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Full Length Research Article

ASSESSMENT OF PARTICIPANTS' PERCEPTION ON THE USE OF MASS DRUG ADMINISTRATION IN COMMUNITIES ENDEMIC TO *WUCHERERIA BANCROFTI* COBBOLD, 1877 IN NORTHERN NIGERIA

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ABSTRACT
Lymphatic filariasis (LF) is one of the neglected tropical diseases that cause permanent long term disability inform of hydrocoele, lymphoedema and elephantiasis that develop as a result of inflammation of the lymphatic system. This study aimed to assess the prevalence of lymphatic filariasis and perception of participants towards Mass Drug Administration (MDA) programme. The study was a community-based cross-sectional study for screening microfilariae of *Wuchereria bancrofti* in consenting participants. A total of 1010 participants' from selected communities on the MDA programme in 5 Local Government Areas (LGAs) of Bauchi, Plateau and Kaduna states were enlisted into to the study. The communities were chosen based on the presence of the people living with LF according to the signs and symptoms. A well-structured adapted questionnaire was administered to collect participants' information and their perception of the MDA programme. Microflaria of *Wuchereria bancrofti* were identified based on the sheathed nuclear, caudal nuclei and bent tail in Parasitology and Entomology Research Laboratory, Ahmadu Bello University, Zaria. Data was analysed using descriptive statistics, chi-squared and odds ratio. Participants with knowledge (294/1010; 29.11%) of the MDA programme were less than those without knowledge (716/1010; 70.89%) of the MDA. Similar, the prevalence of LF was higher in participants with knowledge (26.87%) of the MDA than in those without knowledge (25.14%). The status of participation showed that, those that participated (380/1010; 37.62%) in the MDA were lower than those did not participants (630/1010; 62.38%); the infection in participants that did not partook in the MDA programme had higher prevalence (29.68%) of LF than those that participated. Participants gave various reasons for not being part of the MDA programme ranging from absent (177/1010; 17.53%) at the time of the campaign to side effect (2/1010; 0.20%) of the drugs after taking it. However, those that gave reasons for not participating because Community Drug Distributors (CDD) did not come, had highest prevalence (40.74%) of LF compared to those that gave reasons as side effect (0.00%) for not taking the drugs. Overall LF prevalence of 25.64% was found in this study. There is poor knowledge of MDA programme among the participants in the communities examined. Similarly, microfilaria was present in some participants despite the MDA campaign in the selected states. Intensive awareness campaign and drug distribution need to be carried out in most of the remote communities in the affected states. Furthermore, members of the communities must be part of the CDDs for acceptability and effectiveness of the campaign.

Keywords: Perception, Communities, Participants, *Wuchereria bancrofti*, Microfilariae.

INTRODUCTION
The majority of global cases of lymphatic filariasis are caused by *Wuchereria bancrofti*, with *Brugia malayi* and *B. timori* as important local causes of the disease in some parts of South-east Asia. Lymphatic filariasis is ranked 4th as the cause of permanent long term disability resulting in hydrocoele, lymphoedema and elephantiasis that develop due to inflammation of the lymphatic system (WHO, 2023). There is an estimated 120 million human cases across 55 countries, with 5.9 million suffering from disability-adjusted life-years (DALY) (WHO, 2017).
In Nigeria, an estimated total of 128 million people require preventive chemotherapy, and as of 2016, 54% of the populations have received treatment {Expanded Special Projects for Elimination of Neglected Tropical Disease (ESPEN, 2018)}. The persistent transmission of LF in Nigeria was documented recently by Lawal *et al*. (2019) who reported a prevalence of 11.04% in Katsina State, while, Elkanah *et al*. (2022) reported prevalence of 32.64% in Taraba State. The continued transmission of LF in endemic countries of the world is yet to be fully understood, however, many researchers have advanced various reasons such as poor perception of the Mass Drug Administration (MDA), side effect, compliance to the MDA, inefficiency of community drug distributors.

