Lymphatic filariasis (LF) is one of the most debilitating neglected tropical diseases known since ancient times. Caused by three species of filarial worms and transmitted by mosquitoes, LF occurs among deprived, poor populations across the world. Globally, 1.34 billion people are at-risk, and the South-East Asia Region is where 63% of them reside. In the past two decades, the commitment to control and eliminate LF has gained momentum with advancement in knowledge and science of LF, with the Global Programme to Eliminate Lymphatic Filariasis launched in 2000, led by WHO. The target is to eliminate LF by 2020, relying on two main strategies: preventive chemotherapy through mass distribution of effective drugs; and morbidity management. Nine LF-endemic countries in South-East Asia Region have adopted the strategy, completed mapping and implementing the plan.

This report elaborates the efforts in the past decade towards eliminating LF in the Region, highlighting key components for success, challenges and the way forwards. The use of simplified tools, strengthening partnership and collaboration and integration with other programmes to control NTDs should be lessons learnt to attain the target by 2020.
Towards eliminating lymphatic filariasis: progress in the South-East Asia Region (2001–2011)
Contents

Foreword .................................................................................................................. v
Acronyms ............................................................................................................... vii
Executive summary ............................................................................................ ix
1. Introduction ....................................................................................................... 1
2. Current burden of disease and progress ....................................................... 2
   2.1 General ......................................................................................................... 2
   2.2 Regional progress of LF elimination ....................................................... 4
   2.3 Transmission assessment surveys in deciding to stop MDA .......... 7
3. Progress of cost-effective tools ................................................................. 12
4. Strengthening partnership ............................................................................. 13
5. Revised Regional Strategic Plan: 2010–2015 .............................................. 14
6. Adoption of WHO-recommended two-drug strategy for MDA ............. 16
7. Morbidity management ................................................................................. 17
8. Issues and challenges .................................................................................. 18
9. Country-wise progress .................................................................................. 21
   9.1 Bangladesh ............................................................................................. 21
   9.2 India .......................................................................................................... 24
   9.3 Indonesia .................................................................................................. 29
   9.4 Maldives .................................................................................................. 32
   9.5 Myanmar .................................................................................................. 35
   9.6 Nepal ......................................................................................................... 38
Towards eliminating lymphatic filariasis: Progress in the South-East Asia Region

9.7 Sri Lanka..............................................................42
9.8 Thailand ..............................................................46
9.9 Timor-Leste...........................................................50

10. Global and regional initiatives for LF elimination .......................53

11. Relevant technical support ..................................................55
11.1 Drug quality, drug supplies and logistics ...............................55
11.2 Surveillance including mapping and programme monitoring ....56

12. The partners and their roles ..................................................57
12.1 Local partners ............................................................57
12.2 Bilateral agencies .........................................................58
12.3 International agencies ......................................................58
12.4 Academic institutions ......................................................58
12.5 Pharmaceutical partners ....................................................59
12.6 International donor/developmental partners ..........................59

13. Integration with other disease control programmes.................60
13.1 Soil-transmitted helminthiasis and other neglected tropical diseases .........................................................60
13.2 Malaria control programme .............................................61
13.3 Regional Strategic Plan for integrated NTD control: 2012–2016 .................................................................61

14.1 Regional targets .............................................................62

15. Millennium Development Goals ..........................................66
16. The way forward ..................................................................67

References................................................................................68
Lymphatic filariasis (LF) is one of the most debilitating neglected tropical diseases known since ancient times. Caused by three species of filarial worms and transmitted by mosquitoes, it is endemic in 72 countries and responsible for 5.9 million DALYs lost. An estimated 63% of the 1.34 billion people globally at risk of infection and 50% of the 120 million infected people live in nine countries in the South-East Asia Region.

In recognition of the worldwide burden of LF, in 1997, the Fiftieth World Health Assembly passed Resolution WHA50.29 calling for collaborative efforts by Member States to eliminate the disease as a public health problem. In 2000, the Global Programme to Eliminate Lymphatic Filariasis (GPELF) was formed in response to the WHA Resolution and aimed to eliminate the disease by 2020. The programme adopted a two-pronged strategy: to interrupt transmission of infection through implementation of annual mass drug administration (MDA) and to alleviate morbidities associated with the disease.

Nine LF-endemic countries in the South-East Asia Region have adopted the strategy, and completed mapping and implementing the plan. LF-endemic Member States gradually implemented MDA with diethyl carbamazine citrate (DEC) and albendazole and increased the coverage from 19.4 million in 2001 to 314 million in 2011. As a result the micro-filarial (Mf) rate declined to less than 1% after five or more MDA rounds in 493 implementation units (IU) accounting for 45% of the total 1100 IUs endemic for LF in the Region by 2011.

Maldives and Sri Lanka have initiated the process of verification of LF elimination in 2011, with WHO assistance. Thailand has also initiated the process of verification in December 2012.
This report highlights the country-wise progress towards elimination of lymphatic filariasis in the South-East Asia Region since 2001. Halfway through, it is the right time to capture the different elements of the LF elimination efforts since it started and the progress made. As a Region with a majority of LF-endemic countries, strategic direction and assistance provided by WHO and several partners in the Region have proven crucial in the elimination of the disease, in spite of several challenges and constraints. It is expected that the report would serve as an advocacy tool for the national and local governments and partners to continue to provide support beyond LF elimination including morbidity management and disability alleviation.

