

Status of lymphatic filariasis in Afikpo North L.G.A., Ebonyi State, Nigeria

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Abstract— The status of lymphatic filariasis in Afikpo North L.G.A., Ebonyi State, Nigeria was investigated among seven hundred and eighty one (781) subjects from thirty (30) villages, using the following Parasitological methods; the Wet Smear preparation, the Knott's concentration Technique and the Immunochromatographic Card Test (ICT). From the study, the following prevalence rates of *Wuchereria bancrofti* were obtained, wet smear preparation (1.66%), the Knott's concentration technique (5.38%) and the ICT method (21.13%). Subjects within the age group 58-62 years had the highest prevalence of 43.48%, using the ICT method. Males were more infected 85(21.85%) than female 80(20.41%). There was no statistically significant difference in the prevalence of infection by gender using ICT cards ($P>0.05$) at 2 tailed difference of .780. With the Knott's concentration technique, subjects within 58 – 62 years had the highest prevalence of 26.09%. Males were also more infected 24(6.16%) than females 18(4.59%). The prevalence of hydrocoele was found to be 8.23%. Hydrocoele was more frequent among older people of 53 years and above than the younger ones below the age of 27 years. The prevalence of lymphoedema was 8.88%. Males were more affected with prevalence rate of 5.55% than females (3.33%).

Keywords— Lymphoedema, Filariasis, Hydrocoele, *Wuchereria bancrofti* and Knott's concentration technique.

I. INTRODUCTION

More than 100 million individuals worldwide are estimated to suffer from lymphatic filariasis (LF) caused by infection with the mosquito-borne filarial nematode *Wuchereria bancrofti* (WHO, 1994). The infection induces sub-clinical abnormalities in the lymphatic system, which ultimately may result into the development of the overt clinical manifestations such as lymphoedema, elephantiasis, or hydrocoele (Ottesen, 1994; WHO, 1994). Lymphatic filariasis has been identified as the second leading cause of permanent and long –term disability and a major contributor to poverty in the world (Ottesen, 1994, WHO, 2003).

In Africa, lymphatic filariasis is caused by *Wuchereria bancrofti* and it is mainly transmitted to man through the bites of female *Anopheles* mosquito. Humans are the definitive hosts for *Wuchereria bancrofti*. There is no animal reservoir (Ottesen *et al.*, 1997). Other species of filarial worms that may be associated with lymphatic filariasis are *Brugia malayi* and *Brugia timori* (WHO, 1994). The most important vectors for the transmission of *W. bancrofti* infection are *Anopheles gambiae sensu stricto*, *anopheles funestus*, *Culex quinquefasciatus*, *Aedes polynesiensis*, *Aedes scapularis*, *Aedes pseudoscutellaris* and *Mansonia uniformis* (Service, 1979; Hunter *et al.*, 1976; Cheesbrough, 2002).

II. AIMS AND OBJECTIVES

The aims and objectives of the study include among others;

1. To establish the prevalence of lymphatic filariasis in the study area
2. To determine the influence of age and gender on the distribution of lymphatic filariasis (LF)
3. To determine the morbidity levels of lymphatic filariasis in the study area using clinical signs

III. MATERIALS AND METHODS

THE STUDY AREA

The study was carried out in 30 villages in Afikpo North Local Government Area of Ebonyi State, Nigeria. The villages are Ezi Ekwu, Amangwu, Amasiri, Unwana, Akpoha, Ezinnali, Ibii, Amaechara, Mgbom, Amangballa, Amaobolobo, Amauzu, Ukpa, Amachi, Ngodo and Enohia Nkalu. Others include Kpogirikpo, Amaorie, Amaikpo, Enohia Itim, Amaukwu, Amankwo, Ugwuogu, Oti-village, Ogudu Amuku, Itim Ukwu, Ezi Nwachi, Amaizu, Amoha, and Amuro. Afikpo is located between latitudes 5°4' and 6°3' N and longitudes 7°5'E and 7°55E. There are two main seasons in this area, that is rainy season which is between April – October and dry season which lasts between November - March. The annual rainfall is about 160mm – 220mm with maximum precipitation occurring between July and September. The temperature ranges between 23.4°C

and 29.9⁰C. The relative humidity is between 60 – 80% (Iloeje, 1981; Federal Ministry of Aviation and Metrological Services 2000, NPC, 2006). Afikpo is bounded in the North by Ohaozara L.G.A. of Ebonyi State. By the East by Afikpo South L.G.A., in the South by Cross River State and also in the West by Abia State (Iloeje, 1981; NPC, 2006).

According to the 2006 National Population Census, the population of Afikpo people is about 672,000 persons. The area is hilly with undulating plains. The people are predominantly farmers producing rice, cassava, yam, vegetables, palm oil, coco yam, etc. They are also fishermen, hunters and a good number of them deal on timbers. These outdoor activities predispose them to mosquito bites, which transmits the microfilariae of *W. bancrofti*, the causative agent of lymphatic filariasis. Afikpo people have nucleated settlements. Most of the houses have mud walls and thatched roofs. The waste water from the households helps to create breeding sites for the mosquito vectors. Some houses are also not protected with mosquito nets, so as to disallow the entry of insects especially mosquitoes.

