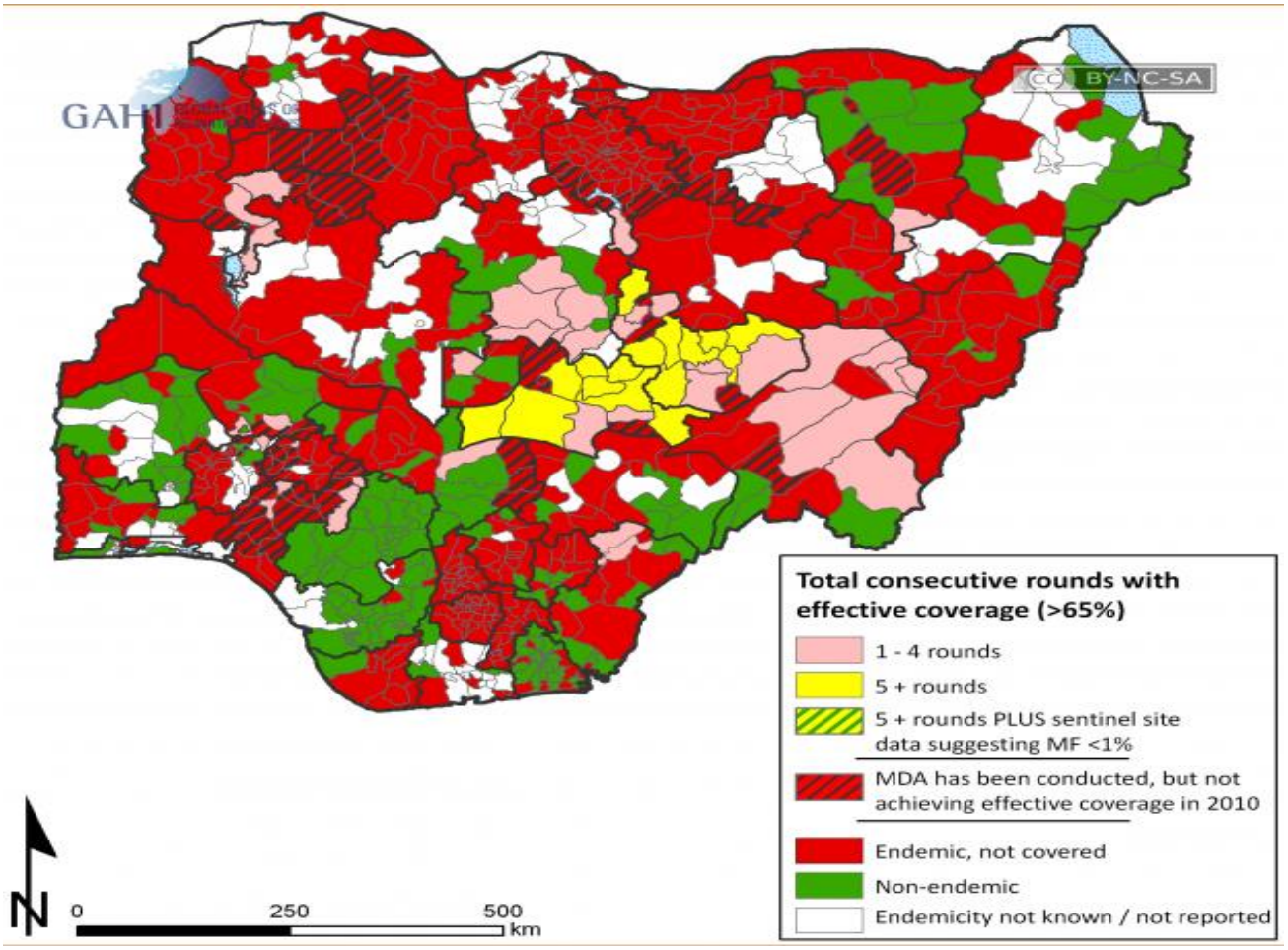

Figure 2.5: Status of Lymphatic filariasis elimination Programme by local government area in Nigeria (Tropical and Plan 2015).

2.6. Vector Control

Vector control can provide a useful supplement to chemotherapy in reducing LF transmission. The feasibility of vector control programs depends upon the local epidemiological conditions, including the species of vectors, their biting, resting, and breeding habits, and the type of environment (e.g., rural or urban) (Bhattacharya and Kushwaha, 2013). The main anti-vector measures are environmental control of breeding sites, use of insecticides against adult mosquitoes. Vector control success depends on community motivation and involvement and it is often expensive and rarely sustainable the following approaches depending on the vector species can be used: larviciding using *Bacillus sphaericus*, polystyrene beads, bed nets (both insecticide-impregnated and impregnated), chemical agents, indoor residual spraying (Njomo, 2011).

2.7. Treatment of Lymphatic filariasis

Chemotherapeutic control of LF is generally based on mass treatment, that is, administration of drug to total population in a community (except individuals in whom it is contraindicated). The strategy of using mass drug administration programs for 4–6 years is based on the assumption that reduction in the mf to very low levels would slowdown transmission and re- emergence of disease. The drugs used in LF control programs are diethylcarbamazine (DEC), ivermectin alone or in combination with albendazole. Diethylcarbamazine (DEC): DEC was first discovered against *L. sigmodontis* in cotton rat in 1944 and has been in use for the treatment and control of LF since 1947 (Hewitt *et al.*, 1947). The drug is inactive invitro and is known to act through the host immune system. A single dose of DEC (6 mg/kg) can reduce microfilaria production from adult females by

67–87 % and blood mf density by 57–52% at 1–2 years post- treatment in humans. DEC is also known to have partial macro-filaricidal (adulticidal) effects Ivermectin (IVM): Ivermectin was introduced in 1981 in worm control program. It was found to be safe and effective for treating river blindness in Africa, reducing clinical symptoms, and halting progression to blindness. The parasites responsible for elephantiasis have a population of endosymbiotic bacteria, Wolbachia, that live inside the worm. When the symbiotic bacteria of the adult worms are killed by the antibiotic, they no longer provide chemicals which the nematode larvae need to develop, which either kills the larvae or prevents their normal development. This permanently sterilizes the adult worms, which additionally die within 1 to 2 years instead of their normal 10 to 14 year lifespan.