The efforts must continue and with the lessons learnt and way forward outlined in this report, it is hoped that LF will become history in the South-East Asia Region.

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Regional Director
Acronyms

AFC  anti-filaria campaign
CCC  Collaboration Coordinating Committee
DALY disability adjusted lost year
DEC  diethylcarbamazine
EU   evaluation unit
GAELF Global Alliance to Eliminate Lymphatic Filariasis
GPELF Global Programme to Eliminate Lymphatic Filariasis
ICT   immunochromatographic test
IU    implementation unit
LF    lymphatic filariasis
MDA   mass drug administration
MDG   Millennium Development Goal
Mf    microfilarial
NGO   nongovernmental organization
NGDO  nongovernmental development organization
NTD   neglected tropical diseases
RPRG  Regional Programme Review Group
SAE   Severe adverse events
SEAR  WHO South-East Asia Region
TAS   transmission assessment survey
WHO   World Health Organization
Executive summary

Lymphatic filariasis (LF) is one of the leading causes of disability worldwide. An estimated 63% of the 1.34 billion people globally at risk of infection and 50% of the 120 million infected people live in the South-East Asia Region. The Region bears almost 57% of the total global burden estimates of 5.1 million DALYs lost due to LF. It also accounts for the highest burden of the disease among WHO Regions, with 9 out of the 11 countries in the Region being endemic. All the three lymphatic filarial parasites, namely *Wuchereria Bancrofti*, *Brugia malayi* and *B. timori* are prevalent in the Region with *W. bancrofti* accounting for 95% of the infections. Bancroftian filariasis transmitted by the ubiquitous principal vector, *Culex quinquesfasciatus*, is the most predominant infection in continental Asia, while Brugian infections transmitted by *Mansonella* and *Anopheles* vectors predominate in the Indonesian Archipelago.

Following the fiftieth World Health Assembly Resolution WHA50 to eliminate LF, WHO established the Global Programme for Elimination of LF (GPELF) in 2000 with the goal to eliminate LF as public health problem by 2020. The strategy is to interrupt transmission of infection through implementation of mass drug administration (MDA) to the entire at-risk population. A two drug combination of DEC and albendazole given once a year, for a minimum for five years, was recommended as an effective intervention to reduce the microfilarial (Mf) rate to less than 1%.

LF-endemic Member States of the South-East Asia Region gradually implemented MDA with DEC and albendazole as a strategy to interrupt transmission of infection. MDA coverage increased from 19.4 million in 2001 to 314 million in 2011.
As a result of effective implementation of MDA, the Mf rate declined to less than 1% after five or more MDA rounds in 493 implementation units (IU) accounting for 45% of the total 1100 IUs endemic for LF in the Region by 2011. India alone achieved less than 1% Mf rate in 203 IUs by 2011. Of the 493 IUs, 290 stopped MDA and commenced with post-MDA surveillance.

Maldives and Sri Lanka have initiated the process of verification of LF elimination in 2011, with WHO assistance.

The Regional Office for South-East Asia had revised the Regional Strategic Plan for LF 2010–2015 to emphasize not only the interruption of transmission, but also morbidity and disability management. Collaboration among different partners and stakeholders is indispensable to achieve elimination objectives. Glaxo-Smith-Kline (GSK) continued to donate albendazole through WHO. The Regional Programme Review Group (RPRG) for LF continued its role of reviewing the programme and providing advice on technical issues, and also maintaining the recommendation of albendazole requirement of the programme.

Some of the issues and challenges pertaining to the LF elimination programme in the Region include: insufficient funds and human resources; high per capita costs for MDA implementation in some countries; delays in the availability of quality drugs; lack of baseline data prior to commencement of MDA in some countries or areas within some countries; lack of data from sentinel and spot-check sites; large differences in reported versus survey-assessed coverage; lack of resources for implementing Stop MDA and Post MDA procedures; and frequent changes in national LF programme managers that affect programme implementation.

In view of the progress of the LF elimination programme, other neglected tropical diseases such as soil-transmitted helminthiasis, trachoma and schistosomiasis are being integrated with the LF programme wherever co-endemicity exists. The Region shared the Regional Strategic Plan for Integrated NTD Control: 2012–2016 with Member countries and to mobilize resources. Indonesia, Myanmar, Nepal and Timor-Leste have drafted their country plans to integrate control of NTDs, and the implementation phase has started in Indonesia and Nepal.

This report highlights the Member country-wise progress towards elimination of lymphatic filariasis in the South-East Asia Region from 2001 to 2011. Halfway through, it is the right time to capture progress made and different elements of the LF elimination efforts since it started. As a Region with a majority of LF-endemic countries, strategic direction and assistance
provided by WHO and several partners in the Region have proven crucial in the elimination of the disease, in spite of several challenges and constraints. It is expected that the report would serve as an advocacy tool for the national and local governments and partners to continue to provide support beyond LF elimination including morbidity management and disability alleviation.