There are different bodies of water in the study area which include: Ndibe beach, Unwana beach, Iyi Enohia, Iyi Unwana, Ozizza beach, Akpoha River and their subsidiaries. These bodies of water, together with the typical forest vegetation and swampy areas for rice farming, timber lumbering, fishing, palm wine tapping etc, constitute an enabling environment which can serve as potential breeding sites for the mosquito vectors

MOBILIZATION OF THE VILLAGERS/ETHICAL CONSIDERATION

Ethical approval before the commencement of the study was sought from the director of public health in the State Ministry of Health. The chairman of the LGA and the elders of the communities were met and briefed on the importance and the rationale of the study, who then passed the information to the members of their villages. Some indigenes of the villages were recruited to help in reaching out to their people, for convenience purposes. The health centers in the various villages were used as a rallying point for the volunteer members (subjects) of the different villages to reduce the inconvenience of having to move from house to house with all the equipment/materials needed for the investigation and to give everyone an equal chance of being attended to. After the awareness and mobilization of the people, consent forms were distributed to everybody in the communities. Those that gave their consents were the examined.

STUDY POPULATION

The study population for the clinical and parasitological examinations included subjects between the ages of 18 years and above both male and females who presented themselves for examination at the medical centers to check for the physical signs of the disease such as hydrocoele and lymphoedema of the arms, legs, genital organs, breast etc and who had lived in that community for at least ten years. The sample size is 798 persons.

CLINICAL EXAMINATION OF PARTICIPANTS

Participants who came to the medical centers in response to the announcements were first of all documented, their demographic data such as name, age, occupation and duration of stay in the locality were obtained through the completion of questionnaire that were administered to them. They were made to undergo clinical examinations by the residents' clinicians in the health centers for the evidence of lymphatic filariasis infections among others. Such clinical manifestations like genital enlargement (hydrocoeles), lymphoedema of the breast and elephantiasis of the legs were looked for. Few health centers were found in the study areas. The people were meant to gather at the nearest health centers that were nearer to them. The 'ogo' the common meeting place of the people were equally used.

The grading of lymphoedema was based on the WHO grading system of lymphoedema (Gerusa *et al.*, 2002). Lymphoedema is graded in stages, ranging from stage 1 to stage 7.

DIRECT SMEAR METHOD (WET PREPARATION)

About 20µl (0.02ml) of capillary blood collected with graduated pipette was mixed with 2 drops of water to lyse the red cells on a slide. The slide was covered with a cover slip and was examined for motile microfilariae using x10 objective. The direct smear method was used as a screening test for microfilariae, so it is not a sensitive test for microfilariae (Cheesbrough, 2002).

COLLECTION OF BLOOD SAMPLES

Blood samples were collected between the hours of 10.00pm and 1.00am from respondents who willingly reported at the medical centers of each village or the common meeting point of the people (ogo), which serve as the rallying points for each village. The microfilariae of *W. bancrofti* exhibits nocturnal periodicity and they are commonly found at the peripheral blood level during this time (10.00pm – 2.00am), (Cheesbrough, 2002; WHO, 2002). Collection of blood samples at this time also helped

in detecting the microfilariae of *W. bancrofti* in blood (Cheesbrough, 2002; WHO, 2002).

Before collection of blood, hand gloves were worn to protect the researcher and the volunteers from contacting diseases or infections. Tourniquet was used in trying the arm to expose the vein, the area was cleaned using cotton wool soaked with methylated spirit (swab). About 2mls of venous blood was drawn from the arm using 2ml syringe and transferred into an EDTA bottle. The collected blood samples were used in testing for microfilariae of *W. bancrofti* using the wet preparation method, the Knott's concentration technique and the ICT method for testing for the circulating filarial antigen of *W. bancrofti* (Michael and Bundy, 1997).

KNOTT'S CONCENTRATION TECHNIQUE

1ml of blood was mixed thoroughly with 9ml of 2% formalin in a centrifuge tube of about 15ml. The contents were allowed to stand for 15 minutes before centrifugation at 2,000rpm for 5 minutes. The supernatant fluids were decanted and the sediment was used to make a thick film. The thick film was air-dried and stained with 3% Giemsa stain and left for about 30 minutes. The preparation was washed with distilled water and allowed to dry. The whole preparations were examined under low power (X40) of the microscope and also with oil immersion (x100) to detect the presence of microfilariae of *W. bancrofti* (Belding, 1965; Graig and Faust, 1970; Njenga and Wemae, 2001).