2.8. Prevention and Control

The best way to prevent lymphatic filariasis is to avoid mosquito bites. The mosquitoes that carry the microscopic worms usually bite between the hours of dusk and dawn. If one live in an area with lymphatic filariasis, it is advisable to sleep in an air-conditioned room or sleep under a mosquito net at night, between dusk and dawn, one can wear long sleeves and trousers and Use mosquito repellent on exposed skin (CDC, 2016). Another approach to prevention includes giving entire communities medicine that kills the microscopic worms and controlling mosquitoes. Annual mass treatment reduces the level of microfilariae in the blood and thus, diminishes transmission of infection. This is the basis of the Global Program to Eliminate Lymphatic Filariasis.

(WHO, 2014) recommends mass deworming, treating entire groups of people who are at risk with a single annual dose of two medicines, namely albendazole in combination with

either ivermectin or diethylcarbamazine citrate with consistent treatment, since the disease needs a human host, the reduction of microfilariae means the disease will not be transmitted, the adult worms will die out, and the cycle will be broken (WHO, 2016). In sub-Saharan Africa, albendazole (donated by GlaxoSmithKline) is being used with ivermectin (donated by Merck & Co.) to treat the disease, whereas elsewhere in the world, albendazole is used with diethylcarbamazine (CDC, 2016). Transmission of the infection can be broken when a single dose of these combined oral medicines is consistently maintained annually for duration of four to six years. Using a combination of treatments better reduces the number of microfilariae in blood. Avoiding mosquito bites, such as by using insecticide-treated mosquito bed nets, also reduces the transmission of lymphatic filariasis (CDC, 2016).

Experts consider that lymphatic filariasis, a neglected tropical disease (NTD), can be eliminated globally and a global campaign to eliminate lymphatic filariasis as a public health problem is under way. The elimination strategy is based on annual treatment of whole communities with combinations of drugs that kill the microfilariae. As a result of the generous contributions of these drugs by the companies that make them, hundreds of millions of people are being treated each year. Since these drugs also reduce levels of infection with intestinal worms, benefits of treatment extend beyond lymphatic filariasis. Successful campaigns to eliminate lymphatic filariasis have taken place in China and other countries (CDC, 2016).

Mosquito control is a supplemental strategy supported by World Health Organization (WHO). It is used to reduce transmission of lymphatic filariasis and other mosquito-borne infections. Depending on the parasite-vector species, measures such as insecticide-treated

nets, indoor residual spraying or personal protection measures may help protect people from infection. The use of insecticide-treated nets in areas where Anopheles is the primary vector for filariasis enhances the impact on transmission during and after MDA. Historically, vector control has in select settings contributed to the elimination of lymphatic filariasis in the absence of large-scale preventive chemotherapy (WHO, 2016).

2.9. Environmental Suitability of LF in Nigeria.

The occurrence of LF appeared to increase with increasing elevation, and levels off at around 500meters above sea level. This phenomenon is thought to reflect the negative effect of decreasing temperature with increasing altitude on mosquito survival and the rate of parasite development within the vector (Eneanya *et al.*, 2018).

2.10 Knowledge and Perception about Lymphatic Filariasis

Many people in endemic areas share a common belief that the disease is caused by god. This is because illness is considered to be of the natural occurrence. In Haiti, lymphatic filariasis is considered a mystical illness caused by placement of magical powders *(pile poud)* along the footpath. If stepped on by a wrong person it causes *gwo pye* (elephantiasis) which can only be treated by voodoo healers (Addiss *et al.*, 2003). In Ghana, elephantiasis is believed to be caused by stepping on spiritual medicines thrown on the ground by juju men during war dances performed at funerals, stepping on herbs pricks of thorn on dwarf habited areas and removing of the thorn(s) by oneself could also lead to elephantiasis. Husbands are also said to use charms or smear herbs on their wives' legs while they are asleep to inflict on them elephantiasis so as to make them undesirable. On the arm,

elephantiasis can be caused by picking a juju man's tail (of horses, donkeys or cows) by mistake (Gyapong *et al.*, 1996).

CHAPTER THREE

3.0. MATERIALS AND METHOD

3.1 Description of the Study Area

Niger State is located in the North Central Nigeria and the largest state by landmass in the country with Minna as the State capital; it has twenty-five (25) local governments. Paikoro Local Government lies at $9^0$26'N $6^0$38'E and it has an area of 2,066km^2 with a population of 158,086 according to 2006 population census. Majority of the inhabitants live in rural agricultural areas and engage in peasant agriculture, the state's reputation as the power state of the nation is being seriously jeopardized by the socio-economic consequences of parasitic diseases. Paikoro local government area is one of the local government areas in Niger state Nigeria. It has its administrative headquarters situated in Paiko town. It is located in the eastern region of the state and the area council is made of districts of Paikoro, Gwam, Adumu, Chimbi, Ishau, Jere, Kafin Koro, Kwagana, Kwakuti, Nikuchi T, Paikoro Central, Tutungo Jedna

Figure 3.1: Map showing Paikoro communities and other villages around it

Source:(www.maphill.com/nigeria/niger/paikoro/maps/physical-map)

3.2 The SD Bioline LF Immunoglobulin (IgG4) biplex (61FK20) Test

The test is a rapid, qualitative test for the detection IgG4 antibodies against the *Wuchereria bancrofti*123 antigens in human serum, plasma and whole blood. The test kits (produced by Alere Scarborough, Inc.) components allow to equilibrate to ambient temperature (15-37^{o}C) before testing and the test strips was remove from the foil pouch immediately prior to use. It is an in vitro test intended for professional use as an initial screening test or as a population surveillance tool. Since there is a geographical overlap of lymphatic filariasis elimination programs in central Africa and the test is relatively simple to use, The SD Bioline LF IgG4 biplex (Wb123) test contains a membrane strip, which is pre-coated with recombinant wb123 capture antigen on a separate test line region. The anti-human IgG4 gold colloid conjugate and the sample move along the membrane chromatographically to the test regions and form a visible line as the antigen-antibody gold particle complex forms with high degree of sensitivity and specificity. The test lines and control line in the result window have been clearly labeled “L” for the lymphatic filariasis test line and “C” for the control line. Both test and control lines are not visible before applying any sample. The control line is use for procedural control and should always appear if the test procedure is performed correctly.

