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THE NATIONAL PROGRAMME TO ELIMINATE LYMPHATIC FILARIASIS FROM ETHIOPIA

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ABSTRACT

Lymphatic filariasis (LF) is one of the most debilitating and disfiguring diseases common in Ethiopia and is caused by Wuchereria bancrofti. Mapping for LF has shown that 70 woredas (districts) are endemic and 5.9 million people are estimated to be at risk. The national government's LF elimination programme commenced in 2009 in 5 districts integrated with the onchocerciasis programme. The programme developed gradually and has shown significant progress over the past 6 years, reaching 100% geographical coverage for mass drug administration (MDA) by 2016. To comply with the global LF elimination goals an integrated morbidity management and disability prevention (MMDP) guideline and a burden assessment programme has also been developed; MMDP protocols and a hydrocoele surgical handbook produced for country-wide use. In Ethiopia, almost all LF endemic districts are co-endemic with malaria and vector control aspects of the activities are conducted in the context of malaria programme as the vectors for both diseases are mosquitoes. In order to monitor the elimination, 11 sentinel and spot-check sites have been established and baseline information has been collected. Although significant achievements have been achieved in the scale up of the LF elimination programme, there is still a need to strengthen operational research to generate programme-relevant evidence, to increase access to morbidity management services, and to improve monitoring and evaluation of the LF programme. However, the current status of implementation of the LF national programme indicates that Ethiopia is poised to achieve the 2020 goal of elimination of LF. Nevertheless, to achieve this goal, high and sustained treatment coverage and strong monitoring and evaluation of the programme are essential.

Keywords: *Lymphatic filariasis, Wuchereria bancrofti, Ethiopia*

INTRODUCTION

Lymphatic filariasis (LF) is a neglected tropical disease (NTD) caused by three species of filarial worm: *Wuchereria bancrofti*, *Brugia malayi* and *Brugia timori*. LF is prevalent in 73 tropical and sub-tropical countries (1), and is transmitted via the bite of an infected mosquito. Whilst infection can be acquired during childhood, the overt chronic manifestations of the disease may occur in later life. Those clinical manifestations of greatest public health significance are lymphoedema of the limbs, genital disease (most commonly hydrocoele) and recurrent acute attacks. Estimates suggest that 19.4 million men worldwide suffer from hydrocoele and almost 16.7 million individuals, mostly women, have lymphoedema of the leg (1); although these estimates probably do not reflect the true magnitude of the global burden from this infection.

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Due to these disfiguring clinical manifestations, LF is regarded as one of the leading causes of global disability. Following the World Health Organization (WHO) classification of LF as a potentially eradicable disease, the World Health Assembly (WHA) adopted Resolution WHA 50.29 in 1997, which called on Member States to initiate steps to eliminate LF as a public health problem (2). Three years later, the WHO launched the Global Programme to Eliminate LF (GPELF) with each endemic member country expected to set up a programme for elimination of the disease. The two key components of the strategy being to interrupt transmission of the disease through mass drug administration (MDA) with Ivermectin and Albendazole drugs, and to prevent disability and manage morbidity of affected populations (3).

METHODS

To date, a strong progress has been made in terms of MDA, with 18 countries having completed treatment and a further 22 having delivered MDA in all endemic areas. However, with only 24 out of 73 endemic countries reported to have an active morbidity management and disability prevention (MMDP) component in their LF programmes, further efforts are needed to ensure greater access to care for those disabled and disfigured by the clinical manifestations of LF (4). Ethiopia initiated the LF elimination programme in 2009. This manuscript describes the LF programme in Ethiopia documenting the milestones, and lessons learnt through the implementation of the programme.

Epidemiology and geographical distribution of LF in Ethiopia: LF is one of the most debilitating and disfiguring diseases common in Ethiopia and in this country is caused by *Wuchereria bancrofti* (5). *Anopheles* species of mosquitoes are the main vectors for LF transmission in Ethiopia (6).