The use of MDA for the preventive chemotherapy involves the combination of Diethylcarbamazin citrate (DEC) and Albendazole (ALB) in some Asian countries, however, combination of ivermectin and ALB are administered in most African countries where onchocerciasis is coendemic with LF; while those that are with signs and symptoms of LF can be managed for morbidity (Parker and Allen, 2013; Lupenza *et al*., 2022).
Despite the progress made in controlling LF, there have been reports of persistent transmission in some areas with the on-going MDA over a decade (Biritwum *et al*., 2016; Derua *et al*., 2017; Jones *et al*., 2018). In Ghana for instance, 14 rounds of MDA did not stop the transmission of LF in districts with relatively high baseline prevalence (Biritwum *et al*., 2016). Similarly, in Mafia Islands of Tanzania, the evidence continued transmission of LF was reported after 15 rounds of MDA (Derua *et al*., 2017; Eneanya *et al*., 2018). The continued transmission of LF has been linked by some researchers to low drug uptake by the parasites (Kisoka *et*

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al., 2014; Jones *et al*., 2017). The presence of epidemiological hotspots in some endemic communities on one hand, and the systematic low perception of individuals on the other hand, potentially serve as reservoirs of LF infection (Boyd *et al*., 2010). There are a number of factors that contribute to low perception to MDA programmes by many individuals in endemic communities which include: age, fear of side effects, prejudice about the MDA programme, inadequate communication on the rationale of MDA, a general dislike of taking medications, low motivation of drug distributors, geographic location, religious beliefs, level of education, as well as knowledge and perception of the diseases have influenced the implementation of the programme, as previously reported by Krentel *et al*. (2013), Parker and Allen (2013), Shuford *et al*. (2016), Jones *et al*. (2017) and Niles *et al*. (2021).

Maximum participation of the community members to whom the drugs are administered is important for the eliminating of LF in Nigeria. The perception of the communities in selected states in northern Nigeria to the MDA under programme to eliminate lymphatic filariasis (PELF) is the focus of this study.

MATERIALS AND METHODS

The study was conducted in Bauchi, Plateau and Kaduna States, Nigeria (Figure 1) in which 5 Local Government Areas (LGAs) were selected for the study; comprises of 3 LGAs in Bauchi (Ganjuwa, Dass and Alkaleri), 1 each in Plateau (Jos North) and Kaduna (Kachia).