The strip was place on a work stray, showing the indicator arrow pointed toward the operator. The participants left middle finger was cleaned with methylated spirit and then puncture using a sterile lancet. The initial sample of blood was removed using a cotton swab, and sufficient fresh blood was obtained to fill a 100 ql capillary tube. The blood was then transfer from the capillary tube to the pad on the FTS kit card and the 4 drops of assay diluents was added into the square assay diluents well. The results of each FTS card were read after 10- 15 mins. A positive result showing two pink lines appear on the card’s

window and a negative result showed when a single line is seen. Test results with the individual's identification code was recorded on the participant' diagnostic data sheet.

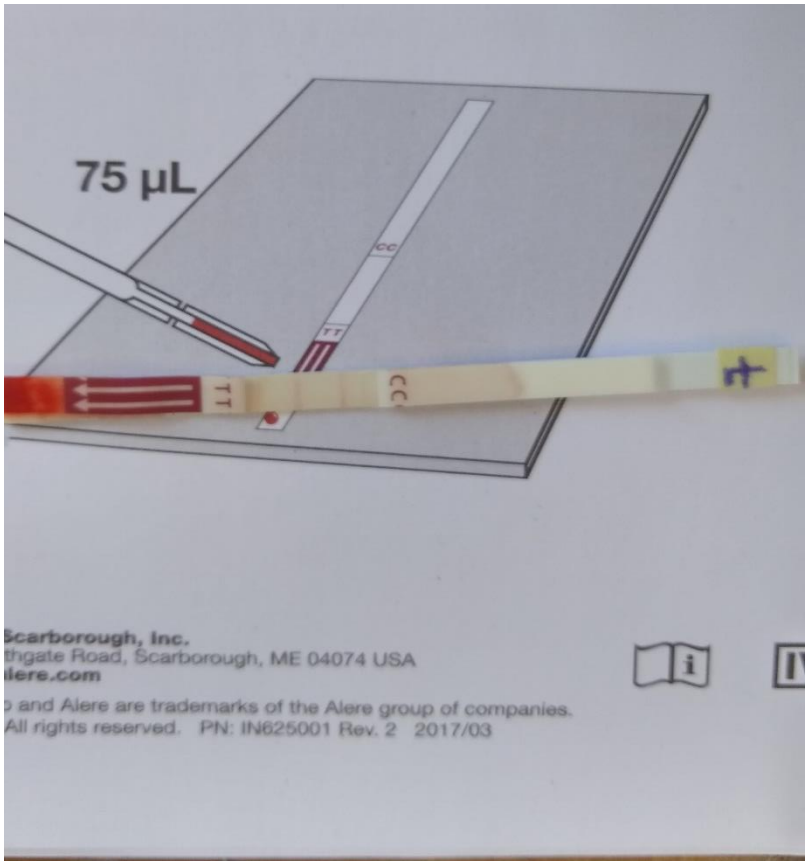

Plate I: Immuno chromatographic test kit used for detection of microfilariae in the blood sample collected.

3.2.1 Microscopic examination for microfilariae

The Finger thump was pricked for blood collection in the night (10pm-1am) for thick smear slide preparation and stained for microscopic reading. 2 drops of well-mixed whole blood was used to prepare thick film on the pre-cleaned appropriately labeled slides following standardized procedure. The blood films was stained after 20-30mins with freshly prepared 10% Giemsa stain solution at pH 7.2 and then examined with oil immersion (x100)

objective microscope. Two hundred oil-immersion high power fields were examined on the thick smear before any slide is interpreted as being negative. Positive slides were reported according to species observed in the microscopic examination from thin blood film (Cheesbrought, 2005).

3.3 Examination of Clinical Signs and Symptoms

Signs of clinical filariasis (breast and hand swelling, lymphoedema, hydrocoele presence of non-pitting oedema) were checked in targeted population by simply asking them to lift up their clothing for examination. This was carried out by both male and female health workers. Swollen limbs was identified and classified based on their degree of swelling. This status of each respondent was treated with confidentiality, (Meyrowitsch *et al.,* 1995)

3.4 Structured Questionnaire for Knowledge and Perception of Lymphatic Filariasis

Structured questions using the focus group discussion was used to obtain socio-demographic data and evaluate the knowledge, attitude and practices towards lymphatic filariasis from respondents. The questionnaire allows the respondents knowledge and perception about causes, signs, symptoms, prevention, treatment of lymphatic filariasis as well as their demographic characteristics.

3.5. Study Group

3.5.1. Age

The subject chosen for the research were between the ages of 5 years and above.

The rationale for selecting this age group of 5 years and above for the study is that a long incubation period is required, in addition to repeated exposure over an extended period of time before lymphatic filariasis is notice as infection. It takes even longer period for the clinical signs and symptoms of lymphatic obstruction to appear.

3.5.2. Inclusion Criteria

(a) They must be permanent residents in the communities for at least 5 years.

(b) Consent must have being given by targeted participant

3.5.3. Exclusion Criteria

(a) Participants below the ages 5 years

(b) People who are not permanent resident in the communities

(c) People who have been residents in the communities for less than 5 years

(d) Refusal to provide informed consent by the subject

3.5.4. Sample Size

A total of one thousand and fifteen (1,015) persons from the proposed one (1) Local Government Area in Niger State were sampled. This was be calculated by using Yamane (1967) formula for determining sample size for research activities.

Sample size is calculated as follows:

$$\frac{n = N}{1 + N e^{2}}$$

n = desired sample size

N = population size

e = margin of error set at 0.05 or 5%

3.6. Test Interpretation

Lymphatics filariasis reactive: Positive for IgG4 antibodies to *W. bancrofti* wb123: When the both purple lines “C” and “L” appear in the viewing window Note: Positive even if “L” line is weak pink and purple color.

Negative: When only the control line appears in the viewing window, then the respondent is said to be negative.

Invalid: When no “C” lines appear in the viewing window, then the result is said to be invalid and another The SD Bioline LF IgG4 biplex (61FK20) test device will be used.

Note: All positive SD BiolineLF IgG4 biplex (61FK20) test device, venous blood were collected at night for slide thick smear preparation and stained for microscopic reading and blood spots.

