FACTORS INFLUENCING SUSTAINED TRANSMISSION OF LYMPHATIC FILARIASIS IN SCHOOL CHILDREN AFTER EIGHT ROUNDS OF MASS DRUG ADMINISTRATION: A CASE OF MAFURIKO VILLAGE IN NORTH-EASTERN TANZANIA

Lilian Charles

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By

Lilian Charles

A Dissertation Submitted in Partial Fulfilment of the Requirements for the Degree of Masters of Science (Tropical Diseases Control) of Muhimbili University of Health and Allied Sciences

Muhimbili University of Health and Allied Sciences
October, 2013

CERTIFICATION

The undersigned certify that she has read and hereby recommend for acceptance by Muhimbili University of Health and Allied Scienc**es** a thesis / dissertation entitled: **Factors Influencing Sustained Transmission of Lymphatic filariasis in school children after eight rounds of Mass Drug Administration: A Case of Mafuriko village in North-Eastern Tanzania**, in Partial fulfilment of the requirements for the degree of Masters of Science (Tropical Diseases Control) of the Muhimbili University of Health and Allied Sciences.

_____

Dr. Dinah B. Gasarasi

(Supervisor)

_____

Date

DECLARATION

AND

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I, **Lilian Charles** declare that, this dissertation is my own original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

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I also thank my classmates for their support during my studies and making my life at Muhimbili comfortable and enjoyable.

Above all I thank God for his love and Care.

DEDICATION

I dedicate this study to my lovely children Jaden and Jade.

ABSTRACT

Background: The program to eliminate lymphatic filariasis in Tanzania is based on Mass Drug Administration (MDA) with ivermectin and albendazole once per year for 4-6 years in order to interrupt transmission. One of the indicators used to measure the impact of MDA is the prevalence of circulating filarial antigen in children born within the intervention period. It is thought that at a good coverage of ≥ 80% and more than 4 rounds of MDA these children are not expected to have infection (WHO, 2005). High prevalence of circulating filarial antigen of 6.4% has been reported in Tanga despite 8 rounds of MDA in the region (Simonsen et al 2011). This suggests that there is an ongoing transmission of lymphatic filariasis in Tanga.

Objective: This study was designed to determine factors influencing sustained transmission of lymphatic filariasis in Tanga based on the findings of high prevalence of circulating filarial antigen in children born within the elimination program.

Methodology: A descriptive cross-sectional study involving individuals aged 6 years and above was conducted at Mafuriko village along the coast of Tanga. The study had three parts, an entomological component that included collection and determination of infection and infectivity rates in vectors, parasitological component that involved night blood examination for microfilaria detection and quantitative studies to assess community knowledge and awareness of the LF elimination program, to determine the proportion of individuals who took drugs during the last round of MDA and to assess the rate of insecticide treated bed net utilization. The study recruited 317 study participants.

Results: The microfilaria prevalence among the study participants was 6%**.** The prevalence was high among males (4.7%) than females (1.3%). The most affected age group was the youth below 26 years of age with the prevalence of 19.2% p=0.09. History of ever participated in MDA was found to be protective [AOR=4.6, 95%CI (1.6-13.9)]. Only two mosquitoes out of 555 were found to harbour L1 and L2 and all collected vectors were *Culex quinquefasciatus*.

Ninety one percent (91%) of study participants were aware of lymphatic filariasis (LF) and 79% were aware of the LF elimination program, 99.3% had good knowledge about LF elimination program and 54% swallowed the drugs in the last cycle of treatment. 76.7% participants reported to possess an ITN, among these 93.4% used the ITN the night before the interview.

Conclusion: Presence of infected individuals, infected mosquitoes, poor compliance to treatment, low levels of knowledge on LF elimination program, transmission and prevention are the main factors that may influence high prevalence of CFA in school children at Mafuriko village.

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LIST OF ABBREVIATIONS

ADL	Adenolymphangitis
ALB	Albendazole
CFA	Circulating Filarial Antigens
DEC	Diethylcarbamazine
ICT	Immunochromatographic Tests
ITN	Insecticide Treated Net
ITNs	Insecticide Treated Nets
IVM	Ivermectin
LF	Lymphatic Filariasis
MDA	Mass Drug Administration
MF	Microfilaria
MOHSW	Ministry of Health and Social Welfare
NIMR	National Institute of Medical Research
NTDs	Neglected Tropical Diseases
WHO	World Health Organization

CHAPTER ONE

1.1 BACKGROUND TO THE PROBLEM

Lymphatic filariasis is a mosquito-borne disease caused by filarial worms including; *Wuchereria bancrofti*, *Brugi*a *malayi* and *Brugia timori*. The disease is widespread and is of a major public health problem in 83 tropic and sub-tropic countries of Africa, Asia, South America and the Caribbean. It is estimated that 120 million people are infected. In Africa lymphatic filariasis is caused by *Wuchereria bancrofti* and transmitted by *An. gambiae, An.funestus* and *Culex quinquefasciatus*. In humans the adult worms live in the lymphatic vessels and cause dysfunction of lymph flow, this result in swelling of limbs (lymphoedema, elephantiasis), genital organs (hydrocele) and painful recurrent febrile attacks of acute adenolymphangitis. Gravid female of *W.bancrofti* release microfilariae which find their way to the peripheral blood where they circulate at night and are available for the nocturnally feeding mosquitoes. In the mosquito, ingested microfilariae pass through three larval stages, molts to reach the infective larva stage (L3) in about 1-2 weeks: L3 are able to infect human when infectious mosquito return to feed again. The L3 develop to adult male and female worms, they mate in the human lymphatic system and females produce microfilariae, thus completing the life cycle of the parasite (CDC, 2012).

Bancroftian filariasis accounts for more than 90% of the disease burden. Recognizing the disease burden and public health importance, a global programme to eliminate LF was launched in 1997. The mainstay of this programme is to interrupt transmission of infection by vectors through diminishing the parasite population in human hosts through annual mass administration of single-dose diethylcarbamazine (DEC) or ivermectin (IVM) in combination with albendazole (ALB) (Ottesen 2000). It has been estimated that six rounds of mass drug administration with treatment coverage up to ≥80% might reduce microfilarial density to levels that could interrupt transmission (Norman et al 2000). In order to establish a clear impact of the program effective and efficient monitoring is

necessary as this will provide information for decision on end point of the intervention. According to WHO the MDAs should be implemented in settings where the prevalence of antigenemia is greater than or equal to 1% (WHO, 2005).

Effective diagnostic tools for MDA monitoring programmes have been developed. Disease prevalence, in the form of hydrocoele, lymphoedema or elephantiasis, is not a sensitive indicator of changes in infection or transmission rates following MDA. Microfilaria detection provides data on infection prevalence, parasite density and community microfilaremia load, all of which should decrease following MDA (Weil et al 2007). The major limitation with this method is that it requires night time blood collection as this is the peak time for microfilaria circulation in the peripheral blood. Recently new, filariasis antigen tests that detect antigens released by adult *Wuchereria bancrofti* worms in human blood were developed. Antigen testing by ICT card test or ELISA is more sensitive than MF detection and they can use blood collected during the day or night. The main limitations of commercially available antigen tests are cost, Also, antigen testing (as a single test modality) is not a good indicator for monitoring progress in the first years of lymphatic filariasis elimination programme because many infected people remain antigen positive for years after treatment, even if they achieve sustained clearance of microfilaremia (Melrose et al.,2004). Based on these considerations, MF and antigen testing are considered to be complementary, and a combination of antigen and MF monitoring is preferable to either test used alone (Weil et al., 2007). Entomological monitoring provides an alternative method of measuring the impact of MDA on transmission although not recommended by WHO (Ramzy et al., 2006).

The development of highly sensitive antigen detection methods have helped to recognize that LF infection is also a disease of childhood. Many studies have indicated that determination of circulating filarial antigen in young children who are born within the intervention is a good indicator of assessing the impact of MDA in a community as these children are not expected to be found positive in settings where MDA coverage ($\geq$ 80%) and population compliance are good. In most of lymphatic filariasis endemic regions the prevalence of LF infection in children is proportional

to that of the adult. Therefore if the prevalence of CFA in children in a certain community is high then there is a need of screening the adult population for microfilaremia in order to establish a true status of infection in that community (Witt et al., 2001)

Since the launch of the LF elimination programme, there has been consistent and steady increase in the number of countries implementing MDA from 12 in the year 2000 to 53 in the year 2009 with the total number of population treated under MDA ranging from 2.9 million to more than 500 million. Seventeen countries out of the 53 countries have already completed five or more rounds with 100% of geographical coverage (WHO 2010). Many countries have declared reduction of infection and transmission after one to more years of interventions. China and Korea declared to have eliminated lymphatic filariasis as the public health concern in 2007 and 2008 respectively (WHO GPELF progress, 2010). Togo is the first Sub-Saharan African country to stop MDA after 9 years of implementation (CDC Weekly Report, 2011). Zanzibar has also achieved lower parasite densities in human populations through MDA to levels not believed to support transmission (Mohammed et al., 2006). Right from the beginning of these global efforts to eliminate lymphatic filariasis as a disease of public health concern by the year 2020, Tanzania as one of the LF endemic countries has been in the forefront in efforts to implement LF control. Lymphatic filariasis is wide spread in the country; high endemicity is seen along the coast of the Indian Ocean and in areas adjacent to the great lakes (Malecela et al., 2008).

The Tanzania national lymphatic filariasis elimination programme was launched in the year 2000, the focus was to adapt to mass drug administration with a combination of ivermectine (150-200ug/kg) and albendazole 400mg to all individuals aged 5 years and above in selected programme areas (Simonsen et al., 2010). The LF Elimination Programme in the country enters its 8^{th} year since its inception; it has covered a total of about ten million people in 34 districts in 6 regions. Massive up scaling is planned through the Neglected Tropical Diseases (NTDs) programme to cover the additional 10 million people in other 51 districts in

4 regions (Ministry of Health and Social Welfare, 2005). Mafia Island of Tanzania was the first place in sub Saharan Africa to receive treatment in the year 2000, before MDA half of its population was infected but it is now declared free of LF infection after five rounds of MDA (Malecela et al., 2008). Zanzibar is in post-programme surveillance, it was able to interrupt transmission even before 5 rounds of MDA, and marked decrease in ADLs and secondary bacterial infections was observed (Mohammed et al., 2006).

During monitoring of MDA impact the indicators observed were microfilaremia, antigenemia and infection and infectivity rates of vectors. Tanzania has been able to prove improvement in clinical manifestation after more than two rounds of MDA (Malecela et al., 2009).The current measures of success as proposed by WHO is microfilaremia prevalence of less than 1% in a community. If microfilaremia prevalence is less than1% it is thought that transmission of the parasite cannot be sustained and there should be few or no incidence of infection (Richards et al., 2011).

Tanga region located in the north-eastern part of Tanzania was enrolled in the first MDA in October 2004. Surveys to measure the effect of MDA have been conducted in this region every year for eight years since the first MDA in 2004. From the surveys the prevalence of circulating filarial antigen (CFA) in young school children has been decreasing from year to year but there has been fluctuation of the prevalence in some of the surveyed villages. In the year 2011 CFA prevalence of young school children was reported to be 6.4% (Simonsen et al., 2011). Prevalence of *microfilarem*ia in Tanga is 10.6% and the overall MDA coverage is 80%-90% (Simonsen et al., 2010). According to WHO, more than five rounds of MDA and coverage of $\geq$ 80% is considered as an effective MDA therefore transmission is expected to be interrupted (WHO monitoring and epidemiological assessment. 2005). The threshold set for ongoing transmission is $\geq$ 0.1% prevalence of CFA positive children born after the initiation of effective MDA (WHO, 2005), The reported CFA prevalence in – children of 6.4% suggest that there is an ongoing transmission of lymphatic filariasis in Tanga despite the presence of an effective MDA programme. This study therefore was designed to determine factors

influencing sustained transmission of LF in Tanga based on the findings of high prevalence of circulating filarial antigen in children born within the elimination programme.

1.2 Statement of the Problem

Mass Drug Administration (MDA) with a combination of ivermectine and albendazole and other mosquito control measures have been shown to reduce prevalence and transmission of lymphatic filariasis in almost all filariasis endemic regions. For the past 8 years MDA has been going on in Tanga.

A survey conducted to monitor the program has observed a sustained high prevalence (6.4%) of Circulating Filarial Antigens (CFA) in young school children who are believed to be born within the program (Simonsen et al., 2011). These findings suggest that there is an ongoing transmission of lymphatic filariasis (Ramzy et al., 2006).