Tremendous progress has been made on mapping of LF in Ethiopia. The School of Medicine at Addis Ababa University together with the Carter Center and the Federal Ministry of Health (FMOH) initiated the mapping of LF in 112 districts from 2008 to 2010, in the following 5 regions: Benishangul-Gumuz, Gambella, SNNPR (i.e. Keffa, Sheka, and Bench-Maji zones), Oromia (i.e. West Wollega zone), and Amhara (i.e. North Gondar zone). The mapping included 11,685 individuals living in 125 villages in 112 districts. The result of these surveys indicates that LF is endemic in 34 districts of the 5 regions. The overall prevalence rate was 3.7%, but high geographical clustering and variation in prevalence (ranging from 0% to more than 50%) was found (7).

In 2013, a nationwide integrated mapping of LF and podoconiosis (a disease that also causes lymphoedema and elephantiasis) in 658 districts of 7 regional states and 2 city administrations was conducted. Overall, 130,166 people were examined in 1,315 communities in the 658 districts. In total, 140 people were found to be positive for circulating LF antigen by immuno-chromatographic card test (ICT) in 89 communities. According to the results, 75 of the 658 districts surveyed in the 9 regions were found to be LF endemic[6]. Of these, 45 had a borderline result, where validation of the results was required before deciding to scale up the MDA (6). For this reason, the FMOH in collaboration with the Ethiopian Public Health Institute (EPHI) jointly conducted a validation survey in these 45 districts and found that only 3 districts were endemic for LF.

Together, the LF mapping results indicate that infection is endemic in 70 districts in 6 regions summarized in Table 1 (8).

Table 1. Prevalence of Lymphatic Filariasis in Ethiopia

Mapped districts	Endemic districts	Prevalence	Method of Survey	Year of survey and reference
112	34	0% to 50%	ICT cards	2012, Shiferaw et al (7)
658	75	0% to 5.8%	ICT cards	2014, Rebollo et al (6)
45*	3	0% to 2.1%	ICT cards	2016, Unpublished report

* Remapping of 45 districts with borderline results reduced the total number of LF endemic districts to 3.

The estimated total population at risk of LF for the 70 endemic districts in Ethiopia is 5.9 million (Table 2 & Figure 1) (8). Among the 70 LF-endemic districts, 29 are co-endemic with podoconiosis, 45 are co-endemic with onchocerciasis and 69 are co-endemic with soil transmitted helminthes (STH).

Table 2: Regional distribution of filariasis endemic districts

Region	No. of Endemic Districts
Amhara	8
Tigray	1
Oromiya	17
SNNP	24
Gambella	7
Benishangul-Gumuz	13
Total	70

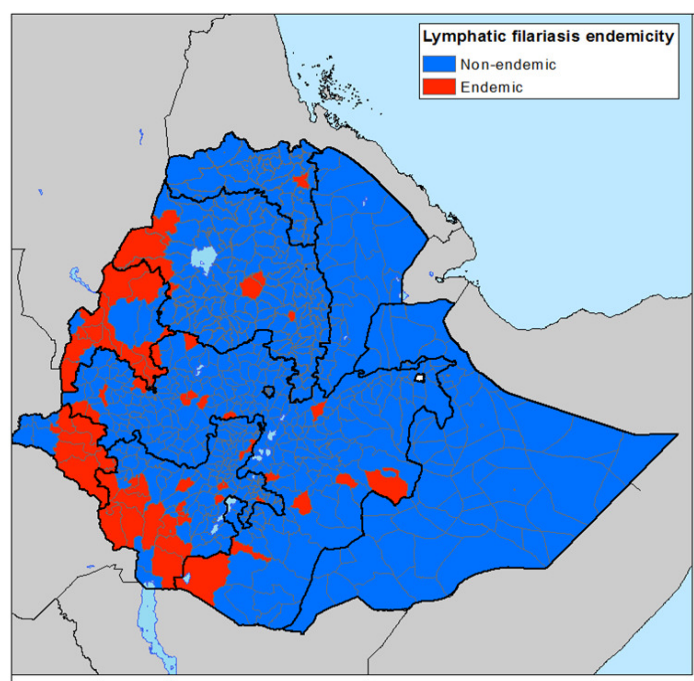


Figure 1. Distribution of Lymphatic Filariasis, Ethiopia

Though detailed information about lymphoedema and hydrocoele burden is not yet available, the first phase of the mapping surveys (2008-2010) carried out in a sample population of 11,685 individuals living in 112 districts of western Ethiopia, indicated that the prevalence of hydrocoele (in males) and limb lymphoedema was 0.8% and 3.6%, respectively (7).