3.7. Ethical Approval

Ethical approval was obtained from the Ethics Review Committee of Niger State Hospital Ethical Committee, Paikoro Primary Health Care and the Informed consent was obtained from the health director for local government and all the participants after the explanation of the procedures and the benefits of the study. The purpose of the study was explained to the village chiefs and traditional leadership councils obtaining their permission and consent, all participating individual (5years of age and older) were asked to gather at the village Primary Health Care (PHC) Centre and randomly selected. Before clinical examination and testing could be carried out, the objectives of the survey was briefly explained based on the language of the community and each consenting individual were able to provide

demographic data. The participants were assigned identification numbers and their names, age, occupation and marital status was taken.

3.8. Data Analysis

Data collected was analyzed using Statistical Package for Social Sciences (SPSS) (Version 20) and presented as bar charts, frequency tables and pie charts. Chi-square test was used to test for significance of relationship between variables ($p < 0.05$).

CHAPTER FOUR

4.0. RESULTS AND DISCUSSION

4.1. Results

4.1.1. Overall microscopic and igG4 detect Prevalence of Lymphatic Filariasis (LF) in Paikoro LGA of Niger State.

A total of 1015 individuals consisting of 576 males and 439females from three communities of Niger state aged 05-66 and above were examined using rapid immune-chromatographic card test to detect the circulation filarial antigen of *Wuchereria bancrofti*. The overall prevalence of *Wuchereria bancrofti* in the study area using Immuno-chromatographic test was 24.33% Table 4.1. Additionally 247 out of the 1015 individuals examined with ICT cards were tested for microfilariae result shows that 91(36.8%) individuals were positive for microscopic microfilariae examination Table 4.1. Chi-square analysis showed that there is no significance difference in the overall prevalence of LF in the communities of Paikoro Local government areas of Niger State at $p<0.05$.

Table 4.1: Overall Prevalence in the Communities of Paikoro Local Government Areas Niger State using Immune-chromatographic card test and Microfilariae Examination.

Community	Number Examined	Number infected (%)
Jazu	289	56(5.52)
Jere	350	79(7.78)
Jeresapai	379	112(11.03)
Total	1015	247(24.33)

Community	Number Examined	Number infected with microfilariae (%)
Jazu	56	19 (7.7)
Jere	79	28(11.3)
Jeresapai	112	44(17.8)
Total	247	91(36.8)

X^2cal =6.00, X^2tab= 9.49 P<0.05

4.1.2: Community Prevalence of Clinical Manifestation of Filariasis and Lymphatic Filariasis Antigen As Detected By Filariasis Card Test Strip (FCT)

The clinical manifestations of lymphatic filariasis exhibited by members of these communities as shown by Table 4.2 are hydrocele with the overall prevalence of 14(1.38) and Lymphedema 7(0.69) and Leopard skin 3(0.29).Out of all these clinical manifestations,

hydrocoele was the most abundant clinical manifestations seen among members of the communities.

4.1.3 Age-Related Prevalence of Clinical Manifestation of Filariasis and Detection of Lymphatic Filariasis Antigen Using Filariasis Card Test Strip (FTS).

Table 4.3 shows the result of the prevalence of clinical manifestation of filariasis in relation to age among communities of Paikoro LGA of Niger State. Among the age group 5-15 years, hydrocoele was the most common clinical manifestations with a prevalence of 4 (1.37%) while the least observed clinical manifestations in this age group was lymphedema with a prevalence of 0 (0.00). In the age group 16-25 years, hydrocele was the most abundant clinical manifestations with a prevalence of6 (1.72%) followed by Lympheodema 2 (0.57%) and the least was Leopard skin1 (0.29%). In the age 26-35, there was clinical manifestation of Lympheodema 3 (1.31%), followed by hydrocele 1 (0.44%) and there was no leopard skin manifestation observed. In the age 36-45, there was clinical manifestation of Lympheodema 2 (2.5%), while hydrocoele and leopard skin have equal prevalence of 1 (1.25%). In Age group 46-55, there was no manifestation of lympheodema while hydrocoele and leopard skin have equal prevalence of 1 (3.13%). In age group 56-65, there was no manifestation of lympheodema and leopard skin while hydrocoele occur at prevalence of 1 (5.56%). In age group 66 and above no clinical manifestation of filariasis was observed. Various stages in the clinical manifestation of Lymphatic filariasis were observed (Plate 4.1 and 4.2).

Table 4.2: Community Prevalence of Clinical Manifestation of Filariasis and Lymphatic Filariasis Antigen as Detected By Filariasis Card Test Strip (FCT).

Community	Number Examined	Number with Hydrocoels	Number with Lymphoedema	Number with Leopard Skin	Number Who Had Taken/Ivemection
Jazu	289	3(1.04)	2(0.70)	0(0.00)	43(14.88)
Jere	350	4(1.14)	2(0.57)	1(0.29)	52(14.86)
Jerespai	376	7(1.86)	3(0.80)	2(0.53)	86(22.87)
Total	**1015**	**14(1.38)**	**7(0.69)**	**3(0.29)**	**181(17.83)**

Table 4.3: Age-Related Prevalence of Clinical Manifestation of Filariasisand Detection of Lymphatic Filariasis Antigen Using Filariasis Card Test Strip (FCT).

Age Group	Number Examined	Number with Hydrocoele	Number with Lymphoedema	Number with Leopard Skin	Number who had taken/Vemection
5 – 15	291	4 (1.37)	0 (0.00)	0 (0.00)	0 (0.00)
16 – 25	348	6 (1.72)	2 (0.57)	1 (0.29)	42 (12.07)
26 – 35	229	1 (0.44)	3 (1.31)	0 (0.00)	58 (25.33)
36 – 45	80	1 (1.25)	2 (2.5)	1(1.25)	76 (95.00)
46 – 55	32	1 (3.13)	0 (0.00)	1(3.13)	4 (12.5)
56 – 65	18	1 (5.56)	0 (0.00)	0 (0.00)	1 (5.56)
66 – above	17	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Total	**1015**	**14(1.38)**	**10(0.99)**	**3(0.30)**	**181(17.83)**

(A) **(B)**

Plate II: **Clinical manifestation of lymphatic Filariasis**

A. Stage 3 Elephantiasis and Lymphoedema

B. Stage 1 Elephantiasis and Lymphoedema

Plate III: Clinical manifestation of Lymphatic Filariasis in Paikoro Local Government