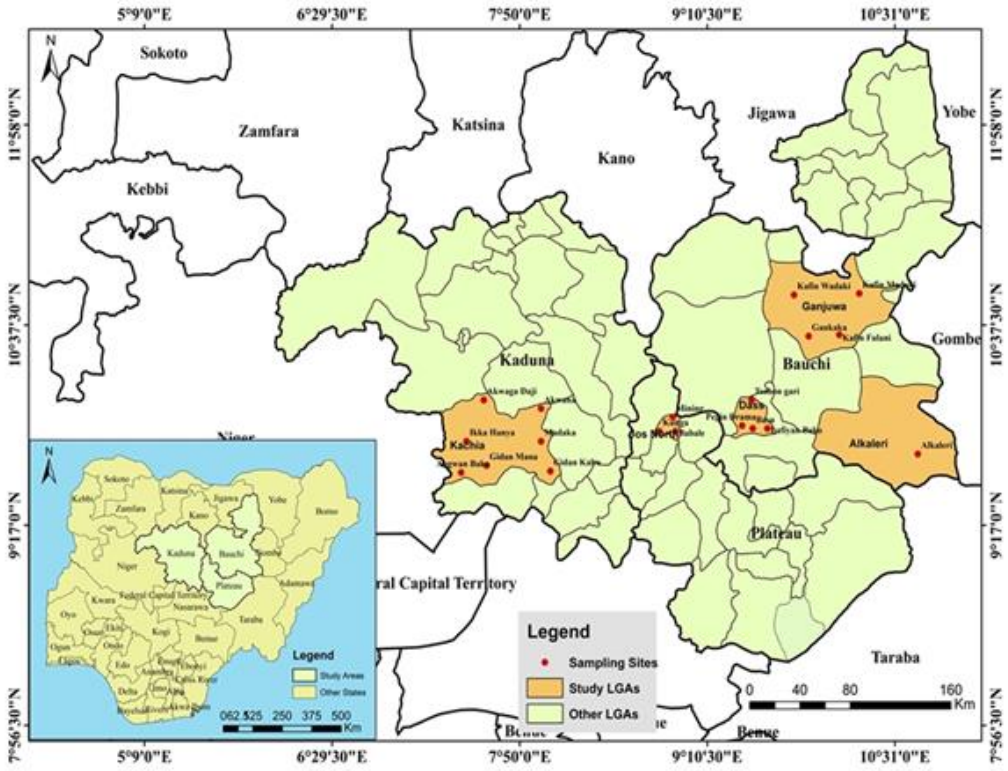

Figure 1: Selected Communities on the Mass Drug Administration Programme in Bauchi, Plateau and Kaduna States

An ethical approval was sought from the respective States (Bauchi, Plateau and Kaduna) Health Research Ethics Committee and ABU committee on the use of Animals and Human Subjects. Prior to the study, separate meetings with district authorities and village leaders were held to obtain permission to conduct research in their communities.

The study was a community-based cross-sectional study for screening microfilariae of *W. bancrofti* and participants' perception to the MDA programme in the selected communities of Bauchi, Plateau and Kaduna States. The study was conducted between September 2021 and May 2022. Purposive and convenient sampling technique was used to select the communities based on the presence of signs and symptoms LF exhibited by the individuals, to recruit participants' with clinical conditions and the consenting individuals in the selected communities.

Health facilities (dispensaries), village administrative buildings, or schools were selected as meeting points for sample collection exercise as well as house to house visit for married women in some Muslim communities.

Sample size was estimated using formula of Chochran (Cochran, 1977) that was modified by Kogi (2019):

$$N = \frac{Z^2(1-p)}{2d^2};$$

Where,

N = Sample size,
Z = Confidence level = 1.96,
p = Prevalence which is 8.2% from the study of Okorie *et al*. (2013),

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d = Precision level = 0.05

$$N = \frac{1.96^2(1-0.082)}{2(0.05)^2} =$$

$$N = \frac{3.5266}{0.005} = 705.32 \approx 705$$

The total number of samples in the 3 States was increased to 1010 for effective distribution and wider coverage.

Blood samples were collected using syringe from the vein in the arm of the consenting persons into sample bottles containing EDTA and preserved using anticoagulant and RNAlater that was transported in ice box to the Entomology and Parasitology Research Laboratory in the Department of Zoology, ABU, Zaria, for storage in deep freezer at -20 °C until use. All participants' that consented formed the target human population with the exception of those below the age of 5 years. The age groups selected for this study were the ones that were eligible for the MDA programme.

A well-structured questionnaire was administered to collect socio-demographic data of the participants including age, sex, occupation, level of education, duration of residence in the community, perception and knowledge of the MDA programme in controlling of the LF. Questionnaire was administered with the help of research assistants and other health technicians who are indigenous to the communities.

The blood sample was prepared in 2 horizontal smears of thick blood film on labeled sterilized glass slides. The blood on the slide was allowed to air dry and deheamoglobinized using distilled water for 3 s and allowed to air dry. The sample slide was fixed, using ethanol for 30 s and then stained with 3% solution of Giemsa stain for 45 min. Microflaria of *Wuchereria bancrofti* were identified based on sheathed nuclear, caudal nuclei and bent tail (WHO, 1997; Cheesbrough, 2005).

Data Analyses

Descriptive statistics was used to calculate the proportion of study participants that were positive to *W. bancrofti* mf. Chi-square test and odds ratio were used to test the significant difference and association of LF infection, respectively amongst the participants in the selected communities. Significance level was set at $p < 0.05$ (5%) and the confidence interval at 95%.