In settings where persistent antigenemia is observed after several rounds of MDA with a good coverage of ≥80%, it is necessary to detect infection and infectivity rates of vectors and microfilaremia in humans (Grady et al., 2007). Where coverage of 80% has been achieved the recommended end point of MDA should be when microfilaremia prevalence is ≤ 1%. The MDA coverage in Tanga is reported to be very high around 80-96% (Simonsen et al., 2011). This coverage and 8 rounds of MDA is expected to interrupt transmission but it is observed that antigenemia and microfilaremia in this region are still high 6.4% (Simonsen et al., 2011) and 10.6% (Simonsen et al., 2010) respectively. At a coverage of 76% and one round of MDA, Zanzibar was able to reduce the prevalence of LF from 17.8% to 4%. The main reason for this was good population compliance with MDA that was facilitated by appropriate social mobilization and community participation in drug distribution (Mohammed et al., 2006). A study in Kenya's Coastal region in an area under mosquito nets for malaria control, indicated sustained reduction in microfilaremia from 20.9% in the year 2002 before MDA to 0.9% in the year 2009 and all the children born since the start of MDA programme were CFA negative in the year

2009 despite missed rounds of MDA (Njenga et al. 2011). These findings when compared to the situation in Tanga North Eastern Tanzania suggest unexplained inconsistency on the impact of MDA with high coverage on reduction of microfilaremia in the community, infection and infectivity rate of vectors. This study was therefore designed to determine the factors influencing the sustained transmission of LF in Tanga based on the findings of high prevalence of CFA in children born within the elimination programme.

1.3. Research Questions

This study was guided and aimed at responding to the following questions:

1. What are the factors influencing sustained transmission of lymphatic filariasis in school aged children at Mafuriko in Tanga region?
2. What is the microfilaremia prevalence among individuals aged 6 years and above at Mafuriko village?
3. What are the rates of infection and infectivity of LF vectors at Mafuriko after eight rounds of MDA?
4. What is the proportion of individuals who took medication in the last round of MDA at Mafuriko village?
5. What is the level of LF knowledge and MDA awareness among individuals living at Mafuriko?
6. Do people sleep under insecticide treated mosquito bed net?

1.4. Objectives of the Study

1.4.1. Broad Objective

To determine factors influencing sustained transmission of lymphatic filariasis in school children after 8 rounds of Mass Drug Administration at Mafuriko Village.

1.4.2. Specific Objectives

The specific objectives of the study were the following:

1. To determine the microfilaria prevalence in individuals aged 6 years and above at Mafuriko village

2. To determine the infection and infectivity rates in LF vectors, *Culex quinquefasciatus, Anopheles gambiae* and *Anopheles funestus*.
3. To determine the proportion of individuals who took the medication in the last cycle of treatment
4. To assess the level of community knowledge and awareness on LF elimination programme
5. To assess the level of utilization of insecticide treated mosquito nets

1.5. Significance of the Study

The findings from this study might contribute towards identification of factors which influence continual transmission of LF in areas where there have been more than 6 rounds of MDA. This will be crucial for those involved in the lymphatic filariasis elimination programme and might contribute to the stock of knowledge and efforts towards LF elimination.

The study findings are also critical to LF elimination program in a way that they can trigger initiation of updating current education material to improve compliance because without securing higher levels of compliance amongst those infected successful elimination of LF will not be attained.

Moreover this study might raise an alarm to the LF elimination program about the reported coverage and therefore a good method that will provide an actual MDA coverage might be established. Additionally these study findings may also convince the LF elimination program to come up with new strategies that will be effective in controlling *Culex quinquefasciatus* because the available mosquito control methods mainly focus on controlling *Anopheles* mosquitoes.

1.6. LITERATURE REVIEW

1.6.1. Lymphatic Filariasis Globally

Lymphatic filariasis (LF) is globally distributed, and has been identified as a major public health problem which hampers social and economic development of those infected. LF is recognized by the WHO as one of the most disabling diseases, and is endemic in over 80 tropical and sub tropical countries. It is currently estimated that up to 120 million people are infected with *Wuchereria banncrofti* in about 83 endemic countries. Of these, it is estimated that 40 million people have indicative gross pathological conditions ranging from chronic manifestations such as hydrocele and lymphoedema/elephantiasis, to serious conditions among affected individuals who suffer repeated episodes of adenolymphangitis forms (‘acute attacks’) which result in marked loss in their economic productivity (WHO, 2000).

Although LF does not result in death, it is estimated that it is the second, most common cause of long-term disability after mental illness globally. One third of people infected with LF live in India, a third live in Africa especially Nigeria and the remainder live in Papua New Guinea, Southeast Asia, the Pacific Island and the Americas (Molyneux et al., 2005)

1.7. Lymphatic Filariasis in Tanzania

According to the data from The Ministry of Health and Social Welfare (MoHSW), almost 36 million people are at risk of getting infection with LF and the prevalence of microfilaeramia is estimated at about 11.95% in the population above 5 years of age, while 6 million people have shown clinical manifestations of the disease (MoHSW 2005). Almost all districts of Tanzania mainland are affected with LF, except Babati and Chunya district in Manyara and Mbeya regions respectively.

A map (Appendix 1) shows endemicity of LF in Tanzania, alhough LF is endemic in almost all the regions of Tanzania, Tanga, Dar es Salaam, Morogoro Pwani (coast) Mtwara and Lind are more affected than other regions of the country. The Tanzania LF Elimination Program enters its 8^{th} year since its inception and has covered a total

of about ten million people in 34 districts in 6 regions. Massive up scaling is planned through the Neglected Tropical Diseases (NTDs) program to cover an additional 10 million people in other 51 districts in 4 regions. The objectives of the program were; To interrupt transmission through mass-treatment to all endemic populations with single-dose-Ivermectin, once –yearly with 2-drug regimen for 4-6 yrs, alleviate the clinical manifestations; Use of bed-net to reduce man vector pathogen contact and clear mosquito breeding sites; Lymphoedema management and Hydrocelectomy.

To assess the impact of LF elimination programme (MDA), surveys have been conducted to determine the prevalence of infections among individuals who are under the programme. According to WHO guidelines transmission is said to be interrupted when the microfilaremia prevalence in the community is below 1%. Other studies suggest that if the prevalence of circulating filarial antigen among young school children who were born within the intervention period is high then it is believed that there is an ongoing transmission (Boyd et al., 2006) in that area and MDA has not been able to interrupt transmission. There are several reasons to this ongoing transmission in an MDA region including poor population compliance, poor adherence to the available vector control interventions and high base line prevalence of infection (Kyelem et al., 2008).

1.8. MDA Compliance (Swallowing the Drug)

Identification of factors influencing compliance with each population would help to maximize the effectiveness of the MDA programme. Disease caused by *Wuchereria bancrofti* can result in both social and economic impact to the affected population, through the current intervention these impacts can be prevented, reduced and beyond that, having albendazole in combination in the MDA reduces health impact caused by soil transmitted helminthes. Introducing awareness programme to explain the danger of the disease and to educate the community on benefits of a filariasis free community as well as beyond filariasis benefits of having albendazole given in combination in the MDA programme is a good strategy of improving population

compliance with MDA (Gunawarden et al., 2007) and (Ottesen et al., 1999). A number of studies have highlighted the importance of treatment compliance (swallowing the drug) in control programs (Plaiseir et al., 2000). Example in Leogane Haiti a systematic noncompliance with drug administration (i.e., never taking the medication) was observed to be a factor related to ongoing transmission (high infection rates among young children) (Boyd et al., 2010).

Prevalence of circulating filarial antigens in young school children who are born within the programme is an indicator whether MDA has been able to interrupt transmission or not (Ramzy et al., 2006). In a meeting that involved expertise from eight countries, several factors that determine success for lymphatic filariasis elimination programme were identified but four were mentioned to be the most prominent these include; initial level of endemicity, effectiveness of vector mosquitoes, MDA drug regimen and population compliance (Kyelem et al., 2008).

Many issues related to health system or policy influences the coverage and compliance of MDA (Babu and Kar., 2004).Pre –MDA education campaign and community participation in any health programme for example participation in lymphoedema management programme (Cantey et al., 2010) and drug distribution may also increase population compliance with MDA (Ramiah et al., 2001).Geographical distribution of places and physical activities can reduce population compliance with MDA, to a great extent urban settings are believed to have poor compliance with MDA compared to rural settings, because of many physical activities including business and work around the place (Ramaiah et al., 2000). In an area where compliance with MDA is low and baseline prevalence of lymphatic filariasis is high, more rounds of MDA are required to interrupt transmission. In this kind of situation it is essential to improve compliance in the future rounds of MDA to achieve target and eventually elimination of lymphatic filariasis in a reasonable time frame (Boyd et al., 2010).

1.9. Circulating filarial Antigens under MDA program

In LF endemic areas where MDA program is implemented effective monitoring and evaluation program is required to assess the impact of the MDA on transmission of the disease (WHO, 1999). One of the indicators used is CFA in children who are born during the MDA implementation period. In Kenya MDA started in 2002 and in 2009 a zero CFA count was observed in children below 8 years of age (Njenga et al., 2011). A reduction of CFA prevalence was also observed in a study conducted in Haiti after three rounds of MDA (De Rochars et al., 2005). Another survey conducted in sentinel sites in an area hyperendemic for LF in Haiti after observed reduction of MF prevalence from 15% to < 1% after seven rounds of MDA suggesting that transmission had been interrupted. But a separate survey conducted in the same area to determine CFA in children aged 2 to 4 years of age found a prevalence of 14.3% in these children, these results indicate that transmission was not interrupted. The main factor that was found to influence continued transmission was systematic noncompliance with MDA (Boyd et al., 2010).

1.10. Determination of Infectivity Rate in Mosquitoes and ITNs Utilization

Mass drug administration with ivermectine and albendazole and the intergration of intervention with vector control measures reduces nocturnal microfilaremia resulting in fewer mosquitoes being infected when they take a blood meal (Ashton., 2011), this can also reduce time required for eliminating lymphatic filariasis (Sunish et al.,2007). To assess the impact of MDA and determine the endpoint of intervention on lymphatic filariasis transmission it is necessary to detect infection both in human and mosquitoes (Grady et al., 2007). A study conducted in Egypt to assess the effect of MDA 5 on lymphatic filariasis, indicated reduction of infection in both human and mosquitoes (Ramzy et al., 2006). Achievement of 0% infection rate in mosquitoes may be necessary to totally interrupt *Culex* transmitted lymphatic filariasis (Ramaiah et al., 2003).

Prevention from mosquito bite by use of insecticides treated bed nets strongly suppresses the risk of *W.bancrofti* transmission (Pedersen and Mukoko., 2002). A

study conducted in Uganda observed a marked reduction of *W. bancrofti* infection and infectivity in humans and vectors respectively, in areas where both MDA and Long Lasting Treated Nets (LLNs) were used to reduce transmission (Ashton et al, 2011), in the same year a study conducted in a neighboring country Kenya, observed a sustained reduction of lymphatic filariasis infection despite of missed rounds of MDA in an area under mosquito nets for malaria control (Njenga et al., 2011). In areas where transmission is ongoing longer or additional interventions i.e., insecticides treated bed nets should be considered in order to interrupt the transmission (Richards et al., 2011). To successfully achieve the goal of eliminating lymphatic filariasis as a disease of public health concern in areas of high endemicity, an effective control strategy that addresses two important factors; community coverage and vector control measures is required (Michael et al., 2004)

There is evidence suggesting that, within the national programs LF can be eliminated as a public health problem and also in many settings transmission can be completely arrested. In a recent study by Ottesen, (2006) showed that many countries like; Japan, South Korea, the endemic areas of China, Sri Lanka, Thailand, Malaysia, Solomon Islands, Costa Rica, Suriname and others have succeeded to eliminate LF.

These successes were based on different approaches aiming at controlling LF such as mass distribution of DEC or DEC salt, Ivermectin alone or with albendazole/mebendazole, selective treatment of infected individual, vector control or a combination of number of a approaches. Monitoring infection in mosquitoes and antifilarial antibody levels in children may serve as indicators for local transmission and be useful for making decision about the programme endpoints (Mladonicky et al., 2009)

CHAPTER TWO

2. METHODOLOGY

2.1. Study Area Description

Mafuriko is a coastal village in Tanga Region of north-eastern Tanzania: located approximately 4 kilometers north of Tanga City along the Tanga-Mombasa road. The village is along the coast of the Indian Ocean, within 1 kilometer from the sea, mangrove swamps, coconut shells and holes created by cows legs present in this area serve as breeding sites for mosquitoes during the rainy season. It has a population of 7416, males are 3528 and females are 3888. The inhabitants practice subsistence activities such as fishing and keeping domestic animals like cattle, goats and chicken. Most of the houses are brick-walled and iron sheet-roofed but few mud-walled with thatched roof are also available. The primary school in this village is among ten selected sentinel/ spot check to monitor MDA in Tanga region. The prevalence of circulating filarial antigen in this village fluctuates from year to year. In the year 2008 CFA prevalence was 12%, in 2009 it was 13%. There was no information on microfilaremia prevalence of adult individuals nor was there information about vector infection and infectivity rate in this village.