The efforts must continue and with the lessons learnt and way forward outlined in this report, LF will become history in the South-East Asia Region.
Introduction

Lymphatic Filariasis (LF) is one of neglected tropical diseases (NTDs) which lead to severe incapacitation and disability. Globally, 1.34 billion people are estimated to be at risk of infection and some 120 million people are infected in 72 countries. It is one of the major public health problems in the South-East Asia Region, as it accounts for the highest burden of the disease among WHO Regions: 9 of the 11 countries in the Region are endemic for LF.

Although it is not fatal, LF causes severe suffering to those infected, as people in the productive age group are often affected and LF incapacitates their productivity. Moreover, the disease creates stigmatization and has ‘hidden’ features affecting life opportunities like marriage. LF also has a huge economic impact, not only due to direct costs incurred in surgical or medical treatment, but also due to indirect costs on account of labour loss and reduced work capacity.

LF has been recognized as a leading cause of permanent and long-term disability worldwide only recently. Despite its ancient history, LF has been poorly understood and largely ignored by health authorities. There was little awareness of the burden and loss exacted by this disease, inadequate tools for diagnosis and treatment, insufficient knowledge on how to alleviate the suffering and disfigurement, inadequate strategies to control the infection, insufficient knowledge on the parasites and their pathogenesis; all these have offered little hope that things would ever change.

However, things have changed, as in the last two decades there has been plenty of research on LF, including Research and Development for drug development and multicentric drug trials, combination therapy, immunodiagnosis, immunopathology and understanding its epidemiology (social aspects of disease burden). This has provided new insights into the global burden of LF, its pathogenesis and control measures and helped in according priority to LF.
Current burden of disease and progress

2.1 General

Regional versus global

South-East Asia accounts for the highest burden of LF among the six WHO Regions. All the three lymphatic filarial parasites, namely *W. bancrofti*, *B. malayi* and *B. timori* are prevalent in the Region but *W. bancrofti* accounts for 95% of the infections. Bancroftian filariasis transmitted by the ubiquitous principal vector, *Culex quinquesfasciatus*, is the most predominant infection in continental Asia while Brugian infections transmitted by *Mansonina* and *Anopheles* vectors predominate in the Indonesian Archipelago.

Of the 1.34 billion people globally at risk of LF in 72 countries, an estimated 844 million (63%) live in South-East Asia (Figure 1) and of the 120 million globally infected, 60 million (50%) are in the Region (Figure 2). The Region also accounts for about 57% of the total global burden estimates of 5.1 million DALYs lost due to LF. An estimated 40 million, LF-infected people in the world, suffer from various kinds of disabilities.

Thus, the achievement of the LF elimination target in the Region will have a big impact on the reduction of the global burden and in reaching the global target of LF elimination by 2020.

The nine LF-endemic countries in the South-East Asia Region (SEAR) are Bangladesh, India, Indonesia, Maldives, Myanmar, Nepal, Sri Lanka, Thailand
Figure 1: WHO Region-wise burden of Lymphatic Filariasis: 2010

Figure 2: Lymphatic filariasis-endemic countries of the SEA Region, 2010
and Timor-Leste. The two non-endemic countries are Bhutan and Democratic People’s Republic of Korea. Filariasis control programmes are operational in all the nine endemic countries and national plans of action are being implemented in all countries. National task forces for the elimination of LF have also been established in eight of the nine countries. However, their performance is varied and needs to be strengthened in some countries.

2.2 Regional progress of LF elimination

Mapping

The Region completed mapping in all the nine LF-endemic countries by 2010 (Figure 3). Member States began implementing MDA (either DEC alone or in combination with albendazole) from 2001 onwards while making progress in mapping. Indonesia was the last country to complete mapping due to the vast geographic profile of the country and insufficient funds.

Progress in implementing mass drug administration

As of 2010, the global programme for elimination of LF (GPELF) had targeted 622 million people and treated 466 million with the two-drug combination in 53 countries. In the South-East Asia Region, 476 million people were targeted and 365 million treated in 2010, contributing to around 78% of global

Figure 3: Cumulative number of MDA treatment: 2000–2010

Source: country data
treatment (Figures 4 and 5). Since the South-East Asia Region is contributing significantly to the success of the global programme, it is important to scale up treatment coverage through mass drug administration (MDA). Bangladesh, India, Indonesia, Myanmar and Nepal are making steady progress in scaling up MDA to cover the entire endemic population. Timor-Leste would need additional resources to reinitiate MDA which was discontinued in 2007. The country, with assistance from WHO and the University of Sydney, is gradually preparing to restart LF MDA, integrating it with deworming activities with regard to intestinal worm infection.

Figure 4: WHO Region-wise treatment coverage in 2010

Figure 5: Progress in mass drug administration (MDA) in SEA Region, 2001–2011
LF-endemic Member States have gradually implemented MDA with DEC and albendazole as a strategy to interrupt transmission of infection (Figure 6). MDA coverage increased from 19.4 million (2001) to 418 million in 2009. Subsequently, the treatment coverage of the targeted population declined from 365 million in 2010 to 314 million in 2011. The drop in treatment coverage was mainly attributed to problems in local procurement of albendazole in India (since India receives only 50% of the total 600 million annual requirement from WHO as donation and the rest is procured locally) and difficulties in mobilizing operational costs or treatment delivery costs in some countries such as Indonesia and Myanmar.

