

Community Participation in the Mass Drug Administration and their Knowledge, Attitudes, and Practices on Management of Filarial Lymphoedema in Lindi District, Tanzania: A Cross-Sectional Study

Winfrida John^{1,2}, Vivian Mushi¹, Donath Tarimo¹ and Upendo Mwingira²

¹Department of Parasitology and Medical Entomology, School of Public Health and Social Sciences, Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania .

²National Institute for Medical Research, Dar es Salaam, Tanzania.

Corresponding Author:
Vivian Mushi

Mobile:
+255653942973

E mail:
vmushi31@gmail.com,

Key words:
Knowledge, Attitude,
and Practices,
Lymphatic filariasis,
Lymphoedema, Mass
drug administration .

Background and study aim: Lindi District is among hotspots area for lymphatic filariasis (LF) after eleven rounds of mass drug administration (MDA) in Tanzania. Though transmission has remarkably been reduced, lymphoedema has remained a public health problem. The frequency of the community participation in the MDA, their knowledge, attitudes, and practices (KAP) regarding lymphoedema management has not been fully established. This study examined the frequency of community participation on the MDA and their KAP on lymphoedema management in the Lindi district.

Methods: A quantitative cross-sectional study was conducted in July 2020. A total of 954 individuals were interviewed on their KAP on lymphoedema management and MDA by using an interview schedule. Data were analyzed by using Statistical Package for Social Sciences version 22. The community KAP was summarized into frequency tables and proportions. The chi-square test was used to compare proportions at the significance level of 0.05.

Results: The large majority (83.9%) participated in the previous MDA rounds, with more than three-quarters of them (78.5 %) having participated in ≤ 5 rounds. More than half of the community members had an inadequate level of knowledge (60%) and negative attitudes (53.7%) regarding MDA and lymphoedema management, with about three quarters (74.2%) doing inappropriate lymphoedema management practices (74.2%). Age groups, marital status and residence were significantly associated ($p < 0.000$) with the appropriateness of community practices for lymphoedema management.

Conclusion: There was a low level of knowledge, poor attitude, and inappropriate practices toward lymphoedema management in the Lindi district. This will have negative consequences on the lymphoedema management in the Lindi district, hence, the need for further public health education on LF management.

INTRODUCTION

Lymphatic filariasis, one of the neglected tropical diseases, is caused by a nematode parasite of different species namely *Wuchereria bancrofti*, *Brugia malayi*, and *Brugia timori*, and a second leading cause of disability worldwide [1]. The disease is transmitted by different types of mosquito species in endemic areas for example *Culex* species in urban and suburban areas, *Anopheles* species in rural areas and *Aedes* species in the

pacific islands [2]. The clinical manifestations of the lymphatic filariasis include acute dermatolymphangioadenitis (ADLA) and lymphoedema, followed by hydrocele and elephantiasis of limbs; the chronic manifestations lead to social stigmatization, financial hardship, and mental illness [3,4].

Lymphatic filariasis is endemic in Africa, tropics, and sub-tropics of Asia, South America, the Western Pacific, and parts of the Caribbean.

Globally, over 120 million people in 72 countries were estimated to be infected with lymphatic filariasis, and over 40 million people were disfigured with either hydrocele (25 million men) or lymphoedema (17 million people). Also, almost 1.3 billion people are at risk of infection [2,5].

Tanzania ranks third among countries in sub-Saharan Africa with a high burden of the lymphatic filariasis, commonly along the coast of the Indian ocean with circulating filarial antigen levels of 45-60% before the initiation of the national lymphatic filariasis elimination program (NLFEP); among those infected, 12.5% develop lymphoedema and subsequently elephantiasis [6-9].

With the burden of lymphatic filariasis in Tanzania, the national lymphatic filariasis elimination program was launched in 2000 with a primary goal to eliminate the lymphatic filariasis by 2020 through interruption of the lymphatic filariasis transmission by using annual Ivermectin and Albendazole MDA. The rate of community participation in MDA should be more than 85% and sustained for a period of 4 to 6 years to stop transmission and development of the new case of lymphoedema or hydrocele. The use of Ivermectin helps to reduce the microfilariae density in the bloodstream and prevent the spread of parasites to mosquitoes. However, it has limited effects on adults. Hence, the need for combination with Albendazole, which has adverse reactions to adult worms, causing death [5].

The secondary goal was to alleviate suffering from the chronic manifestations and prevention of disability by introducing basic measures, such as foot hygiene for those with lymphoedema and by providing surgery for men with hydrocele [10-12]. Through preventive chemotherapy with Albendazole/Ivermectin, Tanzania has made remarkable achievements in reducing LF transmission to very low levels to near elimination, however, preventive chemotherapy has no impact on the lymphoedema of limbs; and the related complications such as recurrent filarial fevers [13].

In Lindi district transmission has been reduced from 55% to 7.5%, however, lymphoedema have persisted [14,15]. Little is known on what the community does regarding the management of lymphatic filariasis-lymphoedema and associated factors such as ADLA as well as the rate of

participation in preventive chemotherapy with Albendazole/Ivermectin. The success of an intervention for the management of filarial lymphoedema and associated complications among affected community depend on their knowledge and attitudes, as well as day to day practices regarding management of filarial lymphoedema. This study was set out to explore rate of community uptake of preventive chemotherapy with Albendazole / Ivermectin, as well as their knowledge, attitudes, and practice regarding management of lymphoedema and ADLA attacks. Findings on the MDA, community knowledge, attitude, and practices, on the management of lymphoedema, will be used to guide future strategies in building a stronger community-based lymphoedema management program as well as to improve MDA coverage.

