LYMPHATIC FILARIASIS: CHALLENGES OF ELIMINATION IN NIGERIA

By

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Preamble

The Vice Chancellor sir, Deputy Vice Chancellors, (Academic/RI&D), the Registrar, Bursar, University Librarian, Deans, Directors, Professors, my Teachers and Mentors, Head of Departments, Erudite Scholars, Members of University Community, invited guests, great UDUS students, great Chemical and Life Sciences students, greatest Zoology students, distinguish ladies and gentlemen.

It is with deep gratitude, praise, and obedience to Allah (SWT) that I stand before you today to deliver the 34thInaugural lecture of this great University. It is indeed a great honour to have the priviledge of todays lecture which is the seventh inaugural lecture from the then Faculty of Science, the second in Parasitology. Coincidentally, it is the first from Faculty Chemical and Life Sciences, and first from Zoology as a Department.

It is accepted that Inaugural Lecture may take any or all of the following forms:

1. Concentrate on the development of the department where the Professor holds his chair;
2. Center on a general topic which the Professor considers that he has something fresh and stimulating to tell the audience;
3. Focus on the Professor's own work within the general framework of his discipline.

My lecture today, covers all the above forms, and the topic is "LYMPHATIC FILARIASIS: CHALLENGES OF ELIMINATION IN NIGERIA" .

Vice Chancellor sir, one may ask why Lymphatic Filariasis (Elephantiasis)? The answer is simple. As a child growing up in Jos, Plateau State, I found cases of leg elephantiasis very common in our streets, market places and places of worship and was wondering what the cause was. The answer came, when I was

studying Parasitology in the University. I understood that, Elephantiasis is a parasitic disease caused by *Wuchereria bancrofti*, *Brugia malay i*and *Brugia timori*, all tissue Nematodes and transmitted through the bite of mosquito. I therefore developed interest in the infection and I committed myself to pursue my Ph. D. research on it. Unfortunately I couldn't because of two reasons; one was the issue of getting night blood from the study population, because of nocturnal periodicity of the parasite which necessitated the use of ICT Kit and second because the Immunichromatographic Card Test (ICT) kit, used for diagnosing the parasite, was not commonly available in this part of the world at that time (2005). Hence I have to change area. This however did not affect my interest in the disease, therefore in collaboration with other parasitologists in the Zoology Department, I continued working on lymphatic filariasis resulting in many research outputs and graduation of many postgraduate students in the area.

Vice Chancellor Sir, distinguish audience, I am a Professor of Parasitology, and therefore, before I delve into my lecture proper, I want to crave your indulgence to briefly take you through the basic concept of the subject; Parasitology. To understand Parasitology, we need to appreciate the concept of parasitism which is the mode of existence in which one organism, a parasite, infects another, the host, and the parasite does some measure of harm to the host while itself deriving a benefit. Some of the damage which pathogenic parasites produce in the tissues of the host may be described in the following two ways;

(a) Direct effects of the parasite on the host

- Mechanical injury - may be inflicted by a parasite by means of pressure as it grows larger, e.g. Hydatid cyst causes blockage of ducts such as blood vessels producing infraction.
- Blockage of intestinal and lymphatic passages- As in Ascarisis and lymphatic fialariasis

- Deleterious effect of toxic substances- in *Plasmodium falciparum* production of toxic substances may cause rigors and other symptoms.
- Deprivation of nutrients, fluids and metabolites -parasite may produce disease by competing with the host for nutrients.

(b) Indirect effects of the parasite on the host:

- Immunological reaction: Tissue damage may be caused by immunological response of the host, e.g. nephritic syndrome following *Plasmodium* infections.
- Excessive proliferation of certain tissues due to invasion by some parasites can also cause tissue damage in man, e.g. fibrosis of liver after deposition of the ova of *Schistosoma*.

Parasitism is not rare; it is one of the most common lifestyles on earth. As such, the study of parasitism can teach us a great deal about life in general. Parasitism can be studied at many different levels. For instance, parasites in the aggregate pose formidable problems for human health and well-being. Over 500,000 African children still die of malaria every year. Along with the parasites that cause malaria, there are many other parasites that further jeopardize the health of people, especially those living in disadvantaged conditions. Therefore, an understanding of the biology of the responsible organisms could lead to development of control strategies to abolish these long-standing scourges of humanity. Parallel considerations apply to livestock or production of food plants because parasites are also a constant menace to these Sector

Vice Chancellor sir, by definition, any organism that lives in or on another living organism is a parasite; including bacteria, viruses, fungi and insects. But today, Parasitology is concerned with the study of Protozoa and helmimths parasites. So, parasites of

medical importance are grouped into, Protozoan (Unicellular), Nematodes (Round Worms), Treamatodes (Segmented Worms) and Cestodes (Tape Worms). *Wuchereria bancrofti*, *Brugia malay i*and *Brugia timori*, the causative agents of lymphatic filariasis, which is the subject of my lecture is a nematode, belonging to the Phylum *Nematoda*, class *Chromadorea*, order *Rhabditida*, and Family *Onchocercidae*,

LYMPHATIC FILARIASIS

Lymphatic Filariasis (LF) commonly known as elephantiasis is a painful and profoundly disfiguring disease that has a major social and economic impact in Asia, Africa, the Western Pacific and parts of the Americas (Ottesen 1997). It is one of the leading causes of permanent and long-term disability in the world (WHO, 2019). About one billion people in 83 different countries are known to be at risk of this disease (WHO, 2019). Globally, the disease is known to affect about 120 million people in 83 endemic countries (Plate 1).

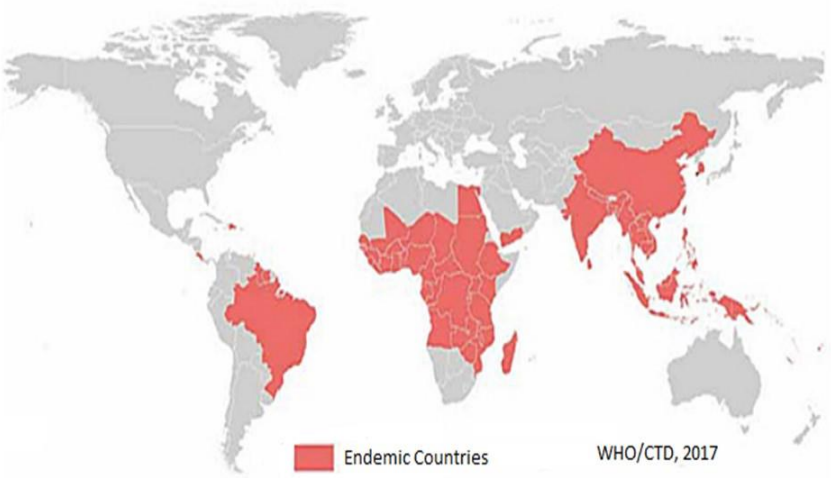

Plate 1: Global LF Map: Lymphatic Filariasis Endemic Countries and Territories

Bangladesh, India, Indonesia and Nigeria account for nearly 70% of lymphatic filariasis cases. Among the estimated millions of people infected; 36 million are microfilaria carriers and 40 million are symptomatic. In sub Saharan Africa, it is estimated that about: 512 million people are at risk of the infection and about 28 million are already infected. Of this number, there are 4.6 million cases of lymphoedema and over 10 million cases of hydrocele. These represent about 40% of the global burden of the disease (WHO, 2019). In Africa, 34 countries are endemic, and Nigeria is believed to bear the highest burden of LF, with an estimated 80 to 128 million people at risk (WHO, 2019).

CAUSES AND TRANSMISSION

Lymphatic Filariasis is caused by long thin filarial worms; *Wuchereria bancrofti, Brugia malayi* and *Brugia timori*, that live in lymph channels in the human body. In most endemic countries, it is transmitted by the bite of female *Culex* and *Anopheline* mosquitoes through the process of taking a blood meal from individuals infected with microfilaria (mf) which are millions of larval forms produced by paired adult worms.

The mosquito ingests the microfilaria (mf) during a blood meal. The mf progresses through several larval stages to an infective stage, called the L3 larva; which breaks out of the mosquito mouth parts, escapes, and finds its way into the human bloodstream during another blood meal. The L3 matures into an adult worm within the human host between 3 to 15 months, migrates to the lymphatics, where it pairs with an adult of the opposite sex and initiates a fecund infection with the production of mf.