In spite of several difficulties, the reported treatment coverage (calculated for the eligible population) was generally maintained above 80%. However, epidemiological (drug) coverage (calculated for the total population of the implementation unit) was not satisfactory.

Three countries – Maldives, Sri Lanka and Thailand have completed more than five rounds of MDA to the entire eligible endemic population of approximately 10 million and reduced the microfilarial (Mf) rate to <1%. They have stopped MDA (except for 87 implementation units in Narathiwat province in Thailand) and will undertake the next steps.

Bangladesh and Nepal are scaling up MDA using the two-drug regimen to cover the entire endemic population and are expected to complete five or more rounds of MDA by 2015 and initiate a transmission assessment survey (TAS) to decide about stopping MDA. Myanmar requires external financial support to expand MDA to cover the entire endemic population to achieve the regional and global targets.

India has already scaled up MDA to cover the entire endemic population, using the two-drug regimen and is expected to complete at least five rounds of MDA in all implementation units by 2015 and soon after, also start implementing TAS to stop MDA.

Indonesia is gradually scaling up MDA to cover the entire endemic population by 2015 or later with additional support for USAID/RTI. Timor-Leste is planning to restart LF-MDA by 2013 which was interrupted in 2007, with external support.

Some of the key issues and challenges pertaining to the LF elimination programme in the Region are – insufficient funds and human resources; high per capita costs for MDA implementation in some countries; delays in the availability
of quality drugs; lack of baseline data prior to commencement of MDA; lack of data from sentinel and spot-check sites; large differences in reported versus survey-assessed coverage; and lack of resources for implementing stop-MDA and post-MDA procedures.

In spite of geographic, financial and trained manpower difficulties, the stepped up treatment coverage by endemic countries has contributed to more than 70% of the total treatment globally. In 2010, the South-East Asia Region contributed to 78% of the global treatment, signifying that elimination of LF at the global level depends heavily on progress in the Region.

2.3 Transmission assessment surveys in deciding to stop MDA

Since monitoring and epidemiological assessment of MDA is an integral, important component of the LF elimination programme, WHO had revised its 2005 guidelines for programme managers in 2011 (WHO 2011). In addition to MDA treatment coverage monitoring, it emphasizes the detection of antigen (Ag) with the use of immunochromatographic (ICT) card, among the children of 6 – 7 years either in schools (school grade 1 and 2) or in the community to assess transmission of infection. TAS is to be carried out six months after completing an effective fifth MDA round in a defined evaluation unit (EU) with not more than 2 million population under MDA programme. Pre-TAS assessment is to be done to record previous microfilarial rate (Mf) in sentinel sites and spot checks to decide eligibility for TAS since the exercise is found to be quite expensive. Though TAS is one of the components of the monitoring and epidemiological exercise, it is a decision-making tool to stop MDA and not a monitoring tool. If an EU passes TAS, MDA will be stopped and post-MDA surveillance implemented for five years before verification of LF elimination is initiated.

Impact of MDA

The impact of MDA in the LF elimination programme is quite visible. As a result of effective implementation of MDA, the Mf rate declined to less than 1% after completing five or more MDA rounds in 493 implementation units (defined geographic area). So far, this accounts for 45% of the total 1100 implementation units (IU) endemic for LF (Figure. 6).
A total of 290 (26%) out of 1100 implementation units have stopped MDA in Bangladesh (five in 2011), Maldives (one in 2009), Myanmar (three in 2009), Nepal (five in 2011), Sri Lanka (eight in 2007) and Thailand (268 in 2007). This adds to 26% of the total 1100 implementation units requiring MDA.

**Initiating verification of LF elimination**

Verification of LF elimination is a process to confirm that there is no continued transmission / recrudescence of LF infection among children in the 6–7 years age group which is considered as a robust indicator. A country dossier will be developed and submitted to WHO for a thorough review including field visit (if needed) and a country will be certified as free from LF infection. However, a country has to wait till all the endemic implementation units complete post-MDA surveillance after stopping MDA. Morbidity and disability management will, however, continue.

In the South–East Asia Region, both Maldives and Sri Lanka stopped MDA in 2009 and 2007 respectively. The Mf rate (including Ag rate) was consistently less than 1%. Both the countries implemented surveillance including mosquito surveillance (Sri Lanka initiated xeno monitoring).

A WHO expert team visited both the countries in 2011 and verified all the retrospective data available, declining trends in Mf rate, and surveillance data. In addition, spot checks with ICT cards for antigenaemia were conducted in

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**Figure 6: Impact of LF mass drug administration in SEA Region, 2011**

![Graph showing impact of LF mass drug administration](image-url)
the schools (grade 1 and 2 children) to cross-check reported data and provide technical assistance as needed.

Since the Mf rate declined to less than 1% in Thailand, it is planned to initiate the first step in verification of LF elimination late in 2012 in 268 IUs and to stop MDA exercise in the remaining 87 IUs in Narathiwat. Bangladesh and Nepal stopped MDA in 10 districts after completing a TAS exercise in 2011 and implemented post-MDA surveillance.

In India, 203 implementation units have reached an Mf rate of <1% and completed five or more MDA rounds by 2011. A TAS exercise is being planned to stop MDA eventually. Stopping MDA will result in saving of albendazole tablets and allow the programme to expand MDA to the remaining districts. However, funding to procure ICT kits and mobilizing operational costs including capacity building is a challenge for the countries.