4.1.4: Prevalence of Lymphatic Filariasis (Card Test) in Communities of Paikoro Local Government Area in Relation to Sex and Ages

The results of the prevalence of lymphatic filariasis in communities of Paikoro Local Government Area in relation to sex and age are presented in Table 4.4. The prevalence of *Wuchereria bancrofti* showed a gradual increase with Age. Age groups 16-25 have the highest prevalence (8.6%) Table 4.5 then a gradual decline is observed from age 26- 66 and above. Gender related prevalence showed that males have higher prevalence (13.1%) than females (11.2%) Table 4.4. However, there was no statistical significant difference in the prevalence of *W. bancrofti* among sex and age groups Table 4.4

The age range 5-15 years had 38(3.7%) rate of LF infection 16-25 years had 87 (8.6%) rate of LF infection. The rate of LF infection in the age range 26-35 years was 48 (4.7%), 36-45 years age range had 42(4.1%) rate of infection, while 18 (1.8%) rate of LF infection was recorded in the age range 45-56 years. The rate of LF infection in the age range 56-65 years was 6 (0.6%), while the age range 66- above had 8 (0.8%) rate of LF infection.

Table 4.4: Prevalence of Lymphatic Filariasis (Card Test) in Communities of Paikoro Local Government Area in Relation to Sex and Ages

Age Group	Male		Female		Total	
	Number Examined	Number Infected	Number Examined	Number Infected	Number Examined	Number Infected
05-15	164	21(2.07)	127	17(1.67)	291	38 (3.7)
16-25	196	48(4.72)	152	39(3.84)	348	87 (8.6)
26-35	128	26(2.56)	101	22(2.17)	229	48 (4.7)
36-45	57	27(2.66)	23	15(1.48)	80	42(4.1)
46-55	13	6(0.59)	19	12(1.18)	32	18(1.8)
56-65	8	1(0.10)	10	5(0.49)	18	6(0.6)
66 and above	10	4(0.39)	7	4(0.39)	17	8(0.8)
Total	**576**	**133 (13.1)**	**439**	**114 (11.2)**	**1015**	**247 (24.3)**

X^2_{cal} = 8.40, X^2_{tab} = 12.59, df =7, P>0.05

4.1.5: Respondent Perception on the Most Worrisome Sign and Symptom of Lymphatic Filariasis

Table 4.5 shows the perceptions of respondent of Paikoro LGA communities on most worrisome sign and symptom of lymphatic filariasis. Majority of the infected respondent 20(8.10) believed that fever is the most worrisome sign and symptoms of LF. 14(5.67%) of the infected respondents believed that swelling is the most worrisome sign and symptoms of LF disease, while 6(2.42%) of the infected respondents believed that physical discomfort is the most worrisome sign and symptoms of LF disease. 8(3.24%) of the infected respondents believed that itching and chills are the most worrisome sign and symptoms of LF disease, while 2.17% of the respondents believed that pain is the most worrisome sign and symptoms of LF disease. 6(2.42%) of the respondents believed that physical discomfort is the most worrisome sign and symptoms of LF disease while the least perceived sign and symptom of LF disease by respondents 3(1.31%) was impairment.

On the other hand, 60(7.81%) of uninfected respondent believed that fever is the most worrisome sign and symptoms of LF. 28 (3.64%) of the uninfected respondents believed that physical discomfort is the most worrisome sign and symptoms of LF disease, while 23(3.0%) of the uninfected respondents believed that itching is the most worrisome sign and symptoms of LF disease. 31(4.04 %) of the uninfected respondents believed that chills is the most worrisome sign and symptoms of LF disease, while 22(2.86 %) of the uninfected respondents believed that pain is the most worrisome sign and symptoms of LF disease. 19(2.47 %) of the uninfected respondents believed that swelling is the most worrisome sign and symptoms of LF disease while the least perceived sign and symptom of LF disease by respondents 3(0.39 %) was impairment.

Chi-square analysis revealed that there is significant difference between the respondents' perceptions on the major cause of lymphatic filariasis disease.

4.1.6: Respondents knowledge on cause of lymphatic filariasis

Most of the infected respondents (23.8%) from the community do not know the cause of lymphatic filariasis while 30.16% of the infected respondents believed that mosquito bite is the major causes of LF disease. While the rest of the infected respondent had different opinion, they believed that sexual intercourse (4.76%), trekking long distance is the major cause of the LF disease (3.17%), Stepping on dirty water (4.76 %), Eating contaminated food (4.76%), inadequate personal hygiene (14.28), Curse from gods (9.52%), stressful work (1.38%).

Most of the uninfected respondents (21.55%) from the community do not know the cause of lymphatic filariasis while 21.02% of the uninfected respondents believed that mosquito bite is the major causes of LF disease. While the rest of the infected respondent had different opinion, they believed that sexual intercourse (3.53%), trekking long distance is the major cause of the LF disease (3.18%), Stepping on dirty water (4.95%), Eating contaminated food (15.19%), inadequate personal hygiene (16.25%), Curse from gods (9.18%), stressful work (4.95%). Chi-square analysis revealed that there is significant difference between the respondents' perceptions on the major cause of lymphatic filariasis disease Table 4.6.

Table 4.5: Respondent Perception of the Most Worrisome Sign and Symptom of Lymphatic Filariasis

Sign and symptoms	Infected (%) n= 247	Uninfected n=768
Itching	8(3.24)	23(3.00)
Pain	5(2.02)	22(2.86)
Chill	8(3.24)	31(4.04)
Fever	20(8.10)	60(7.81)
Swelling	14(5.67)	19(2.47)
Disability	3(1.21)	3(0.39)
Physical discomfort	6(2.42)	28(3.64)

X^2_{cal} = 1040, X^2_{tab} = 43.77, df =30, P<0.05

Table 4.6: Respondents Knowledge on Cause of Lymphatic Filariasis

Causes	Unifected n=283	Infected n= 63
Mosquito bite	60(21.02)	19(30.16)
Sexual intercourse	10(3.53)	3(4.76)
Trekking Long Distance	9(3.18)	2(3.17)
Stepping on dirty water	14(4.95)	3(4.76)
Eating contaminated food	43(15.19)	3(4.76)
Inadequate personal hygiene	46(16.25)	9(14.28)
Curse from gods	26(9.18)	6(9.52)
Stressful work	14(4.95)	3(4.76)
I don't know	61(21.55)	15(23.81)

X^2_{cal} = 225, X^2_{tab} = 48.60, df =35, P<0.05

4.1.7: Respondents knowledge on the prevention of Lymphatic filariasis

Respondents believed that several factor would prevent the infection of LF, most of the respondent claimed that using mosquito nets would prevent the infection, only few thought that taking prescribed drugs would prevent the infection Figure 4.5. Others thought that Keeping environment clean, spraying insecticide, never have sex with a woman during her period, stay away from infected people and majority don't know any prevention measure Figure 4.5.