METHODS

Study design and settings:

A quantitative community-based cross-sectional study was conducted in selected wards of the Lindi district to determine community participation in the mass drug administration and their knowledge, attitudes, and practices on mass drug administration and management of filarial lymphoedema. The Lindi district is one among five districts in the Lindi region, Tanzania. The district has approximately a population of 194,143 whereby females are 102,496 and males are 91,647 with an average household size of 3.7 people [16]. The district has thirty-one (31) wards, hundred and forty (140) registered villages. The Lindi district council was selected because it's among the endemic coastal areas with the persistence of transmission of the lymphatic filariasis despite eleven rounds of MDA according to Tanzania unpublished neglected tropical diseases control report of 2018.

Study population:

The study population was the community members aged 18 years and above living in the Lindi district. Only the community members who were willing to participate in the survey and signed the informed consent were included. Participants who did not sign the written informed consent and unable to communicate due to medical reasons such as stroke, mental

disability and dementia were excluded from participating in this survey.

Sample size determination and sampling procedures:

The sample size the study was determined using the formula $n = z^2 P (100-P)/\epsilon^2$, whereby; n = minimum required a sample size, p =prevalence of filarial lymphoedema, estimated as 16% (prevalence of filarial lymphoedema in Tanga (17). Z =Standard normal deviate of 1.96 on using a 95% confidence interval and ϵ =margin of error, =3%. The minimum sample size obtained (574) was adjusted by 10% of non-response rate and the designing effect (1.5) to a minimum sample size of 957. It was assumed that each household comprises of three people [16], therefore 319 households was surveyed in order to get 957 people.

The multi-stage cluster sampling was used to enroll 957 respondents in the community. In the first stage, the ward was considered as the first cluster and eight (8) wards were randomly selected from thirty (30) registered wards in the Lindi district [16] which were Kilangala, Kitomanga, Mtama, Mtua, Nyengedi, Nyangao, Majengo, and Kiwalala. In the second stage, a household was considered as a second cluster and probability proportional to size was used to get the number of households to be recruited from each of the selected wards. The total number of households (X) in each ward were 1294, 1889, 2080, 3501, 1756, 1151, 1633, 1684 for Mtama, Mtua, Nyangao, Kiwalala, Kilangala, kitomanga, Nyengedi, and Majengo ward respectively obtained from the national bureau of statistics and summed up ($X_1+X_2+X_3+...X_8$) to get 14988 (which is the summation of the total households in the study area). The number of households to be recruited from each ward was calculated by the formula: ward sample size (n)/ $N \times X_n$, whereby n/N gives sampling fraction. The numbers of the households recruited were 40, 26, 64, 75, 37, 25, 35, and 36 from Mtama, Mtua, Nyangao, Kiwalala, Kilangala, Kitomanga, Nyengedi, and Majengo ward respectively. Households were selected randomly in each selected village. Also, in each of the selected households, participants were randomly selected.

Data collection tool:

The structured questionnaire was self-constructed and used to collect information on

the socio-demographic characteristics of the community members, the uptake of preventive chemotherapy, community knowledge and attitudes on the role of MDA, causes of lymphoedema, and its management, and practices on the use of preventive chemotherapy, and lymphoedema management. The questionnaire was pre-tested in the Kiswahili language in non-selected wards of the Lindi district council before data collection for the amendment of the questionnaire. The Cronbach's alpha test was used to measure the reliability, and the obtained value was 0.69. The data was collected for one month (July 2020) electronically using mobile phones (Open data kit) and submitted daily to the central server at the neglected tropical disease control program offices in the national institute of medical research in Dar es Salaam Tanzania.

Data analysis:

The collected data was analyzed using the statistical package for social sciences (SPSS) version 22 (IBM Corp., Armonk, NY, USA). The socio demographic characteristics of the participants, knowledge, attitudes as well as practices on the use of preventive chemotherapy and on the lymphoedema management were summarized in the frequency tables with the proportions and their 95% confidence intervals.

The level of knowledge and practices were assessed using six multiple choice questions for each question one point was allocated for a correct answer and zero for incorrect answer. The total score was 6 whereas a score ≤ 2 indicated inadequate/inappropriate practice, and ≥ 3 = adequate knowledge/appropriate practices based on the average score which was 3. The attitudes were assessed using five statements in a likert scale ranging from agree (1 point) or disagree (3 points). The levels were categorized based on the mean attitude scores of 19. The score of ≤ 19 indicated negative attitudes and ≥ 20 = positive attitudes. The association between the dependent variable (MDA uptake and the frequency of MDA uptake, knowledge, attitudes and practices) and independent variables (socio-demographic characteristics) was assessed using Pearson's chi-square statistical test at the significance level of < 0.005 .

RESULTS:

Socio-demographic characteristics of the study participants:

A total of 954 study participants were recruited with a response rate of 99.7%, their ages ranged from 18 to 87 years. More than a half of the participants were less than 38 years (56.8%), female (56%), married (51.9%), and nearly half of the respondents (48.4%) had attained a primary school level of education (Table 1).

The frequency of community participation in the mass drug administration for the lymphatic filariasis elimination:

Out of 954 participants, the large majority (83.9%) reported having participated in the previous MDA rounds with more than three-quarters of them (78.5 %) participated in ≤ 5 rounds while 21.5% participated in ≥ 6 rounds since the launching of the LF elimination program (Figures 1 and 2). There was a statistically significant association between the residence and participation on IVM and ALB rounds ($p < 0.00$) and frequency on IVM and ALB uptake ($p < 0.00$) (Table 2).