RESULTS

Participants' Perception of Mass Drug Administration

The perception of participants was assessed and evaluated based on their knowledge of the MDA programme, status of participation in the programme, reasons for not participating in the programme, role of drug's side effect on the participation.

Participants' Knowledge of the Mass Drug Administration Programme in the Selected States

The knowledge of the MDA of the participants was evaluated according to the selected communities in 3 States and presented in Table 1. In Bauchi State, participants who did not have the knowledge of the MDA 73/201 (25.98%) were slightly higher than those that had knowledge 48/187 (25.67%).

Table 1: Participants' Knowledge of MDA Programme in Bauchi, Plateau and Kaduna States

State	Response	Number examined	Number positive (%)	Odds ratio	Confidence interval	Chi-square	p-value
Bauchi							
	Yes	187	48 (25.67)	0.983	0.645-1.502	0.000	1.000
	No	281	73 (25.98)	1.016	0.666-1.551	0.000	1.000
	Subtotal	**468**	**121 (25.86)**				
Plateau							
	Yes	90	25 (27.78)	1.997	1.070-3.726	4.130	0.042*
	No	161	26 (16.15)	0.501	0.268-0.934	4.130	0.042
	Subtotal	**251**	**51 (20.32)**				
Kaduna	Yes	17	6 (35.29)	1.300	0.465-3.633	0.052	0.820
	No	274	81 (29.56)	0.769	0.275-2.151	0.052	0.820
	Subtotal	**291**	**87 (29.90)**				
Overall	Yes	294	79 (26.87)	1.094	0.804-1.489	0.243	0.622
	No	716	180 (25.14)	0.914	0.672-1.244	0.243	0.622
	Grandtotal	**1010**	**259 (25.64)**				

Key:
* = Significantly associated at p<0.05.

Participants that did not have knowledge of the MDA programme in Bauchi State had insignificantly higher association (OR = 1.016; CI = 0.666-1.551) of infection than those that had knowledge (OR = 0.983; CI = 0.645-1.502) of it.

The prevalence of LF in participants with knowledge of the MDA 25/90 (27.78%) in Plateau was higher than those without knowledge 26/161 (16.15%). Those with the knowledge of the MDA had significantly higher ($p < 0.042$) LF infection and were associated (OR = 1.997; CI = 1.070-3.726) with it.
Participants' with the knowledge of the MDA in Kaduna State was 6/17 (35.29%), while those with no knowledge were 81/274 (29.56%). There was insignificant association (OR = 1.300; CI = 0.465-3.633) of participants between those with knowledge of LF and those without in Kaduna State.

Out of 1010 participants, 292 (28.91%) respondents had knowledge of the MDA programme, while 718 (71.09%) had no knowledge. The prevalence of *W. bancrofti* was slightly higher in those that had knowledge of the MDA programme 79/292 (27.06%) in all the study areas, than those without knowledge 180/718 (25.07%) of it. Participants that had knowledge of the MDA programme did not differ significantly ($p > 0.05$) and were not associated (OR = 1.109; CI = 0.814-1.509) with LF.

Level of Participation in the MDA Programme in Relation to Status of Infection with LF
Table 2 shows the status of participation in the MDA programme in the selected communities of Bauchi, Plateau and Kaduna States. The highest prevalence of LF was among respondents who did not participate (87/292 (29.80%) in the MDA programme, while those that participated was 34/176 (19.32%).