METHOD OF ICT FILARIASIS TESTS (BINAX NOW FILARIASIS)

The blood specimen was added to the pink test pad with batch no. PK300200, using 100ul capillary tube provided by the manufacturer. (Inverness Professional Diagnostic, Binax Inc. United States of America (U.S.A). Any *W. bancrofti*

antigen present binds to the colloid gold-labeled antibody. The card was closed accordingly. Antigen joined to the colloid gold-labeled antibody travelled up the strip. When the monoclonal antibody (MAB) line was reached, the antigen – antibody complex bound to the monoclonal antibody, and formed a pink line. A positive control was included which was seen as a pink line above the test card. The test was read within 5 minutes or 15 minutes for accurate results.

LIMITATIONS OF THE ICT FILARIASIS TEST (BINAX NOW FILARIASIS)

The test is structured to indicate the presence or absence of *W. bancrofti* antigen in the sample. The absence of antigen of *W. bancrofti* does not exclude filariasis caused by other nematodes species.

STATISTICAL ANALYSIS

Statistical Package for Social Sciences (SPSS) was used to test for the differences in the prevalence of infection using the wet preparation method, ICT and Knott's concentration method. It was also used to compare the prevalence between male and female subjects and between their ages. Tables were used to represent the frequency of occurrence of microfilariae in the study area and its percentage occurrence.

IV. RESULTS

PARASITOLOGICAL FINDINGS

Out of 781 participants whose blood samples were examined for microfilariae, the results showed that Ezi Nwachi had the highest prevalence of 2(7.41%) and the highest microfilariae (mf) density of 150mf/ml. The total microfilariae density using the wet preparation method is 750mf/ml (table1).

Table.1: Prevalence of lymphatic filariasis in Afikpo North using wet smear method

Villages	Estimated Population	No Examined	No. Positive for <i>W. b</i>	(%)	MF density mf/ml
Ezi Egwu	2000	25	1	(4.00)	50
Kpogirikpo	720	26	1	(3.85)	100
Ukpa	510	27	0	(0.00)	0.00
Amachi	290	24	0	(0.00)	0
Mgbom	420	26	0	(0.00)	0
Ibii	680	26	1	(3.85)	50
Amangbala	280	26	0	(0.00)	0
Itim ukwu	550	27	0	(0.00)	0
Ezinnali	220	26	1	(3.85)	50
Ezinwachi	100	27	2	(7.41)	150
Amasiri	750	26	1	(3.85)	50

Ngodo	120	26	0	(0.00)	0
Amachara	150	26	0	(0.00)	0
Amuro	110	26	1	(3.85)	100
Unwana	840	26	1	(3.85)	50
Amaobolobo	450	26	1	(3.85)	50
Enohia Nkalu	140	26	0	(0.00)	0
Enohia Itim	410	26	0	(0.00)	0
Amorie Ozizzia	220	26	1	(3.85)	50
Amoha	440	26	0	(0.00)	0
Amaizu	320	26	0	(0.00)	0
Amauzu	300	26	1	(3.85)	0
Amangwu	350	26	0	(0.00)	0
Amaikpo Ozizza	880	26	0	(0.00)	0
Ama Ukwu	230	26	0	(0.00)	0
Amankwo	365	26	0	(0.00)	0
Ugwuegu	310	26	0	(0.00)	0
Akpoha	430	26	1	(3.85)	50
Ezi Oti village	210	26	0	(0.00)	0
Ezi Ogudu village	180	27	0	(0.00)	0
Total	12,975	781	13	(1.66%)	750

NB: LF denotes = Lymphatic filariasis; *W. b*

= *Wuchereria bancrofti*; MF

= Microfilaria

A total of 781 individuals were examined for circulating filarial antigen of *Wuchereria bancrofti* using the rapid immunochromatographic Test Cards (Binax Now Filarisis) (ICT) in thirty (30) villages of Afikpo North L.G.A., Ebonyi State, Nigeria, out of which 165 (21.13%) were positive for ICT. Amuro village had the highest percentage prevalence of *Wuchereria bancrofti* antigen using the ICT method 9(34.61%), table 2.

Table 2 also shows the prevalence of microfilariae of lymphatic filariasis using the Knott's concentration method. Here, 781 subjects were examined for microfilariae of lymphatic filariasis, 42(5.38%) persons were positive. Ezinwachi village had the highest percentage prevalence of 14.81% microfilariae of *Wuchereria bancrofti*, and also with the highest percentage microfilariae density of 450mf/ml.