Community knowledge on the MDA, filarial lymphoedema and its management:

Nearly half of the participants (48.7%) mentioned that worms are the cause of filarial lymphoedema and more than half of the participants (53%) mentioned long-term use of the anti-filarial drugs (MDA) as treatment of filarial lymphoedema. On the management of the filarial lymphoedema, less than a half (42.5%) of participants knew limb elevation and exercise as the correct measure to reduce swollen limbs. Furthermore, few (10.5%) participants knew inspection and treatment of entry lesions as the method for the protection of swollen limbs from dirt and germs (Table 3).

The level of community knowledge on MDA, filarial lymphoedema and its management according to the socio demographic characteristics:

Of the total participants, 572 (60%) had an inadequate level of knowledge while 382 (31.7%) had an adequate level of knowledge about the uptake of the MDA, filarial lymphoedema, and its management. There was no statistically significant association between the levels of knowledge and socio-demographic characteristics (Table 4).

Community attitudes toward the MDA, filarial lymphoedema and its management:

More than half of the participants (50.5%) agreed that the MDA causes sexual impotence and may cause death as a side effect (53.9%). The respondents had misconceptions on the management of lymphoedema such as lymphoedema is transmitted by washing the limbs (48.2%), and can be cured by traditional mark (50.3%) (Table 5).

The level of community attitudes on MDA, filarial lymphoedema and its management according to the socio demographic characteristics:

Of the total participants, more than half 512 (53.7%) had negative attitudes towards the MDA, filarial lymphoedema and its management while the rest 442(46.3%) had positive attitudes. There was a statistically significant association between the residence ($p < 0.000$) and the levels of community attitudes on MDA, filarial lymphoedema, and its management indicating, the community members of the Kilangala ward had high levels of negative attitudes compared to the rest (Table 6).

Community practices for lymphoedema management:

Less than one-third of the participants (29.6%) washed the affected limbs as part of the lymphoedema management. However, close to two thirds (62.4%) clean the affected limb only once in a day. Also, the majority (77.4%) doesn't inspect the entry lesion and exercise the affected limb (75.1%) (Table 7).

The level of community practice on filarial lymphoedema management according to the socio demographic characteristics:

Of the total participants, close to the third quarter 708 (74.2%) had inappropriate practices for filarial lymphoedema management, while 246(25.8%) had appropriate practices for lymphoedema management. The age groups ($p < 0.000$), residence ($p < 0.000$), and marital status ($p = 0.001$) were statistically significantly associated with the community practices on lymphoedema management (Table 8).

The influence of knowledge and attitudes on the community practices for lymphoedema management:

The majority of the participants (78.7% and 79.2%) with inadequate knowledge and positive attitudes on the role of MDA, lymphoedema, and its management had inappropriate practices on lymphoedema management. Also, there was a

statistically significant association between level of knowledge ($p < 0.000$) and attitude ($p = 0.001$) with the community practices for lymphoedema management (Table 9).

Table (1): Socio-demographic characteristics of the study participants (n=954)

Variable	Category	n (%)	95% CI
Gender	Female	534(56.0)	53.0-59.0
	Male	420(44.0)	41.0-47.0
Age (years)	< 38	542(56.8)	53.5-60.0
	38-52	224(23.5)	20.8-26.3
	53-68	149(15.6)	13.4-18.1
	> 68	39(4.1)	2.9-5.3
Educational level	No formal	203(21.3)	18.7-24.2
	Primary	462(48.4)	45.0-51.6
	Secondary	203(21.3)	18.6-23.9
	College/ University	86(9.0)	7.3-10.8
Marital status	Married	495(51.9)	49.0-54.9
	Single	310(32.5)	29.6-35.6
	Divorced	68(7.1)	5.5-8.8
	Widow	50(5.2)	3.8-6.7
	Cohabiting	31(3.2)	2.2-4.4
Residence	Kilangala	67(7.0)	5.3-8.6
	Kitomanga	72(7.5)	6.0-9.2
	Kiwalala	215(22.5)	19.7-25.5
	Majengo	162(17.0)	14.6-19.4
	Mtama	86(9.0)	7.2-10.9
	Mtua	89(9.3)	7.7-11.4
	Nyangao	95(10.0)	8.2-12.1
	Nyengedi	168(17.6)	15.2-20.0