Table 2: Status of Participants in the MDA Programme in Relation to Infection in the Selected Communities of Bauchi, Plateau and Kaduna States

Location	Status	Number examined	Number positive (%)	Odd ratio	Confidence interval	Chisquare	p-value
Bauchi	Participated	176	34 (19.32)	0.564	0.360-0.885	5.752	0.017*
	Not Participated	292	87 (29.80)	1.773	1.130-2.781	5.752	0.017*
	Subtotal	**468**	**121 (25.86)**				
Plateau							
	Participated	94	14 (14.89)	0.568	0.288-1.117	2.223	0.099
	Not Participated	157	37 (23.57)	1.762	0.895-3.467	2.223	0.099
	Subtotal	**251**	**51 (20.32)**				
Kaduna							
	Participated	110	24 (21.82)	0.523	0.303-0.903	4.905	0.027*
	Not Participated	181	63 (34.81)	1.913	1.108-3.303	4.905	0.027*
	Subtotal	**291**	**87 (29.90)**				
Overall							
	Participated	380	72 (18.95)	0.554	0.406-0.754	13.769	0.000*
	Not Participated	630	187 (29.68)	1.806	1.327-2.458	13.769	0.000*
	Grandtotal	**1010**	**259 (25.64)**				

Key:
* = Significantly associated at $p<0.05$.

Prevalence of LF by participation in the MDA programme in Bauchi State was significantly higher ($p < 0.017$) and associated (OR = 1.773; CI = 1.130-2.781) with those that did not participate.
The prevalence of LF in Plateau State was highest in respondents that did not participate 37/156 (23.72%) in the MDA programme, while those that participated had the lowest prevalence 14/94 (14.89%). However, the prevalence of LF was not significantly associated (OR = 1.762; OR =0.895-2.467) with participants in the MDA and those that did not.
In Kaduna State, those that did not participate 63/182 (34.62%) in

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the MDA programme had highest prevalence than those that participated 24/110 (21.82%). In the same vein, there was significant association (OR = 1.913; CI = 1.108-3.303) of LF prevalence in participants that responded to 'not participated' in the MDA programme.

Overall, participants' who did not partook 187/630 (29.68%) in the MDA programme had highest prevalence of *W. bancrofti*, while those that participated 72/380 (18.95%) had the lowest. Respondents that did not participate in the MDA programme in all the locations were significantly associated (OR = 1.806; CI = 1.327-2.458) with infection from microfilariae of *W. bancrofti*

Participants' reasons for not partaking in Mass Drug Administration programme

Table 3 shows the participants' reasons for not being part of the MDA programme in selected States. Those that indicated 'did not hear' 87/274 (31.75%) about the programme in Bauchi had significantly higher association (OR = 2.189; CI = 1.397-3.431) with infection compared to those that they 'were absent' 3/31 (9.68%).

Table 3: Participants Reasons for Not Participating in the MDA Programme in Bauchi, Plateau and Kaduna States

State	Response	Number examined	Number positive (%)	Odds ratio	Confidence interval	Chi-square	p-value
Bauchi							
	Absent	31	3 (9.68)	0.290	0.086-0.971	3.674	0.055
	Didn't hear	274	87 (31.75)	**2.189**	**1.397-3.431**	**11.260**	**0.001***
	CDD didn't come	8	5 (62.50)	1.107	0.386-3,174	0.000	1.000
	Breast feeding	7	2 (28.57)	1.150	0.220-6.004	0.000	1.000
	Side effects	2	0 (0.00)	NA	NA	0.001	0.978
	Others	146	24 (16.44)	0.519	0.315-0.856	6.147	0.013*
	Subtotal	**468**	**121 (25.86)**				
Plateau							
	Absent	27	10 (37.04)	**2.626**	**1.121-6.151**	**4.130**	**0.042***
	Didn't hear	126	33 (26.19)	**2.109**	**1.115-3.992**	**4.684**	**0.030***
	CDD didn't come	15	3 (20.00)	0.341	0.100-1.163	2.441	0.118
	Breast feeding	1	0 (0.00)	NA	NA	0.000	1.000
	Side effects	0	0 (0.00)	NA	NA	NA	NA
	Others	82	5 (6.10)	0.273	0.103-0.721	6.665	0.010
	Subtotal	**251**	**51 (20.32)**				
Kaduna	Absent	119	34 (28.57)	0.898	0.538-1.500	0.079	0.779
	Didn't hear	17	8 (47.06)	2.194	0.817-5.891	1.742	0.187
	CDD didn't come	4	3 (75.00)	1.421	0.332-6.084	0.007	0.932
	Breast feeding	0	0 (0.00)	NA	NA	NA	NA
	Side effects	0	0 (0.00)	NA	NA	NA	NA
	Others	151	42 (27.82)	0.880	0.533-1.454	0.138	0.711
	Subtotal	**291**	**87 (29.90)**				
Overall	Absent	177	47 (26.55)	1.059	0.733-1.531	0.044	0.833
	Didn't know	417	128 (37.45)	1.562	**1.175-2.076**	9.060	0.003*
	CDD didn't come	27	11 (40.74)	2.036	0.933-4.450	2.553	0.110
	Breast feeding	8	2 (25.00)	0.723	0.153-3.426	0.002	0.963
	Side effects	2	0 (0.00)	NA	NA	0.000	1.000
	Others	379	71 (18.73)	0.543	0.399-0.740	14.617	0.000
	Grandtotal	**1010**	**259 (25.64)**				