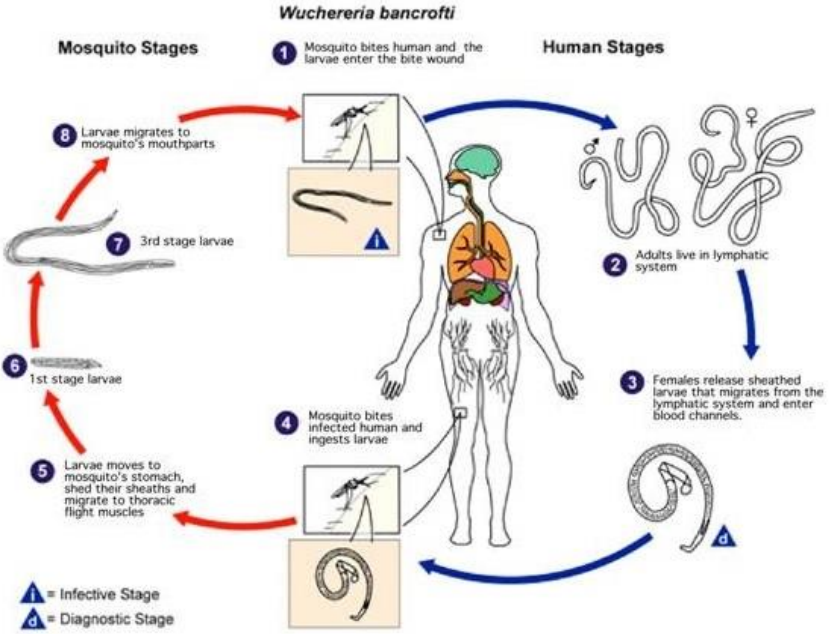

Plate 2: Lifecycle of *Wuchereria bancrofti* (CDC, 2020)

The adult worms may live up to 8 years on the average, but there have been reports of some worms living beyond 20 years (WHO, 1996). Of the 3 species only Bancroftian filariasis is endemic in Nigeria.

It is clear from the aforementioned that, for transmission of LF to occur, certain factors must be present. These are the Parasite (*W.bancrofti, B. malayi* and *B. timori*), the Human Host (Humans are the exclusive host of infection with *W. bancrofti*), the Vector (*Culex*, *Anopheles*, *Aedes* and *Mansonia*) and the Environment (Climatic conditions affect the vector like Temperature, Rainfall, Strong winds, etc). It is worthy of note that *Anopheles gambiae*, *A. funestus* and *Culex quinquefasciatus* were the vector species reported from different parts of Nigeria (Amaechi et al., 2017, Ladan *et al*., 2017).

CINICAL MANIFESTATIONS

The disease targets the body's lymphatic system; as a result the lymph channels get damaged and blocked thereby preventing the proper flow of lymph fluid through the body. The accumulation of lymph fluids leads to the chronic manifestation of LF in the extremities of the body namely; Lymphoedema/elephantiasis of the upper and lower limbs, which affects about 4.6 million people in Africa.

Plate 3: Lymphoedema of Right Leg

Plate 4: Lymphoedema of Both Legs

Plate 5: Elephantiasis of the Right Leg **Plate 6**: Elephantiasis of the Right Leg

Plate 7: Lympoedema of the Right Leg **Plate 8**: Elephantoid Leg with pus

Hydrocele is another manifestation of LF and is also known to affect about 10 million men in Africa alone (WHO, 2019). Women have been known to have infections of the breast and female genitalia but these are rare.

a

b

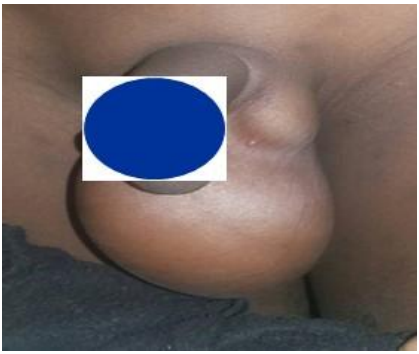

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Plate 9 a - d: Different Grades of Hydrocoel

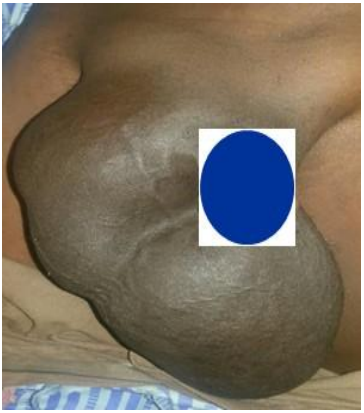


Plate 10: Hydrocoel

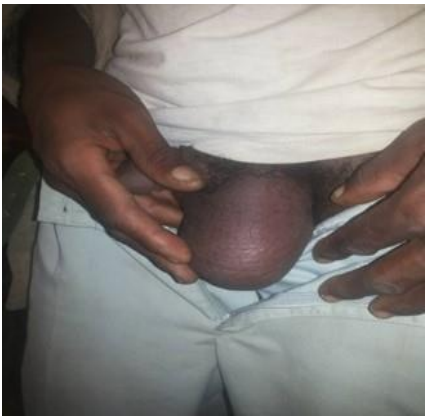


Plate 11: Hydrocoel

Plate 12: Hydrocoel

Plate 13: Hydrocoel

Plate 14: Hydrocoel

Plate 15: Oedema of the Breast

DISEASE BURDEN

The pathology associated with LF results from a complex interplay of the pathogenic potential of the parasite, the immune response of the host, and external ('complicating') bacterial and fungal infections. It is clear that lymphoedema, elephantiasis and hydrocoel, may lead to severe deformity, stigma and disability. Sometimes victims of the disease experience extreme discomfort, embarrassment, insults, stares, and sense of ostracism at the advanced disease stage. Some feel shy when the elephantoid leg has pus oozing out of it from infection and they are being chased by flies. Many reported loosing leadership potential, losing spouses and if not married loosing marriageability.

Impact of LF on Work, Family Life and Interpersonal Relationships

"There was a time I went for a job interview but was unsuccessful. I was later informed that I was not offered employment because of my condition, as they were concerned about my ability to stand and teach students" Male Victim.

"As a tailor, when my customer's attention and eyes are on my leg, I quickly pull down my trouser to cover it, and I don't feel comfortable to do my work," Male Tailor Victim

“When I gained admission into a tertiary institution, I could not return to school on time after the semester holidays because my leg became swollen to the extent that I lost some of my finger nails.” A female Victim narrated.

According to a community member “They become poor because they usually produced little on their farms. When they fall sick, it affects their work in the farm and the harvest becomes very low, which in the end pushes the individual into poverty.”

“About two years ago, I had fever and severe pain such that I stayed at home for about two months without going to work. I could not go anywhere within that period, other than to eat and use restroom. Then my employer began to consider laying me off because I was unable to come to work for about two months in a row, but it took the Grace of God for them to retain me and pay me my salaries for those months. So this condition really affects my work. When the sickness comes, I become incapacitated to the point that I wouldn’t be able to lift even a bucket of water by myself. But whenever the fever leaves me, I become strong enough to do work.” Narration from another Male Victim.

“When the condition is not severe, then a person can get married without much difficulty. But when the sickness is very severe, it can be a deformity and no girl will want to marry you.”

Emotional Consequences of Stigma and Discrimination on Persons with LF

“When people tell me to stay away because of this sickness, it makes me angry.” Victim

“Sometimes it makes us to be ashamed and angry”

“People insult me when they see me and I feel bad about it….and I used to cry. Sometimes I used to cry for up to three days.” Another Victim.

“How can I be happy when I am unable to do my work.”. Another Male victim.

“I feel very bad because of the experiences I had, at such times I weep a lot.”

“Sometimes when I look at the leg, I become angry and always want to cry. It makes me become discouraged because of the fact that the leg will remain big for the rest of my life. I usually become sad and frustrated.” Female victim.

“He gets angry with me when he sees my leg and says it puts him off me” Another Female Victim.

Suicidal Tendency

“I feel demoralized and very sad. There was a time that I was in severe pain and I prayed to God to just take my life so that I will be relieved of the pain.”

“When the sickness begins, it used to get swollen and secrete fluid. On account of the pains, I used to say that it is better to die so I can rest.”

“I get so worried and feel so sad because I wish to work like others and be able to feed myself, but I cannot. I get so worried that I prayed to God to just take my life because I have no use in this life. I have a disease that I can’t walk and so people avoid me and when I do business people don’t patronize me.” Female Victim.