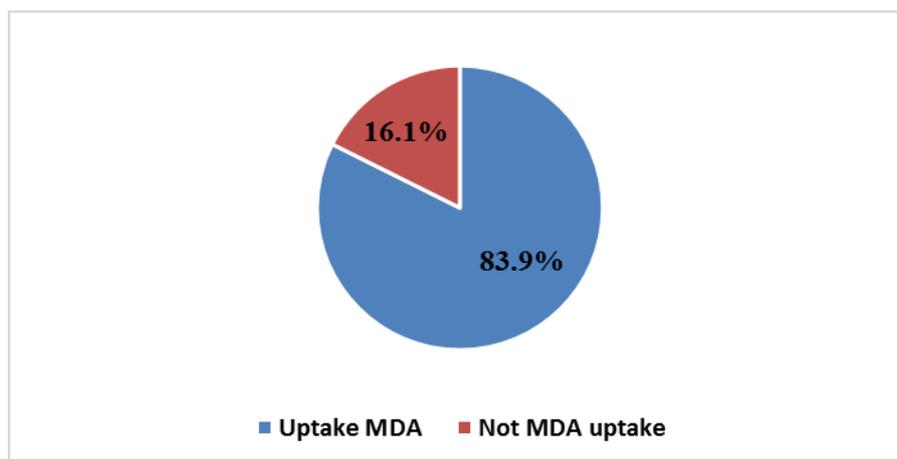


Figure (1): Community participation in MDA for lymphatic filariasis

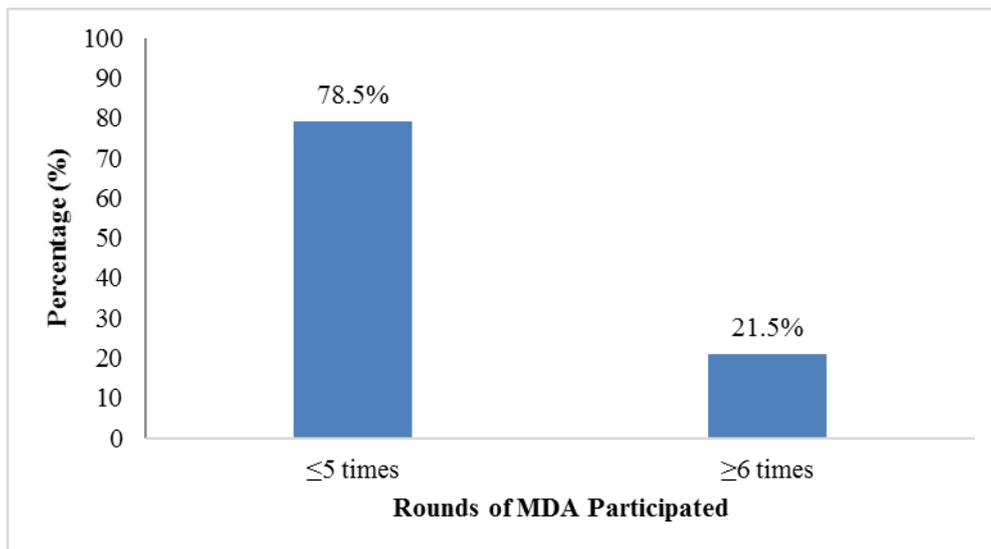


Figure (2): Frequency of community participation in MDA rounds

Table (2): The influence of socio-demographic characteristics on the IVM + ALB uptake and their frequency (n=954)

Variable	Participants (%)	Ever taken IVM+ALB	P-value (χ^2)	Frequency of IVM +ALB (rounds)		P-value (χ^2)
				≤ 5	≥ 6	
Gender						
Female	534(56)	454(85)	0.272	366(81)	88(19)	0.095
Male	420(44)	346(82.4)		262(76)	84(24)	
Age groups						
<38	542(56.8)	454(83.8)	0.952	361(79.5)	93(20.5)	0.062
38-52	224(23.5)	186(83.0)		143(76.9)	43(23.1)	
53-68	149(15.6)	127(85.2)		93(73.2)	34(26.8)	
>68	39(4.1)	33(84.6)		31(93.9)	2(6.1)	
Education level						
No formal	203(21.3)	170(83.7)	0.194	135(79.4)	35(20.6)	0.492
Primary	462(48.4)	379(82.0)		297(78.4)	82(21.6)	
Secondary	203(21.3)	180(88.7)		145(80.6)	35(19.4)	
Collage/University	86(9.0)	71(82.6)		51(71.8)	20(28.2)	
Marital status						
Married	495(51.9)	417(84.2)	0.578	325(77.9)	92(22.1)	0.599
Single	310(32.5)	258(83.2)		208(80.6)	50(19.4)	
Divorced	68(7.1)	59(86.8)		47(79.7)	12(20.3)	
Widow	50(5.2)	43(86.0)		30(69.8)	13(30.2)	
Cohabiting	31(3.2)	23(74.2)		18(78.3)	5(21.7)	
Residence						
kilangala	67(7.0)	59(88.1)	0.000	53(89.8)	6(10.2)	0.000*
Kitomanga	72(7.5)	64(88.9)		43(67.2)	21(32.8)	
Kiwalala	215(22.5)	179(83.3)		147(82.1)	32(17.9)	
Majengo	162(17.0)	131(80.9)		93(71.0)	38(29.0)	
Mtama	86(9.0)	78(90.7)		67(85.9)	11(14.1)	
Mtua	89(9.3)	87(97.8)		59(67.8)	28(32.2)	
Nyangao	95(10.0)	72(75.8)		67(93.1)	5(6.9)	
Nyengedi	168(17.6)	130(77.4)		99(76.2)	31(23.8)	

* Statistically significant ($p < 0.005$)

Table (3): Community knowledge on the MDA, filarial lymphoedema and its management (n=954)