Key:
* = Significantly associated at p<0.05; NA = Not Applicable

Others gave reasons as, 'distributors did not come' 5/18 (27.78%), 'breast feeding' 2/7 (28.57%), 'side effect' 0/2 (0.00) and 'other factors' 24/136 (17.65%). Similarly, there was significant prevalence of infection between those that 'didn't hear' (x^2 = 11.260; p = 0.001) and 'other factors' (x^2 = 6.147; p = 0.010).

In Plateau State for instance, participants that were absent 10/27 (37.04%) and those that 'did not hear' 33/126 (26.19%) about the programme were 2.626 and 2.109 more likely of getting infected with LF, respectively, than those that gave reasons as 'CDDs did not come' 3/34 (8.82%) and 'other factors' 5/62 (8.07%). There was significant prevalence of *W. bancrofti* in respondents who 'didn't hear' (x^2 = 4.130; p = 0.042) about the programme, 'community drug distributors didn't come' (x^2 = 4.684; p = 0.030) and 'others' (x^2 = 6.665; p = 0.010).

Participants that responded to 'did not hear' 8/17 (47.06%) about the MDA programme in Kaduna had higher prevalence of LF than

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those that were 'absent' 34/119 (28.57%), while participants that responded to 'others' 42/147 (28.57%) had the least. Those that did not hear about the MDA programme or CDDs did not come had 2.194 and 1.421 likelihood of getting LF infection.
Community level of participation was assessed; those that did not know about the programme 128/417 (37.45%) had significantly higher infection (χ^2 = 9.060; p = 0.003) and were associated (OR = 1.562; CI = 1.175-2.076) with *W. bancrofti* than participants who were absent 48/177 (27.12%) at the time of campaign, CDDs did not come 11/27 (40.74%) and breast feeding 2/8 (25.00%) stop them participating during the programme.

Participants response to drugs' side effect used in the MDA programme

Participants responded differently to drug's side effect used in the MDA programme across the 3 selected States in this study (Table 4). Various responses were giving by the participants after taking the drugs used in controlling LF.
Participants in Bauchi State, for instance, those that had side effect after taking the drugs were 11/45 (24.44%), some took it in the past 11/42 (26.19%). Other participants that did not have side effect 46/197 (23.35%) or did not participate in the programme were classified under not applicable had 53/184 (28.80%) prevalence of LF.

Participants with no side effect 27/108 (25.00%) had higher prevalence of LF infection than those who were not applicable 24/74 (16.78%) in Plateau State. Nonetheless, participants with no side effect was not significantly associated (OR = 1.440; CI = 0.739-2.767) with LF infection.
Participants responses to the side effect of drugs used in the MDA programme in Kaduna State showed that, those without side effect had 4/28 (14.29%) lower prevalence than those that were not applicable 83/263 (31.56%). Furthermore participants who were not applicable to drug's side effect was significantly associated (OR = 5.380; CI =1.865-15.515) with LF infection.
The side effect of the drugs was not significantly (OR = 1.330; CI = 0.996-1.775) high (χ^2 = 3.474; p = 0.062) in not applicable participants 160/572 (27.97%). However, participants that had side effect after taken the drug were lower 11/54 (20.37%) than those who had no side effect 77/333 (23.12%).