In one particular study we conducted, the following was obtained from infected participants and their family members, when asked about the most worrisome sign/symptom:

Sign/Symptom	Infected (%)	Family (%)
Chill	**8(3.24)**	**31(4.04)**
Disability	**3(1.21)**	**3(0.39)**
Fever	**20(8.10)**	**60(7.81)**
Itching	**8(3.24)**	**23(3.00)**
Pain	**5(2.02)**	**22(2.86)**
Physical Discomfort	**6(2.42)**	**28(3.64)**
Swelling	**14(5.67)**	**19(2.47)**

$X^2_{Cal} = 1040$, $X^2_{Tab} = 43.77$, df = 30, $P<0.05$

Of the 120 million people estimated to be globally infected by LF, 22 million of them (17.2%) are children below the age of 15 years – school aged children (WHO, 2019). The school-aged children affected by LF are also debilitated. This no doubt affects their education and future career prospects.

Therefore, the disease causes loss of employment opportunities, stigmatization, reclusion and impact victim's workability. Similar to other neglected tropical diseases, lymphatic filariasis occurs mostly among the poor disenfranchised populations living in highly endemic settings, perpetuating a cycle that traps people into further poverty and destitution.

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 North eastern states of Nigeria. Several Mapping surveys have been done to properly document the prevalence of lymphatic filariasis in Nigeria. 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).

Available literature on lymphatic filariasis shows that lymphatic filariasis is prevalent and widespread in Nigeria. Nigeria is thought to have more cases of lymphatic filariasis than any other country worldwide, except India (WHO, 2019). The following rates were reported across the country; 18.8%; Ovari, Aguata LGA, Anambra State (Mbah and Njoku, 2002); 16.9% among

Ezza People in Ebonyi State (Anosike et al., 2005); In Katsina State LF was found in all of 17 of 34 LGAs surveyed with a prevalence of 46% (FMoH, 2008); 5.5%; Lower Cross River Basin (Udoidung et al., 2008); 6.5%; Benue (Targema et al., 2008); 15.5%; Mbembe people, Cross River (Okon et al., 2010); 12.0%: Kano State (FMoH, 2010); 73.0%: 3 LGAs of Imo State (Obi et al., 2011); 23.57%: Communities of Lau LGA, Taraba (Elkanah et al., 2011); 17.20%; EdimOtop Community in Calabar C/River (Ekanem et al., 2011);24.6%; Benue (Amuta et al., 2012); 6.3%; Yakurr, Cross River (Iboh et al., 2012); 6.1%; 8 clinics in Jos, Plateau State (Terranella, 2013); 22.3%; Abia State (Amaechi, 2014); 21.0% Ado-Ota Ogun State (Okonofua et al., 2014); 10.2%; 6 Wards of Bodinga LGA, Sokoto State (Adamu et al., 2014); 5.57%; Cross River State (George et al., 2016); 35.0%; Gombe (Yoriyo et al., 2017); 92.5%; Kebbi State (Konofua et al., 2017); 33.58%, Muri Emirate, Taraba State (Elkanah et al., 2017); 4.7%; Osun (Brant et al., 2018); 17.0%; Bakassi, C/River (Mbah et al., 2018); 30.02% 11 communities of Northern Taraba State (Elkanah et al., 2018); 37.79%; T/Mafara, Zamfara State (Ladan et al., 2019); 2.00% from three (3) wards in Jega LGA, Kebbi State (Mustapha et al., 2023).

OUR CONTRIBUTION IN THE DEPARMENT OF ZOOLOGY

Distinguish guests as I have mentioned earlier, as part of our contribution towards the global efforts of eliminating filariasis, we have conducted a lot of epidemiological studies on filariasis in parts of Sokoto, Kebbi and Zamfara States. Some of the findings are presented below:-

An epidemiological study was carried out in five (5) wards of Bodinga Local Government Area of Sokoto State using on site Filariasis IgG/IgM Combo Rapid Test specific for *Wuchereria bancrofti* and *Brugia malayi* and search for clinical manifestations (hydrocele and lymphoedema) (Attah, et, al. 2017). Out of the

two Hundred and twenty-nine (229) individuals analysed, twenty-three (23) tested positive and this represents a prevalence of 10.0%. Infection rate was highest in Bangi/Dagaba ward with 13.3%. The males were more infected than the females; however, the difference was not statistically significant (P>0.05%). The age bracket 70 and above showed the highest rate of infection, 18.2%. The unmarried individuals were significantly more infected than the married ones (P<0.05). No clinical sign was observed in the study area.

Table 1: Prevalence of Lymphatic Filariasis in Five Wards of Bodinga LGA, Sokoto State

Ward	No. Examined	No. Infected	Prevalence (%)
Badau/Darhela	47	4	8.5
Bangi/Dabaga	45	6	13.3
Danchadi	47	5	10.6
Kauran Miyo	45	4	8.9
Sifawa/Lukuyawa	45	4	8.9
Total	**229**	**23**	**10.0**

Table 3: Sex Specific Prevalence of Lymphatic Filariasis in the Study Area

Sex	No. Examined	No. Infected	Prevalence (%)
Male	109	11	10.1
Female	129	12	10.0
Total	**229**	**23**	**10.0**

Table 4: Distribution of Lymphatic Filariasis among Different Age Groups in the Study Area

Age Group	No. Examined	No. Infected	Prevalence (%)
10 – 19	24	3	12.5
20 – 29	24	2	8.3
30 – 39	38	1	2.6
40 – 49	36	6	16.7
50 – 59	54	5	9.3
60 – 69	42	4	9.5
Above 70	11	2	18.2
Total	**229**	**23**	**10.0**

Table 5: Prevalence of Lymphatic Filariasis by Marital Status in Five Wards of Bodinga LGA, Sokoto

Marital Status	No. Examined	No. Infected	Prevalence (%)
Married	200	19	9.5
Single	29	4	13.8
Total	**229**	**23**	**10.0**

Table 6: Occurrence of Lymphatic Filariasis among Different Occupational Groups in the Study Area

Occupation	No. Examined	No. Infected	Prevalence (%)
Farming	65	8	12.3*
Civil Service	29	2	6.9
Trading	12	1	8.3
Others	123	12	9.8
Total	**229**	**23**	**10.0**

In Zamfara State, a study was conducted on the Sero-prevalence of Lymphatic Filariasis in Six Communities of Talata Mafara Local Government Area, Zamfara State, Nigeria (Ladan et al., 2019). The results showed that, the area is endemic for Bancroftian filariasis, with male, students and farmers having higher risk of being infected.

Table 7: Sero-Prevalence of Lymphatic Filariasis in Different Wards

Ward	No. Examined	No. Positive	Prevalence (%)
Garbadu	51	20	39.2
Jangebe	52	21	40.4
Kagara	51	21	41.2
Makera-Taketsaba	51	19	37.3
Ruwan Bore	51	13	25.5
Shiyar Galadima	51	22	43.1
Total	**307**	**116**	**37.8**

Not Significant, $X^2 = 2.759$, df: 5, $p = 0.737$

Table 8: Sero-Prevalence of Lymphatic Filariasis in with Respect to Gender

Sex	No. Examined	No. Positive	Prevalence (%)
Male	185	72	38.9*
Female	122	44	36.1
Total	**307**	**116**	**37.8**

*: Significant, $X^2 = 6.759$, df: 1, $p = 0.009$

Table 9: Sero-Prevalence of Lymphatic Filariasis in Different Age Groups

Age Group	No. Examined	No. Positive	Prevalence (%)
1 – 10	94	35	37.2
11 – 20	70	33	47.1*
21 – 30	47	13	27.7
31 – 40	39	11	28.2
41 – 50	28	10	35.7
51 – 60	11	7	63.6*
61 - Above	18	7	38.9
Total	**307**	**116**	**37.8**

*: Significant, $X^2 = 34.00$, df: 6, $p = 0.0001$

Table 10: Sero-Prevalence of Lymphatic Filariasis in with Respect to Occupation

Occupation	No. Examined	No. Positive	Prevalence (%)
Farming	88	38	43.2
Trading	51	13	25.5
Civil Service	38	9	23.7
Students	60	26	43.3
Unemployed	70	30	42.9
Total	**307**	**116**	**37.8**

*: Significant, $X^2 = 24.948$, df: 4, $p = 0.000$

In Kebbi State, a study on Lymphatic Filariasis in Six Rural Villages of Yauri Local Government Area, Kebbi State, Nigeria was conducted (Ukatu et al., 2020:). The results showed active transmission of the infection in the area, occurrence of the infection significantly associated with Zamare village, having the highest prevalence, while farmers and fishermen were the most infected groups.