Since 290 implementation units have stopped MDA, it means an estimated 24 million people at risk were protected from LF infection. If India is also able to stop MDA in 203 implementation units, an additional 337 million people will be protected from LF infection. The impact of MDA on reducing the Mf rate in the SEA Region will be quite visible since it would shrink the LF endemicity map (Figure 7).

Figure 7: Impact of LF MDA in Member States of the South–East Asia Region, 2010
The WHO Regional Office for South-East Asia conducted a regional capacity building workshop on TAS in 2012 to enhance the knowledge and skills of programme managers to initiate stopping MDA in the districts.

Elimination of lymphatic filariasis has the added benefit of controlling soil-transmitted helminthic infections including those caused by roundworm, hookworm and whipworm. This helps in reducing morbidity among the target population, especially school-age children, the most vulnerable group, and in improving their nutritional status and physical/cognitive growth.

WHO’s role includes the continuation of supply of albendazole to all the endemic countries and provide technical assistance. During 2011, WHO supplied 394 million tablets of albendazole and 50 million tablets of DEC to Myanmar.

Sustaining political commitment and providing adequate resources are the main challenges. In addition, the following issues need to be addressed.

1. Need for alternate control tools, especially for *B. malayi*;
2. Timely procurement of drugs to ensure high coverage;
3. Impact analysis of MDA on *B. malayi* and *B. timori*;
4. Procurement of ICT kits which are expensive;
5. Capacity-building in planning and implementing TAS.

**Strategies**

A regional strategy for 2010–2015 has been developed focusing on the following:

1. Sustained political commitment;
2. Implementation of MDA and ensuring high treatment coverage and compliance;
3. Strengthening partnership and resource mobilization;
4. Integrated vector management;
5. Procuring quality drugs;
6. Social mobilization;
7. Specific strategies to prevent and alleviate disability;
(8) Community home care measures for lymphoedema;
(9) Management of acute episodes;
(10) Surgical facilities for hydrocoelectomy;
(11) Patient and family education;
(12) Surveillance and operational research;
(13) Monitoring and evaluation.
Progress of cost-effective tools

Low-cost, safe and very effective drugs are available for prevention of infection and treatment of morbid cases. These drugs are well tolerated with minimum side effects. Diagnostic kits and monitoring tools are acquirable and within the reach of endemic countries to detect infection in man and mosquito. A cost-effective control technology has been developed for the elimination of lymphatic filariasis.

**Twin “pillars” of lymphatic filariasis elimination:**

- Interrupt transmission
  - Mass treatment of “at risk” population
- Disability prevention and alleviation
  - Community-level and home-based care of those with disease
    - Lymphoedema
    - Acute inflammatory attacks
    - Hydrocele surgery

Many countries have rich experience in time-bound successful elimination of lymphatic filariasis. Community cooperation was found to be very encouraging when the LF elimination programme was integrated with the control of intestinal helminthic infections.

Such an inter-programmatic approach will accelerate the coverage, community participation and improve utilization of services, as well as reduce the operational costs and workload on health workers.
Strengthening partnership

Strong partnership with the national public health programme is a basic need to achieve expected goals. Partnership is strengthened on the basis of mutual respect, trust, transparency and free sharing of credit. To eliminate lymphatic filariasis by 2020, a strong partnership has been established at global, regional, country and implementation levels. The Global Programme to Eliminate LF (GPELF) could be expanded rapidly because of the involvement of a wide range of partners; such as international agencies, pharmaceutical agencies/foundations, bilateral agencies, the private sector, academic institutions, nongovernmental development organizations (NGDOs), authorities, communities, and other programmes and projects.

From 1999 onwards, more than 27 partners have come forward to support the LF elimination programme. Glaxo-Smith-Kline (1998) and Merck Co. Inc. (1999) pledged free supply of albendazole and Ivermectin necessary to achieve elimination of LF. These donations are considered as the largest drug donations in the history of public health programmes. By 2000, GPELF was launched by WHO. Recently, Eisai Foundation of Japan came forward to donate DEC tablets from 2014 onwards. As an interim donation, Sanofi of France has agreed to provide DEC selectively to some endemic countries who cannot procure the drugs (such as Myanmar in the South-East Asia Region). Academic institutions and research divisions within the private sector carried out basic and applied research and provided new drugs and tools which has facilitated the programme. The LF-endemic Member States with the support of international and national partners, governmental sectors other than health, have implemented the WHO-recommended MDA strategy to interrupt the transmission of LF infection.
Revised Regional Strategic Plan: 2010–2015

To accelerate the process of achieving the goal of elimination of LF by 2020, the South-East Asia Regional LF Strategic Plan (2007–2010) was reviewed and revised to 2010–2015 with the following specific objectives:

General objectives
- To progressively reduce and ultimately interrupt the transmission of lymphatic filariasis with annual mass drug administration as the core strategy;
- To prevent and reduce disability in affected persons through community-based disability alleviation and management.