Table 4: Participants Response to Side Effect of Drugs used in the MDA Programme in Bauchi, Plateau and Kaduna States

State	Response	Number examined	Number positive (%)	Odds ratio	Confidence interval	Chi-square	p-value
Bauchi							
	After taking the dose	45	11 (24.44)	0.921	0.451-1.880	0.002	0.962
	In the past	42	11 (26.19)	1.019	0.496-2.097	0.000	1.000
	No	197	46 (23.35)	0.796	0.521-1.217	0.899	0.343
	Not applicable	184	53 (28.80)	1.285	0.845-1.955	1.134	0.287
	Subtotal	**468**	**121 (25.86)**				
Plateau							
	After taking the dose	0	0 (0.00)	NA	NA	NA	NA
	In the past	0	0 (0.00)	NA	NA	NA	NA
	No	108	27 (25.00)	1.653	0.891-3.067	2.084	0.149
	Not applicable	143	24 (16.78)	0.605	0.326-1.123	2.084	0.149
	Subtotal	**251**	**51 (20.32)**				
Kaduna	After taking the dose	9	0 (0.00)	NA	NA	2.626	0.105
	In the past	9	0 (0.00)	NA	NA	2.626	0.105
	No	28	4 (14.29)	0.361	0.122-1.075	2.826	0.093
	Not applicable	245	83 (33.88)	5.380	1.865-15.515	10.547	0.001
	Subtotal	**291**	**87 (29.90)**				
Overall							
	After taking the dose	54	11 (20.37)	0.730	0.371-1.439	0.565	0.452
	In the past	51	11 (21.57)	0.788	0.398-1.561	0.270	0.604
	No	333	77 (23.12)	0.818	0.602-1.111	1.464	0.226
	Not applicable	572	160 (27.97)	1.330	0.996-1.775	3.474	0.062
	Grandtotal	**1010**	**259 (25.64)**				

Key:
* = Significantly associated at p<0.05; NA = Not Applicable.

DISCUSSION

The participants' perception of *W. bancrofti* in selected communities in five LGAs of Bauchi, Plateau and Kaduna States in northern Nigeria was examined and evaluated in this study. Out of 1010 participants, 259 were infected with *W. bancrofti* with an overall prevalence of 25.64%.

Participants with knowledge of the MDA programme had higher prevalence of infection than those that did not have knowledge. Knowledge of the MDA programme does not stop the transmission of *W. bancrofti* in the selected communities of Bauchi, Plateau and Kaduna States. This may be due to participants' unwillingness to swallow the drugs used in the control of LF. Other factors could be that they did not have the disease or any of their family members is not suffering from it, while some believe LF is a divine curse, hence, do not need treatment. The effect of participants' knowledge of the MDA programme was not significantly associated with LF infection in Bauchi and Kaduna States, however, those with knowledge of the MDA had significant odds of getting infected with LF. In the studies of Amarillo *et al*. (2008) and Joseph *et al*. (2011) they reported that knowledge of LF was found to be positively associated with ingestion of the LF drug. The non-treatment of some individuals who may continue to serve as reservoirs to sustain transmission in their communities may be responsible for the persistence of the LF in those areas (de Souza *et al*., 2020).