The result of respondents believe on the prevention of LF disease is presented in table 4.7. The result revealed that 37.7 % of the infected persons believed that avoiding mosquito bites is the best way to prevent the transmission of LF disease. Only a few (13.3%) believed that avoiding

body contact with affected person is the mode of prevention of LF disease 11.1% of the infected persons had of the opinion that avoiding sexual intercourse with affected persons. Only 35.8% of the uninfected persons believed that avoiding mosquito bite prevents LF disease while 12.2% of the uninfected persons on the other hand are of the opinion that avoiding sexual intercourse with affected persons and avoiding body contact with affected persons are the best way to prevent LF disease This result therefore revealed that majority of the people of Paikoro LGA communities believed that avoiding mosquito bites and improving their personal hygiene is the best way to prevent LF disease. The result of the chi-square analysis shows that there is significant difference in the respondents' believes on the prevention of LF disease at P>0.05.

4.1.8: Respondents Source of knowledge about Lymphatic filariasis

Majority of the respondent got their firsthand information from person that has previous experience with LF. Infected respondent that got their information from past experience with LF were 30.8% while uninfected respondent were 38.8%. other source of information include mass media 23.1% and 17.1% for infected and uninfected respondent respectively, community health worker 21.2% and 35% for infected and uninfected respondent respectively, hospital 25% and 9.6% for infected and uninfected respondent respectively.

Table 4.7: Respondents Belief on the Prevention of Lymphatic Filariasis

Prevention measures	Affected n=56	Unaffected n=187
Sleeping under mosquito net	17(37.7)	67(35.8)
Taking prescribe drugs	4(8.9)	14(7.5)
Keeping environment clean	11(24.4)	48(25.7)
Spraying with insecticides	2(4.4)	11(5.9)
Never have sex with a woman during her period	5(11.1)	23(12.2)
Stay away from infected people	6(13.3)	24(12.8)

X^2_{cal} = 105.00, X^2_{tab} = 38.89, df =25, P>0.05

Table 4.8: Respondents Source of Information about Lymphatic Filariasis

Source of information	Affected n=56	Unaffected n=187
Mass media	12(23.1)	41(17.1)
Community Health Workers	11(21.2)	84(35)
Hospitals/Dispensaries	13(25)	23(9.6)
Experience of previous attack of LF	16(30.8)	92(38.33)

X^2_{cal} = 12.00, X^2_{tab} = 16.92, df =9, P>0.05

4.1.9: Prevalence of Lymphatic Filariasis in Communities of Paikoro Local Government Area in Relation to Sex and Marital status.

According to marital status, Married individuals were found to be more infected (11.6%), followed by single individual (8.7%), divorced (2.8%) and widowed (1.2). However there is no significant difference between categories of marital status Table 4.9.

4.1.10: Prevalence of Lymphatic Filariasis in Communities of Paikoro Local Government Area in Relation to Occupation.

According to occupation, prevalence was highest in farmers (12.5%) while lowest was in traders (1.4%). The prevalence of LF in Jazu community according to occupation shows that Farmers had 2.9% prevalence followed by Students (2.4%) and Traders (0.2%). While in Jere community Farmers had 4.0% prevalence followed by Students (3.0%) and Traders (0.8%). However jerespai result shows the highest prevalence across all occupation with Farmers 5.6% prevalence followed by Students (5.0%) and Traders (1.4%).

The result of the chi-square analysis shows that there was no statistical significant difference in the prevalence of *W. bancrofti* among the studied community Table 4.10.

Table 4.9: Prevalence of Lymphatic Filariasis in Communities of Paikoro Local Government Area in Relation to Sex and Marital status

Marital status	Male		Female		Total	
	Number Examined	Number Infected **(%)**	Number Examined	Number Infected **(%)**	Number Examined	Number Infected **(%)**
Married	244	63(6.2)	192	55 (5.4)	436	118 (11.6)
Single	289	45(4.4)	209	44 (4.3)	498	89 (8.7)
Divorced	33	20(2.0)	20	8 (0.8)	53	28 (2.8)
Widowed	10	5(0.5)	18	7(0.7)	28	12 (1.2)
Total	576	133(13.1)	439	114(11.2)	1015	247 (24.3)

X^2 cal = 4.60 X^2 tab= 5.99 P<0.05

Table 4.10: Prevalence of Lymphatic Filariasis in Communities of Paikoro Local Government Area in Relation to Occupation

Community	Occupation							
	Farmer		Student		Trader		Total	
	Number examined	Numbers infected	Number examined	Numbers infected	Number examined	Numbers infected	Number examined	Numbers infected (%)
Jazu	158	29(2.9)	120	25 (2.4)	11	2(0.2)	289	56 (5.5)
Jere	206	41(4.0)	134	30 (3.0)	10	8(0.8)	350	59(5.8)
Jerespai	153	57(5.6)	207	51(5.0)	16	4(0.4)	376	112(11)
Total	517	127(12.5)	461	106 (10.4)	37	14(1.4)	1015	247(24.3)

X^2cal =4.76, X^2tab= 5.99, P<0.0

4.2. Discussion

Lymphatic filariasis infection was found to be present in Paikoro Local Government Area, Niger state. The prevalence of 24.3 % of ICT and 36.8 % for positive microfilariae was reported in the studied communities this revealed that Lymphatic filariasis is endemic in Paikoro Local Government. The prevalence is lower than the reported prevalence in Yorro Local Government Area Taraba state and Northern Taraba state respectively (Elkanah *et al.,* 2018; Obadiah *et al.,* 2018) although this prevalence is much higher than the reported prevalence in Yakurr people of Cross river state, where a prevalence of 6.1 % was positive for microfilariae in their blood (Iboh *et al.,*2012). The high endemicity is as a result of the availability of mosquitoes breeding site, unprotected housing facilities, worsen sanitary condition and occupational exposure.