2.2. Study Design

A descriptive cross-sectional study was conducted at Mafuriko village in Tanga municipality. The study had three parts, an entomological component, parasitological and interviews through questionnaire component. The entomological component involved collection of adult mosquito and dissection of lymphatic filariasis vectors to determine their infection and infectivity rates. The parasitological component involved preparation of nocturnal blood slides, staining and examination for microfilaremia. Through questionnaires assessment was made on proportion of individuals who took treatment in the last cycle of MDA, community knowledge and awareness about MDA, and ITN’s utilization.

2.3. Study Population

All residence of Mafuriko village aged 6 years and above. An initial household census was conducted to obtain social demographic information concerning this population.

Inclusion criteria: all individuals at Mafuriko village who were 6 years of age and above.

Exclusion criteria: individuals below 6 years of age and people who have been in the village for a period of less than 12 months.

2.4. Sample Size

The sample size was calculated by assuming the estimated prevalence of 16.4% (Njenga et al., 2000) which was found to be the prevalence of lymphatic filariasis in Kwale district coast province of Kenya. This area is located nearby Tanga and has the same ecological features similar to those observed at Mafuriko village. The desired estimate percentage point is ±5%.

Using formula

$$N= (1.96/d)^2 \pi (1-\pi)$$

Whereby:

N- Sample size

d- Margin of error

π- Prevalence from relevant related study

$$N= (1.96/0.05)^2 0.164(1-0.164)$$

$$N= 210.67\sim211$$

Variance inflation factor= 1.5

Therefore $N= 1.5\times211$

N=317

Therefore a total of 317 individuals of Mafuriko village was included in this study.

2.5. Sampling Procedure

Multistage cluster sampling was employed to obtain study participants from the village. There are eleven (11) hamlets in this village, 50% (5.5 was rounded to 6) of

these were randomly selected to obtain hamlets that were involved in the study. By simple random sampling households from which study participants were obtained were selected. Prior to sampling procedure a meeting was conducted at the village for the purpose of mobilizing the community to participate in the study and obtaining their informed consent.

2.6. PARASITOLOGICAL METHODS OF DATA COLLECTION

2.6.1. Blood Sample Collection for Determination of microfilaria Prevalence

This part was conducted during the evening hours. All the study participants assembled at one point, this was either under a tree or at a village leader's office. Blood samples were collected from consented individuals between 21:30hrs and 00:00hours this is the time when the numbers of microfilaria approach peak levels in the peripheral blood circulation. 80ul finger prick blood sample was collected by using capillary tube and transferred to a clean microscope glass slides. A thick blood smear was prepared; the smear was dried over overnight before haemoglobinization and staining with giemsa stain 1ml of giemsa in 9ml of distlled water concentration. The stained slides were later examined for microfilariae under a light microscope in the laboratory at Bombo field station NIMR –Amani research center Tanga (MacMahon et al.,1979). The slides were examined by two laboratory technicians and the principal investigator. Quality assurance was observed by re-examining another person's examined slide. The results were recorded in the designed laboratory form and then entered in the computer. Prior to analysis data were rechecked for accuracy.

2.7. COLLECTIONS OF ENTOMOLOGICAL DATA

2.7.1. Household Sampling for Mosquito Collection

Due to the number of traps available six households one from each of the 6 sampled hamlets was selected randomly for mosquito collection. Sensitization and consent was obtained from household heads in which traps were hung. Adult mosquitoes were collected from the selected houses by using CDC light traps and taken to the laboratory at Bombo field station where they were sorted out according to species, counted and dissected for determination of *Wuchereria bancrofti* larvae stages.

2.7.2. Mosquito Collection

Suitable room(s) in each selected house was selected. Ideally this should be a room where a single person sleeps. Alternatively a room that has the lowest number of sleepers was used, provided that is acceptable to the person who gave consent to the study.

The trap was hanged one meter above the ground at the foot end of the bed, using the string and nails where necessary. Height was adjusted so that the lid was level at about a meter, the bed net was hanged over the bed by tying the four corners to existing fittings if possible, otherwise hammer was used to put in 4 nails by which to suspend the bed net. The net was low enough over the bed so that it can be tucked in. Demonstration on how to tuck in the net was given to the sleeper or the consenter. If a trapping room contained multiple beds, the other room occupants were provided with bed nets if they didn't have any.

Traps were labeled by writing the village and house name, trap number and date on a slip of paper and were put inside the trap cage/pot and in the side pockets if any.
The color coded lead terminals from the trap were fixed to match those of the battery terminals, and the fan was fitted to ensure that it is blowing downwards into the net and not upwards by feeling the air current from both ends (top and bottom). One terminal of the battery was left disconnected; this was to be connected by either the village assistant (VA) or field worker (FW) at 19:00 hours to start operating the trap. The trap was set to run throughout the night. In the morning at 07:00 hours, before disconnecting the battery from the trap, the sleeve was tied of the net/cage first to avoid mosquitoes escaping. All traps were collected before 10:00 hours. All the mosquitoes in the net were emptied by using sucking tubes and transferred into the labeled cups. Mosquitoes were collected every day for 14 days.
All the batteries used the previous night were taken to the field station for recharging.

2.7.3. Dissection procedures

Mosquitoes were knocked down with chloroform and sorted and identified to species by morphology. The female mosquito was placed in a drop of normal saline on a slide.

The slides were labeled with species, serial number and date.The mosquito was de-winged on a slide. Head, thorax and abdomen were separated. The above parts were teased apart under the high power of a dissecting microscope and examined for filarial larvae (L1, L2 & L3).Larvae stages from each part of the mosquito were counted and recorded in the dissection form. To cross-check the results of the initial infection examinations, all slides which were larvae- positive were fixed with methanol and then stained with heamatoxyline. Observation was done under X10 and X40 using a compound microscope. Results were recorded on a designed laboratory form.

2.7.4. Determination of Infection and infectivity rates of Mosquito

A Mosquito is said to be infected when it carries any of the three *W.bancrofti* larvae stages (L1, L2 &L3), mosquito infection provides infection parameter. Mosquito infectivity rate provides immediate real time evidence of community LF transmission. Infectivity rate is determined by finding L3 in any party of the mosquito

2.8. Determination of knowledge, ITNs utilization and taking drug in the last treatment cycle.

Assessment whether an individual had taken medicine during the last cycle of treatment, knowledge and awareness about LF and MDA and ITN’s utilization was determined by administration of an interviewer-based pre-tested questionnaire. The questions were designed to elicit personal details and information about drug administration, knowledge and awareness with regard to the MDA program for elimination of lymphatic filariasis and utilization of insecticide treated mosquito bed net.

2.9. Training of research assistant and interview procedure

The team of 5 researchers who administered the questionnaires was trained on the approach of interviewee, handling of questions and how they should be answered in order to maintain consistency.

To avoid recall bias and in order to prompt study participants memory concerning administration of drugs the participants were shown the tablets when asked if they had swallowed the drugs in the last cycle of MDA. Also participants were asked as to whether they normally use treated bed nets and whether they had used it the previous night to ascertain the extent of bed net utilization.

2.10. Data Analysis

Data collected were recorded into data forms and then entered into a computer database using a computer program; Statistical Package for Social Sciences (SPSS) Version 18 has been used to analyse quantitative data thematically by relating them to the research questions. All data collection forms were rechecked by another person prior to entry into the computer programme. The obtained results of the analysed data are presented in form of tables, figures and descriptions. The levels of knowledge were determined by arbitrarily classified scores regarding the number of correct responses on questions relating to knowledge on LF elimination programme. A score of one point was assigned for each correct response, and the maximum score was 5. Respondents scoring 2 and above were classified as having good level of knowledge while anyone with less than 2 of the score was classified as having a poor level of knowledge.

Dependent variables are: microfilaremia, infection and infectivity rates of vectors
Independent variables are: knowledge and awareness on LF and MDA, and ITN's utilization.

2.11. Ethical Considerations

A Village meeting was held before the study period in the national language (Swahili, which is widely spoken and understood in the area) to inform the villagers about the study contents and implications and to obtain their cooperation. The meeting included information about individuals' right to withdraw from participation during any part of the study without negative consequences. Prior to any blood sampling the individual was asked if the purpose and consequences as explained during the meeting had been understood and questions for further clarification were answered. Oral consent is the traditional way for making agreements in the study area, whereas written consent is unfamiliar and might cause suspicion and refusal to participate. Having light traps in the house attract mosquitoes, for this case every bed in the house were provided with a mosquito net. Individuals found to have microfilaria were directed to the health centre at Mafuriko for treatment. Permission and ethical clearance to carry out the study was obtained from MUHAS Ethical clearance review board.

CHAPTER THREE

RESULTS

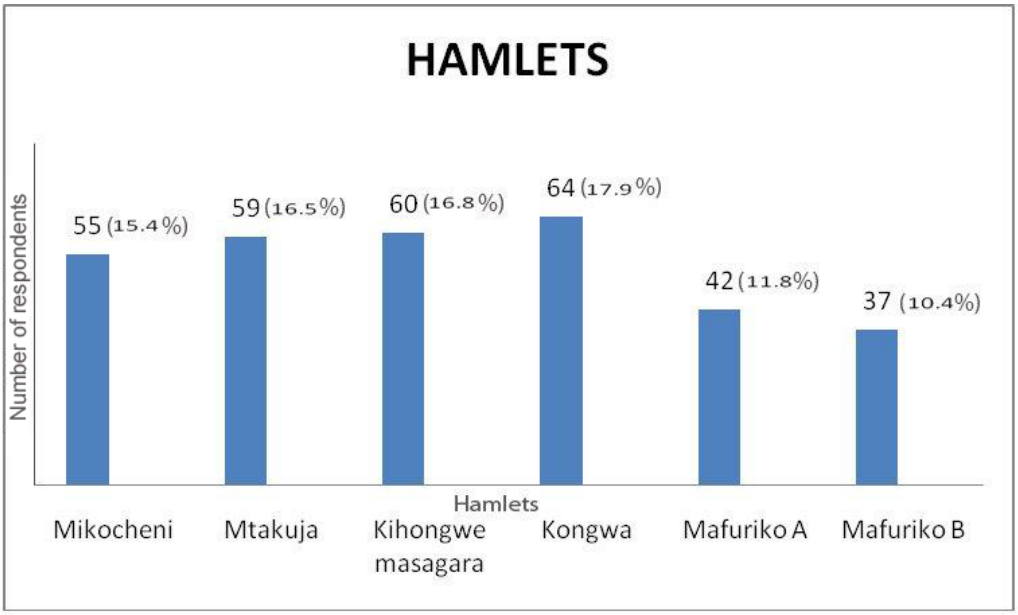
This chapter presents the findings of the inquiries conducted by this study. Data were collected, analyzed and interpreted. The research was conducted using questionnaires, laboratory tests of blood samples and dissection of mosquitoes. The analysis was done using the SPSS programs. The findings are categorized into five main sections according to the five objectives. The results include both quantitative and qualitative data. Results are presented using tables and charts. The figures and tables show frenquencies and/or percentages. The following are, the findings of the study.

3.1. Social Demographic Characteristics

3.1.1 Place of Residence of Respondents

The respondents were found in different locations. Six hamlets were selected, These were Mikocheni, Mtakuja, Kihongwe Masagara, Kongwa, Mafuriko A, and Mafuriko B. Many participants were found in Kongwa, Kihongwe masagara and Mtakuja while Mafuriko A and Mafuriko B had less than 50% participants as shown in figure 1.

Figure 1: A bar chart showing the distribution of the respondents in selected hamlets



3.1.2. Age and Sex Distribution of the Study Participants

The total number of participants in this study was 317.The majority of the participants were young adults in the age group between 16 and 45 years as shown in table 1 below. The number of females was nearly twice as much as that of male participants whereby more than 50% of the females were in the age groups of 16 to 45 and half of the elderly aged 55 and above were females (Table 1).

Table 1: Age and Sex distribution of the study participants

	Sex				Total
	Male		**Female**		
Age group	**No**	**%**	**No**	**%**	**No**
6 - 15	12	37.5	20	62.5	**32**
16-25	45	43.3	59	56.7	**104**
26-35	26	29.9	61	70.1	**87**
36-45	14	33.3	28	66.7	**42**
46-55	11	50	11	50	**22**
55+	13	43.3	17	56.7	**30**
Total	**125**	**100**	**192**	**100**	**317**

Table 2: Marital status, Education level and Occupation of the study participants

Variable	Frequency	Proportion (%)
Marital status		
Married	165	52.1
Single	135	42.6
Divorced	8	2.5
Widow	9	2.8
Education level		
None	57	18
Primary	207	65
Secondary	46	15
Post-secondary	7	2
Occupation		
Subsistance farming	132	39.7
Own Business	73	23
Employed	17	5.4
Unemployed	95	30

Table 2 shows that majority (52%) of the respondents were married few (5.3%) were divorced or widowed while the remaining (42.6%) were single. Most of the respondents (65%) have attained primary education. Subsistance farming is the major means of economy.