Specific objectives
- To complete the mapping of the distribution of LF in Indonesia by 2010 and undertake mapping in new areas if required;
- To further scale up and sustain mass drug administration (MDA) with DEC and albendazole, covering the entire country-wide population at risk in all implementation units in Bangladesh, India, Myanmar and Nepal by 2010 and in Indonesia and Timor-Leste by 2012;
- To ensure high treatment coverage exceeding 65% of the total and 80% of the eligible population and high treatment compliance rate verified by surveys;
Towards eliminating lymphatic filariasis: Progress in the South-East Asia Region

- To ensure the implementation of necessary steps for stoppage of MDA in each of the implementation units which have completed a minimum of five or more effective annual rounds of MDA with the two-drug regimen;
- To initiate steps for stoppage of MDA in the implementation units in India, where single or two-drug regimens were used for more than five years and where the Mf rate is less than 1%;
- To implement surveillance including mosquitoes after stopping MDA. Wherever possible, initiate xeno monitoring;
- To further scale up and implement activities for prevention and alleviation of disability in all endemic countries;
- To implement supplementary measures including integrated vector management wherever necessary and feasible;
- To conduct operational research on important elements of LF epidemiology and elimination activities;
- To ensure an effective programme monitoring system to assess the progress of ELF activities and identify the gaps for corrective measures;
- To initiate steps for verification of LF elimination in Maldives, Sri Lanka and Thailand.
Adoption of WHO-recommended two-drug strategy for MDA

By 2006, all the nine endemic Member States of the South-East Asia Region adopted two-drug regimen based MDA as per the global strategy for the elimination of lymphatic filariasis (ELF). India decided to administer the two-drug regimen to the entire eligible population from 2006 onwards. Bangladesh and Sri Lanka started two-drug based MDA as early as 2001.
Morbidity management

LF-endemic countries are gradually expanding morbidity management services. Since the reporting system is not fully established for this component, the real situation is not known. However, considering that an estimated 50% of the 120 million people infected with LF globally are in the South-East Asia Region, the magnitude of disabilities lies somewhere around 20 million (50% of 40 million globally). By 2011, Member States reported an estimated 1.3 million LF-related disabilities. Efforts are being made to gather information from health facilities. Some countries are developing national guidelines and training health workers and volunteers to implement disability management. In some countries (Bangladesh and India), NGOs are also providing morbidity management services.
Issues and challenges

Issues and constraints delaying progress

Some of the issues and challenges pertaining to the LF elimination programme in the Region are: insufficient funds in some countries; high per capita costs for MDA implementation; delays in the procurement and supply of quality DEC and albendazole; lack of baseline data (including mapping) prior to commencement of MDA in some countries or areas within some countries; lack of data from sentinel and spot-check sites; partial coverage of big implementation units due to insufficient funds; large differences in reported versus survey-assessed coverage; and frequent changes in national LF programme managers that affects the programme implementation.

Lack of independent LF elimination monitoring (LEM) including validation of reported data at the micro level influences the quality of the programme and its outcome.

In addition, funding for expensive ICT card procurement and storage, phasing out MDA for LF while ensuring continued treatment against other helminths, sustaining trained health personnel during post-MDA surveillance to prevent recrudescence and alternative and affordable diagnostic tools for monitoring and evaluation, are some of the issues that need to be addressed. Issues relevant to each component are outlined below.

Mapping and baseline information

- Sufficient funding and political will for completing baseline mapping of implementation units especially in large countries and decentralized health system;
• Cost and timely availability of immuno-chromatographic test (ICT) cards for *W. bancrofti*;

• Short shelf-life of ICT cards and appropriate storage facilities in the districts;

• Need for alternate control tools i.e. diagnostics and treatment, especially for *B. malayi*.

**Drugs**

• To meet the huge demand for drugs, particularly DEC, and ensuring timely procurement of DEC and albendazole and uninterrupted supply of drugs;

• Need for a global or regional procurement mechanism for DEC prequalified by WHO;

• Free supply of albendazole to cover entire at-risk population without any interruption in a given annual MDA round;

• Need for additional pre-qualified sources for drugs;

• Need to ensure timely procurement and uninterrupted supply of quality drugs, including buffer stocks;

• Strengthening and streamlining logistics management at the national and subnational level.

**MDA**

• Insufficient human and financial resources to scale up MDA and related activities, such as capacity building, public education, social mobilization and logistic management;

• To ensure high coverage of MDA;

• Lack of public education including media and political personnel on safety and benefits of MDA drugs;

• Impact of MDA on *B. malayi* and *B. timori*.

**Monitoring**

• Pre-MDA baseline Mf rates not assessed uniformly in some implementation units in some countries;
• Lack of data from some sentinel and spot check sites;
• Inconsistent reporting from many sentinel sites;
• Lack of coverage surveys leading to lack of understanding of actual treatment coverage status;
• Lack of independent (internal and external) reviews/validation of data/reports at the micro level.

Stopping MDA
• Need for sufficient funds, planning and implementation of transmission assessment surveys to stop MDA;
• Need to build in-country capacity to plan and implement transmission assessment survey (TAS) according to WHO manual on LF TAS 2011;
• Procurement of ICT cards and Brugia Rapid tests for TAS.

Post-MDA surveillance
• Lack of clearcut guidelines and capacity to plan and implement post-MDA surveillance (PMS) for five years before LF verification exercise is implemented;
• Lack of funds and diagnostic tools for post-MDA surveillance.