Among the three communities studied, Jeresapai reported the highest prevalence, followed by Jere and Jazu. The difference in the prevalence among the three communities may be due to the lower socio economic status among the communities. Jeresapai community is lower socio economic community with poor environmental conditions that enhances mosquito vector breeding and personal protections against mosquitoes were unaffordable. The main economic activities in the communities is farming, this occupation exposes the respondents more to the vector bite. Farmers are more liable to be closer to their breeding site of mosquitoes.

The clinical manifestations of Lymphatic filariasis in Paikoro include Lymphoedema of the legs and Hydrocele. This findings is similar to findings of (Elkanah e*t al.,* 2018) while it is slightly dissimilar to the work of (Iboh *et al.,* 2012) because there was no record of hydrocele in their study. This is due to low prevalence of infection in Yakurr people of Cross-river state.

A gradual increase in prevalence with age was reported in this study which is different from the results reported by (Iboh *et al.,* 2012), who reported a gradual increase in prevalence with age. The peak prevalence was in the age group 16-25 (8.6%) this is different from the result of (Iboh *et al.*, 2012), he reported the peak Age- Prevalence to be Age 41- 60. These observed differences may be due to the engagement of the youth in the study area in vigorous occupational activities such as fishing and farming. The decline of prevalence in older age group may be as result of passive immunity acquired from past exposure to the parasite.

Males (13.1%)) were found to be more infected than females (11.2%), this is similar to the result of (Elkanah, 2018) which reported that females (28.4%) and males (32.6%) but not similar to the result of (Iboh et al. 2012). There was no significant difference in the prevalence of LF between male and female due to the fact both sex are both at risk of been bitten by infected mosquitoes.

Lymphatic filariasis is well known in the community although the main cause of the disease remain unknown among majority of the respondents and their perception about the cause may be influence by sociocultural believes and mass media. Majority of the respondent have wrong perception about the cause of the disease, this may cause difficulty in seeking appropriate health care. There is account of stigmatization, as healthy respondent stays away from respondent that have developed filariasis. This stigmatization is an obstacle in the control of LF as it prevent respondent from seeking appropriate health care services. However, few respondents that have correct perception about the disease were informed by community Health workers and were able to take the right preventive measures.

Married individuals (11.6%) are found to be more infected which is due to migration among communities for marriage as exposure within communities will establish infection can put the

migrating individual at more risk of infection. LF exerts a socio-economic impact on marriage and sexual life, young males that have hydrocoele will be stigmatized and it is possible their sexual life is truncated.

19.11% of the infected individuals were farmers, followed by students and traders. This is because farmers are more exposed to the vectors during their farming activities and mosquito vector can breed in trenches and ditches in the farms. The difference in prevalence among the occupation may be due to different occupational condition each individual is exposed to. This result is dissimilar to the result of (Elkanah *et al.*,2018) who reported that student were more infected than uneducated farmers.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Lymphatic filariasis is endemic in Paikoro Local Government Area, and the prevalence of 24.3% and 36.8% ICT and microfilariae respectively which qualifies these villages for mass drug administration (MDA) in order to eliminate the disease. The prevalence of Lymphatic filariasis in Paikoro local government shows that there is continuous transmission of *W. bancrofti* in the area thus causing the endemicity of this debilitating disease. It is therefore pertinent to commence Mass drug administration immediately.

The perception of respondents about the disease is fair, there is a need for proper awareness of how the disease is transmitted, and how it can be prevented and managed. Community health workers and house-to-house publichealth campaign should be employed for the role of educating the community members about the disease; this will help to shift their perception towards the true cause of the disease. It is important to assure community members about the necessity of Mass Drug Administration (MDA), effect of taking the drugs and use of insecticide treated net to ensure that there reduction in transmission and to engage in innovative and intensified disease management.

5.2 Contribution to Knowledge

The study validated the demographic characteristics, knowledge and perception of participants aged >5years with overall prevalence of 24.33% was established, the result shows higher prevalence in males (13.11%) than females (11.22%). *Wuchereria brancrofti* prevalence varies significantly ($p<0.05$) among the age group examined while the highest prevalence was recorded among age group of 16-25 (8.6%). Married individuals (11.6%) are found to be more infected

which is due to migration among communities for marriage as exposure within communities will establish infection can put the migrating individual at more risk of infection

5.3 Recommendations

In assessing the community practices, perception and clinical manifestation on the distribution of lymphatic filariasis among people living in communities where research has been conducted; the following recommendations were suggested;

i. The study has demonstrated the need for health education programs to be establish which will help people to be able to protect themselves against mosquitoes bite which is the major way of transmission
ii. Though Nigerian vision 2020 on neglected tropical disease has been established and commence the lymphatic elimination programs, morbidity management activities also need to be developed urgently so as to alleviate burden of the affected individual.
iii. Due to critical condition of this study to delineating lymphatic filariasis communities, there is needed to be replicated in other part of the state and the country at large where the status of the disease is unknown in order to ascertain the status of the disease for mass drug administration.