Table 11: Village Prevalence of Lymphatic Filariasis in Yauri LGA, Kebbi State

Village	No. Examined	No. Positive	Prevalence (%)
Chulumgumbi	73	1	1.37
Gungun Sarki	71	3	4.22
Jijima	75	5	6.67
Tondi	74	6	8.11
Yauri North	72	6	8.33
Zamare	67	10	14.93*
Total	**432**	**31**	**7.18**

*: Significant

Table 12: Gender – Related Prevalence of Lymphatic Filariasis in Yauri LGA, Kebbi State

Village	No. Examined (Male)	Prevalence (%)	No. Examined (Female)	Prevalence (%)
Chulumgumbi	51	1 (1.96)	22	0(0.00)
Gungun Sarki	57	3 (5.26)	14	0(0.00)
Jijima	52	4 (7.69)	23	0(0.00)
Tondi	31	5 (16.13)	43	1 (2.37)
Yauri North	39	2 (5.13)	33	1 (3.03)
Zamare	57	8 (14.04)	10	1 (10.0)
Total	**287**	**23 (8.01*)**	**145**	**3 (2.07)**

*: Significant

Table 13: Age – Related Prevalence of Lymphatic Filariasis in Yauri LGA, Kebbi State

Village	No. Examined	No. Positive	Prevalence (%)
0 – 9	27	3	11.11
10 – 19	116	8	2.62
20 – 29	114	10	6.39
30 – 39	79	4	5.06
40 – 49	35	2	15.71
50 – 59	33	3	29.09
60 – 69	21	1	14.76
70 – 79 +	0	0	0.0
Total	**432**	**31**	**7.18**

Table 14: Prevalence of Lymphatic Filariasis According to Marital Status

Marital Status	No. Examined	No. Positive	Prevalence (%)
Single	171	11	6.43
Married	261	20	7.66
Total	**432**	**31**	**7.18**

Table 15: Occupation – Based Prevalence of Lymphatic Filariasis in Yauri, Kebbi State

Occupation	No. Examined	No. Positive	Prevalence (%)
Civil Service	17	0	0.0
Farming	102	11	3.92
Fishing	26	2	3.85
House Wife	54	2	1.85
Unemployed	17	1	0.0
Student	99	6	3.03
Trading	18	0	0.0
Pupil	87	9	2.29
Others	12	0	0.0
Total	**432**	**31**	**7.18**

In another study on 150 participants from three (3) wards in Jega LGA of Kebbi State (Bala et al., 2023), 6.67% had Hydrocoel while 4.76% were found with Lymphoedema, however, only participants from Jega – Firchin tested positive for the presence of circulating microfilariae, a prevalence of 5.00%.

Table 16: Prevalence of Lymphatic Filariasis in three (3) Wards of Jega LGA, Kebbi State

Marital Status	No. Examined	No. Positive	Prevalence (%)
Alelu Gehuru	40	0	0.0
Dan Gmaji	50	0	0.0
Jega Firchin	60	3	5.00
Total	**150**	**3**	**2.00**

Table 17: Occurrence of Clinical Manifestation of LF in Jega LGA, Kebbi State

Village	No. Examined	Lymhpoedema No (%)	Hydrocoel No (%)	Prevalence (%)
Alelu Gehuru	40	0 (0.00)	3 (7.50)	7.50
Dan Gamaji	50	3 (6.00)	3 (6.00)	8.00
Jega Firchin	60	4 (6.67)	4 (6.67)	11.6
Total	**150**	**7 (4.50)**	**10 (6.67)**	**11.33**

Table 18: Prevalence of hydrocoele and lymphoedema with Respect to Local Government Areas in Zamfara State

LGA	Total No. Examined	Hydrocele No. Positive (%)	Lymphoedema No. Positive (%)	Total No. Positive (%)
Talata Mafara	307	42 (13.7)	26 (8.5)	68 (22.1)
Kaura Namoda	406	39 (9.6)	27 (6.7)	66 (16.3)
Gusau	547	36 (6.6)	29 (5.3)	65 (11.9)
Total	**1260**	**117 (9.3)**	**82 (6.5)**	**199 (15.8)**

Hydrocele (x^2 =0.462, *df*=2, P=0.794); Lymphoedema (x^2 =0.171, *df*=2, P=0.918)

Based on community member's knowledge of lymphatic Filariasis, Bala *et al*. (2022) reported 68.0% of the participants knew and heard of LF whereas 32.0% of the individuals were unaware of the disease. Regarding respondent's knowledge on the cause of hydrocoel, 62.0% lack knowledge of the cause, 12.0 believed it is natural, 11.30% believed it is caused by encephalitis, while 8.70% attributed it to sexual intercourse.

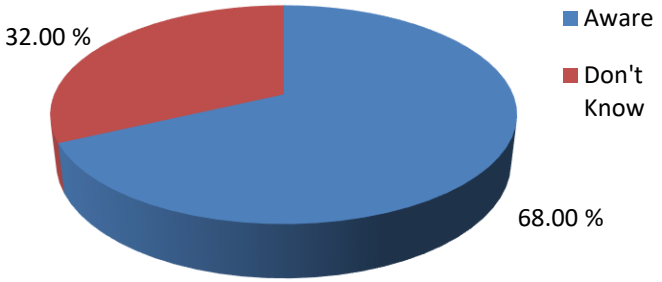


Figure 3: Participant's Knowledge of Lymphatic Filariasis in Kebbi State

Table 19: Distribution of Respondents Based on Knowledge of the Cause of Hydrocoel in Kebbi State

Cause	(%)
Appendicitis	1.00
Cold water	1.00
Don’t Know	62.00
Encephalitis	11.00
Farm Work	1.00
Infection	1.00
Mosquito	1.00
Naturally By God	12.00
Nature	1.00
Sex	8.00
Unlawful Sex	1.00

Table 20: Distribution of Respondents Based on causes of Lymphoedema in Kebbi state

Cause	(%)
Cancer	8.00
Contaminated Water	1.00
Hot Season	1.00
Infection	1.00
Inheritance	3.00
Mosquito	3.00
Naturally By God	13.00
Nature	1.00
Red Meat	1.00
Spiritual	7.00
Tsetse Fly	1.00
Unhygienic	1.00
Water	1.00
Don't Know	58.00

Table 21: Respondents Knowledge on the Causes of Hydrocoel in Zamfara State

Perceived Cause	Number of Respondent	Percentage of Respondents
Mosquito Bite	115	9.1
Sexually Transmitted Disease	235	18.7
Natural Cause	226	17.9
Cancer	83	6.6
Poor Personal Hygiene	82	6.5
Carrying Heavy Load	68	5.4
Lack of Sexual Fulfilment	66	5.2
Inherited Disease	58	4.6
Holding Urine in Bladder	44	3.5
Insect Bite	23	1.8
Don't Know	260	20.6

Table 22: Respondents Knowledge on the Causes of Lymphoedema in Zamfara State

Causes	Number of Respondents	Percentage of Respondents
Mosquito Bite	134	10.6
Natural Cause	207	16.4
Cancer	148	11.7
Cold from rice field	112	8.9
Poor Personal Hygiene	92	7.3
Stepping on Charm	91	7.2
Long Distance Trekking	59	4.7
Witchcraft	56	4.4
Inherited Disease	53	4.2
Insect Bite	38	3.0
Committing Sin	18	1.4
Don't Know	252	20.0

Table 23: Local Name of Hydrocoel and Lymphoedema in Kebbi State

Hydrocoel	%	Lymphoedema	%
Gwaiwa	70.6	Gudunguma	66.00
Zure	3.33	Kuturta	1.33
Ciwon Daji	0.74	Ciwon Daji	0.67
No Response	25.33	No Response	32.00

Table 24: Respondents Knowledge of Lymphatic Filariasis in Terms of Local Names of Hydrocoele and Lymphoedema in Zamfara State

Variable	Local Name	Number of Respondents	%
Hydrocele	*Gwaiwa*	779	61.8
	Zure	164	13.0
	Kayan-maza	105	8.3
	Don't know	212	16.8
Lymphoedema	*Gudunguma*	646	51.3
	Ciwon-daji	324	25.7
	Tindirma	105	8.3
	Don't know	185	14.7

Vice Chancellor sir, ladies and gentlemen, we have also conducted research on the mosquito vector of bancroftian Filariasis. The colour preference of mosquito for oviposition was studied (Badamasi et al., 2009). This is because selection of oviposition sites by female mosquitoes is a crucial event for the survival of their species. Females follow visual or olfactory cues to appropriate water collections and guided by chemical cues and physical factors in the water, assess the quality of the water before making a decision to lay their eggs. We found that the colour preference of mosquitoes was in the order of Red 81 (25.39%), Brown 65 (20.38%), Black 51 (15.99%), Blue 42 (13.17%), Purple 33(10.35%), Pink 25 (7.84%), Green 20 (6.27%), Yellow 2 (0.63%) and White 0.