Opportunities
The availability of simple and cost-effective tools and a consensus on elimination strategies have made the disease amenable for elimination. Furthermore, strong commitment and support from various partners and the national authorities for the elimination of lymphatic filariasis by 2020 was available. Uninterrupted and generous donation of drugs in all endemic countries for the mass drug administration initiative was a prominent example. Success stories from China and the Republic of Korea in 2007 and 2008 respectively also encouraged other countries to scale up the elimination process to achieve the target.
Country-wise progress

9.1 Bangladesh

Figure 8: Baseline mapping, 2004

Figure 9: Progress of MDA, 2011

(1) Total population of the country: 148.77 million (2011)
(2) Total number of divisions: 7
(3) Total number of districts: 64
(4) Total area: 144,000 km$^2$ and population density: 1033 per km$^2$
(5) Total number of endemic districts (implementation units): 34
(6) Total number of non-endemic districts: 30
Towards eliminating lymphatic filariasis: Progress in the South-East Asia Region

(7) Population at risk of LF: 76 million
(8) Mapping of endemic areas completed in 2004
(9) Mf rate baseline: 10.8% (ranging from >1% to 20%)
(10) Antigenaemia rate: ICT cards were used for baseline mapping rate 0%-15.4%
(11) LF parasitic species: W. bancrofti ✓
     : B. malayi 
     : B. timori
(12) Main vectors: Culex quinquesfaciatus
(13) Year of starting MDA: 2001
(14) Year of adopting DEC + ALB: 2001
(15) Estimated morbidity status: 2% to 3.9%

The programme completed baseline mapping in 2004 (Figure 9). Bangladesh started MDA in 2001 covering 0.8 million population in one implementation unit and scaled it up to 36.3 million population in 2010. Of the 34 endemic districts, MDA was implemented in 20 districts (including Dhaka district) in 2008. Mf survey was carried out in 11 districts during 2008. The Mf rate declined from 1% in 2004 to 0% in 2010. In 2011, since five districts stopped MDA, MDA implementation was continued in 14 districts.

Fourteen endemic districts originally positive for ICT card tests were taken up for night blood films for micro-filarial rate (2007–2009). All the blood samples showed <1%. The programme is planning for assessment of endemicity before launching MDA.

Transmission assessment survey

Bangladesh completed a transmission assessment survey (TAS) as per the current LF TAS manual of WHO 2011 in five districts (Rajshahi, Dinajpur, Meherpur, Borguna and Patuakhali). Since school attendance rate was ≥ 75%, the school survey method was selected. A sample of school children (grades 1 & 2) using the survey sample builder was obtained and ICT card testing was done. All the EUs were eligible to stop MDA. The programme stopped MDA in 2011 and implemented post-MDA surveillance (Figure 10). Mf survey and TAS is being implemented in another five districts with the aim to stop MDA in 2012.
Table 1: Progress in MDA implementation in Bangladesh

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of IUs covered</th>
<th>Population targeted (million)</th>
<th>Population covered (million)</th>
<th>Reported no. number of people covered by MDA (million)</th>
<th>Reported drug coverage %</th>
<th>Programme drug coverage %</th>
<th>Mf rate</th>
<th>Number of IUs with Mf rate&lt;1% after ≥ 5 rounds</th>
<th>Number of IUs which stopped MDA</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>1</td>
<td>0.9</td>
<td>0.8</td>
<td>0.8</td>
<td>100</td>
<td>96</td>
<td>NA</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>2002</td>
<td>4</td>
<td>5.2</td>
<td>5.1</td>
<td>4.9</td>
<td>96</td>
<td>94</td>
<td>NA</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>2003</td>
<td>5</td>
<td>6.7</td>
<td>6.2</td>
<td>6.2</td>
<td>93</td>
<td>93</td>
<td>NA</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>2004</td>
<td>10</td>
<td>9.5</td>
<td>6.2</td>
<td>5.7</td>
<td>92.0</td>
<td>60</td>
<td>1.0</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>2005</td>
<td>12</td>
<td>19.7</td>
<td>16.8</td>
<td>15.1</td>
<td>92.2</td>
<td>77</td>
<td>0.3</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>2006</td>
<td>13</td>
<td>22.8</td>
<td>17.0</td>
<td>16.2</td>
<td>92</td>
<td>71</td>
<td>0.6</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>2007</td>
<td>15</td>
<td>34</td>
<td>27</td>
<td>25</td>
<td>91.0</td>
<td>81</td>
<td>0.31</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>2008</td>
<td>20*</td>
<td>35</td>
<td>34</td>
<td>30.5</td>
<td>97.0</td>
<td>89</td>
<td>0.62</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>2009</td>
<td>19</td>
<td>36</td>
<td>32</td>
<td>31</td>
<td>93.0</td>
<td>85</td>
<td>0.17</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>2010</td>
<td>19</td>
<td>36.3</td>
<td>34</td>
<td>31</td>
<td>92</td>
<td>81</td>
<td>0</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>2011</td>
<td>14</td>
<td>27</td>
<td>24</td>
<td>22</td>
<td>92</td>
<td>81</td>
<td>0</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

*One IU, Dhaka district, started MDA in 2008 and later discontinued it from 2009 onwards as per the RPRG recommendation since it was non-endemic.