3.2. Microfilaria Prevalence in Individuals aged 6 years and above at Mafuriko Village

3.2.1 Determination of Microfilaria among Respondents

The study attempted to determine microfilaria prevalence among individuals aged 6 years and above living in the study area. The night blood samples were collected and analysed in the laboratory. The samples were examined twice by two different individuals for quality assurance purpose.

The results are summarized in the tables 3 and 4. The overall prevalence of microfilaria in the area was found to be 6%. The highest prevalence of 4.7% was observed in males' participants while the females MF prevalence was 1.3%. Among the six hamlets the prevalence was found to be highest in Mafuriko B (18.92%) in this hamlet male had the highest prevalence (13.5%) while the MF prevalence in females was 5.4% (table 3). Furthermore the data indicates that the most affected age group is the youth below 25 years of age, of the 19 MF positive participants 11 (57.9%) were below the age of 25 years (table 4).

Table 3: Distribution of Microfilarial positivity by sex and hamlet

Hamlet	**Sex**								**Total**
	Male				**Female**				
	Mf positive		**Mf negative**		**Mf positive**		**Mf negative**		
	No	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**
Mikocheni	4	7.3	18	32.7	0	0.0	33	60.0	**55**
Mtakuja	0	0.0	18	30.5	0	0.0	41	69.5	**59**
K/Masagara	0	0.0	23	38.3	0	0.0	37	61.7	**60**
Kongwa	3	4.7	12	18.8	1	1.6	47	73.4	**64**
Mafuriko A	3	7.1	19	45.2	1	2.4	19	45.2	**42**
Mafuriko B	5	13.5	20	54.1	2	5.4	10	27.0	**37**
Total	**15**	**4.7**	**110**	**34.7**	**4**	**1.3**	**188**	**59.3**	**317**

Table 4: Distribution of microfilarial Positivity by age and sex

	Sex								Total
	Male				Female				
	Mf positive		Mf negative		Mf positive		Mf negative		
Age group	No	%	No	%	No	%	No	%	No
6 - 15	3	9.4	9	28.1	1	3.1	19	59.4	**32**
16-25	6	5.8	39	37.5	1	1.0	58	0.6	**104**
26-35	1	1.2	25	28.4	2	2.3	59	67.8	**87**
36-45	3	7.1	11	26.2	0	0.0	28	66.7	**42**
46-55	1	4.6	10	45.5	0	0.0	11	50.0	**22**
55+	1	3.3	16	53.3	0	0.0	13	43.3	**30**
Total	**15**	**4.7**	**110**	**34.7**	**4**	**1.3**	**188**	**59.3**	**317**

Chi-square=9.4, p=0.09

3.2.2 Factors Associated with Infection

In order to determine factors that are associated with infection a logistic analysis was carried out. Factors considered were; sex, age group, marital status, education status, occupation, awareness about LF elimination, participation in MDA, swallowing drugs in the last cycle and ITN utilization.

In a bivariate logistic regression, it was shown that being a male was significantly found to be a risk of having infection compared to female in the village. Moreover, the history of ever participated in any of the MDA round was also found to be protective against the infection compared to those who had never participated in MDA rounds. (AOR= 4.6, 95%CI=1.6-13.9). Different age groups, marital status, education status, type of occupation, awareness of LF elimination program and history of participating in the last cycle of MDA round was not associated with infection among the participants in the village in bivariate logistic regression.

When all of the factors suspected to be associated with infection prevalence were adjusted in a Multivariate logistic regression, again being a female (AOR=7.5, 95%CI=2.3-23.8) and history of ever participated in any of the MDA (AOR=4.6, 95%CI=1.6-13.9) round in the past were significantly found to be protective against microfilaria infection.

Table 5: factors associated with prevalence of infection

	Microfilaria Status			
Sex	**Positive(19)**	**Negative (298)**	**COR**	**AOR**
Female	4	188	1	1
Male	15	110	6.4 (2.1-19.6)	7.5 (2.3-23.8)
Age groups				
6-15	4	28	1	1
16-25	7	97	0.5 (0.1-1.9)	0.1 (0.002-6)
26-35	3	84	0.25(0.05-1.2)	0.25(0.002-29.4)
36-45	3	39	0.5 (0.1-2.6)	0.9(0.007-143)
46+	2	50	0.3 (0.05-1.6)	0.2(0.003-16.1)
Marital status				
Married	7	158	1	1
Not married	12	140	1.9 (0.8-5.1)	1.1 (0.06-17.6)
Education status				
Never been to school	4	53	1	1
Primary	9	198	0.6 (0.2-2.1)	0.7 (0.03-17.9)
Post primary	6	47	1.7(0.4-6.4)	2.1 (0.05-83.3)
Occupation				
Have income activity	12	210	1	1
No income activity	7	87	1.4 (0.6-3.7)	2.9 (0.2-45.5)
Stay time				
Less than 3 month	0	13		
More than 3 month	19	285		
Heard of LF elimination				
Yes	12	240	1	1
No	7	58	2.4 (0.9-6.4)	1.2 (0.4-3.6)
Ever participated				
Yes	6	195	1	1
No	13	103	4 (1.5-11.1)	4.6 (1.6-13.9)
Drug last cycle				
Yes	4	168	1	1
No	2	21	4 (0.7-23.3)	2.8 (0.4-21.7)
ITN last night				
Yes	14	213		
No	0	6		

COR-crude odds ratio AOR-Adjusted odds ratio

In history of taking MDA in the last round and the use of ITN last night some participants did not respond to these questions simply because they have never participated in the MDA and some do not possess ITNs

3.3. Infection and infectivity rates in LF vectors

To establish infection and infectivity rates of LF vectors laboratory dissections of mosquitoes collected from selected households were carried out. During the study period, 1010 mosquitoes were trapped and collected of these 92 were non vector species. The Lf vectors were 918 all of which were of the species *Culex quinquefasciatus,* out of these only 555 were alive and were dissected for the presence of *Wuchereria bancrofti* larval stages. Only 2 (0.4%) mosquitoes were found to harbour *Wuchereria bancrofti* larvae stages (LI and L2) none of the mosquitoes was found to harbour infective larvae stage (L3).

3.4. Knowledge and awareness of lymphatic filariasis elimination programme

Before the assessment on awareness of LF elimination programme individuals were asked if they are aware about LF. Those who were aware about LF were 91% and those who have not yet heard about LF were 9%. Among these 79% knew well about the LF elimination programme however about 21% of respondents were not aware about the LF elimination programme. The source of information was varied 37.9% heard from the radio, 23.7% knew because of professional background (health workers), 14.9% heard from other family members, 9.8% read from posters and heard from other people and the rest 16.5% got information from Newspapers teachers in school and TV. It is notable that the majority of the respondent seemed to have heard information from the radio.

The study also answered the level of awareness on mode of transmission of LF. The majority of the respondents 46.4% did not know how LF is acquired. However, interestingly 38.2% mentioned the mosquito bite. Others had misconception such as drinking coconut juice (9%) bewitched (6%), and unclear environment (2.2%) and drinking dirty water and sexual promiscuity similar proportion of 1.3%.

Understanding the link of the mosquito and LF was assessed by inquiring whether reduction of mosquito vectors can lead to decrease in LF infection. 52% of the respondents affirmed that reducing the number of mosquitoes would decrease LF infection. 27% of the respondents did not know and 12% indicated that reducing mosquitoes does not lead to reduction of LF the rest (9%) did not answer.

Participants were further asked if they know any sign and symptoms of LF the majority (58%) did not know any signs and symptoms of LF. However, 25.2% knew some of the signs and symptoms of LF. The respondents in varied proportions mentioned elephantiasis of the leg, elephatiasis of the breast, hydrocele and a small proportion of 6% mentioned acute filarial attacks and joint pains. Furthermore an inquiry was made as whether any member of the household of the respond had LF. It is notable that the majority 81% had no house hold member with LF. Only 10% of the respondents had a household member with LF. The rest of the respondents had no response.

This study investigated the knowledge of respondents about LF treatment and prevention. Although majority of respondents 55.2% have agreed that the best way of preventing LF is to take antifilarial drugs, there were also a great proportion of respondents 20.8% who answered that they do not know the means of preventing the LF. Measures concerning environmental control and anti-mosquitoes were not well known by respondents. It has been shown that only 48% of the study participants were aware about the community-based LF intervention while 43% were not aware about LF intervention in the village. Other remaining 9% did not answer to this question. In addition to this an inquiry was made on drug eligibility most respondents 49.5% answered that everyone was eligible. Others did not answer to the questions. There were also some respondents 5% who answered that adult men and women were eligible; meanwhile, other respondents had views that only individuals with elephantiasis take the tabltes and others had an opinion that the tablets are given to children under 5 years of age.

The level of participation of respondents in MDA program was investigated. The findings show that 63% answered that they have ever participated in the MDA while 37% have never participated. The main reason mentioned by respondents (36%) for them to participate in MDA was the worry about transmission of LF but also the fact that they were told by a health worker (11%). Other reasons did not have much influence on respondents. 36.3% of respondents did not answer this question because they did not participate in MDA. Respondents were asked to mention the things they like about MDA. The findings reveal that majority of respondents 25.9% liked the fact that it was easy to get to the distribution site, another thing that the respondents liked was the house-to-house distribution. Other 16.1% answered that there is nothing they like about MDA. About 36.3% did not answer the question basically because they did not participate in MDA. The results reveal that majority of respondents 53.6% did not like the adverse reaction of the drugs. There were also many respondents 36.3% who did not answer this question. Other reasons like unfriendly distributors and the fact that it took too much time were also mentioned as reasons for not liking the MDA program. The study conducted further inquiry to know how often the respondents have taken the antifilarial drugs in LF elimination program.

These results show that 39% of the respondents had taken the antifilarial drugs once and 10% twice per year. Other respondents 29% answered that they do not know about the antifilarial drugs.

Table 6: Level of knowledge on lymphatic filariasis elimination programme

Knowledge level	**frequency**	**Proportion (%)**
Poor knowledge	1	0.7
Good knowledge	133	99.3
Total	**134**	**100**

The levels of knowledge were determined by arbitrarily classified scores regarding the number of correct responses on questions relating to knowledge on LF elimination programme. A score of one point was assigned for each correct response, and the maximum score was 5. Respondents scoring 2 and above were

classified as having good level of knowledge while anyone with less than 2 of the score was classified as having a poor level of knowledge. The study revealed that 133(99.3%) of participants who responded to knowledge questions on LF elimination programme had good knowledge.

3.5 Participation in the last MDA Treatment Cycle

The respondents were asked whether they swallowed tablets in the last MDA cycle. From the results obtained, the majority of respondents 54 % swallowed the drugs in the last cycle of MDA intervention while only 7% of the respondents did not swallow the drugs in the last MDA cycle. About 39% did not answer this question basically because they had never participated in the MDA intervention. Further inquiring was made on reasons for not swallowing the drugs. The findings show that the majority of the participants 89.6% gave no answer to this question because they found no reasons for not swallowing the drugs. However, some respondents 2.2% indicated that they did not swallow the drugs because of the fear of side effects and others 1.6% had no access to the drugs, other reasons included not knowing about the distribution date and not being given the drugs.

Furthermore the findings show that 20.2% have swallowed the drugs only once since MDA intervention started in 2004 while 19.9% reported to have swallowed the drugs twice.

3.6 Utilization of Insecticide Treated Mosquito Nets

Of the study participants, 243 (76.7%) reported to possess ITN at home. The ITN were reported to be obtained from Health centres (77.4%), ITN distributers (15.6%), shops (3.7%) and Head of the house (3.3%). Those who possess ITNs 227 (93.4%) of the participants reported to use ITN the night before the interview. As shown in Table 6 the majority who possess ITN did not report to have used it the night before the interview and did not have any reason for not using it.

Table 7: Reasons for not using ITNs

Reason not using ITN	Frequency	Proportion
Alternative use of ant-mosquito measures	5	31.2
ITN doesn't fit with the bed	3	18.8
Heat gets worse under the ITN's	1	6.2
No reason	7	43.8
Total	**16**	**100**

Only, 119 (49%) of participants who possess ITN reported to retreats the mosquito nets periodically. Long lasting treated mosquito nets was the main reason 83 (76.9%) respondents who did not report to retreat mosquito nets periodically. Others reported not retreating mosquito nets because it is expensive (6.5%), didn’t like the smell of retreating drug (2.8%) and 13.9% they did not have any reason for not retreating the nets.