Variable	Category	n (%)
Causes of filarial lymphoedema	Injury	170(17.8)
	Worms	465(48.7)
	Snake bite	147(15.4)
	Witchcraft	64(6.7)
	Medical conditions	108(11.3)
Treatment of filarial lymphoedema	Covering with bandage	139(14.6)
	Surgery	170(17.8)
	Long term use of anti-filarial drug	506(53.0)
	Traditional marks	109(11.4)
	Balance diet	30(3.1)
Reduction of swollen limb	Limb elevation and exercise	405(42.5)
	Limb hygiene	268(28.1)
	Wearing appropriate footwear	192(20.1)
	Inspection and treatment of entry lesion	89(9.3)
Protection of the feet soles from the injury	Limb elevation and exercise	262(27.5)
	Limb hygiene	278(29.1)
	Wearing appropriate footwear	344(36.1)
	Inspection and treatment of entry lesion	70(7.3)
Prevention of swollen limb from dirt and germ	Limb elevation and exercise	301(30.6)
	Limb hygiene	283(29.7)
	Wearing appropriate footwear	270(28.3)
	Inspection and treatment of entry lesion	100(10.5)
Removing dirt and germs from the skin surface	Limb elevation and exercise	251(26.3)
	Limb hygiene	368(38.6)
	Wearing appropriate footwear	200(21.0)
	Inspection and treatment of entry lesion	135(14.2)

Table (4): Influence of socio demographic characteristics on the community level of knowledge on MDA, filarial lymphoedema and its management (n=954)

Variable	Inadequate (%) n=572	Adequate (%) n=382	p value(χ^2)
Gender			
Female	332(62.2)	202(37.8)	0.116
Male	240(57.1)	180(42.9)	
Age group			
<38	318(58.7)	224(41.3)	0.784
38-52	140(62.5)	84(37.5)	
53-68	91(61.1)	58(38.9)	
>68	23(59.0)	16(41.0)	
Education Level			
No formal	121(59.6)	82(40.4)	0.511
Primary	286(61.9)	176(38.1)	
Secondary	113(55.7)	90(44.3)	
College/ university	52(60.5)	34(39.5)	
Marital status			
Married	290(58.6)	205(41.4)	0.334
Single	182(58.7)	128(41.3)	
Divorced	48(70.6)	20(29.4)	
Widow	33(66.0)	17(34.0)	
Cohabiting	19(61.3)	12(38.7)	
Residence			
Kilangala	38(56.7)	29(43.3)	0.012
Kitomanga	46(63.9)	26(36.1)	
Kiwalala	114(53.0)	101(47.0)	
Majengo	99(61.1)	63(38.9)	
Mtama	54(62.8)	32(37.2)	
Mtua	68(76.4)	21(23.6)	
Nyangao	61(64.2)	34(35.8)	
Nyengedi	92(54.8)	76(45.2)	

Table 5: Community attitudes toward the MDA, filarial lymphoedema and its management (n=954)

Variable	Category	n (%)
MDA causes sexual impotence	Agree	482(50.5)
	Not sure	211(22.1)
	Disagree	261(27.4)
MDA may cause death	Agree	514(53.9)
	Not sure	202(21.2)
	Disagree	238(24.9)
Lymphoedema management can't reduce limb size	Agree	395(41.4)
	Not sure	248(26.0)
	Disagree	311(32.6)
Bathing is sufficient to manage lymphoedema	Agree	429(44.9)
	Not sure	266(27.9)
	Disagree	259 (27.2)
Lymphoedema transmitted by washing their limbs	Agree	460(48.2)
	Not sure	236(24.7)
	Disagree	258(27.1)
Lymphoedema can be managed by traditional mark	Agree	480(50.3)
	Not sure	221(23.2)
	Disagree	253(26.5)
Lymphoedema management is time consuming	Agree	349(36.6)
	Not sure	253(26.5)
	Disagree	352(36.9)

Table (6): Influence of socio-demographic on the community level of attitude towards MDA, filarial lymphoedema and its management (n=954)

Variable	Negative (%) n=512	Positive (%) n=442	p value(χ^2)
Gender			
Female	289(54.1)	245(45.9)	0.753
Male	223(53.1)	197(46.9)	
Age group			
<38	288(53.1)	254(46.9)	0.209
38-52	126(56.3)	98(43.8)	
53-68	83(55.7)	66(44.3)	
>68	15(38.5)	24(61.5)	
Education Level			
No formal	107(52.7)	96(47.3)	0.538
Primary	249(53.9)	213(46.1)	
Secondary	104(51.2)	99(48.8)	
College/ university	52(60.5)	34(39.5)	
Marital status			
Married	281(56.8)	214(43.2)	0.066
Single	163(52.6)	147(47.4)	
Divorced	27(39.7)	41(60.3)	
Widow	23(46.0)	27(54.0)	
Co-habiting	18(58.1)	13(41.9)	
Residence			
Kilangala	44(65.7)	23(34.3)	0.000*
Kitomanga	25(34.7)	47(65.3)	
Kiwalala	121(56.3)	94(43.7)	
Majengo	91(56.2)	71(43.8)	
Mtama	38(44.2)	48(55.8)	
Mtua	40(44.9)	49(51.1)	
Nyangao	48(50.5)	47(49.5)	
Nyengedi	105(62.5)	63(37.5)	

* Statistically significant (p<0.005)

Table (7): Community practices on the management of filarial lymphoedema (n=954)

Variable	Category	n (%)
Washing of the affected limbs	Yes	282(29.6)
	No	672(70.4)
Frequency of washing the affected limbs	Once	176(62.4)
	Twice	82(29.1)
	Thrice	24(8.5)
Inspection of entry lesion	Yes	216(22.6)
	No	738(77.4)
Elevation of the affected limb	Yes	227(23.8)
	No	727(76.2)
Exercise the affected Limb	Yes	238(24.9)
	No	716(75.1)
Use of appropriate foot wear for the affected Limbs	Yes	261(27.4)
	No	693(72.6)

Table (8): Influence of socio demographic characteristics on the community practices for lymphoedema management (n=954)