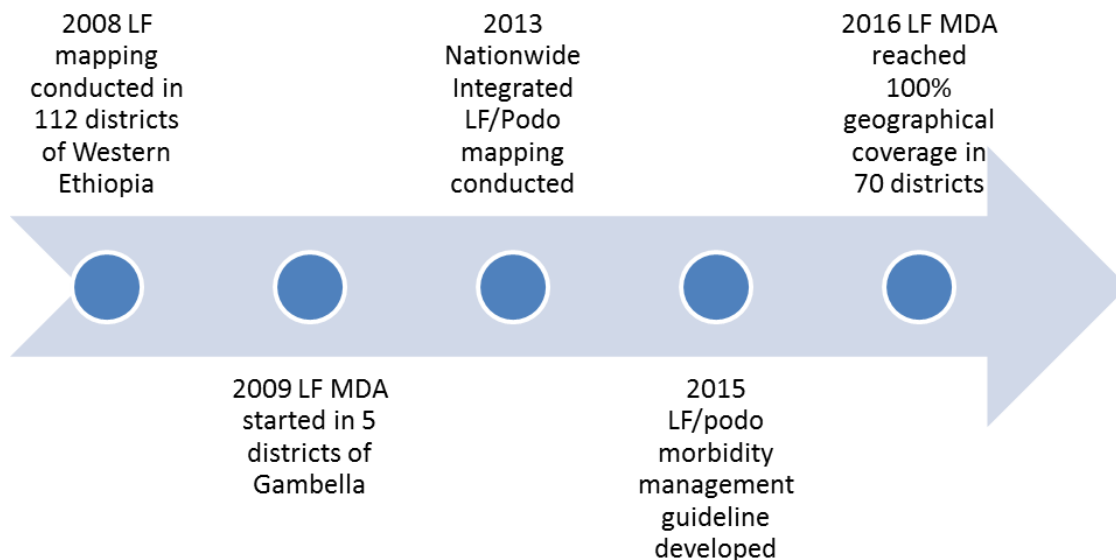


Figure 2: Lymphatic Filariasis programme milestones

Programme Implementation: The NTD team under the disease prevention and control directorate has formulated a national master plan (2016-2020) (8) for the Elimination of Lymphatic Filariasis and other NTDs in Ethiopia and has established a National Task Force (Figure 2). In line with the global strategy, the government initiated the implementation of the national LF elimination programme in 2009, integrated with the onchocerciasis control programme, to undertake programmes aimed at controlling and eliminating lymphatic filariasis as a public health problem in Ethiopia by 2020.

MDA Process: Medication has been distributed by the health development army who has been trained in the correct ways of administering the tablets to endemic communities. The approach used in most of the communities included a number of training sessions prior to each activity. Zonal-level ‘training of trainers’ style training followed by district-level training has been conducted every year before MDA. This training is then cascaded to the community-level each year. This is the most appropriate remedy to overcome the challenges posed by pastoralist populations and to reduce non-compliance. Training for community leaders is conducted to sensitize and educate them about LF, including how to organize the MDA. Training sessions on health communication are also organized in each community and focus on a number of key messages related to LF treatment, transmission, and prevention, as well as the clinical manifestations of LF. Training is followed by an intense community mobilization campaign using available media including banners, posters, audio spots on local radio stations, and messages delivered by megaphones to inform and encourage the population to participate in the MDA. Different types of posters have been distributed to each village and posted in a range of places to increase visibility. Community mobilization and sensitization is also conducted by health extension workers and the health development army at each village using mechanisms such as social and religious gatherings and local market places where people are gathered. The community elders and the community administration, as well as the community at large, are key players in facilitating the MDA activities. Finally, following the distribution, reported coverage data aggregated by age and gender is collected from each distribution post and submitted to the FMOH.