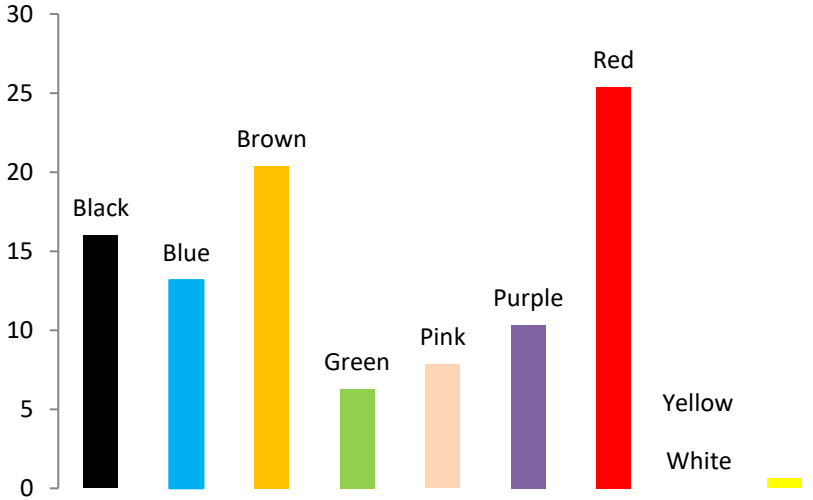


Figure 4: Colour Preference of Mosquito for Oviposition

During mosquito survey in Zamfara State, a total of 10,550 mosquitoes were collected within the study area. Of the total number collected, only three genera (*Culex*, *Anopheles* and *Aedes*) were encountered. *Culex* mosquitoes were the most abundant with 7,987 (75.7%), followed by *Anopheles* with 2,266 (21.5%) while *Aedes* had the least abundance rate with 297 (2.8%).

Table 25: Mosquitoes Abundance in Zamfara State

LGA	*Culex* Number (%)	*Anopheles* Number (%)	*Aedes* Number (%)	Total Number Captured	Mean±SD
Gusau	3197 (72.4)	1091 (24.7)	127 (2.9)	4415	1.30±0.519[a]
Talata Mafara	1998 (76.8)	515 (19.8)	90 (3.5)	2603	1.27±0.515[b]
Kaura Namoda	2792 (79.0)	660 (18.7)	80 (2.3)	3532	1.23±0.473[c]
Total	**7987 (75.7)**	**2266 (21.5)**	**297 (2.8)**	**10550**	**1.27±0.504**

In one study we recovered 1.7% and 0.40% microfilariae from engorged female *Culex* and *Anopheles* mosquito respectively, after dissection.

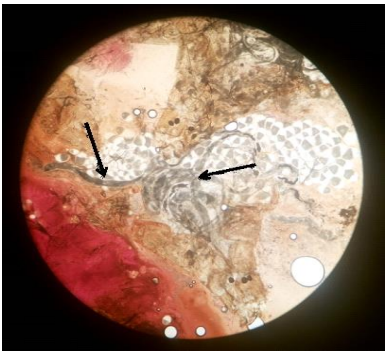


Plate 16A: *W. bancrofti* L1 Larvae recovered from mosquitoes' abdomen under x40 objective lens

Plate 16B: *W. bancrofti* L1 Larvae recovered from mosquitoes' thorax under x40 objective lens

With respect to local control strategies, a study was conducted to determine the local mosquito control strategies among the respondents. The results showed that 32.8% used bed nets, 26.2% were using mosquito coil, then 10.0% used plant materials, 9.5% insecticide spray, 8.2% used either fans or air conditioners, 7.7% were not using any control methods, 4.5% used mosquito repellents and 1.7% covered their body completely with blanket/bedsheet.

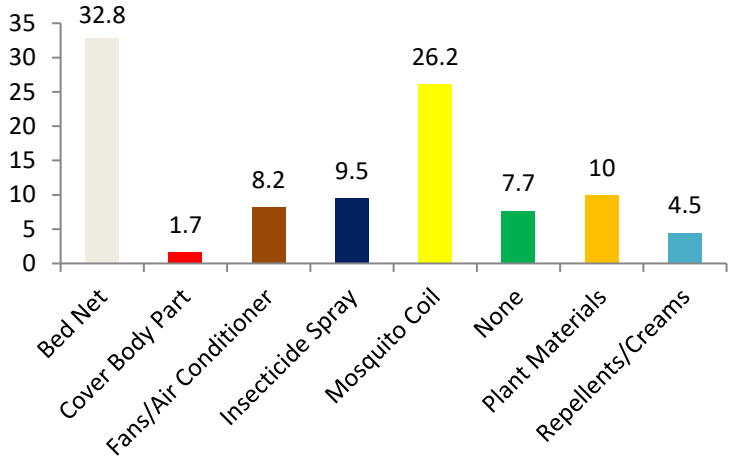


Figure 5: Strategies Used in the Control of Mosquito

Table 26: Respondents Use of Plant Materials to Control Mosquitoes in the Study Area

Botanical Name of the Plant Used	Common Name of Plant	Local Name of Plant	Part of Plant Used	Number of Responses (%)
Hyptis suaveolens	Pignut	Sarakkuwar sauro	Whole plant	14 (20.9)
Citrus sinensis	Sweet orange	Lemun zaki	Peels of fruits	12 (17.9)
Tapinanthus sessifolius	African mistletoe	Kuduji	Whole plant	10 (14.9)
Ocimum gratissimum	Scent leaves	Doddoya	Whole plant	8 (11.9)
Azadrachta indica	Neem tree	Dogon yaro	Leaves	6 (9.0)
Sorghum bicolor	Sorghum	Dawa	Leaves	5 (7.5)
Pennisetum glaucum	Pearl millet	Gero	Millet hulls	3 (4.5)
Xylopia aethiopica	Ethiopian pepper	Kimba	Seeds	2 (3.0)

STATUS OF LYMPHATIC FILARIASIS (LF) IN NIGERIA

In an interview with Channels Television in March 2012; the then Minister of Health, Prof. Onyebuchi Chukwu, has declared that LF is endemic in Nigeria. From his words;

“LF and Malaria are parasitic diseases that are transmitted by mosquitoes; they are endemic in all states and the FCT.” “Nigeria is ranked the second highest global burden of lymphatic filariasis after India”. “Over a 100 million persons, that is two out of every three Nigerians are at risk of the disease” stated the Minister.

Adding that; “the LF prevalence studies indicate that 13 states have high prevalence rate of about 23 per cent, while the rest have prevalence rate of about 10 per cent.” “Such complications are major impediments to productivity and psychosocial well-being of our people” (Channels Television, March 29, 2012).

Ten (10) years after that, on 30th January, 2023, on the World NTD day, during launching of the 2023 – 2027 Neglected Tropical disease Master Plan, according to Voice of Nigeria;

HEALTH

Nigeria Launches 2023-2027 Neglected Topical Disease Master-Plan

Edward Samuel, Abuja

On **Jan 30, 2023**

The then Minister of Health Dr Osagie Ehanire stated that Nigeria conducted an assessment for lymphatic filariasis in 200 LGAs out of 583 endemic LGAs. According to him - "As of today, we have less than 300 LGAs needing assessment." "We ask that Nigeria stay committed to the delivery on NTD road map 2021-2030 especially with the launch of the 2023-2027 master plans to address shortages of funds and medicines and foster partnerships."

The theme of the 2023 NTD Day was: "Act now. Act together. Invest in Neglected Tropical Diseases" and it supports efforts to keep 2030 targets on track with innovative and sustainable financing.

According to him, "Nigeria is still confronted by the challenges posed by 15 out of the 20 Neglected Tropical Diseases (NTDs) listed by the WHO to include; Lymphatic Filariasis (Elephantiasis), Soil Transmitted Helminthiasis (STH), Onchocerciasis (River blindness), Trachoma (Granular Conjunctivitis), and Schistosomiasis (Bilharzia).."