Variable	Inappropriate (%) n=708	Appropriate (%) n=246	p value (χ^2)
Gender			
Female	399(74.7)	135(25.8)	0.687
Male	309(73.6)	111(26.4)	
Age group			
<38	352(64.9)	190(35.1)	0.000*
38-52	194(86.6)	30(13.4)	
53-68	127(85.2)	22(14.8)	
>68	35(89.7)	4(10.3)	
Education level			
No formal	142(70.0)	61(30.0)	0.016
Primary	361(78.1)	101(21.9)	
Secondary	138(68.0)	65(32.0)	
College/ university	67(77.9)	19(22.1)	
Marital status			
Married	371(74.9)	124(25.1)	0.001
Single	211(68.1)	99(31.9)	
Divorced	52(76.5)	16(23.5)	
Widow	46(92.0)	4(8.0)	
Cohabiting	28(90.3)	3(9.7)	
Residence			
Kilangala	56(83.6)	11(16.4)	0.000*
Kitomanga	52(72.2)	20(27.8)	
Kiwalala	141(65.6)	74(34.4)	
Majengo	141(87.0)	21(13.0)	
Mtama	74(86.0)	12(14.0)	
Mtua	82(92.1)	7(7.9)	
Nyangao	64(67.4)	31(32.9)	
Nyengedi	98(58.3)	70(41.7)	

* Statistically significant ($p < 0.005$)

Table (9): The influence of knowledge and attitudes on the community practices for lymphoedema management (n=954)

Variable	Inappropriate practices (%) n=708	Appropriate practices (%) n=246	p-value
Level of knowledge			
Inadequate knowledge	450(78.7)	122(21.3)	0.000*
Adequate knowledge	258(67.5)	124(32.5)	
Level of attitude			
Negative attitude	358(69.9)	154(30.1)	0.001
Positive attitude	350(79.2)	92(20.8)	

* Statistically significant (p<0.005)

DISCUSSION

In this study, the large majority of the participants reported swallowing Ivermectin and Albendazole (anti-filarial drugs), which is in contrast with the previous studies which reported low uptake of anti-filarial drugs in different areas of Tanzania including, the Lindi municipality [18]. In the LF endemic areas, the recommended IVM and ALB coverage is at least 65% [22]. The coverage of Ivermectin and Albendazole in the Lindi district has been reported to be above 65% for the five consecutive years now. However, the anti-filarial drugs cannot reduce the burden of filarial lymphoedema which is responsible for the morbidity. The upholding of the recommended coverage in the Lindi district is due to previous experience with MDA activities such as better timing of the MDA distribution, understanding of habits of community members, good MDA delivery system [23,24]. The community member at risk need to swallow the drugs annually for five or more years to reduce the transmission of the diseases [25]. The findings from the study showed more than three quarters of participants participated up to five rounds of the previous MDA. This could be the reason for the remarkable reduction of lymphatic filariasis from 55% to 7.2% in the Lindi district [14,15].

It was observed that the majority of the study participants had an inadequate level of knowledge on filarial lymphoedema, and its management which is similar to the findings from Nepal and Sri Lanka, which showed the majority (75%) and more than half (60%) of the study participants respectively, had a low level of knowledge on filarial lymphoedema and its management [26,27]. The misconception on the causative agent of lymphoedema, its treatment

and management could be partially contributed by inadequate knowledge provided to the community members on the subject. The adequate knowledge on the lymphoedema management is very crucial for the success of the morbidity management. Hence, there is a need to raise the community awareness and knowledge on the lymphoedema management and treatment in the Lindi district. The literature has reported that the introduction of the lymphoedema management programs in the communities has contributed to the raise of the awareness, knowledge, attitudes and practices on the management of filarial lymphoedema in different LF endemic areas [28].

More than half of the respondents had negative attitudes towards MDA, filarial lymphoedema, and its management which made participation in MDA rounds be ≤ 5 out of 11 MDA rounds in the Lindi district. The misconception that the MDA causes sexual impotence and death as side effects could affect the coverage and uptake of the IVM and ALB. Hence, the continuation of the LF transmission in the community and the hindrance of success the LF elimination program in the Lindi district. Also, the community had negative attitudes on the filarial lymphoedema that it can be spread to another person after washing their affected limbs and can be cured by traditional mark. This could affect the proper management of the filarial lymphoedema. The observed misconception on the mode of transmission has been reported in another study in Tanga, Tanzania, which showed acquiring of the lymphoedema by living with the infected person (0.7%), by witchcraft (0.8%), and by inheritance (0.3%) [8].

The findings of this study showed that close to three quarters of participants had inappropriate

practices for lymphoedema management in the Lindi district. The inappropriate practices are due to inadequate knowledge and poor attitudes observed among the participants. The issue of inappropriate practices for lymphoedema management has been observed and reported in sub-Saharan Africa including, Tanzania [5,9,10,13,14]. In this study, less than a half of respondents washed the affected limbs and performed it once in a day which is comparable to the study which was done by [9,10]. The practice of washing the limb only once a day is contradicted with recommended one and could result to the progression of the lymphoedema. Also, less than quarters of community members inspect the entry lesion, elevate, exercise, and use the appropriate footwear on affected limbs. This means more than three-quarters do not follow the recommended ways of proper management of the affected limbs. Hence, the higher risk for the development of advanced stage of lymphoedema which causes disability and decreases the quality of life. The majority of the participants had inappropriate practices on lymphoedema management which are contributed by the lack of a community-based lymphoedema management program in Lindi, inadequate knowledge on the subject, and negative attitudes on lymphoedema.