Mass Drug Administration: The programme started slowly, with only 5 districts in Gambella region being treated through MDA, giving geographical coverage of only 7% in 2009. However, there has been significant progress over the past 6 years with all endemic districts (70 in total) expected to implement MDA by 2016, thus giving 100% geographical coverage. The number of districts covered by MDA each year since 2009 and the cumulative geographical coverage are summarized in Figure 3 and Figure 4.

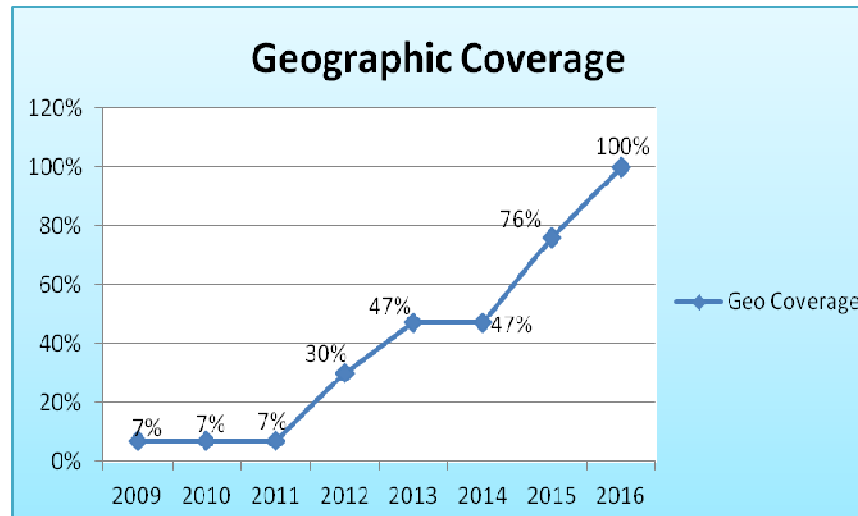


Figure3. Percentage distribution of districts covered by MDA from 2009-2016.