Table.2: Prevalence of lymphatic filariasis in Afikpo North LGA using ICT method and the knots concentration technique

Villages	Estimated population	ICT method			Knott's Concentration Technique			Mf Density mf/ml
		No. Examined	No Positive	%	No examined	No positive	%	
Ezi Eguu	2000	25	7	(28.00)	25	2	(8.00)	150
Kpogirikpo	720	26	6	(23.08)	26	3	(11.54)	250
Ukpa	510	27	5	(18.52)	27	3	(11.11)	150
Amachi	290	24	2	(8.33)	24	0	(0.00)	000
Mgbom	420	26	7	(26.92)	26	1	(3.85)	150
Ibii	680	26	8	(30.77)	26	3	(11.54)	200
Amangbala	280	26	4	(15.38)	26	2	(7.69)	200
Itim Ukwu	550	27	8	(29.63)	27	2	(7.41)	150
Ezinnali	220	26	5	(19.23)	26	1	(3.85)	150
Ezinwachi	180	27	7	(25.93)	27	4	(14.81)	450
Amasiri	750	26	5	(19.23)	26	3	(11.54)	300
Ngodo	120	26	0	(0.00)	26	1	(3.85)	100
Amaechara	150	26	4	(15.38)	26	0	(0.00)	000

Amuro	110	26	9	(34.61)	26	2	(7.70)	250
Unwana	840	26	6	(23.08)	26	3	(11.54)	350
Amaobolobo	450	26	5	(19.23)	26	0	(0.00)	000
Enohia Itim	140	26	7	(26.92)	26	2	(7.70)	250
Enohia Nkalu	410	26	7	(26.92)	26	1	(3.85)	200
Amorie	220	26	6	(23.08)	26	1	(3.85)	150
Amoha	440	26	7	(26.92)	26	2	(7.70)	250
Amaizu	320	26	5	(19.23)	26	1	(0.00)	000
Amauzu	300	26	6	(23.08)	26	0	(0.00)	000
Amangwu	350	26	7	(26.92)	26	0	(0.00)	000
Amaikpo	880	26	8	(30.77)	26	2	(7.69)	200
Amaukwu	230	26	5	(19.23)	26	0	(0.00)	000
Amankwo	365	26	7	(26.92)	26	1	(3.85)	150
Ugwuegu	310	26	3	(11.54)	26	0	(0.00)	000
Akpoha	430	26	6	(23.08)	26	2	(7.69)	100
Oti village	210	26	0	(0.00)	26	0	(0.00)	000
Ogudu amauku	180	27	3	(11.11)	27	1	(3.70)	150
Total	12,975	781	165	(21.13)	781	42	(5.38)	4200

Table.3: Infection Distribution According to Techniques Used

Techniques used	No. Tested	No. Positive	(%)
Direct Smear (Wet Preparation)	781	13	(1.66)
ICT	781	165	(21.13)
Knott's Concentration	781	42	(5.38)

Table.4: Prevalence of Lymphatic Filariasis in Afikpo North Lga by Age and Sex Using ICT Method

Age	Males			Females			Totals		
	No. Examined	No Positive	%	No. examined	No. Positive (%)		No. examined	No Positive (%)	
18-22	40	9	(22.50)	40	8	(20.00)	80	17	(19.75)
23-27	40	7	(17.50)	40	8	(20.00)	80	15	(12.50)
28-32	40	8	(20.00)	40	8	(20.00)	80	16	(10.00)
33-37	35	8	(22.86)	35	7	(20.00)	70	15	(11.43)
38-42	35	7	(20.00)	33	7	(20.00)	70	14	(14.23)
43-47	35	8	(24.24)	33	8	(24.24)	66	16	(18.18)
48-52	34	8	(23.50)	34	8	(23.52)	68	16	(14.28)
53-57	31	9	(29.03)	31	8	(25.80)	62	17	(12.90)
58-62	23	9	(43.48)	22	9	(40.90)	45	19	(21.74)
63-67	20	8	(40.00)	20	6	(30.00)	40	14	(20.00)
68-72	15	3	(20.00)	15	3	(20.00)	30	6	(26.66)
73-77	13	0	(23.08)	13	0	(0.00)	26	0	(26.66)
78-82	10	2	(30.00)	10	0	(0.00)	20	0	(0.00)
83-87	8	0	(0.00)	8	0	(0.00)	16	0	(0.00)
88-92	7	0	(0.00)	7	0	(0.00)	14	0	(0.00)
93-97	5	0	(0.00)	6	0	(0.00)	8	0	(0.00)
98-102	0	0	(0.00)	3	0	(0.00)	1	0	(0.00)
Totals	389	85	(21.85)	392	80	(20.41)	781	165	(21.13)

The prevalence of lymphatic filariasis in Afikpo North L.G.A., by age and sex, using ICT method, is shown in Table 4. A total of 85 (21.85%) males were positive for circulating filarial antigen of *W. bancrofti*. Out of 389 males examined using the ICT method, subjects within the age group 58-62 years had the highest percentage prevalence of 43.48%. Out of 392 females examined using the ICT method, only 80(20.41%) of the subjects were

positive. Females within the age group 58-62 years had the highest percentage prevalence of 40.90%. The prevalence of infection using ICT card in both sexes and of different age groups is 21.13%. Males were more infected (21.85%) than females (20.41%). However, there is no significant difference between sexes (males and females), using the ICT cards ($p>0.05$).