CHAPTER FOUR

DISCUSSION

4.1. Community Characteristics

The study was conducted in Mafuriko village, six hamlets were selected (Mikocheni, Mtakuja, Kihongwe Masagara, Kongwa, Mafuriko A, and Mafuriko B) and 317 respondents participated in the study. The prevalence of circulating filarial antigen in this village fluctuates from year to year. In the year 2008 the CFA prevalence was 12% and in 2009 it was 13% (Simonsen,et al.,2011). Among the 317 participants, 61% were females and this is twice as much as the male participants. Majority of the respondents were young adults in the age between 16 and 45 years. Subsistance farming is the main economic activity and 39.7% of the respondents were engaged subsistance farming. A small proportion (5.4%) was employed. About 30% were unemployed this group could be used as drug distributors and good amabassodors of LF elimination program.

4.2. Microfilaria Prevalence in Individuals aged 6 years and above

Non participation in MDA rounds provide potential reservoir for microfilaria this could maintain transmission after several rounds of MDA programmes (Boyd et al., 2010). During intervention the issue of noncompliance with MDA must be addressed to ensure that the microfilaria is not harboured in clusters of people. In this study the microfilaria prevalence was 5.99% in the community. This prevalence is very high in an area where more than 8 rounds of MDA have been instituted. This high prevalence may be the reason why a high prevalence (6.4%) of CFA (Simonsen et al 2011) is observed in Mafuriko village as these MF positive individuals serve as reservoirs of infection and therefore may perpetuate the infection in the area. Although low infection rates were established in the vectors this may be indicative of on-going transmission. Similar findings were observed in Haiti where children who were born within the period of 7 rounds of MDA in the area were found to have 14.3% CFA prevalence. Further investigations conducted to confirm the continued transmission of infection in this study revealed an MF prevalence of 4.6% despite

having more than 6 rounds of MDA. In addition to that high rates of infection in mosquitoes were observed. Poor community compliance with MDA was the main factor observed in this study (Boyd et al., 2010). A similar observation was also found in Samoa where high level of infection after several rounds of MDA was associated with poor community compliance with MDA (Hayley et al., 2011). These observations are corroborated by the current findings at Mafuriko where poor compliance to MDA was also discerned. The current measure of MDA success as proposed by WHO is microfilaremia prevalence of less than 1% in a community. If microfilaremia prevalence is less than1% it is thought that transmission of the parasite cannot be sustained and there should be few or no incidence of infection (Richards et al., 2011).

When all of the factors suspected to be associated with infection prevalence were adjusted in a Multivariate logistic regression, being a female (AOR= 7.5, 95%CI=2.3-23.8) and history of ever participated in any of the MDA (AOR=4.6, 95%CI=1.6-13.9) rounds in the past were found to be significantly protective against microfilaria infection. Similar findings were found in Haiti, where the odds of being positive with infection was significantly higher in those people who had never participated in MDA than those who had ever participated in MDA (Boyd et al., 2010) Socio-economic and cultural factors (example health status of the family is responsibility of a mother/woman) linked to the behaviours of women in the community can explain this observed difference (Prado., 1992).

4.3. Infection and infectivity rates in LF vectors

The analysis revealed that only 2 vectors out of 555 dissected were carriers of *Wuchereria bancrofti* larva stage L1 and L2. There was no single vector which carried L3. This indicates that the level of infection and infectivity was very low considering the number of vectors examined. Although the observed infectivity and infection rates are low the presence of infected mosquitoes is indicative of continued transmission. All the mosquitoes collected were *Culex quinquefasciatus* species. High utilization of ITNs (79%) in Mafuriko village may be the reason why

Anopheles mosquitoes which have high susceptabilty of pyrethroids (Kulkarni et al., 2007) that is incorporated in ITNs have not been collected in this study. *Culex* mosquitoes have proved to be resistant to pyrethroids in a number of studies (Khayrandish and Wood., 1993; Chandre et al 1998).

Achievement of 0% infection rate in mosquitoes may be necessary to totally interrupt *Culex* transmitted lymphatic filariasis (Ramaiah et al., 2003).

4.4. Knowledge and Awareness of Lymphatic Filariasis and LF Elimination Programs

4.4.1 Knowledge and Awareness on Lymphatic Filariasis

This study evaluated awareness and knowledge on LF elimination program. The results show that 91% of respondents were aware about LF. However, only 38.2% knew how LF was transmitted. This shows that although LF is well known, there are still some people who do not have knowledge about the transmission of LF. This high percentage of people ignorant of how LF is transmitted indicates that there is also high percentage of people who are not protected. This is also shown by the percentage of respondents who did not know that reducing the population of mosquitoes lead to reducing the transmission of LF infection. This shows that the community does not implement measures to control the diseases. This can be one of the factors for continuous and sustained transmission of LF infection. The little knowledge available is obtained from radio. Low level of community-based interventions to increase the level of awareness and knowledge in the community can be one of the factors that lead to continuous and sustained transmission of LF infection. Literature also report that the knowledge on cause and transmission of LF was poor and people ignore the role of mosquitoes in the transmission of the disease, even after various health communication activities associated with MDA (Rath et al, 2006). Other studies also reported poor awareness about the role of mosquitoes in the transmission of LF (Ramaiah et al, 1996 and Babu and Kar 2004).

Majority of respondents in the study area expressed the idea that the major effect of LF is the poor socio-economic status. This is because people fail to carry on with their activities when they are sick. However, some respondents about 38.5% did not know the effects of LF. The proportion of those who do not know the effects of LF is still high which means that the efforts to participate in LF elimination program is low because they do not understand how they can be affected if they get sick, this may be one of the reasons which make people fail to protect themselves against the disease.

Kumari et al (2005) and Gyapong et al. (2000) have argued that the lack of understanding and documentation of LF's socio economic consequences have led to a gross underestimation of its impact. The absence of good understanding of socio cultural impacts of LF can impede on the progress of global elimination programme (Shona et al., 2007). This study has also observed poor awareness on the social effects of LF among the participants this may hamper their participation in LF intervention programs.

4.4.2 Knowledge about LF Elimination Programme

In this study, the results indicate that the majority of the respondents believed that the best way of preventing LF is through administration of antifilarial drugs. The respondents knew very little about environmental management like cleaning the environment and undertaking anti-mosquito measures. The knowledge about community-based interventions was also low because only 48% knew about the community-based interventions. The implications of this limited knowledge of LF intervention are that people in the community do not participate in these intervention and therefore, these interventions do not reach intended goals.

Poor means of health communications may limit community knowledge about diseases interventions and its prevention. It was observed that people who are informed about LF elimination interventions get information from health workers and some from radios. Others means of communication about health issues are not yet well developed in the study area. This may explain why majority of the respondents had taken the drugs once or twice only despite the fact that there has

been eight rounds of MDA in the study area. Some studies indicate that the use of local health information is a necessary tool for improving health condition of the community and make health informations available to them (Luck et al, 2006).

The literature also reveals that in some areas where endemicity is very low and people know very little about the disease, they give very low priority to the diseases and its prevention; in such places, coverage and compliance rates are generally very low (Babu and Karr, 2004). The knowledge about LF elimination programme is good but the knowledge about the disease in Mafuriko village is poor this may make them put low priority on the disease and the elimination program.

4.5. Participation in the last cycle of treatment.

Among 317 study participants only 201 have ever participated in the MDA and 172 (85.6%) out of these swallowed the drugs in the last cycle of treatment.

The level of participation in mass drug administration was 63%. This level is still low because the 37% who did not participate in MDA are still many people to influence the transmission of LF. The reasons given for participation in the MDA were because people are worried about the transmission of LF and others participated just because the health workers have told them to do so. The reasons for liking the MDA were found to be the easiness to get to the distribution site and the distribution from house-to-house. However, they did not like the adverse reaction of the drugs and others did not like the unfriendly distributors and the fact that it took too much time to get the drugs. Some participants gave no definite reasons for not swallowing the drugs similar findings are reported in Burdwarn and West Bengal India (Roy et al., 2013). Little sensitization campagns to emphasize on importance of drug swallowing campagns could be the reasons for some of the participants not swallowing the drugs. To increase population compliance with LF MDA agrresive campaings like what was done in malaria control progams are needed.

The reported coverage for MDA in Tanga is 80%-90% (Simonsen et al., 2010) Respondents who did not swallow the drugs in the last MDA cycle were only 7%, considering that 39% had never participated in MDA; it makes around 46% of people who did not swallow tablets in the last MDA cycle. This implies that the MDA coverage during the last cycle of treatment is 54%, this does not meet the required WHO coverage of ≥80% to interrupt transmission and therefore it may be one of the factors for continued transmission of LF in Mafuriko village. The highest coverage reported in the area could reflect the number of ant-filarial drugs distributed and not the number of drugs swallowed. Similar to the current study a study conducted in Orissa revealed that 83% of the population had received the drugs but only 49% consumed the drugs (Babu and Kar 2004).
With these many people not swallowing the drugs, it will be difficult to ensure the effectiveness in eliminating LF in Mafuriko village. The reasons for not swallowing the drugs were fear of the side effects of the drugs and lack of access to drugs because they were not made available to some people.

The findings at Mafuriko village are suppoted by other studies which have established similar reasons why people do not swallow drugs and the predominant reasons were that health workers or drug distributors did not visit the family, followed by absence during the distribution and others found it unnecessary to take the drugs and fear of the side effects (Babu and Karr, 2004; Nandha et al., 2007).

It was also observed that the number of times people have participated in different MDA cycles were still very low, with the majority of people participating once or twice. Yet there have been eight MDA cycles and only 0.6% participated seven times and 0.9% participated five times. This reflects pitfalls in distribution system or education massages of the MDA. These proportions are very low for the MDA to be effective. The observed poor compliance with MDA cycles may continue to provide a reservoir of MF and propagate the transmission cycle. Studies conducted in Sri Lanka and Phillipines found non-compliance rates of 30% and 28% this study has also observed a 46% noncompliance with MDA in the last cycle of treatment. With

this low level of participation in MDA it is difficult to interrupt the transmission of LF in the community.

A study conducted in Egypt has proved to have reduction in infection and transmission after conducting a study to determine effect of MDA 5 on lymphatic filariasis, the study determined infection both in human and mosquitoes (Ramzy et al., 2006). There are several reasons to this ongoing transmission in an MDA region including poor population compliance, poor adherence to the available vector control interventions, high base line prevalence of infection (Kyelem et al., 2008).

4.6. Utilization of Insecticides Treated Nets

Insecticide Treated Nets were well known in the study area with 96.8% of respondents aware of ITNs. The ITNs are more popular with malaria campaigns and people generally use them to protect themselves against malaria and not LF infection. Malaria National Control Program has coordinated many initiatives to combat malaria, and distribution of ITNs was one of the interventions made across the country. The studies have also highlighted that the mosquito control efforts targeting malaria inadvertently interrupted the transmission of LF in some areas (Njenga et al, 2011). This explains the reasons why *Anopheles* mosquitoes have not been collected in this study meaning that the program against malaria is working. But on the other hand this has not been effective against *Culex* mosquitoes (The only LF vector collected in this study) as this species has proved to be less susceptible to pyrethroid an insecticide that is incoorparated in the ITNs (Kulkarni. et al 2007). In addition to this, resistance to pyrethroid has been widely recorded in *Culex quinquefasciatus* (Khayrandish and Wood 1993; Chandre et al., 1998) often resulting in low efficacy of ITNs against this species (Curtis et al., 1996; Guillet et al., 2001). However, with all ITNs campaigns against malaria 3.2% of respondents still were not aware of ITNs. This number seems small but compared to the dissemination of information done about ITNs, this number of people who are not aware of ITNs is still high.

However, those who possess ITNs were 79% and this is lower than 96.8% of those who know about ITNs. This shows that some people are aware about ITNs but they do not have means or will to get their own ITNs. Respondents mentioned that they were getting these ITNs from health centres or health workers but very few 2.8% bought the ITNs using personal resources. Most do not retreat because they are using Long Lasting Treated Nets (LLTNs).

Moreover, literatures have emphasized that prevention from mosquito bite by use of insecticides treated bed nets strongly suppresses the risk of *W.bancrofti* transmission (Pedersen et al., 2002) and that insecticides treated bed nets should be considered in order to interrupt the transmission (Richards et al., 2011).

4.7. Other findings

During the interview with the community it was found that there are some people who were given only one type of antifilarial drugs rather than a combination of the two (Ivermectin and albendazole). The study discovered this when they were shown the drugs and asked if they swallowed them in the last MDA cycle. Few particpants responded that they were given only the large tablets which refer to albendazole. The main drug against filarial worms is ivermectin and it can work alone even without albendazole. Missing it during the distribution means the distribution cycle may be invalid.