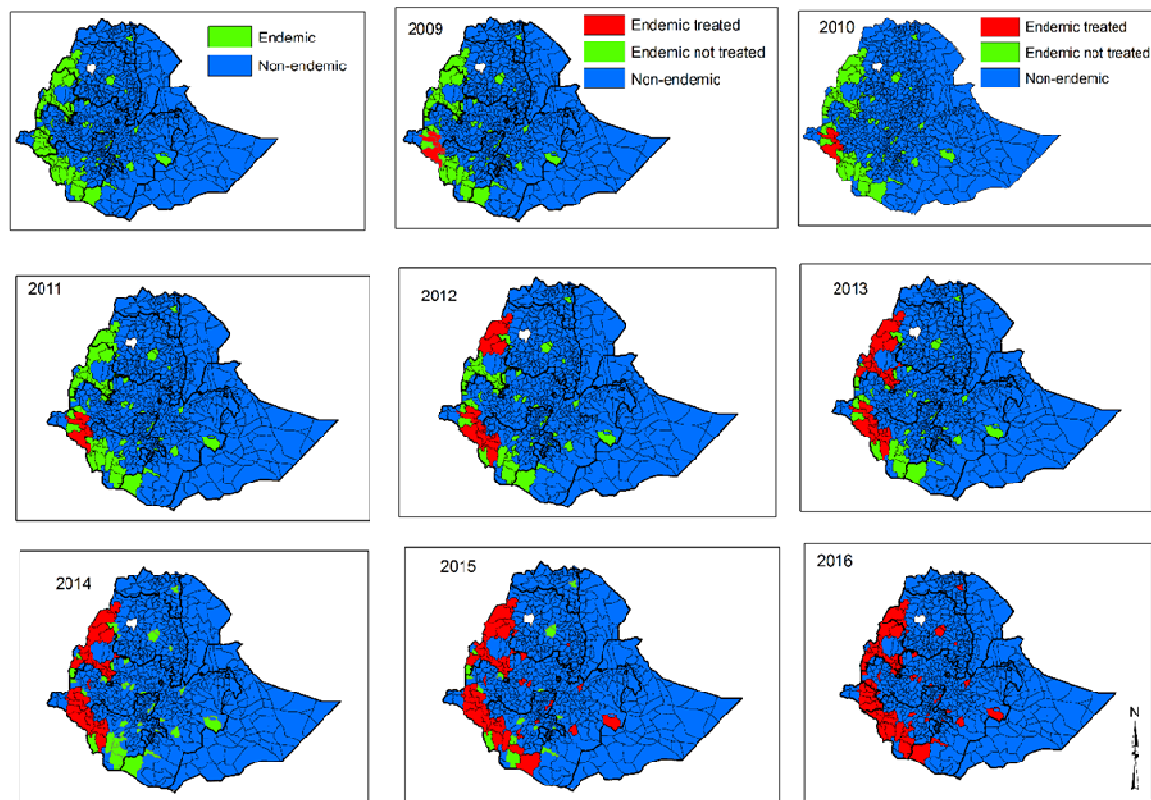


Figure 4. Map showing the geographic coverage for mass drug administration for Lymphatic Filariasis

With the gradual scale-up of geographical coverage, the number of people targeted and treated each year has increased notably. The annual treatment coverage rates are shown in Table 3, including data from 2009 to 2015. Overall, satisfactory programme coverage rates have been achieved each year in the targeted areas since 2009 and maintained at a high level since 2015, ranging from 72.7% to over 87%. In subsequent years, the FMOH with partner support has made significant achievements in the scaling up of treatments as shown in Table 3. LF treatment has increased rapidly with 77,424 individuals treated in 2009 to 3.7 million treated by end of 2015, with the average reported treatment coverage reaching 87% in 2015. Most notably, the national epidemiological coverage for LF steadily increased over the years to reach over 65%, treating around 1.6 million people each year since 2009 to the end of 2015 (Table 3, Figure 5).

Table 3: Trend of therapeutic coverage of LF treatment

Year	# Targeted	# Treated	Therapeutic/Reported Coverage
2009	99,037	77,422	78%
2010	101,013	73,435	73%
2011	103,896	84,929	82%
2012	920,032	711,701	77%
2013	1,872,078	1,422,298	76%
2014	1,887,095	1,533,916	81%
2015	3,732,694	3,205,901	86%