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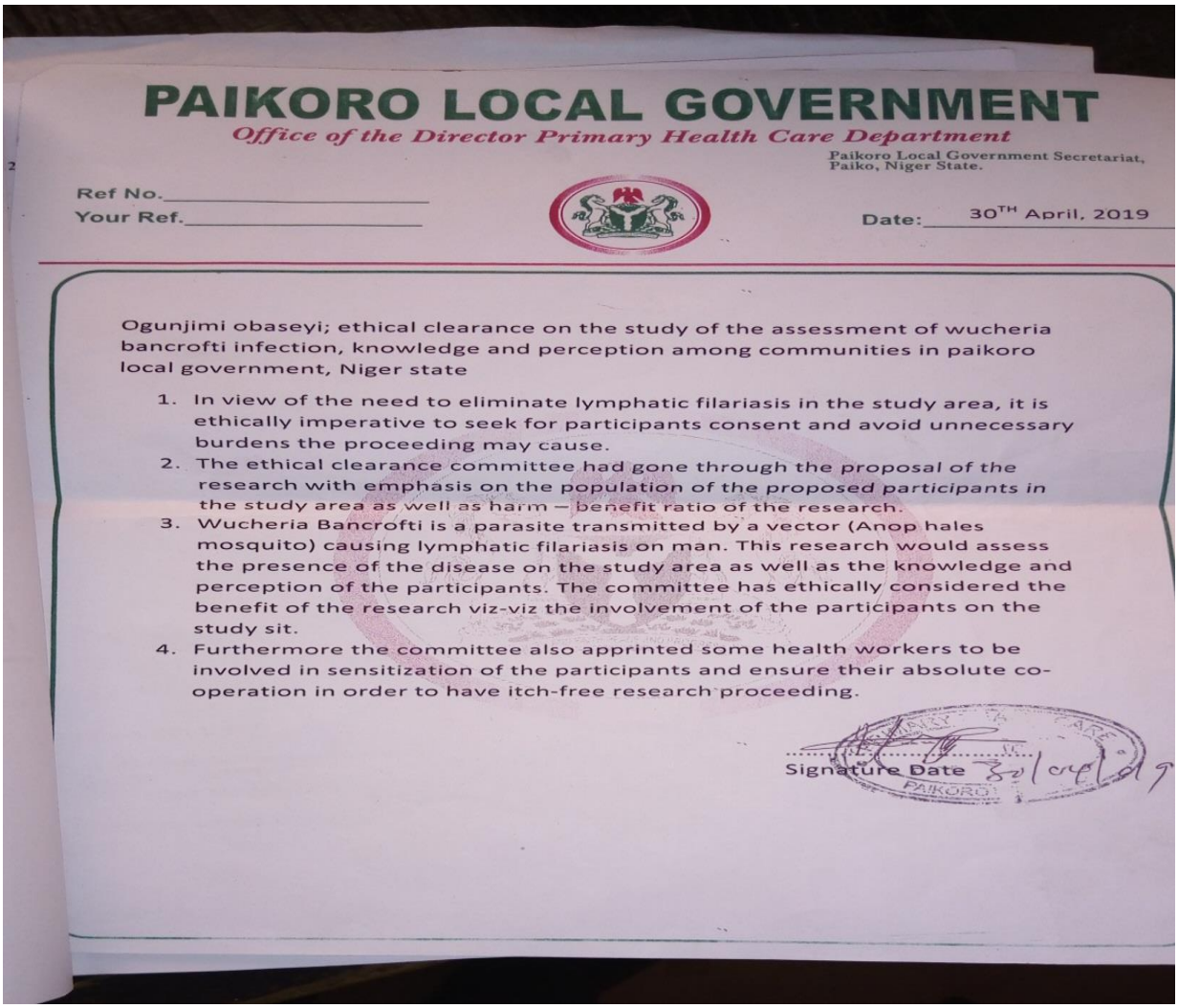
ABBREVIATION

LF	Lymphatic Filariasis
ICT	Immuno-Chromatographic Card Test
CFA	Circulating Filarial Antigen
WB	Wuchereria bancrofti
NTD	Neglected Tropical Disease
GPELF	Global Programme to Eliminate Lymphatic Filariasis
MDA	Mass Drug Administration
DEC	Diethylcarbamazine
MOM	Micro-Stratification Overlap Mapping
CDTI	Community-Directed Treatment with Ivermectin
GBD	Global Burden of Disease
REM-LF	Rapid Epidemiological Mapping Survey for Lymphatic Filariasis
IgG4	Immuno-globulin G4

APPENDIX

Appendix A



PAIKORO LOCAL GOVERNMENT

Office of the Director Primary Health Care Department

Paikoro Local Government Secretariat,
Paiko, Niger State.

Ref No._____

Your Ref._____

Date: 30TH April, 2019

Ogunjimi obaseyi; ethical clearance on the study of the assessment of wucheria bancrofti infection, knowledge and perception among communities in paikoro local government, Niger state

1. In view of the need to eliminate lymphatic filariasis in the study area, it is ethically imperative to seek for participants consent and avoid unnecessary burdens the proceeding may cause.
2. The ethical clearance committee had gone through the proposal of the research with emphasis on the population of the proposed participants in the study area as well as harm – benefit ratio of the research.
3. Wucheria Bancrofti is a parasite transmitted by a vector (Anop hales mosquito) causing lymphatic filariasis on man. This research would assess the presence of the disease on the study area as well as the knowledge and perception of the participants. The committee has ethically considered the benefit of the research viz-viz the involvement of the participants on the study sit.
4. Furthermore the committee also apprinted some health workers to be involved in sensitization of the participants and ensure their absolute co-operation in order to have itch-free research proceeding.

Signature Date 30/04/19

PAIKORO

Plate i: Ethical Clearance

Appendix B

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

QUESTIONAIRE FOR POST GRADUATE RESEARCH ON PREVALENCE, CLINICAL MANIFESTATIONAND ASSESSMENT OF KNOWLEDGE AND PERCEPTIONSON LYMPHATIC FILARIASIS INPAIKORO LOCAL GOVERNMENT, NIGER STATE

Name: …….

Community Name: ……

Gender: (Male) (Female)

Age……

Occupation……

Marital Status……..

Years spent at the community: (0<3) (3<5) (5 and above)

Clinical Symptoms: (hydrocoele) (lymphoedema) (Elephantiasis) (others)

Worrisome Signs: pain/itching/chill/fever/swelling/impairment/physical discomfort/don't know

Information about lymphatic filariasis by the participants: Mass media/experience of previous lymphatic filariasis attack/hospitals/dispensaries/community health workers

Causes of lymphatic filariasis: mosquito bites/sexual intercourse/trekking long distance/eating contaminated food/stepping on dirty water/curse from the gods/stressful work/inadequate personal hygiene/I don't know

Prevention and management of lymphatic filariasis: Sleeping under mosquito nets/Taking the prescribed drug or ivermectin/keeping the environment clean/Spraying with insecticides/Never have sex with a woman during her period/Stay away from infected people/I don't know
Parasitological result: (Positive) (Negative) (10) Microscopic result: (Positive) (Negative)

Serological result: (Positive) (Negative)

Parasitological result: (Positive) (Negative)

Apendix C

A. **B.**

Plate III: A. Stage 3 Elephantiasis and Lymphoedema B. Stage 1 Elephantiasis

Appendix E

Plate V: Collection and Processing of Samples