Table.5: Prevalence of lymphatic filariasis in Afikpo North LGA by age and sex using the Knott's Concentration Technique

Age Group	No. examined	Males			No. examined	Females			No. examined	Totals		
		No	Positive %	MF Density		No	Positive %	MF density		No positive %	MF density	
18-22	40	1	(2.50)	150	40	2	(5.00)	100	80	3	(7.50)	250
23-27	40	1	(2.50)	100	40	2	(5.00)	100	80	3	(7.50)	200
28-32	40	2	(5.00)	200	40	1	(2.50)	50	80	3	(7.50)	250
33-37	35	1	(2.86)	50	35	1	(2.86)	50	70	2	(5.86)	100
38-42	35	2	(5.71)	150	35	1	(2.86)	100	70	3	(8.57)	250
43-47	33	3	(9.09)	450	33	1	(3.03)	100	66	4	(12.12)	550
48-52	34	3	(8.82)	350	34	2	(5.88)	150	68	5	(14.70)	500
53-57	31	4	(12.90)	550	31	3	(9.68)	350	62	7	(22.58)	900
58-62	23	6	(26.09)	750	22	4	(18.18)	450	45	10	(44.70)	1200
63-67	20	1	(5.00)	100	20	1	(5.00)	150	40	2	(10.00)	250
68-72	15	0	(0.00)	000	15	0	(0.00)	000	30	0	(0.00)	000
73-77	13	0	(0.00)	000	13	0	(0.00)	000	26	0	(0.00)	000
78-82	10	0	(0.00)	000	10	0	(0.00)	000	20	0	(0.00)	000
83-87	8	0	(0.00)	000	8	0	(0.00)	000	16	0	(0.00)	000
88-92	7	0	(0.00)	000	7	0	(0.00)	000	14	0	(0.00)	000
93-97	5	0	(0.00)	000	6	0	(0.00)	000	1	0	(0.00)	000
98-102	0	0	(0.00)	000	3	0	(0.00)	000	3	0	(0.00)	000
Total	389	24	(6.16)	2850	392	18	(4.59)	1600	781	42	(4.38%)	4450

Table 5 shows the prevalence of lymphatic filariasis in Afikpo North L.G.A. by age and sex, using the Knott's concentration Techniques. Three hundred and eighty nine (389) males were examined using Knott's Concentration Technique, 24(6.16%) were positive. Individuals within the age brackets 58-62 years had the highest percentage prevalence of 18.18%, males were more infected than

females ($p>0.05$), there is no significant difference between sexes (males/females).

The microfilariae density of males was 2850mf/ml, while females had 1600mf/ml. Then the total microfilariae density was found to be 4450mf/ml, using the Knott's Concentration Techniques. Males had higher microfilariae density (2850mf/ml) than females (1600mf/ml).

Table.6: Sizes of hydrocoeles found in Afikpo North L.G.A.

Villages	Age	No.	No. positive (%)	Occupation	Sizes of hydrocoeles in
	Range	examined			cm per positive case
Amaizu	73-77	13	2 (15.38)	farmers	25,23
Amaizu	53-57	40	2 (5.00)	farmers	18,20
Unwana	43-47	33	3 (9.09)	traders	18,20,21
Unwana	48-52	34	3 (8.84)	traders	18,20,21

Unwana	73-77	13	3	(23.07)	farmers	18,19,22
Mgbom	23-27	31	1	(3.23)	student	10
Kpogirikpo	78-82	10	2	(20.00)	farmers	22,19
Kpogirikpo	58-62	23	2	(8.69)	farmers	20,22
Ibii	28-32	40	2	(5.00)	students	12,14
Ibii	78-82	10	2	(20.00)	farmers	23,14
Enohia Nkalu	63-67	20	2	(10.00)	farmers	19,20
Enohia Nkalu	23-27	40	2	(3.23)	students	10,11
Ezinwachi	73-77	13	1	(7.69)	farmer	14
Ugwuegu	68-72	15	1	(6.66)	farmer	18
Amuro	73-77	13	1	(7.69)	fish farmer	21
Amaorie	53-57	8	2	(25.00)	farmers	20,25
Amaorie	53-57	31	2	(6.45)	farmers	18,19
Amangballa	73-77	13	1	(7.69)	farmers	20
Amaobolobo	68-72	15	1	(6.66)	farmers	15
Amaechara	78-82	10	1	(10.66)	farmers	18
Total		425	36	(8.23)		

Table 6: shows sizes of hydrocoeles found in Afikpo North L.G.A., according to village, age range and occupation. Unwana village had the highest number of subjects with hydrocoeles. They were nine (9) positive cases of hydrocoeles ranging from 18cm-22cm. Hydrocoeles found from the study areas ranges from 10cm-25cm in size. Hydrocoeles affect subjects of different occupations. Hydrocoeles affect the older people more than the younger

people. Subjects within the age brackets 83 -87 years had the highest percentage prevalence (25.00%) while subjects within the age group 23-27 years had the lowest percentage prevalence (3.23%). Overall prevalence of hydrocoeles was (8.23%). Also fig.1 shows the pie chart representing the percentage positive of hydrocoeles found in Afikpo North L.G.A. Hydrocoele affects subjects of different age groups.