Limitations of the study:

The major limitations of this study were due to the cross-sectional study design which cannot determine if the measured outcomes had an impact on the management of filarial lymphoedema among community members in Lindi District. Another limitation was the recall bias from the participants because some of the questions on the uptake of IVM and ALB and its frequency required the participant to remember the information from the previous years. Also, the qualitative exploration of community knowledge, attitudes, and practices on lymphoedema management was not done. Hence, missing the in-depth perspective of the community experiences and challenges on the study.

CONCLUSIONS:

The study shows that despite the large majority of respondents who participated in previous rounds of MDA, the community members had inadequate level of knowledge, and negative attitudes on MDA, filarial lymphoedema, and its

management as well as inappropriate practices for lymphoedema management. Therefore, there is a need to provide health education in the community with the focus on the importance of the MDA and lymphoedema management to increase compliance of MDA as well as lymphoedema management to the community.

Abbreviations

ADLA: Acute dermatolymphangioadenitis

ALB: Albendazole

IVM: Ivermectin

KAP: Knowledge, Attitudes and Practices

LF: Lymphatic filariasis

MDA: Mass drug administration

WHO: World Health Organization

Acknowledgements

My well-expressed thanks go to all community members of Lindi District who participated in this study, together with the chairperson of Lindi District council for allowing me to carry out this study. The extension of thanks to the data manager; Mr. Alpha Malishee, and TAKEOFF team for their endless support during data collection.

Author contribution: We declare that all listed authors have made substantial contributions to all of the following three parts of the manuscript:

- Research design, or acquisition, analysis or interpretation of data;
- drafting the paper or revising it critically;
- approving the submitted version.

We also declare that no-one who qualifies for authorship has been excluded from the list of authors.

Funding: The work was supported by NIMR-TAKEOFF Project

Conflict of interest: None

Ethical consideration:

Ethical clearance was obtained from the Institutional Review Board (IRB) of the Muhimbili University of Health and Allied Sciences before conducting the study. Permission to conduct the study in Lindi District was requested from the local authorities. The participants were informed about the objectives, procedures, potential risks, and benefits of the

study, as well as individuals' right to withdraw from participation at any time during the study without negative consequences. Moreover, informed consent for participation was sought from each respondent after giving them sufficient information.

Highlights:

- There is high coverage and uptake of Ivermectin and Albendazole in this Lindi community. The high coverage and uptake is a good sign in terms of the control of the Lymphatic filariasis because it will halt the transmission of the disease.
- The Lindi community had misconceptions on several aspects of lymphoedema management, such as lymphoedema is transmitted by washing the limbs and can be cured by traditional marks. The ongoing misconceptions will affect the individual efforts of managing the morbidity associated with lymphatic filariasis.
- The small group of community members who believed mass drug administration may cause sexual impotence and death as a side effect, there is a chance, they won't take Ivermectin and Albendazole hence serve as the reservoir of the infection. This will compromise the ongoing efforts to control lymphatic filariasis.

REFERENCES

1. Chandrasena TN, Premaratna R, De Silva NR. Lymphoedema management knowledge and practices among patients attending filariasis morbidity control clinics in Gampaha District, Sri Lanka. *Filaria J.* 2004; 3(1):6. doi:10.1186/1475-2883-3-6
2. WHO. Lymphatic filariasis. <https://www.who.int/news-room/fact-sheets/detail/lymphatic-filariasis>. Accessed April 10, 2021
3. Chandrasena N, Premaratna R, Gunaratna IE, de Silva NR. Morbidity management and disability prevention for lymphatic filariasis in Sri Lanka: Current status and future prospects. *PLoS Negl Trop Dis.* 2018; 12(5):e0006472. doi:10.1371/journal.pntd.0006472
4. Gasarasi DB, Premji ZG, Mujinja PG, Mpembeni R. Acute adenolymphangitis due to bancroftian filariasis in Rufiji district, south east Tanzania. *Acta Trop.* 2000; 75(1):19-28. doi:10.1016/s0001-706x(99)00090-x
5. WHO. Morbidity management and disability prevention in lymphatic filariasis. 2013; <https://apps.who.int/iris/bitstream/handle/10665/205539/B4990.pdf?sequence=1&isAllowed=y>; Accessed May 5, 2021.
6. Bockarie MJ, Pedersen EM, White GB, Michael E. Role of vector control in the global program to eliminate lymphatic filariasis. *Annu Rev Entomol.* 2009; 54:469-487. doi:10.1146/annurev.ento.54.110807.090626
7. Simonsen PE, Mwakitalu ME. Urban lymphatic filariasis. *Parasitol Res.* 2013; 112(1):35-44. doi:10.1007/s00436-012-3226-x.
8. Derua YA, Kisinza WN, Simonsen PE. Lymphatic filariasis control in Tanzania: infection, disease perceptions and drug uptake patterns in an endemic community after multiple rounds of mass drug administration. *Parasit Vectors.* 2018; 11(1):429. doi:10.1186/s13071-018-2999-x;
9. Hotez PJ, Kamath A. Neglected tropical diseases in sub-saharan Africa: review of their prevalence, distribution, and disease burden. *PLoS Negl Trop Dis.* 2009; 3(8):e412. doi:10.1371/journal.pntd.0000412
10. Zinia TN, Remadevi S, Regi J, Nirmala C, Rajmohan K, Indu PS, et al. Evaluation of Coverage and Compliance to Mass Drug Administration (MDA) for Lymphatic Filariasis Elimination – A Qualitative Study. *Academic Medical Journal of India* 2013; 2347-5919: vol 1;pg 23-27.
11. Mwakitalu ME, Malecela MN, Pedersen EM, Mosha FW, Simonsen PE. Urban lymphatic filariasis in the city of Tanga, Tanzania, after seven rounds of mass drug administration. *Acta Trop.* 2013; 128(3):692-700. doi:10.1016/j.actatropica.2013.10.004
12. Jones C, Ngasala B, Derua YA, Tarimo D, Reimer L, Bockarie M, et al. Lymphatic filariasis transmission in Rufiji District, southeastern Tanzania: infection status of the human population and mosquito vectors after twelve rounds of mass drug administration. *Parasit Vectors.* 2018; 11(1):588. Published 2018 Nov 13. doi:10.1186/s13071-018-3156-2
13. Ramaiah KD, Ottesen EA. Progress and impact of 13 years of the global programme to eliminate lymphatic filariasis on reducing the burden of filarial disease. *PLoS Negl Trop Dis.* 2014; 8(11):e3319. Published 2014 Nov 20. doi:10.1371/journal.pntd.0003319
14. Neglected Tropical Diseases Control Program. Tanzania Lymphatic Filariasis Elimination Updates. 2018. Ministry of Health, Community, Development, Gender, Elderly and Children