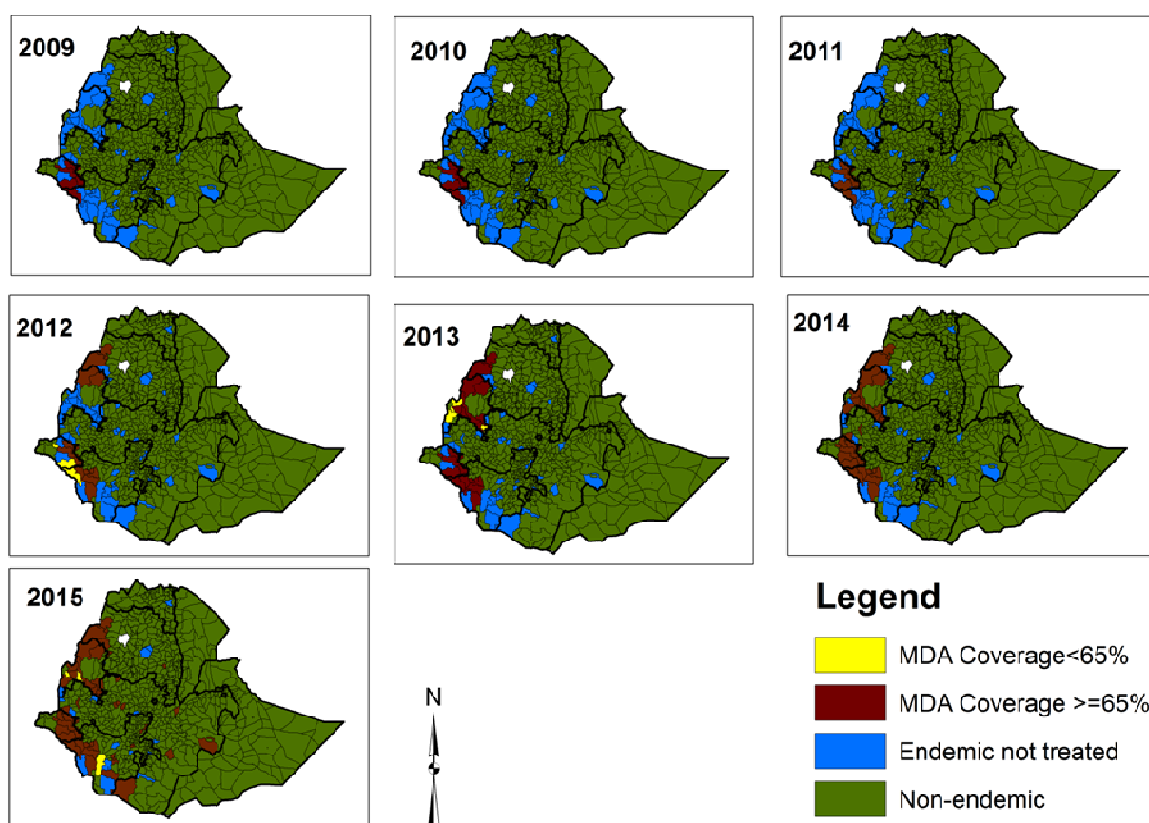


Figure 5. Treatment coverage for lymphatic filariasis mass drug administration

Morbidity Management: In addition to MDA, morbidity management is another component of the LF elimination programme in Ethiopia. To begin to initiate the scale-up of integrated morbidity management for LF and podocooniosis, an integrated (MMDP) guideline has been developed for both diseases. The MMDP guideline provides practical guidance on patient management and disability prevention based on practical in-country field experiences. It provides guidance on planning, implementation and monitoring of MMDP activities and also provides the best available information on MMDP for acute dermatolymphangioadenitis (ADLA; acute attacks), lymphoedema or elephantiasis, and hydrocoele. Furthermore, the FMOH in collaboration with partners has prepared a hydrocoele surgical handbook to standardize and scale up hydrocoele surgery services in the endemic districts. Together with the Surgical Society of Ethiopia and partners, the FMOH conducted a hydrocoele surgery training and 15 surgeons were trained and 18 patients treated during the session.

To estimate and identify lymphoedema and hydrocoele cases, a burden assessment protocol has been developed and so far, conducted in 35 districts (50% of endemic districts). The burden assessment is important to identify patients with lymphoedema and hydrocoele for prioritization of MMDP resources. The burden assessment was conducted through a complete census of every household in the endemic districts by trained health extension workers. The FMOH is working to ensure 100% access to lymphoedema management services in all endemic districts by 2020. Currently, there are 7 districts (10%) providing lymphoedema management integrated with podocooniosis treatment.

Vector Control: Ethiopia has fostered a robust long-lasting insecticidal net (LLIN) distribution and indoor residual spraying (IRS) programme. The linkage between LF prevention and sleeping under a bed net is well-understood. The major malaria and LF vector in Ethiopia is the *Anopheles* species (9). Therefore, malaria interventions will also play an important role in the prevention of LF. The FMOH conducted a malaria stratification study using transmission intensity data (annual parasite incidence per 1000 population -API), altitude information and expert opinion (10). As per this stratification, 67 (96%) districts are co-endemic with low, moderate and high malaria endemic districts. Moderate malaria endemic districts are targeted for LLINs while high endemic districts are targeted for both LLINs and IRS[10]. Among the 67 co-endemic districts 46 (66%) are eligible for LLINs and 25 (36%) are targeted for both LLINs and IRS intervention.

Monitoring and Evaluation: Sentinel and spot-check sites are important to provide programme managers with reasonably accurate information on the trend of infection over the course of the programme (11). Therefore, in order to assess the impact of MDA, sentinel sites were established in 11 districts and baseline information collected. WHO recommends that at least 1 sentinel site should be identified for each implementation unit (IU) or at a minimum, at least 1 site per 1,000,000 population in the IU (11). In Ethiopia, the sentinel sites are located in the following endemic districts:

Table 4. Sentinel site community-based results by district

	District	Result ICT (%)	Year of Survey, ICT	Result Microfilaria (MF)	Year of Survey, MF
1	Metema	23/100(23)	2008-2009	4/360(1.1)	2011
2	Quarra	17/100(17)	2008-2009	0/304(0)	2011
3	Guba	55/100(55)	2008-2009	32/404(7.9)	2011
4	Meneat Goldiya	27/100(27)	2008-2009	0/608(0)	2011
5	Maji	21/100(21)	2008-2009	1/308(0.32)	2011
6	Abobo	81/303(26.7)	2008-2009	0/311(0)	2014
7	Sherkole	19/306(6.2)	2012	-	-
8	Srba Abay	73/300(24.3)	2012	-	-
9	Mao Komo	3/273(1.1)	2012	-	-
10	Gambela Zuria	66/193(34)	2008-2009	0/201(0)	2014
11	Harana Buluk	2/363(0.6)	2014	-	-

Partnership: The FMOH provides overall policy direction, as well as coordinating and creating an enabling environment so that stakeholders and partners can contribute to the country's efforts towards achieving the envisaged elimination goal by 2020. It officiates the endemicity and disease burden data not only to help evidence-informed planning and resource mobilization, but also to set benchmarks to monitor and evaluate the programme. The Ministry further plays a pivotal role in harmonizing the contributions of stakeholders and partners while enhancing complementarity and avoiding duplication of efforts.

To strengthen the LF elimination programme, FMOH established and supports a Technical Working Group (TWG) for LF and podoconiosis. The members of the TWG include stakeholders, implementing partners, research institutes and a local university. The TWG, under the auspices of the National NTD Taskforce (NNTF), advises the Ministry on strategic issues. By doing so, they set high standards to guide programming through self-updating on new developments and proposing revisions for policy consideration, make expertise contributions in developing and harmonizing national strategic plans, technical guidelines and tools, reviewing progress in treatment coverage and disease burden to assure that the country is on-track towards reaching set targets, design mechanisms to document and disseminate research findings, and analyzing best practices and lessons learnt to improve programme performance. The TWG also helps in identifying and materializing priority operational and implementation research to ensure policy and programme quality. Together with the implementing partners, the members also help in documenting best practices for adoption by others.

The main LF programme implementing partners include The Carter Center (TCC), Research Triangle Institute (RTI), and the Centre for Neglected Tropical Diseases at the Liverpool School of Tropical Medicine (CNTD/LSTM). TCC and RTI support both LF and onchocerciasis endemic regions while CNTD supports largely LF endemic regions. Out of 70 endemic districts, TCC has supported MDA since 2009 in 25 districts in Gambella, Benishangul-Gumuz, SNNP and Amhara regions; RTI supports 23 districts in Oromia and Benishangul-Gumuz regions through Light for the World and the Fred Hollows Foundation, and CNTD supports 22 districts in SNNP, Amhara and Oromia regions (Figure 6). RTI and CNTD have further made the necessary preparations to support MMDP interventions in LF endemic districts of Benishangul-Gumuz, Tigray and Oromia regions and SNNPR. The implementing partners closely work with the Ministry and Regional Health Bureaus in designing and managing model programmes that can serve for training, cross-learning and scaling up.

The WHO Country Office is also a member of the TWG and provides technical support to the Ministry as well as regions. The Ethiopian Public Health Institute (EPHI) has played a prominent role in LF mapping throughout the country between 2013 and 2016. Furthermore the Institute is a key partner in generating evidence through sentinel surveillance sites that are distributed throughout the endemic districts.

Universities and other research institutions are continuously contributing in addressing the knowledge gap on the disease, not only by gathering and disseminating new knowledge from elsewhere, but also by undertaking small and large scale studies in the different parts of the country. They are further contributing in equipping their para-medical and medical students with basic knowledge and skills.

Civil society organizations, such as the Surgical Society of Ethiopia (SSE), are also supporting the elimination efforts through preparing disease management manuals, developing skills of surgeons and other health workers on innovative approaches, and promoting quality assurance through close follow-up of both surgeons' performance and treatment outcomes. At present, SSE is working with the Ministry, RTI and CNTD to organize surgical camps in high disease burden areas, using the model session first instigated in Hawassa in 2015, so as to accelerate alleviating both the sufferings of people and reducing the disease burden.

Last but not least, donors have generously funded innovative LF management approaches. They have made it possible to harmonizing resources and further advocating for leveraging resources from other potential sources to fill prevailing programmatic and geographic coverage gaps.