Table.7: Lymphoedema and their different stages observed in Afikpo North LGA among both sexes.

Village	Age range	No. examined	No positive	Occupation	No. of male positive %	No of females positive %	Stage
Unwana	78-82	10	2	farmer	0 (00)	2 (20.00)	3.2
Unwana	73-77	13	2	farmer	1 (7.69)	1 (7.69)	3.4
Mgbom	78-82	10	1	fish farmer	1 (10.00)	0 (0.00)	3
Kpogirikpo	73-77	13	1	farmer	1 (7.69)	0 (0.00)	3
Amaizu	73-77	13	1	farmer	1 (7.69)	0 (0.00)	4
Amangballa	53-57	31	1	trader	1 (3.23)	3 (0.00)	
Total		90	8(8.88)		5 (5.55)	3 (3.33)	

Table 7 shows the different stages of lymphoedema found in Afikpo North L.G.A., among both sexes. Eight positive cases of lymphoedema were observed in Afikpo North L.G.A. Unwana village had the highest cases (4 positive cases). The individuals were mainly subjects from 53 years and above they were mainly farmers. Males were more affected with lymphoedema than females. There were five positive cases of males while females had three positive

cases. The stages of lymphoedema ranged from stage three (3) to stage four (4). Subjects within the age group 78-82 years females had the highest prevalence 20.00%, while subjects within the age brackets 53-57 years males had the least prevalence 3.22%. However, no positive case was recorded among females within the same age group (53-57 years). Males generally had a higher prevalence of 5.55% while females had a lower prevalence of 3.33%. Overall

prevalence of lymphoedema of 8.88% was recorded in both

V. DISCUSSION, SUMMARY AND CONCLUSION

DISCUSSION

PREVALENCE

The results of this research show that lymphatic filariasis which is caused by *W. bancrofti* exists in Afikpo North LGA, Ebonyi State, Nigeria. The under listed prevalences were observed. The direct smear method which is a non sensitive test for lymphatic filariasis had a prevalence of 1.66%, while the Knott's concentration method which is a more sensitive test for detecting *W. bancrofti* in blood had a prevalence of 5.38%. The immunochromatographic (ICT) test method which dictates the circulating filarial antigen of *W. Bancrofti* had a prevalence of 21.13%.

Ibanga (2004), in her work at Obanliku, Cross River State recorded a prevalence of 1.00% for lymphatic filariasis using the thick blood smear method. The low prevalence was as a result of ivermectin distribution among the populace before carrying out the parasitological test. Udonsi and Odey (1985), Udonsi (1986 and 1988) established a prevalence of 8.7% in Yala, Cross River State, 25.6% in the Niger Delta and 12.8% in Igwu River Basin, Abia State. Targema *et al.*, (2007) had a related finding of 6.50% in comparism with the prevalence of 5.38% established in this work using the same method of Knott's Concentration technique. There has never been mass treatment of ivermectin or in a combination of ivermectin and albendazole in the treatment of lymphatic filariasis in Afikpo North LGA. This gives rise to the high prevalence of 5.38%. Mbah and Njoku (2000) in their work, in Oraeri, Aguata, LGA., Anambra State observed a higher prevalence rate of 18.80%. Njenga *et al.*, (2008) recorded a prevalence of 7.10% in their works in Malindi Kenya.

In a work carried out by Njenga and Wamae (2001) in Nairobi, Kenya, they established a higher prevalence rate of 37.3% of lymphatic filariasis, using the ICT method, as against 21.13% recorded in this work, using the ICT method also.

Eigege *et al.*, (2002) reported a similar prevalence rate of 22.6% using the ICT method in Lafia, Nasarawa State, Nigeria, just as established in this work 21.13% in Afikpo North L.G.A. Ebonyi State.

A microfilariae density of 1mf/50µl to 7mf/50µl was equally observed in the study using the Knott's concentration Technique. Ibanga, (2004) noted a similar report in Obanliku, Cross River State, Nigeria. Ngenga and Waemae (2001) carried out a research using the immunochromatographic technique (ICT) and recorded a prevalence of 21.60% in Kenya, which is close to the

sexes in Afikpo North LGA.

21.13% recorded in this work, using immunochromatographic technique.

The prevalence of lymphatic filariasis was found to be higher in males (21.85%) than in females (20.41%) using the ICT method. Also, with the Knott's Concentration Technique, prevalence was equally higher in males (6.16%) than in females (4.59%). There was no statistically significant difference between both sexes in terms of prevalence using both methods ($p > 0.05$), at two tailed significance difference of .780.