Those that did not participate in the MDA programme cited reasons ranging from being absent, did not know, distributors did not come, breast feeding and side effects of the drugs. However, participants that did not have knowledge of MDA programme had significant association with LF infection. Individuals in this category may be responsible for the transmission of *W. bancrofti* since they don't know about the MDA programme for the control of LF but harbour the filarial worms. The reason for not being aware of the MDA campaign by the participants could be due to lack of proper channel of disseminating information to the communities by the relevant authorities. In addition, the CDDs may only be interested in getting the stipends rather than achieving the goal of disease elimination. Malhotra *et al*. (2003) made similar observation that, presence of an infected pool of adults in the population could not only constitute a potential source of new infections, but can also increase the susceptibility for childhood infections mediated by in-utero immunological mechanisms

Participants who did not hear about the MDA programme in Bauchi were significantly more likely to contract lymphatic filariasis. In Plateau, there was significant association of *W. bancrofti* with participants who were absent or did not hear of the MDA programme. Furthermore, participants in Kaduna that did not hear about the MDA programme were likely to get infected by LF. Factors such as systematic refusal to ingest the drug and non-adherence to the MDA protocols present a programmatic severe obstacle for the success of the LF programme as reported by Krentel *et al*. (2013) and Biritwum *et al*. (2017). Other studies have shown that factors that contribute to the MDA non-participation include: the poor knowledge about the disease and the MDA among the endemic population, fear of adverse effects from treatment, distrust of government programmes, a general dislike of taking drugs, low motivation of drug distributors, lack of knowledge of the disease, and inadequate communication on the rationale of the MDA (Mathieu *et al*., 2006)

Community perception of drug side effect was assessed through reaction after taking the dose, in the past but not now, no side effect and not applicable. The last group was significantly associated with LF infection which may be that, they did not take the drugs and did not experience drug's side effect. Lack of compliance to the MDA programme in this study may also be associated with general feeling of weakness, rashes, swelling, itching, and worm shedding which are the five most common side effects participants usually complained about (WHO, 2017). In the study of Ahorlu *et al*. (2022) in Ghana, respondents experienced adverse effects from the MDA drug and there was statistically significant difference in the drug reaction between those that took the drugs and those that did not take (Chi^2 = 5.1673; p = 0.023). Ahorlu and colleagues further observed that in the past, the MDA drug related adverse reactions were treated for free; however, in recent times, people are being asked to pay for the treatment, especially for medicines, and this has invariably affected participants intake of the MDA drugs.

Drug's side effect did not significantly affect community participation in the communities in three selected States which could be attributed to low turn up for the MDA programme. However, participants that had side effect in the past and not applicable were insignificantly exposed to the LF infection in Bauchi. While, in Plateau and Kaduna States, those that did not take the drugs and classified as not applicable were significantly associated with LF infection. The reason for not participation was due to complain of side effect caused by the drugs used in the programme in Plateau State. Though the State has been declared LF free by the Carter Centre since 2012 and the MDA programme was stopped (Eigege *et al*., 2020). Unfortunately, some remote communities close to Bauchi State and other villages are potential hotspots for LF. In Babale and Sabon Gari for example, there were two individuals each in the communities that started manifesting lymphedema, which is a sign of LF, and their samples were found to be positive for microfilariae. Those individuals have been treating the infection locally (traditional medicine) because the MDA programme has ceased to exist in the State coupled with the lack of awareness that the infection is best treated using modern medicine (combination of ivermectin and albendazole). In most cases where the MDA programme is available, CDDs have two weeks to implement their mandate, which may not be sufficient time to identify and cover every eligible member of the community and this may lead to the omission of some in the community hotspots. The fear of side effects, lack of consent from the parents and low trust on distributed drugs may also be attributed to a challenge in implementing the MDA programmes and in achievement of the target coverage in this study. According to study participants, these concerns might discourage them from allowing their children to swallow the drugs during the MDA. Several studies revealed that taste and size of drugs, rumor and previous experience of side effects, have adverse impact on the uptake of mass treatment (Parker *et al*., 2008; WHO, 2018).

There was overall very low knowledge (71.09%) of the MDA programme amongst the selected communities in Bauchi, Plateau and Kaduna States. Community perception of the MDA programme and the drug's side effect were two factors with negative effect on the selected communities. There is need for intensive campaign awareness within LF endemic areas prior to drug distribution for wider coverage and adequate compliance.

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