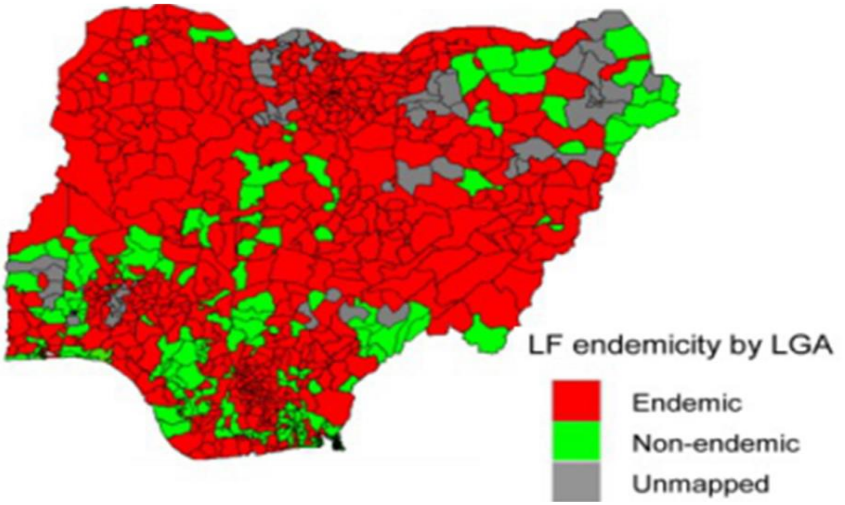


Plate 17: Endemicity Data from Ministry of Health

GLOBAL ELIMINATION OF LYMPHATIC FILARIASIS

Generally parasitic infections can be controlled, prevented, eliminated or eradicated depending on their epidemiological status.

Control is to limit/restrain or curtail the occurrence of an infection or disease, i. e. keeping it from increasing.Control seeks to bring the problems to a level at which it is no longer of public health importance with morbidity at an acceptable level within the community, an absence of mortality and, if appropriate, greatly reduced levels of disability.

Prevention is the action taken to stop something from happening: an action or actions taken to stop occurrence of infections.

Elimination of infection reduction to zero of the incidence of infection caused by a specified agent in a defined geographical area as a result of deliberate efforts; continued measures to prevent the re-establishment of transmission are required.

Eradication is the permanent reduction to zero of the worldwide incidence of infection caused by a specific agent as a result of deliberate efforts; intervention measures are no longer needed.

Vice Chancellor sir, the independent International Task Force for Disease Eradication (IITDE) identified LF in 1993; as one of the only six eliminable infectious diseases (Ottesen 1995). As a result the WHO launched the GPELF in 2000 in response to World Health Assembly Resolution WHA50.29, which urged Member States to initiate activities to eliminate lymphatic filariasis (LF) as a public health problem; a goal subsequently targeted for 2020. This "global elimination of LF as a public health problem" has been operationally interpreted as the reduction in the prevalence of infection with *Wuchereria bancrofti*, *Brugia malayi*, or *Brugia timori* in all endemic countries to target thresholds, below which transmission of the infection cannot be sustained. These thresholds were earlier empirically observed to be <1.7% microfilaria (mf) prevalence for Bancroftian filariasis and <1.5% mf prevalence for Brugian filariasis.

In line with its first strategic plan, the GPELF had two principal aims; to interrupt LF transmission, and to manage morbidity and prevent disability.

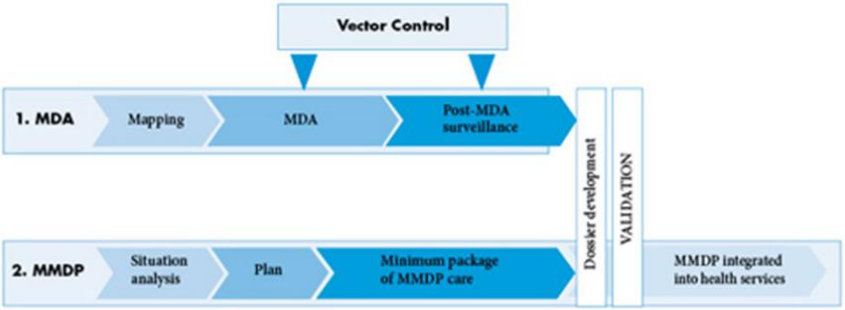


Figure 17: GPELF Strategy

In 2010, WHO published the GPELF's progress report from its first ten (10) years and a new strategic plan outlining the approach and relevant milestones for its second ten years. The report defines the strategic objective of each of GPELF's two aims as follows:

1. Stop the spread of infection – MDA

In order to interrupt transmission, districts in which lymphatic filariasis is endemic must be mapped and a strategy of preventive chemotherapy called; mass drug administration (MDA) implemented to treat the entire at-risk population. The following drug regimens are recommended for use in annual MDA for at least 5 years with coverage of at least 65% of the total at-risk population 6 mg/kg of body weight diethyl carbamazine citrate (DEC) + 400 mg albendazole (ALB). The drugs Diethyl carbamazine (DEC) and ALB are freely donated to endemic countries Merck & Co. Inc® and GlaxoSmithKline® respectively.

2. Alleviate suffering – MMDP

Successful MDA will prevent new infections and no new cases of clinical disease. To achieve the second aim of GPELF a core strategy of morbidity management and disability prevention (MMDP) is needed. Suffering caused by the disease can be alleviated through a minimum recommended package of care to manage lymphedema and hydrocele. These services should be available within primary health care systems in all areas of known patients.

The program encompasses the following sequence of steps:

1) map LF endemic areas (less than 1% of antigenemia (Ag);

2) deliver MDA for a minimum of 5 years with an effective coverage of 65%;

3) conduct a transmission-assessment survey (TAS);

4) conduct post-MDA surveillance;

5) develop a dossier that documents the achievement of elimination targets; and

6) independent validation of the claim that elimination criteria have been achieved.

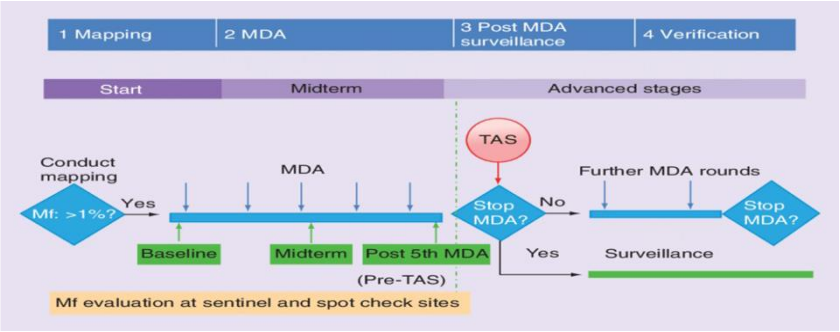


Figure 18: Program steps taken by GPELF to interrupt transmission of lymphatic filariasis. MDA: Mass drug administration; **Mf**: Microfilaremia; **TAS**; Transmission Assessment Survey

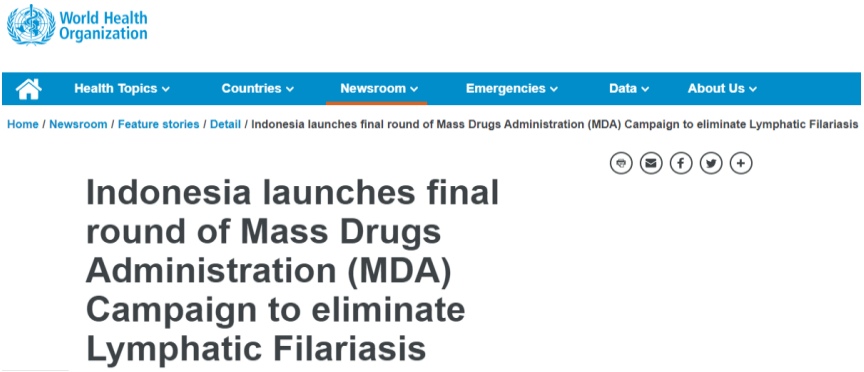
GLOBAL ELIMINATION OF LYMPHATIC FILARIASIS

Progress so far

China, Sri Lanka and the Republic of Korea were declared to have eliminated lymphatic filariasis as a public health problem since 2008. Of 83 countries listed by WHO as being endemic for lymphatic filariasis, 18 countries have completed interventions and are conducting surveillance to validate elimination.

An additional 22 countries had delivered MDA in all endemic areas and are also on track to achieve elimination. The remaining 33 countries have not been able to achieve 100% geographical coverage. Ten (10) of these have yet to initiate preventive chemotherapy or submit evidence that MDA is not required.

Interestingly, on 4th of October 2019, the Indonesian Ministry of Health (MoH), in collaboration with WHO Country Office Indonesia and other implementing partners, launched the fifth and final round of LF Elimination Campaign in Malaka District.