CHAPTER FIVE

CONCLUSION

This chapter provides a summary of key findings, a conclusion and recommendations. The findings have been organized according to the objectives of the study: to determine the microfilaria prevalence in individuals aged 6 years and above at Mafuriko village; to determine the infection and infectivity rates in LF vectors, *Culex quinquefasciatus*, *Anopheles gambiae complex* and *Anopheles funestus*; to assess the level of community knowledge and awareness on LF elimination programme; to determine the proportion of individuals who took the medication in the last cycle of treatment and to assess the level of utilization of insecticide treated mosquito nets

Conclusion

Although the MDA rounds have succeeded in lowering the overall prevalence of LF infection in Tanga from 22.1% to 10.6% (Simonsen et al., 2010) they have not yet succeeded in interrupting transmission of the parasite after eight rounds of MDA. Initial projection for the LF elimination predicted that five to six rounds of the MDA at coverage of ≥ 80% would be sufficient to interrupt the transmission cycle of the parasites. Transmission is persistent in Tanga after more than 6 recommended MDA rounds. Presence of microfilaria positive individuals (5.99% prevalence) may be the main factor that influences high CFA prevalence in children who were born within the intervention period. Other factors include presence of infected vectors, noncompliance with MDA and lack of knowledge about the disease.

RECOMMENDATIONS

The following are the recommendations of the study

- **Observation:** Poor participation in MDA rounds.
- **Recommendation:** The LF elimination program should consider increasing the awareness, knowledge and behavior change to increase compliance of the community in taking antifilarial drugs. The benefits beyond LF control programs and the use of the drugs should be explained. More effective means of communication to reach people at the grass root will be crucial to improve compliance. The LF program should increase the efforts on the information dissemination in the community to increase participation in MDA and more monitoring and evaluation efforts are needed to track the level of participation of the community members in various rounds of MDA in the community.
- **Observation:** only *Culex quinquefasciatus* were collected.
- **Recommendation:** Measures to fight mosquitoes, especially *Culex* species control should also be emphasized.
- There is a need to conduct further research
    - A study should be conducted to assess knowledge of the drug distributors on the LF and MDA programs.
    - Insecticide that can prove efficacy against *Culex quiquefasciatus*

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APPENDICES

Appendix I: Consent Form (English Version)

Name of Principal investigator: Lillian Charles

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

DIRECTORATE OF RESEARCH AND PUBLICATIONS

INFORMED CONSENT FORM

ID-NO:

Dear participant,

Consent to participate in this study

Greetings! My name is Lilian Charles, a student from Muhimbili University of Health and Allied Sciences. I am working on my dissertation with the objective of finding out factors influencing sustained transmission of lymphatic filariasis in children of this village.

Purpose of the study

The objectives of this study are to determine microfilaria prevalence in individuals aged 6 years and above; to determine infection and infectivity rate in mosquitoes, to determine proportional of individuals who took treatment in the last cycle of mass drug administration to assess level and awareness of individuals on lymphatic filariasis and MDA and to assess utilization of insecticides treated mosquito bed net.

What Participation Involves

If you agree to participate in the study, you will be required to answer questions and to provide a finger prick blood for detection of microfilaria. Do not hesitate because in this interview there is no RIGHT or WRONG answers.

Confidentiality

All collected information we will be entered into computers with only the study identification number. Confidentiality will be provided and unauthorized persons will have no access to the data collected.

Risks

You are assured no harm will occur if you participate or do not participate in this study.

Rights to withdraw and alternatives

Participating in this study is completely voluntarily. If you choose not to participate in any part of the study or if you decide to stop participating you will not get any harm, you can stop participating in this study at any time, even if you have already given your consent. Refusal to participate or withdraw from the study will not involve penalty or loss of any benefits to which you are otherwise entitled.

Benefits

The information from interview and laboratory results that will be obtained will provide the real status of lymphatic filariasis infection in this area and factors influencing the infection. This will enable the national lymphatic filariasis elimination programme to formulate necessary strategies to solve the problem. Also those who will be found with infection will be referred to the programme manager for treatment.

Who to contact

If you have any question about this study, you should contact the principal investigator

Lilian Charles, phone: 0755 819009

Signature

Do you agree to participate in this study?

Participant agrees---------- participant disagrees----------(put a tick on the right space)

I, ---------- have read/understood the contents in this form, my questions have been answered. I agree to participate in this study.

Signature of the participant _____

Signature of the research assistant_____

Date of signed consent _____ _____ /03/2012

Appendix II: Consent Form (Swahili)

Jina la mtafiti mkuu: Lilian Charles
CHUO CHA AFYA NA SAYANSI SHIRIKISHI MUHIMBILI
KURUGENZI YA UTAFITI NA MACHAPISHO
FOMU YA RIDHAA
ID-NO :

RIDHAA YA USHIRIKI KATIKA UTAFITI

Habari! Jina langu ni: **Lilian Charles, ni** mwanafunzi wa shahada ya pili ya uzamili katika Chuo Kikuu cha Sayansi za Afya Muhimbili. Ninafanya utafiti kama sehemu ya masomo yangu, **kuhusu sababu zinazofanya** kuwepo **na watoto wenye maambukizi ya vijidudu vya matende na mabusha japokuwa dawa zimesha tolewa mara nane** Utafiti huu unafanyika katika manispaa ya Tanga kijiji cha Mafuriko.

Umuhimu wa utafiti huu

Matokeo ya utafiti huu yatasaidia kuelewa kiwango cha tatizo hili na kujua viashiria vyake katika eneo hili.

Ushiriki unahusisha nini

Ushiriki unahusisha kukubali kujiunga na utafiti huu kwa hiari na kujibu maswali kama yalivyo katika dodoso la utafiti huu.

Usiri

Taarifa zote utakazo jaza katika dodoso ni siri na wala jina lako halitaingizwa katika kompyuta isipokua namba ya dodoso tu.

Uwezekano wa kutokea jambo la hatari

Sitarajii kama kuna jambo lolote baya linaweza kutokea kwa kushiriki katika utafiti huu.

Haki ya kujitoa na mambo mbadala

Ushiriki wako katika utafiti huu ni wa hiari. Hivyo unayo haki ya kujibu aukutojibu swali lolote katika dodoso. Kukataa kujibu swali lolote hakuna adhabu yoyote wala haupotezi haki zako kama mshiriki na katika kupata huduma za afya ikiwemo kupata dawa za matemde na mabusha kila mwaka.

Faida kwa Mshiriki

Endapo utakubali kushiriki katika utafiti huu unaweza ukapata faida ya moja kwa moja au isiyo ya moja kwa moja. Faida isiyo ya moja kwa moja, ni kwamba majibu yako yatakuwa mchango mkubwa katika matokeo ya jumla ya utafiti huu kwanza kwa kujua ukubwa wa tatizo hili; pili, ambayo yanatarajiwa kuleta mapendekezo yatakayosaidia kupunguza tatizo hili kwenye eneo hili na Tanzania kwa ujumla. Faida ya moja kwa moja unaweza ukapata matibabu endapo utakutwa una maambukiza ya ugonjwa wa matende. Kama utakuwa na swali au tatizo unashauriwa kumweleza mtafiti.

Mawasiliano

Endapo utakuwa na swali lolote kuhusu utafiti huu tafadhali wasiliana na msimamizi wa utafiti huu mtafiti mkuu **Lilian Charles, Chuo Kikuu cha Afya na Sayansi shirikishi, Muhimbili, P.O.Box 65015,Dar es Salaam**

Je unakubali kushiriki? Ninakubali kushiriki_____ Sikubali kushiriki_____

Mimi_____nimesoma/nimesomewa na kuyaelewa maelezo yaliyo katika fomu hii. Maswali yangu yamejibiwa. Ninakubali kushiriki katika utafiti huu.

Sahihi ya mshiriki_____, Sahihi ya Mtafiti_____

Tarehe ya kusaini_____

Appendix III: Questionnaire Based Data Collection

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

IDENTIFICATION

Questionnaire number_____ Date_____

Name of the village _____ Name of the hamlet_____

Household number_____ Time start: _____

Introduction

I am a health care worker from Muhimbili University of Health and Allied Sciences. The LF elimination programme utilizing MDA has been going on in this community since the year 2004. Therefore we are here to partly assess the impact of the programme on controlling the LF infection in this village. Your participation is voluntary and all information that you will provide will be handled confidentially.

Name of the Interviewer_____

1: SOCIAL DEMOGRAPHIC CHARACTERISTICS

Instructions to the interviewer

- State the question to the respondent and wait for response.
- **DO NOT** read the alternatives to the respondent.
- Write the corresponding number of the response in the **box** against the response given by the respondent

1. **Age** _____
2. **Sex**_____
3. **Marital status**

[1.] Married or living together ☐

[2.] Divorced / Separated ☐

[3.] Widowed ☐

[4.] Single ☐

4. **What is the highest level of education you have attained?**

[1.] None ☐

[2.] Primary ☐

[3.] Secondary ☐

[4.] Post Secondary ☐

[5.] Other specify_____

5. What is your main occupation?

[1.] Crop production ☐

[2.] Pastoralist/Animal production ☐

[3.] Fishing ☐

[4.] Employee (Wage employment) ☐

[5.] Business ☐

[6.] Others (Specify)……

6. For how long have you been living this area

[1] ≤ 3 months ☐

[2] 4-6 months ☐

[3] 7-11 months ☐

[4] ≥ 12 months ☐

I1: KNOWLEDGE ON LYMPHATIC FILARIASIS

7. Have you ever heard of lymphatic filariasis?

[1.] Yes ☐ IF YES go to question 8

[2.] No ☐ IF NO go to question 16

8. What is the source of information?

[1] Family members ☐

[2] Radio ☐

[3] TV ☐

[4] Health worker ☐

[5] News paper ☐

[6] Teacher/school ☐

[7] Others_____

9. How does one acquire lymphatic filariasis?

[1] Mosquito bite ☐

[2] Unclean environment ☐

[3] Drinking dirty water ☐

[4] Drink coconut juice ☐

[5] Sexual promiscuity ☐

[6] Bewitchment ☐

[7] Others_____

10. Does reducing the population of mosquitoes help to reduce lymphatic filariasis?

[1.] YES ☐

[2.] NO ☐

[3.] Don't know ☐

[4.] Others specify_____

11. What are the symptoms/ signs of lymphatic filariasis?

[1] Hydrocele ☐

[2] Elephantiasis of arm ☐

[3] Elephantiasis of leg ☐

[4] Elephantiasis of breast ☐

[3] Joint pains ☐

[4] Acute filarial attacks ☐

[5] Don't know ☐

[6] Others specify_____

12. Are there any members of this household with hydrocele/ elephantiasis

[1] YES ☐

[2] NO ☐

13. What are the effects of having lymphatic filariasis

[1] Social stigma ☐

[2] Poor economic status ☐

[3] Failure to get marriage partner ☐

[4] Inability to have sexual intercourse ☐

[5] Others specify_____

111: LYMPHATIC FILARIASIS TREATMENT AND PREVENTION

14. What can you do to prevent lymphatic filariasis infection?

[1] Anti- mosquito measures ☐

[2] Taking antifilaria drugs ☐

[3] Avoid drinking coconut juice ☐

[4] Having clean environment ☐

[5] Avoid promiscuity ☐

[6] Staying far from a diseased person ☐

[7] No stagnant water around ☐

[8] Don't know ☐

[9] Others_____

15. Are there any community-based lymphatic filarisis interventions organized by the village government/Health Committee?