Ibanga (2004) observed higher prevalence in females (1.40%) than in males (0.55%). Gyapong *et al.*, (1994) also observed higher prevalence of lymphatic filariasis in females (18.6%) than in males (15.8%).

Badaki *et al.*, (1999) equally observed higher prevalence of *Wuchereria bancrofti* microfilariae in males (19.56%) than in females (18.42%). Mba and Njoku (2000) in Aguata LGA, of Anambra State, Nigeria, established that males had more prevalence of *Wuchereria bancrofti* microfilariae (24.5%) than the females (23.01%), and reported that there was no significant difference between both sexes. (Ngele and Osonwa, 2010) also reported that males were more infected with the microfilariae of *W. bancrofti* than females from their research work carried out in Ofumbonga Communities Obubra, Cross River State, Nigeria.

In the majority of villages visited in Afikpo North LGA, it was observed that men were mostly found outdoors gathering at the "Ogo" telling stories even at late hours of the night. This act of sitting outside at late hours of the night when the microfilariae of *W. bancrofti* are commonly found at the peripheral blood level encourages the transmission of microfilariae of *W. bancrofti* by mosquito vectors, which show nocturnal periodicity in their biting habits. The female at this time are mostly indoors, where the biting rates of the mosquito vectors are less. The males are also engaged with different clandestine activities like 'obon' 'Akang' etc that last into the night which do not involve the women. The males equally are involved in night hunting which also predisposed them to the mosquito vectors of *W. bancrofti*. Most of the houses visited had no mosquito nets, were not sealed with ceiling, while insecticide are not used in killing mosquitoes. These create entrance for the mosquito vectors of *W. bancrofti* into the houses. The same observations were made by Mba and Njoku (2000) and Ibanga, (2004). The prevalence of circulating filarial antigen, using ICT method, with age shows that subjects within the age group 58-62 years had the highest prevalence of 43.48% for males while 40.90% for females. Subjects within 73 years and above had no

circulating filarial antigen of *W. bancrofti* in their blood. Eigege *et al.*, (2002) had a similar result in Lafia, Nasarawa State, Nigeria.

Also the prevalence of *W. bancrofti* microfilariae using the Knott's Concentration Techniques shows that subject within the age group 58-62 years had the highest percentage prevalence of 26.09% for male and 18.18% for females. Subjects from 68 years and above had no microfilariae in their blood. Badaki *et al.*, (1999) found the highest prevalence of microfilariae of lymphatic filariasis in the age group of individuals older than 50 years and above but lowest in individuals within 10 – 19 years of age. Mbah and Njoku (2000) found the highest prevalence within the age group 31 – 60 years and subjects below the age of 10 years and subjects with 70 years and above had no microfilariae in their blood. This prevalence of infection with age suggests that, infection is acquired early in life and builds up in the lymphatic vessels as the person grows older in age. The absence of circulating filarial antigen and the microfilarial in the blood of subjects above 73 years and 68 years respectively, using ICT and Knott's concentration methods, may be due to acquired immunity after many years of exposure and death of the adult worms in the body after living for about 10-15 years and above (Adams and Maegraith, 1978). It could also be as a result of inability of new infection to be established due to acquired immunity (Adams and Maegraith, 1978; WHO 2002).

Mass treatment of the people with ivermectin or ivermectin alone or a combination of ivermectin and albendazole, or with diethylcarbamazine (DEC) has not been organized in Afikpo North LGA, and this may be the reason why prevalence rates of 21.13% and 5.38% using the ICT and Knott's concentration techniques respectively were recorded in the area. Some individuals who are close to the local government headquarters collect their drugs (ivermectin) direct from there where they are commonly deposited. Those who are far from the headquarters cannot access the drug (ivermectin). Very few health facilities were found to be distributing the drug in the area and a few people also come around to collect the drug due to lack of awareness.

Ottesen *et al.*, (1997) suggested that ivermectin administered annually could result in up to 90% reduction in microfilarial load, which can interrupt the transmission. Bockarie *et al.*, (1998) also suggested that a reduction in the microfilarial reservoir (human infected with microfilariae) by mass chemotherapy may interrupt transmission and thereby eliminate the infection. They observed decrease in microfilarial rate, density and annual transmission potential just after one year of treatment. Ngele and Oparaocha

(2007), recorded 90% clearance of microfilariae of *W. bancrofti*, using a combination of ivermectin and albendazole in the treating the people of Ofumbonga no 1-4 Obura LGA, Cross River State, Nigeria for a period of one year. Eigege *et al.*, (2002) also reported a general reduction in infection rates in mosquitoes 15.0% to 3.3% to 2.6% respectively with only 3 years of treatment in Plateau and Nasarawa States, Nigeria. If the individuals harbouring the microfilariae are treated, this will help to reduce the transmission rate, vector infection and infectivity rates.