The campaign was called “Bulan Eliminasi Kaki Gajah (BELKAGA)” or “LF Elimination Month”. The campaign aimed to accelerate the delivery of preventive chemotherapy medicine to high-risk populations within 118 endemic districts. It is running in conjunction with the annual Mass Drugs Administration (MDA) for the entire eligible population and is expected to be completed by 31 October 2019 (WHO, 2019).

The target set by GPELF in 2000 to eliminate LF as a public health problem globally by 2020 was not achieved, because of setbacks due to COVID-19. Despite these setbacks, WHO will accelerate work to achieve this target by the year 2030. The new, ambitious targets for 2030 are that 80% of endemic countries have met the criteria for validation of elimination as a public health problem (WHO, 2020).

ELIMINATION OF LYMPHATIC FILARIASIS IN NIGERIA

The National Lymphatic Filariasis Elimination Programme (NLFEP) was established in 1997, in response to World Health Assembly Resolution urging member States to eliminate Lymphatic Filariasis (LF) as a public health problem. NLFEP was merged with NOCP in 2007 in order to harmonise implementation of MDA in co-endemic areas. The National Goal was set to eliminate the LF by 2016.

According to the report of the Nigeria Master Plan for Neglected Tropical Diseases (NTDs) 2013-2017 LF prevalence has been determined in 704 out of 774 LGAs of 36 States and FCT. Out of the mapped LGAs, 583 LGAs are suspected to be endemic and so required preventive chemotherapy. Of these, 103 LGAs have been mapped (NMPNTD, 2017).

In 2012, the Federal Ministry of Health in collaboration with the Carter Centre distributed over 36 million drug treatments for LF in 30 LGAs of Plateau and Nasarawa. The two states were declared LF free at the end of that year (Carter Centre, 2017). However the progress report of the WHO, 2019 is showing otherwise. According to the report, there are ten (10) countries with mapping in progress. These are Angola, Cameroon, Central African Republic, Cote d'Ivoire, Democratic Republic of the Congo, Ethiopia, Liberia, Nigeria, Zambia, Zimbabwe (WHO Progress Report, 2019). Nigeria is also listed among countries yet to implement MDA in all endemic IUs WHO Weekly Epidemiological Record (WWER), 4 October 2019, vol. 94, no. 41 (pp. 457–472).

Table 26: Country Status in Implementing MDA for LF Elimination as of 2019

WHO REGION	MDA not started	MDA started and not scaled to all endemic districts	MDA scaled to all endemic districts	MDA stopped in all endemic districts and under surveillance	Validated as having eliminated LF as a public health problem and under surveillance
African	Equatorial Guinea, Gabon	Angola, Chad, Central African Republic, Congo, Democratic Republic of Congo, Madagascar, Nigeria, South Sudan	Benin, Burkina Faso, Comoros, Côte d'Ivoire, Eritrea, Ethiopia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Mali, Mozambique, Niger, Senegal, Sao Tome and Principe, Sierra Leone, Uganda, United Republic of Tanzania, Zambia, Zimbabwe	Cameroon, Malawi	Togo

CHALLENGES FACING LF ELIMINATION IN NIGERIA

Based on the 2019 WHO Progress Report and the WHO Weekly Epidemiological Record, 2019, although globally ranked 2nd highest with LF disease burden, Nigeria is one of the endemic countries that are yet to complete both the mapping of the disease and mass drug administration. Therefore LF still remains a public health problem in Nigeria.

The challenges facing LF elimination in Nigeria are many. Some are discussed below:

ABSENCE OF POLITICAL WILL

We kept talking of political will. We don't have political will in Nigeria. We only have what I called political whiff. When they come on campaign they promise and promise, and when they win elections that is the end of it. So we never have political will in Nigeria, and no commitment even to the whiff that we have. There is iinsufficient funding for health (even the little fund given is misused); insufficient funding for research; we lack regards for

research output; ran Universities and laboratory services aground; Alleged corruption all over; We have expanded our coast of corrupt practices; A story of criminal apathy and tormenting ignorance; we only have Political Dealership not Leadership; A story of an uncaring, carefree and carelessness nation; Our National System is under severe burden of Leadership; Inadequate investment in research – Local Philanthropists do not donate to the cause of carrying out research into the causes of the disease. As a country, we don't set priorities – Utterly disdain excellence and uplifted mediocrity.

In Nigeria, LF treatment data are not included in health indicators reported both at the state and national levels. Hence – Abandonment of responsibility by State/LGA levels; Uncoordinated control activities; This is partly because these programs are usually managed vertically and are donor driven; so, reporting is donor focused rather than country need focused.

Lack of enabling environment – Medical personnel/researchers moving out of the country – nobody cares. We are only concerned with capacity building – not retention. We never learn to keep ahead of times; NHIS do not fund public health interventions to control the rate at which people fall sick rather we wait for people to come to the hospital for treatment.

There are obvious bureaucratic bottle necks identified (NLFEP, 2017) in the process of policy development, inadequate budgetary allocation, late or non-release of counterpart funds at all levels of government, inadequate structures on ground at the National office, non-functional Zonal Offices, inadequate motivation for personnel and no focal data collation officer for LF (NLFEP, 2017).

Problems Associated with Mapping/Data Reporting

Problems of accessibility to endemic communities due to poor road networks in endemic populations, remoteness of some communities, insecurity, Non-cooperation of community members/infected individuals, hiding and or hoarding diagnostic (ICT) kits by health personnel in the Ministry of Health, hiding and or hoarding diagnostic kits (ICT) by researchers, inadequate trained personnel, nonchalant attitude among the few trained ones, inaccurate data reporting, inadequate multicultural consideration during grant awards/selection of researchers.

Community Perception of the Disease

The success of any community based disease control programme depends to a large extent on the cooperation and involvement of the affected population. The felt needs of the communities have to be considered. The problem here is the top – down approach. Experts design control strategies based on what they know about the disease, without taking into consideration the community perception of the disease. Majority of people in endemic areas lack basic knowledge on the cause, course and transmission of the filarial illnesses. Many attribute it to;

- **Stepping on juju**: Men from different clans display their spiritual powers by throwing "spiritual medicines" on the ground. Any unsuspecting person, who steps on these, could get elephantiasis of the leg.
- **Charm**: Some men use charms to inflict the disease on their wives in order that they do not become attractive to other men (Ladan *et al*., 2018). "People began to tell me that the sickness was caused by others through charm, and it was because I stepped on a charm that was intended to harm someone else, if not it would have killed me" (Jibril *et al*., 2018).

- **Heredity**: Some believe elephantiasis is hereditary, because the disease was found across generations in particular households.
- **Fever**: That whenever a man gets a fever, it usually settles in his scrotum if not properly treated, so by the time he is a teenager, he could have had several episodes, which would cause the scrotum to swell and thus cause a hydrocele.
- **Contaminated Food/ Food Poisoning**: Eating Spices; that "cooking with artificial spices like Monosodium Glutamate (MSG) accumulates to hydrocele".
- **Spiritual Causes/Witchcraft/Sorcery and Evil Spell**: - "Ciwon daji" (Ladan *et al*., 2019).
- Others attribute it to:
    - Sexual Intercourse with a woman during her period
    - Poor blood circulation,
    - Trekking Long Distance
    - Prolong standing,
    - Carrying heavy loads,
    - Stepping on Dirty Water
    - Inadequate Personal Hygiene
    - Personal contact with infected person
    - Curse from God

Non-Compliance to both Control Measures/Treatment

These include but not limited to;

- refusal to sleep under ITNs;
- the use of net is not based on the knowledge of the local mosquito vector (Zoophilic, Anthropophilic, Exophily,

Endophily, Exophagy, Endophagy, Domestic, Wild, Intermediate);

- Mosquito may soon develop resistance to the chemicals used in treating the net
- Refusal to take drugs by some infected persons because they use it as an opportunity to extort money in form of begging. To them begging is a form of business;
- Adverse effects also tend to cause resistance among community members: Studies have reported fever, dizziness, vomiting, itchiness, general weakness and other side effects being experienced by communities. This puts undue fear in communities especially when there is inadequate counselling/outreach and social mobilization within the community.

Community Participation

There is also a challenge of participation and compliance among populations, majority of who do not show any visible signs of filarial infection. This tends to happen in communities with low prevalence of the condition and a poor understanding of LF infection and transmission.

This generally makes it difficult for MDA implementing teams to engage community members.

Urban participation is more challenging due to transient populations in these areas, higher possibilities of absenteeism (Hounto et al., 2017), low risk perception, insufficient information and communication among others. There is also the issue of non-involvement of traditional and religious leaders in endemic communities.