15. Neglected Tropical Diseases Control Program. Strategic Master Plan for the Control of Neglected Tropical Diseases Programme, Dar es salaam ,Tanzania. 2012. Ministry of Health, Community, Development, Gender, Elderly and Children
16. United Republic of Tanzania. 2012-population and housing census and population distribution by administrative areas. National Bureau of Statistics, Ministry of Finance. 2013.
17. Mshana HJ, Baraka V, Misinzo G, Makunde WH. Current Epidemiological Assessment of Bancroftian Filariasis in Tanga Region, Northeastern Tanzania. *J Trop Med.* 2016; 2016:7408187. doi:10.1155/2016/7408187
18. Simonsen PE, Derua YA, Magesa SM, Pedersen EM, Stensgaard AS, Malecela MN et al. Lymphatic filariasis control in Tanga Region, Tanzania: status after eight rounds of mass drug administration. *Parasit Vectors.* 2014; 7:507. doi:10.1186/s13071-014-0507-5
19. Kisoka WJ, Simonsen PE, Malecela MN, Tersbøl BP, Mushi DL, Meyrowitsch DW. Factors influencing drug uptake during mass drug administration for control of lymphatic filariasis in rural and urban Tanzania. *PLoS One.* 2014; 9(10):e109316. Published 2014 Oct 8. doi:10.1371/journal.pone.0109316
20. Alexander ND. Are we nearly there yet? Coverage and compliance of mass drug administration for lymphatic filariasis elimination. *Trans R Soc Trop Med Hyg.* 2015; 109(3):173-174. doi:10.1093/trstmh/tru204
21. Nujum ZT. Coverage and compliance to mass drug administration for lymphatic filariasis elimination in a district of Kerala, India. *Int Health.* 2011; 3(1):22-26. doi:10.1016/j.inhe.2010.12.001
22. de Souza DK, Gass K, Otchere J, Htet YM, Asiedu O, Marfo B, et al. Review of MDA registers for Lymphatic Filariasis: Findings, and potential uses in addressing the endgame elimination challenges. *PLoS Negl Trop Dis.* 2020; 14(5):e0008306. doi:10.1371/journal.pntd.0008306
23. Krentel A, Gyapong M, Mallya S, Boadu NY, Nyamongo MA, Stephens M, et al. Review of the factors influencing the motivation of community drug distributors towards the control and elimination of neglected tropical diseases (NTDs). *PLoS Negl Trop Dis.* 2017; 11(12):e0006065. doi:10.1371/journal.pntd.0006065
24. Willis GA, Mayfield HJ, Kearns T, Naseri T, Thomsen R, Gass K, et al. A community survey of coverage and adverse events following country-wide triple-drug mass drug administration for lymphatic filariasis elimination, Samoa 2018. *PLoS Negl Trop Dis.* 2020; 14(11):e0008854. doi:10.1371/journal.pntd.0008854
25. Cantey PT, Rout J, Rao G, Williamson J, Fox LM. Increasing compliance with mass drug administration programs for lymphatic filariasis in India through education and lymphedema management programs. *PLoS Negl Trop Dis.* 2010; 4(6):e728. doi:10.1371/journal.pntd.0000728
26. Pryce J, Mablesen HE, Choudhary R, Pandey B, Aley D, Betts H et al. assessing the feasibility of integration of self-care for filarial lymphoedema into existing community leprosy self-help groups in Nepal. *BMC Public Health.* 2018; 18(1):201. doi: 10.1186/s12889-018-5099-0
27. Wijesinghe RS, Ekanayake S, Perera MS, Wickremasinghe AR. Knowledge and perceptions of filariasis in Colombo, Sri Lanka, among patients with chronic filarial lymphoedema [published correction appears in *Ann Trop Med Parasitol.* 2007 Sep;101(6):498]. doi:10.1179/136485907X156951
28. Addiss DG, Brady MA. Morbidity management in the Global Programme to Eliminate Lymphatic Filariasis: a review of the scientific literature. *Filaria J.* 2007; 6:2. doi:10.1186/1475-2883-6-2