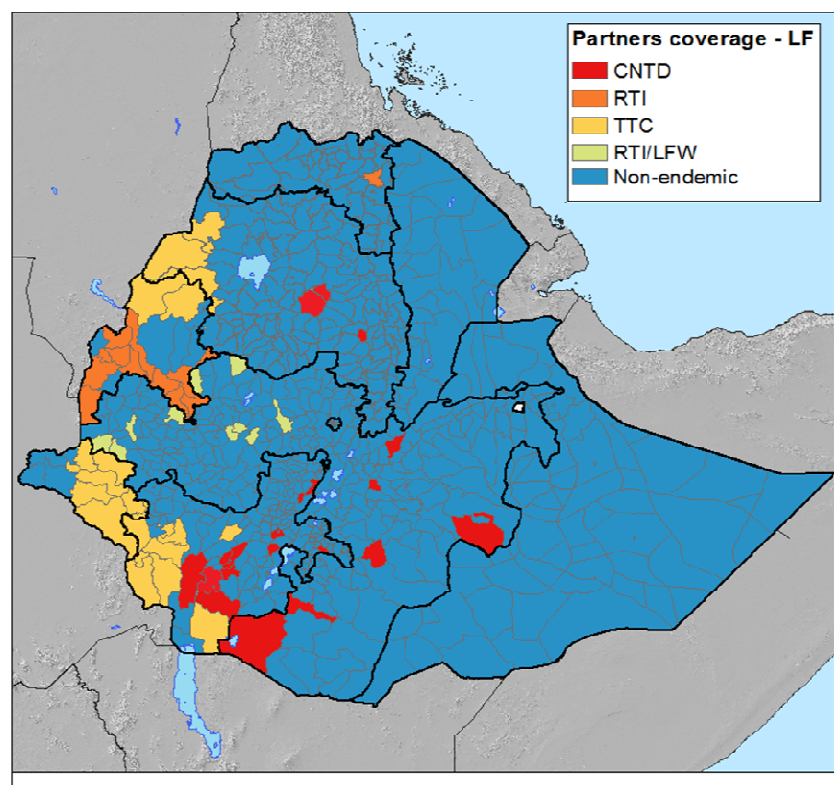


Figure 6: Partners mapping for lymphatic filariasis in Ethiopia

Major Programme Implementation Challenges towards LF elimination: Ethiopia successfully scaled up the LF elimination programme over the last few years. Despite these significant achievements in the scale up and a greater national momentum for LF elimination, several significant issues remain to be resolved. First, the national programme should be backed up by strong operational research to generate evidence and inform the national programme. As this programme is relatively new in the country, operational challenges should be tackled with innovative approaches. Secondly, the 100% geographical coverage through MDA is a very encouraging result. The other pillar of the elimination, i.e. access to MMDP services continues to be a challenge. Burden assessments in all endemic districts should be completed and the morbidity management services should be accessible to patients requiring them. Thirdly, strong monitoring and evaluation of the LF programme is a requirement for monitoring progress towards elimination and achieving the 2020 goals. Sentinel and spot-check sites should be established as per the WHO guidelines.

Conclusion: The mapping of LF nationwide has been completed. The results indicated that LF is endemic in 70 districts in Ethiopia with 5.9 million people at risk of the disease and thus in need of annual treatment. To this end Ethiopia began the national LF elimination programme in 2009. In 2016, the programme aimed to achieve LF MDA coverage in all endemic districts with 100% geographical coverage. The programme has demonstrated strong implementation capacity, coordination mechanisms and successful partnership over the last few years. The current implementation of the programme indicates that Ethiopia is poised to achieve the 2020 goal of elimination of LF. Nonetheless this is contingent upon sustained treatment coverage, strong monitoring and evaluation of progress and strong evidence generation to inform the national programme. Building on the success so far, the programme should accelerate its momentum while maintaining quality. Successful elimination programmes of LF depend upon high and sustained treatment coverage and strong monitoring and evaluation of the programme. Ethiopia should draw lessons from other successful LF elimination programmes elsewhere, whilst capitalizing on in-country lessons from other disease control programmes.

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