The farming practices of the people predispose them to the vector bites of *W. bancrofti* all year round. The Afikpo people are predominantly farmers; they cultivate rice, yam, and maize among other crops twice in a year (May/June and August/September). Another reason for the high level of prevalence of *W. bancrofti* is their level of income. Majority of Afikpo people are living beyond average level. Most people in Afikpo have inadequate housing, greater exposure to infected mosquitoes, limited access to health centers and lack of adequate awareness. The disease lymphatic filariasis had been described by WHO (1997) as a disease of the poor. Similarly, (Coriel *et al.*, 2003) have reported poverty and poor living conditions as the fundamental causes of persistence lymphatic filariasis in Haiti. That is why the disease is commonly found among the low income earners in the society.

CLINICAL MANIFESTATION

Hydrocoele (8.23%) were observed in Afikpo North L.G.A., the presence of hydrocoele cuts across subjects of different age groups. Subjects within the age bracket 83-87 years had the highest prevalence of 25.00%, while subjects within the age brackets 23-27 years had the least prevalence of hydrocoele (3.23%) amongst the positive cases. The sizes of the hydrocoele differ within the age groups. Subjects within the age bracket 83-87 years had bigger sizes of hydrocoele 25cm at maximum while subjects within the age bracket 23-27 years had less sizes of hydrocoele of 10cm, who were invariably younger. Dunyo *et al.*, (1999) established a higher prevalence of 21.85% in Pemba Island, Tanzania. Onapa *et al.*, (2001) working in Uganda; Udonsi and Odey (1985) working Niger Delta Regions of Nigeria also established higher prevalence of Hydrocoele of 28.0% and 17.8% respectively. Udonsi (1986 and 1988) also recorded a prevalence of 12.7% hydrocoele among adult males in Igwu River Basin of Abia State, Nigeria. Ufomadu and Ekejindu (1992) and Targema *et al.*, (2008) recorded lower hydrocoele prevalence of 1.8% and 2.3% in Plateau and Benue States, Nigeria respectively. Poverty is a major handicap in Afikpo North LGA, so the people find it difficult to go to hospital for surgical operation owing to the

high cost of money involved in the surgical operation of the hydrocoeles.

Eigege *et al.*, (2002) established a hydrocoele prevalence of 12.2% and 13.3% in Plateau and Nasarawa States respectively. Ibanga (2002) found low hydrocoele prevalence of 0.74% in Obanliku, Cross River State, Nigeria.

A prevalence of 8.88% lymphoedema was found in Afikpo North L.G.A. Pendersen *et al.*, (1999) recorded lower prevalence of 1.4% lymphoedema (elephantiasis) in Pemba Island, Tanzania. Dunyo *et al.*, (1996); Onapa *et al.* (2001) had similar findings of 8.6%, 9.0% prevalence of lymphoedema in Ghana and Uganda respectively, which is similar to the 8.88% prevalence of lymphoedema established in Afikpo North L.G.A., Ebonyi State, Nigeria. Udonsi (1986) recorded a higher prevalence of 15.9% in Igun River Basin of Abia State, Nigeria. Low level of income among the people and also constant exposure to the bite of infected mosquito vectors contributed to the high prevalence of lymphoedema in Afikpo North L.G.A.

SUMMARY AND CONCLUSION

The following prevalence were obtained using the following parasitological methods; the Wet Smear Preparation 1.66% Knott's Concentration technique 5.38% and the immune chromatographic technique (ICT) 21.13%.

Males were more infected with *Wuchereria bancrofti* than females. Subjects within the age bracket 58-62 years both males and females had the highest percentage prevalence of *W. bancrofti*. Hydrocoeles were equally observed among subjects in Afikpo North LGA. Unwana village had the highest number of subjects with hydrocoeles. with hydrocoeles. Hydrocoele sizes ranges from 10cm – 25cm. Different stages of lymphoedema were equally observed in Afikpo North LGA. Eight positive cases were observed and recorded. Males were more affected than females. Prevalence of lymphoedema was highest among subjects within the age bracket 78-82 years, 20.00% while subjects within 53-57 years had the least prevalence of hydrocoeles 3.22%.

RECOMMENDATIONS

The following recommendations are made;

1. Afikpo North LGA should be included in the list and map of WHO, as one of the areas for the control and elimination of lymphatic filariasis in line with the WHO resolution of eliminating lymphatic filariasis by the year 2020.
2. Health education methods (awareness campaign programme) should be developed which can help to break through the walls of suspicion and supernatural beliefs from locality to locality, on the cause of

lymphatic filariasis, if prevention and control programmes are to make any impact in the rural areas.

3. There should be mass treatment of the people using the combination therapy of albendazole and ivermectin.
4. The people should be encouraged to use insecticide treated nets, ordinary nets and insecticide in controlling the mosquito vectors.
5. General cleanliness of their environments should be encouraged to destroy the breeding sites of the mosquito vectors. That is, by cutting down grasses around them, and by destroying stagnant water around their environment. Integrated control method is highly recommended, if employed, will yield good result.

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