Rumours and Mistrust about the Control Programme

These include

- suspicions that the drugs are being used to poison children,
- as birth control,
- to cause erectile dysfunction
- fear of side effects and
- lack of recognition of the benefit of adherence.

Inadequate Public Enlightenment

Insufficient public awareness with regards to the dangers, complications, route of entry, risk factors, health implications etc of the disease, as done for HIV/AIDS, Polio, Malaria, COVID 19, etc.

Unplanned Construction of man-made lakes and irrigation projects

To meet the demands of the ever rising human populations of Nigeria, most of the major river systems, especially in the savanna and semi-arid regions, have in recent times been modified into man-made lakes and irrigation projects for economic and social necessities such as; hydroelectric power, supply flood control, improved transportation, improved agriculture and development of inland fisheries as well as recreational facilities. Unfortunately, in our quick drive and desire to develop some of the River Basins and the irrigation and hydro-electric dams in the country, adequate scientific knowledge and considerations have not been applied. Hence, these schemes have either aggravated the prevalence of parasitic diseases or directly introduced them into new areas by providing new and permanent habitat for the disease pathogens and their vector species.

One big problem of these water resource projects is the seeming absence of an inbuilt measure to mitigate against the public health

issues that might arise. So, while the government is fighting LF through NLFEP, under the Ministry of Health, it is at the same time providing an enabling environment for the transmission of the diseases through its various water resource development projects under the Ministry of Agriculture.

Mr Chairman, this is a serious issue because the government cannot stop the dam construction because of LF. WHO (1994) noted that *bancroftian* filariasis can also be aggravated by other man-made environmental modifications such as in road and house construction as well as river basin development.

Wright (1968) observed that the economic exploitation and opportunities offered by the irrigation schemes have brought about growth and great mobility of human populations to those areas. These have increased contact between infected humans, mosquito vectors and apparently healthy people, thus, increasing the disease transmission and dissemination.

Careless Engineering Practices/Unhygienic Habits

In addition to dams and irrigation schemes, other careless engineering practices/constructions in the country including ditches, burrow-pits, quarries, pools etc. have been shown to create favourable breeding sites for the mosquito vectors as well as perpetuation of bancroftian filariasis transmission. This is because they are usually not properly graded and cleaned. This is in addition to our habit of indiscriminate discharge of wastes into these open drains, which pollutes the drains often to a very high level, and furthermore prevents the normal flow, thus providing excellent conditions for the larval development of the vector species.

Unplanned Population Growth and Urbanization

In Nigeria and other African countries and Asia the rural population nearly doubled between 1950 and 1985 with a corresponding decline in rural infrastructure and food (DIESA,

1986). The consequent unplanned rural-urban drift has led to increased population by about seven folds of most African cities and towns (including Nigeria) between 1950 and 1980 (Hardoy and Satterthwaite, 1981). In most towns in Nigeria, therefore, the enormous pressure on shelter and services due to this unplanned urban growth had frayed the urban fabric (Nwoke et al., 1993). The consequent establishment of many illegal settlements for the urban poor in over-crowded conditions, in cheap unhygienic squatter-houses with inadequate or no provision of infrastructure and services, is now a common occurrence.

The provision of clean and safe water, adequate waste disposal and sanitation, housing and other social services in most communities in the country are beyond the technical and financial resources available (Nwoke, 1992). You will agree that the great mobility and overcrowding of human population observed in the country is associated with serious environmental modifications and high human activity (Ukoli, 1992). The resultant interactions between the teeming human population and the environment may provide micro-breeding sites for vector species and parasitic disease dissemination such as bancroftian filariasis. As a result of the urban overcrowding, the sanitation services in most of our urban areas, especially at the urban-periphery or squatter settlements are unable to cope adequately with the influx of people. The consequent water pollution in the areas creates favourable breeding sites for *C. quinquefasciatus*. In such areas, constructions of some septic tanks and pit latrines are poorly planned, sometimes improperly installed and badly maintained. And these often offer an ideal habitat for the breeding of bancroftian filariasis vectors.

In addition to these, Iwuala (1979) reported that pots and drums commonly used for cassava fermentation in most homes in the rural SE Nigeria support abundant breeding of *C. quinquefasciatus*, thereby increasing bancroftian filariasis transmission in and around our homes. Abubakar *et al*. (2012)

also observed bathrooms, toilets, reservoirs, vegetation, tyres, gutters, wells, and refuse dumps as breeding sites for mosquitoes in cities of northern Nigeria.






Plates 18 - 29: Common Mosquito Breeding Sites in Nigeria

Way Forward

Lymphatic Filariasis has been identified as a candidate for elimination globally and in many sub-Saharan African countries but there are many barriers to the successful elimination of this disease, particularly in Nigeria. World Health Organization's Global Programme to Eliminate Lymphatic Filariasis (GPELF) was launched in 2000 with an initial target elimination date of 2020, now shifted to 2030. GPELF aims to stop the spread of transmission and to lessen the severity of the disease in those already infected.

Nigeria has set the years 2016 and 2020 for LF elimination which it already missed and now has to work towards the global target of 2030. To achieve the Programme's objectives, concerted action will continue to be required. As outlined in the WHO LF Strategic Plan, key partners must play important roles in helping the national governments and the GPELF overcome its considerable challenges and achieve its global elimination goal; specifically noting the following points:

Reporting needs should be realigned with country needs, so that government at all levels become more interested in the elimination of LF by the WHO target of 2030.

In some areas, Jordan and Webbe (1986) noted that well designed and constructed irrigation system with efficient drainage, correctly prepared land, sound water-management, adequate maintenance and good agricultural practices, have prevented many major ecological and public health problems. Hence, public health personnel should be involved in the planning of all water resource development projects, so that the public health impact of the projects can be fore-casted and mitigation measures put in place.

Since perceptions of disease vary from place to place, there is the need to carry out in depth-studies on the social, cultural and

economic aspects of the disease, before embarking on the elimination process.

Communities' perceptions of the disease need to be properly understood and taken into consideration when planning/implementing elimination measures. To this end, it is clear that a lot of community interaction is needed. This is especially important for disseminating information about the disease.

Members of the community must be willing to take it upon themselves to make sure that everyone is convinced to take the drugs. It is expected that social mobilization efforts could help engender more interest among community members. This can be done by getting traditional, religious leaders and formation of peer groups involved in these campaigns. Some work done showed that the volunteers worked with village chiefs and community health workers to devise strategies to help organize the social mobilization campaign (Bembele *et al*., 2012). In most communities, community health volunteers (CHVs) are tasked with the responsibility of promoting the MDA in their communities. To ensure that communities participate fully in MDA programs, CHVs have to be adequately trained in order to gain public trust and ensure the program is not jeopardized (WHO, 2012). To this end involvement of Civil Society Organizations (CSOs) is of utmost importance. Reports from communities where awareness campaigns were planned, showed persons agreeing to participate in order to avoid being infected (King *et al*., 2011). Testimonies from community members perceiving improved health could help eliminate the challenge of side effects.

Community education remains an important tool in enhancing citizen involvement, the sharing of decision-making and total community participation (Brian *et al*., 2016). There is need for explanation of lymphatic filariasis to people, especially with

regards to the dangers and complications of disease, route of entry, risk factors and health implications of the disease. These messages should be passed by way of televisions, newspapers, schools, radios and health personnel etc. Educational campaigns are equally necessary to ensure patient compliance with drug regimens.

In addition to the above Mr Chairman, for elimination of LF to be realistic, the country will do itself a favour if all the stakeholders LF are given due consideration. That is,

- the Clinician to handle the infected person in the hospital;
- the Parasitologist must be involved to deal with the parasite issue;
- Entomologist must be involved to provide the needed information on the local mosquito vector;
- the Environmentalists must be involved to deal with the environmental issues such as mosquito breeding sites, vegetation, location of houses, spraying e. t. c.;
- the Microbiologist to explore and reveal the bacterial endosymbiont, *Wolbachia*;
- the Sociologist to handle the human attitude towards environment and disease issue;
- Health Administrators to handle the policy;
- Funding agencies/Government funding to provide the needed fund to handle the LF issue.

Conclusion

Finally, poor governance, ignorance, poverty, poor irrigation practices, unplanned urbanization with the subsequent overcrowding, poor sanitary as well as poor maintenance of public infrastructures, are some of the problems hindering the success of the elimination of bancroftian filariasis transmission in Nigeria. If these factors remain unchecked, I am sorry Mr Chairman, that the stage is set for the country to fail in its bid, for

the third time, to eliminate LF as a public health problem by the year 2030.

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