[1] YES ☐ IF YES go to question 16

[2] NO ☐ IF NO go to question 17

16. **What kind of intervention is provided by the village government?**

[1] Distribution of antfilaria drugs to everybody in the area ☐

[2] Hydrocelectomy ☐

[3] Regular screening for infection ☐

[4] Treat children with antifilarial drugs ☐

[5] Clearing of the bushes ☐

[6] Care for those with elephantiasis ☐

[7] Distribution of ITN's

[8] Others specify_____

17. Have you ever heard about LF elimination program

[1] YES ☐ IF YES go to question 18

[2] NO ☐ IF NO go to question 21

18 How **did you hear about the LF elimination programme?**

[1] Heard from friend or neighbour ☐

[2] Heard about it on the radio ☐

[3] Heard about it on the television ☐

[4] Saw poster or pamphlet ☐

[5] Heard about it from health worker ☐

[6] Read from the News paper

[7] Heard from the Teacher/School ☐

[8] Others (specify)_____

19. How often do people take antifilaria drugs in lymphatic filariasis elimination programme? ☐

[1] Once per year

[2] Twice a year ☐

[3] When a distributer shows up ☐

[4] Don't know ☐

[5] Others specify_____

20. Who is eligible to take tablets during LF elimination programme?

[1] Every one ☐

[2] Individuals aged five years and above ☐

[3] Children below 5 years ☐

[4] Pregnant women ☐

[5] Individuals with elephantiasis ☐

[6] Individuals with hydrocele ☐

[7] Don't know ☐

[8] Others specify_____

21. Have you ever participated in the MDA?

[1] YES ☐ IF YES go to question22

[2] NO ☐ IF NO go to question 28

22. What were the reasons for your participation in the lymphatic filariasis elimination programme? ☐

[1] Told to by a health worker ☐

[2] Radio ☐

[3] Television spot ☐

[4] Concerned about the disease ☐

[5] Worried about transmission

[6] Wanted to prevent transmission to future children ☐

[7] Others specify_____

23. What did you like about the MDA? ☐

[1] Easy to get to distribution site ☐

[2] House-to-house distribution ☐

[3] Knowledgeable distributors ☐

[4] No long wait for drugs ☐
[5] Medication easy to swallow
[6] Medication does not cause any problem ☐
[7] Improves children health ☐
[8] Received other information or services ☐
[9] Others specify_____

24. What didn't you like about the MDA?

[1] Site too far away ☐
[2] Drugs ran out, or weren't available ☐
[3] Unfriendly distributor ☐
[4] Took too much time ☐
[8] Didn't dose other members of my family ☐
[9] Adverse reactions to drugs ☐
[7] Others specify_____

1V: COMPLIANCE WITH MDA

25. Did you swallow tablets like these in the last MDA cycle? *(Show the tablets)*

[1] Yes ☐ IF YES go to question 27
[2] No ☐ IF NO go to question 26

26. What are your reasons for not swallowing the drugs?

[1] Fear of side effects experienced in the last cycle ☐
[2] Don't have access ☐
[3] Not around during distribution ☐
[4] The distributors did not show up ☐
[5] Had problem of getting to the distribution centre ☐
[6] I don't need drugs ☐
[7] I am a healthy person ☐
[8] I don't know ☐
[9] Others specify_____

27. How many times have you ever swallowed the drugs from LF elimination programme since 2004? ☐

[1] Once ☐
[2] Two times only ☐
[3] Three times only ☐
[4] Four times only ☐
[5] Five times only ☐
[6] Six times only ☐
[7] Seven times only
[8] Eight times only ☐
[9] More than once, do not know the exactly number ☐
[10] Don't remember ☐

GO TO QUESTION 29

28. What were the reasons for not participating in the MDA?

[1] Did not know about the MDA? ☐
[2] Nobody gave me the drugs ☐
[3] I hear the drugs have serious side effects ☐
[4] Distributors are unfriendly ☐
[5] My village was not visited ☐
[6] No reasons ☐
[7] Others specify _____

V: ITNs UTILAZATION

29. Have you ever heard about ITN's?

[1] YES ☐ IF YES go to question 30
[2] NO ☐ IF NO go to question 40

30. Where did you get the information from? ☐

[1] Media ☐
[2] Health worker ☐
[3] Health centre ☐
[4] Neighbour
[5] Family member ☐ ☐

[6] Teacher/School

[5] Other (*specify)* _____

31. Do you possess an ITN?

[1] **YES** ☐ IF YES go to question 32

[2] NO ☐ IF NO go to question 40

32. Where did you obtain the ITN from?

[1] Bought ☐

[2] Malaria prevention ITN's distributers ☐

[3] Health centre ☐

[4] Provided by Head of family ☐

[5] Others_____

33. Do you sleep under the ITN?

[1] YES ☐ IF YES go to question 34

[2] NO ☐ IFNO go to question 39

34. How often do you sleep under an ITN?

[1] Every day ☐

[2] Some time ☐

[3] I mount it when the health worker is coming for inspection ☐

[4] Others_____

35. Did you sleep under ITN last night?

[1] YES ☐

[2] NO ☐ IF NO go to question 39

36. Do you retreat your ITN?

[1] YES ☐ IF YES go to question 37

[2] NO ☐ IF NO go to question 38

37. How frequent do you retreat your ITN?

[1] Once a year ☐

[2] More than once a year ☐

[3] Others specify_____

GO TO QUESTION 43

38. What are the reasons for no treating your ITN? ☐

[1] Don't like the smell ☐

[2] Expensive ☐

[3] Long lasting treated net ☐

[3] Don't know

[4] Others specify_____

GO TO QUESTION 40

39. If you posses ITN but you do not sleep under it what are the reasons for that

[1] ITN's are provided freely but not needed ☐

[2] Alternative use of ant-mosquito measures ☐

[3] Don't like the colour of the net ☐

[4] ITN doesn't fit with the bed ☐

[5] Heat gets worse under the ITN's ☐

[6] Do not like the smell of the net

[7] Other (*specify)* _____

40. What other alternative mosquito preventive measures do you use besides use of ITN's? ☐

[1] Untreated bed net ☐

[2] Mosquito coils ☐

[3] Burn coconut husks ☐

[4] Mosquito repellents

[5] Other specify_____

41. Did you sleep under the untreated net last night?

[1] YES ☐ IF YES go to question 43

[2] NO ☐ IF NO go to question 42

42. If you did not sleep under untreated bednet last night what are the reasons?

[1] It is hot under the net ☐

[2] The net is torn ☐

[3] I sprayed the house with ant mosquito spray ☐

[4] Used mosquito coil ☐

[5] I don't have any mosquito net ☐

[6] I sleep under an ITN ☐

[7] Others specify_____

43. At what time do you normally go to bed? ☐

[1] Before 21:00hours

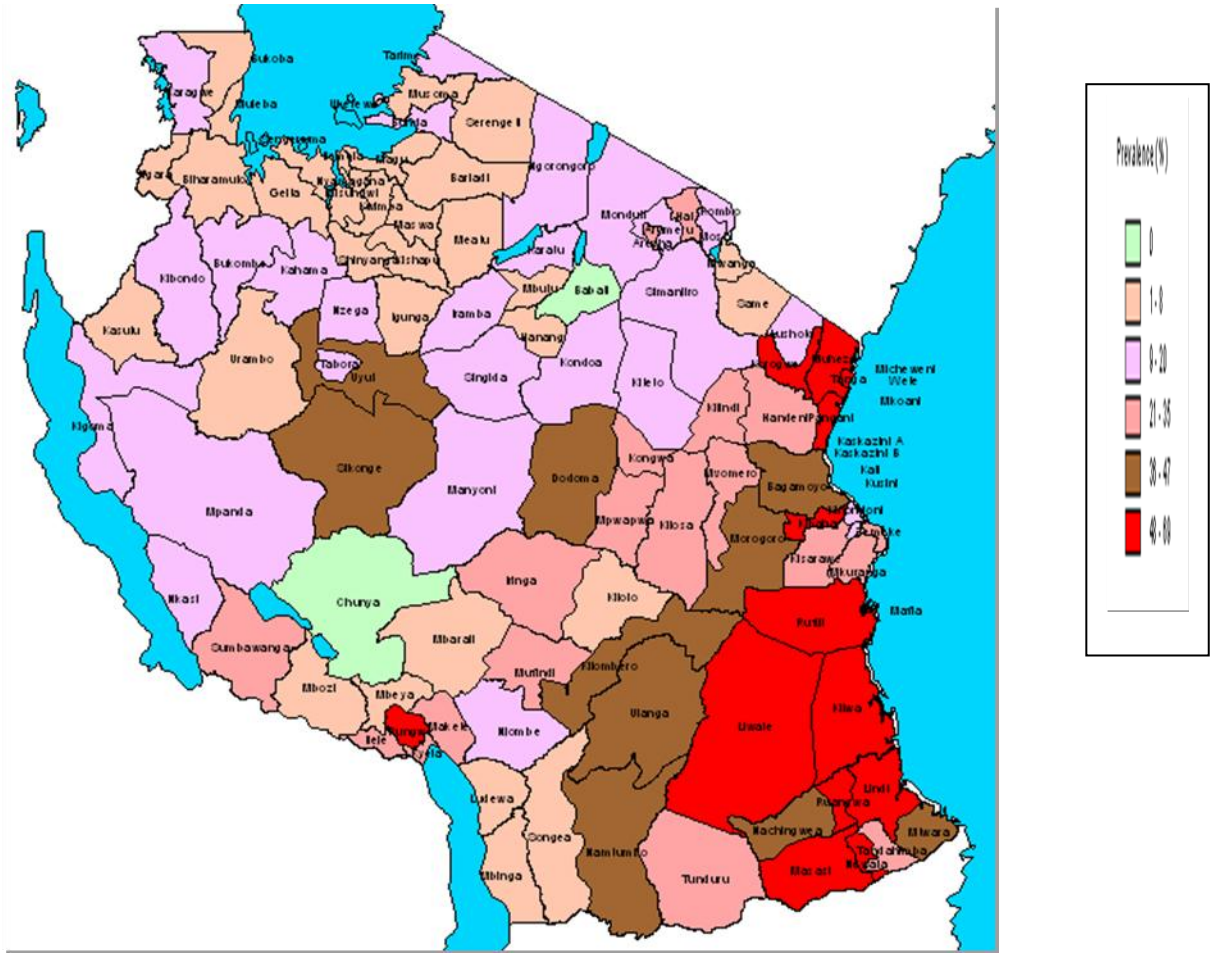
[2] After 21:00hours ☐

END OF THE INTERVIEW

THANK YOU.

Appendix IV. Map of Tanzania showing all the 21 regions,

Endemicity and distribution of Lymphatic filariasis



Source: (NIMR-2009)

Appendix V: Dodoso

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

UTAMBULISHO

Namba ya Dododoso_____ Tarehe_____

Jina la kijiji _____ Jina la kitongoji_____

Namba ya nyumba_____ Muda: _____

Utangulizi

Mimi ni mwanafunzi ninayesomea Shahada ya Uzamili ya kudhibiti Magonjwa yanayopatikana katika ukanda wa Tropika katika Skuli ya Afya ya Umma na Sayansi za Jamii katika Chuo Kikuu cha Afya na Sayansi-Tiba cha Muhimbili. Kampeni ya kutokomeza ugonjwa wa matende na mabusha (ngiri maji) kwa njia ya Mpango wa Utoaji wa dawa za matende na mabusha kwa Umma imekuwa endelevu kwenye jamii hii tangu mwaka 2004. Hivyo basi, sisi tuko hapa kuangalia ni kwa kiasi gani mpango huu umeweza kudhibiti ugonjwa wa matende na mabusha kwenye kijiji hiki. Ushiriki wako ni wa hiari na maelezo yeyote utakayo yatoa yatahifadhiwa kwa siri.

Jina la muulizaji_____

1: TAARIFA BINAFSI

Maelekezo kwa Muulizaji

- Taja swali kwa mshiriki na usubiri akujibu.
- **USISOME MAJIBU kwa mshiriki**.
- Andika namba ya jibu alilotoa mshiriki mbele ya **kisanduku** kinachoendana na jibu lililotajwa.

1 **Umri** _____

2 Jinsia_____

3. Hali ya ndoa

[5.] Ameoa/kuolewa ☐

[6.] Mtalikiwa/tengana ☐

[7.] Mjane ☐

[8.] Sijao/sijaolewa ☐

4. Kiwango chako cha elimu ni?

[6.] Sijasoma

[7.] Darasa la saba

[8.] Sekondari

[9.] Chuo

[10.] Mengineyo_____

5. Unafanya kazi gani?

[7.] Mkulima

[8.] Mfugaji

[9.] Mvuvi

[10.] Muajiriwa

[11.] Mfanyabiashara

[12.] Mengineyo (elezea)……

6. Umeishi eneo hili kwa muda gani?

[1] ≤ miezi 3

[2] Miezi 4-6

[3] Miezi 7-11

[4] ≥ miezi 12

I1: UELEWA JUU YA UGONJWA WA MATENDE NA MABUSHA

7. Umewahi kuusikia ugonjwa wa mabusha na matende?

[3.] Ndiyo ☐ kama jibu ni ndiyo nenda swali la 8

[4.] hapana ☐ kama jibu ni hapana nenda swali la16

8. Umeusikia kutoka kwa nani?

[1] Mwanafamilia

[2] Redio

[3] Luninga

[4] Mtumishi wa afya

[5] Magazeti

[6] Mwalimu/shule

[7] Mengineyo_____

9. Mtu anawezaje kupata maambukizi ya ugonjwa wa matende na mabusha?

[1] Kwa kung'atwa na Mbu ☐

[2] Kwa kuishi kwenye mazingira machafu ☐

[3] Kwa kunywa maji machafu ☐

[4] Kwa kunywa maji ya madafu ☐

[5] Sexual promiscuity ☐

[6] kwa kulogwa ☐

[7] Mengineyo_____

10. Je kupunguza uwingi wa Mbu kunaweza kupunguza maambukizi ya ugonjwa wa matende na mabusha? ☐

11. NDIYO ☐

12. HAPANA ☐

13. Sijui

14. Mengineyo (fafanua)_____

15. Dalili za ugonjwa wa matende na mabusha ni zipi?

[1] Kuwa na busha /ngiri maji ☐

[2] Matende ya mikono ☐

[3] Matende ya miguu ☐

[4] Matende ya matiti ☐

[5] Maumivu ya viungo ☐

[6] Homa za mitoki ☐

[7] Sijui

[8] Mengineyo (fafanua)_____

16. Kuna mtu kwenye familia yenu mwenye mabusha au matende?

[1] NDIYO ☐

[2] HAPANA

17. Athari za ugonjwa wa matende na mabusha ni zipi? ☐

[1] Kutengwa na jamii

[2] kuwa na hali duni ya kiuchumi

[3] Kushindwa kupata mwenza

[4] Kushindwa kufanya tendo la ndoa

[5] Mengineyo (fafanua)_____ ☐

☐

☐

☐

111: UELEWA KUHUSU KINGA NA TIBA ZA UNGONJWA WA MATENDE NA MABUSHA

14. Njia gani zinatumika kutibu na kujikinga na ugonjwa wa matende na mabusha?

[1] Kujikinga na mbu ☐

[2] Kumeza dawa za matende na mabusha ☐

[3] Kuto kunywa maji ya madafu ☐

[4] Kuishi kwenye mazingira masafi ☐

[5] Avoid promiscuity ☐

[6] Kukaa mbali na watu wenye matende na mabusha ☐

[7] kuepuka kuishi maeneo yenye maji yaliyotuama ☐

[8] Sijui ☐

[9] Mengineyo_____ ☐

18. Je, kuna juhudi yoyote inayohusisha mapambano dhidi ya matende na mabusha ambayo inaratibiwa na serikali ya kijiji au kamati ya afya?

[1] NDIYO ☐ kama jibu ni ndiyo nenda swali la 16

[2] HAPANA ☐ kama jibu ni hapana nenda swali la 17

19. **Ni huduma gani za kupambana na ugonjwa wa matende na mabusha zinazotolewa na serikali ya kijiji?**

[1] kusambaza dawa za matende na mabusha kwa kila mtu ☐

[2] Upasuaji kwa watu wenye mabusha ☐

[3] Upimaji wa maambukizi ya mabusha na matende mara kwa mara

[4] Kutibu watoto kwa kuwapa dawa za matende na mabusha ☐

[5] Kufeka nyasi zinazozunguka makazi ya watu ☐

[6] Kutoa huduma kwa watu wenye matende ☐

[7] Kusambaza vyandarua venye dawa ☐

[8] Mengineyo (elezea)_____ ☐

☐

20. Umewahi kusikia kuhusu Mpango wa Utoaji wa dawa za Matende na Ngiri maji kwa Umma?

[1] NDIYO ☐ kama jibu ni ndiyo nenda swali LA 18

[2] HAPANA ☐ kama jibu ni hapana nenda swali la 21

18. Je, **umesikia kuhusu Mpango wa Utoaji wa Dawa kwa ajili ya kutokomeza ugonjwa wa matende na mabusha kutoka kwa nani??**

[1] Rafiki/jirani ☐

[2] Redio ☐

[3] Luninga ☐

[4] Mabango na vipeperushi ☐

[5] Mfanyakazi wa afya ☐

[6] Nimesoma kwenye gazeti ☐

[7] Mwalimu/Shule ☐

[8] Mengineyo (elezea)_____

19. Dawa za ugonjwa wa matende na mabusha zinaotolewa mara ngapi katika kampeni ya kutokomeza ugonjwa wa matende na mabusha?

[1] Mara moja kwa mwaka ☐

[2] Mara mbili kwa mwaka ☐

[3] Mgawaji akitokea ☐

[4] Sijui ☐

[5] Mengineyo (elezea)_____

20. Nani anapaswa kunywa dawa zinatolewa kwenye kampeni ya kutokomeza ugonjwa wa matende na mabusha?

[1] Watu wote ☐

[2] Watu wenye umri miaka 5 kuendelea ☐

[3] Watoto wenye umri chini ya miaka mitano ☐

[4] Wajawazito ☐

[5] Watu wenye matende ☐

[6] Watu wenye mabusha ☐

[7] Sijui ☐

[8] Mengineyo (elezea)_____ ☐

21. Umewahi kushiriki kwenye Mpango wa Utoaji wa Dawa za matende na mabusha kwa Umma?

[1] NDIYO ☐ kama jibu ni ndiyo nenda swali la 22

[2] HAPANA ☐ kama jibu ni hapana nenda swali LA 28

22. Sababu gani zilikufanya ushiriki kwenye Mpango wa utoaji wa dawa za matende na mabusha katika kampeni za kutokomeza ugonjwa huu?

[1] Shinikizo kutoka kwa watu wa afya ☐

[2] Redio

[3] matangazo ya kwenye luninga ☐

[4] Msukumo kuhusu ugonjwa ☐

[5] Naogopa maambukizi yasiendelee

[6] Nilitaka kuepusha maambukizi kwa kizazi kijacho ☐

[7] Mengineyo (elezea)_____ ☐

23. Kitu gani kilikufurahisha kwenye ugawaji wa dawa za matende na mabusha katika kampeni za kutokomeza matende na mabusha? ☐

[1] urahisi wa kufika kwenye eneo dawa zinapogawanywa ☐

[2] Ugawaji wa dawa nyumba kwa nyumba ☐

[3] uelewa mkubwa wa wagawaji ☐

[4] kutokusubiri dawa kwa muda mrefu ☐

[5] Dawa humezeka kirahisi

[6] Dawa haisababishi matatizo yeyote ☐

[7] Dawa zinaboresha afya za watoto ☐

[8] Upatikanaji wa habari na huduma nyingine za afya ☐

[9] Mengineyo (elezea)_____

24. Kitu gani hukukipenda kuhusu Mpango wa Utoaji wa Dawa za matende na mabusha kwa Umma? ☐

[1] Umbali wa eneo dawa zinapogawanywa

[2] Dawa zilikwisha / hazikuwepo ☐

[3] Mgawaji hakuwa mkarimu ☐

[4] Ilichukwa muda mrefu ☐

[5] Watu wengine wa familia yangu hawakupata dawa ☐

[6] Matatizo baada yakumeza dawa ☐

[7] Mengineyo (elezea)_____

1V: HALI YA KUKUBALIANA NA MPANGO WA UTOAJI WA DAWA ZA MATENDE NA MABUSHA KWA UMMA

25. Je, Umeshawahi kumeza vidonge kama kama hivi vilivyotolewa na Mapango wa Utoaji wa Dawa za matende na mabusha kwa Umma? ***(Onyesha vidonge)***

[1] NDIYO ☐ kama jibu ni ndiyo nenda swali la 27

[2] HAPANA ☐ kama jibu ni hapana nenda swali la 26

26. Ni sababu zipi zlikufanya usimeze dawa za matende na mabusha kwenye mzunguko uliopita?

[1] Kuogopa matatizo yanayojitokeza baada ya kumeza dawa niliyoyapata mara ya mwisho nilipomeza dawa hizi ☐

[2] kukosa fursa ya huduma hiyo ☐

[3] Kutokuwepo katika eneo kipindi cha ugawaji wa dawa ☐

[4] Mgawaji hakutokea ☐

[5] Ugumu wa kufika kituo cha ugawaji ☐

[6] Sihitaji dawa ☐

[7] Mimi ni mzima kiafya ☐

[8] Sifahamu ☐

[9] Mengineyo elezea_____

27. Tangu mwaka 2004 umeshawahi kumeza dawa za mabusha na matende mara ngapi?

[1] Mara moja ☐

[2] Mara mbili tu

[3] Mara tatu tu ☐

[4] Mara nne tu

[5] Mara tano tu ☐

[6] Mara sita tu

[7] Mara saba tu ☐

[8] Mara nane tu

[9] Zaidi ya mara moja sina uhakika ni mara ngapi ☐

[10] Sikumbuki ☐

Nenda swali no 29 ☐

28. Ni sababu zipi zilizokufanya usishiriki kwenye Mpango wa Utoaji wa dawa za matende na mabusha kwa Umma?

[1] Sifahamu chochote kuhusu utoaji wa dawa? ☐

[2] Hakuna mtu alienipa dawa hizo ☐

[3] Nilisikia kwamba dawa zina madhara ☐

[4] Wagawaji sio wa karimu ☐

[5] Kijiji changu hakikutembelewa ☐

[6] Sina sababu ☐

[7] Mengineyo elezea _____

V: MATUMIZI YA VYANDARUA VYENYE DAWA

29. Je umewahi kusikia kusuhu vyandarua vyenye dawa?

[1] Ndio ☐ Kama jibu ni NDIYO nenda swali namba 30

[2] Hapana ☐ Kama jibu ni HAPANA nenda swali namba40

30. Umepata habari hizi kutoka wapi?

[1] Vyombo vya habari ☐

[2] Mtumishi wa afya ☐

[3] Kituo cha afya ☐

[4] Jirani ☐

[5] Mwanafamilia ☐

[6] Mwalimu/Shule

[5] Mengineyo elezea _____

31. Je unacho chandarua chenye dawa?

[1] Ndiyo ☐ Kama jibu NDIYO nenda swali namba 32

[2] Hapana ☐ Kama jibu ni HAPANA nenda kwenye **swali namba 4**

32. Je umepata wapi chandarua chenye dawa?

[1] Nimenunua ☐

[2] Kutoka kwa waratibu wa kuzuia ugonjwa wa maleria ☐

[3] Kituo cha afya ☐

[4] Kutoka kwa kiongozi wa familia ☐

[5] Mengineyo_____

33. Je, unalala kwenye chandarua chenye dawa?

[1] **Ndiyo** ☐ Kama jibu NDIYO nenda swali namba 34

[2] Hapana ☐ Kama jibu ni HAPANA nenda swali **namba39**

34. Unalala mara ngapi kwenye chandarua chenye dawa?

[1] Kila siku ☐

[2] Mara chache ☐

[3] Nakitundika watumishi wa afya wanapo kuja kukagua ☐

[4] Mengineyo_____

35. Je, jana ulilala kwenye chandarua chenye dawa?

[1] Ndiyo ☐

[2] Hapana ☐ **Kama jibu ni HAPANA nenda kwenye swali namba 39**

36. Je huwa unachovya chandarua chako kwenye dawa?

[1] Ndiyo ☐ Kama jibu NDIYO nenda swali namaba 37

[2] Hapana ☐ Kama jibu ni HAPANA nenda kwenye swali **namba 38**

37. Je, hua unachovya chandarua chako kwenye dawa mara ngapi?

[1] Mara moja kwa mwaka ☐

[2] Zaidi ya mara moja kwa mwaka ☐

[3] Mengineyo elezea_____

Nenda swali namba 43

38. Je, ni sababu zipi zinazo kufanya usi chovye chandarua chako kwenye dawa?

[1] Sipendi harufu ya dawa ☐

[2] Gharama za dawa ni kubwa

[3] Natumia chandarua kilichowekwa dawa ya muda mrefu

[3] Si fahamu ☐

[4] Mengineyo elezea_____ ☐

Nenda swali namba 40

39. Je, ni kwanini una miliki chandarua chenye dawa alafu haukitumii?

[1] Vyandarua vyenye dawa vinatolewa bure lakini sihitaji ☐
[2] Ninatumia njia mbadala ya kujikinga na mbu ☐
[3] Sipendi rangi ya neti ☐
[4] Chandarua hakitoshei kitandani ☐
[5] Joto linaongezeka unapotumia chandarua ☐
[6] Sipendi harufu ya dawa ☐
[7] Mengineyo elezea _____

40. Je, ni njia zipi mbadala unazo zitumia kujikinga na Mbu badala ya chandarua chenye dawa?

[1] Vyandarua visivyokuwa na dawa ☐
[2] Dawa ya mbu ya kuchoma ☐
[3] Kuchoma vifuu vya nazi ☐
[4] Dawa ya kupuliza ☐
[5] Mengineyo elezea_____

41. Je, umelala kwenye chandarua kisichokua na dawa jana usiku?

[1] Ndiyo ☐ Kama jibu ni NDIYO nenda kwenye swali namba 43
[2] Hapana ☐ Kama jibu ni HAPANA nenda kwenye swali namba 42

42. Je, ni sababu gani zilifanya usilale kwenye chandarua kisicho na dawa jana usiku?

[1] Chandarua kina leta joto ☐
[2] Chandarua kimechanika
[3] Nilipulizia dawa ya mbu ☐
[4] Nilitumia dawa ya kuchoma
[5] Sina chandarua ☐
[6] Nililala kwenye chandarua ☐
[7] Mengneyo elezea_____

43. Kwa kawaida huwa unalala sangapi? ☐

[1] Kabla ya saa tatu kamili usiku ☐
[2] Baada ya saa tatu kamiliki usiku. ☐

Mwisho wa mahojiano

ASANTE!