Table 2: Transmission assessment survey in Bangladesh, 2011

<table>
<thead>
<tr>
<th>Evaluation Unit</th>
<th>Population</th>
<th>Number of schools sampled</th>
<th>Sample size (Grades 1 &amp; 2)</th>
<th>Cut-off point</th>
<th>ICT result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meherpur</td>
<td>671 023</td>
<td>30</td>
<td>1 556</td>
<td>18</td>
<td>No +ve</td>
</tr>
<tr>
<td>Borguna</td>
<td>1 010 341</td>
<td>30</td>
<td>1 692</td>
<td>20</td>
<td>1 + ve</td>
</tr>
<tr>
<td>Patuakhali</td>
<td>1 740 106</td>
<td>30</td>
<td>1 692</td>
<td>20</td>
<td>No +ve</td>
</tr>
<tr>
<td>Dinajpur (2 EU)</td>
<td>3 103 088</td>
<td>60</td>
<td>3 384</td>
<td>20</td>
<td>7 +ve</td>
</tr>
<tr>
<td>Rajshahi (2 EU)</td>
<td>2 720 207</td>
<td>60</td>
<td>3 384</td>
<td>20</td>
<td>1 + ve</td>
</tr>
<tr>
<td>Total</td>
<td>9 244 765</td>
<td>210</td>
<td>11 708</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Post-MDA surveillance

Bangladesh implemented post-MDA surveillance in five districts where MDA was stopped as per the LF-TAS manual 2011.

Integrated vector management

Bangladesh participated in the regional training in integrated vector management (IVM) in India in 2011 and began implementing activities.

Morbidity management

The LF programme reported 89,706 cases in 2011 (lymphoedema 24,386 and hydrocele 65,320). The information is being updated. Disability alleviation activities have been initiated involving NGOs. Surgery was performed on 300 hydrocele cases in 2011, and 2,328 health workers received training.

9.2 India

Figure 10: Lymphatic filariasis endemicity mapping in India 2003
Figure 11: Microfilarial rate-wise LF endemicity mapping in India, 2004

(1) Total population of the country (2011): 1 210 193 442
(2) Total number of states: 35 states including union territories
(3) Total number of districts: 642
(4) Total area: 3 287 240 km and population density: 382 per km
(5) Total number of endemic districts (implementation units): 250
(6) Total number of non-endemic districts: 392
(7) Population at risk of LF: 614 million
(8) Mapping of endemic areas completed in 2006
(9) Mf rate baseline: 19.35% (ranging from >0.5% to 19.34%)
(10) LF parasitic species: W. bancrofti; ✓
     B. malayi
     B. timori

Main vectors: Culex quinquesfasciatus and Mansonia species
Lymphatic filariasis is one of the major public health problems in India among vector-borne diseases after malaria. An estimated 600 million people (almost 50% of the population as per the 2011 census) live in filariasis-endemic districts. India alone bears almost 41% of the global population at risk of LF and 70% of the population in the South-East Asia Region at risk with 250 districts in 20 states are endemic for LF. *W. bancrofti* is the most predominant species causing comprising 99.4% of the problem in the country while *B. malayi* was confined to the western coast of Kerala and a few pockets in six other states (but now only in Shertalai areas of Alappuzha district). Both the infections were nocturnally periodic. In the Nicobar group of islands, diurnally sub-periodic infection of *W. bancrofti*—transmitted by *Aedes (Finlaya) niveus* group was detected about three decades back.

The first pilot project in India for the control of LF was undertaken in Orissa from 1949–1954 and in the subsequent year, the National Filariasis Control Programme was launched to delimit the area endemic for LF. Mapping of LF distribution was completed in 232 IUs in 2003 and 135 of them were found endemic while 97 IUs had either no Mf cases or prevalence rates <1%.

Following the national workshop on a new strategy for ELF in 1996, MDA with DEC alone was taken up during 1996–97 in 13 districts covering 41 million population. In 2000, seven more districts with a population of 14 million were taken up for MDA in addition to 13 districts. In 2002, MDA in the country was extended to 31 districts covering a total population of 77 million with DEC and DEC + albendazole as a pilot project.

The strategy of MDA with an annual single dose of DEC to the eligible population living in filariasis-endemic districts was expanded to 202 districts during 2004. The districts were selected as implementation units based on historical evidence of filaria endemicity, presence of lymphoedema/hydrocoele cases and micro filaria carriers. By 2005, 243 districts were identified as endemic and targeted for MDA and the mapping was considered complete by 2006 and 250 districts were identified as endemic.
Table 3: Progress in MDA Implementation in India

<table>
<thead>
<tr>
<th></th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of IUs covered</td>
<td>202</td>
<td>230</td>
<td>209</td>
<td>250</td>
<td>212</td>
<td>193</td>
<td>218</td>
<td>160</td>
</tr>
<tr>
<td>Population targeted (million)</td>
<td>470</td>
<td>535</td>
<td>416</td>
<td>574</td>
<td>582</td>
<td>448</td>
<td>507</td>
<td>365</td>
</tr>
<tr>
<td>Population covered (million)</td>
<td>382</td>
<td>456</td>
<td>369</td>
<td>509</td>
<td>434</td>
<td>388</td>
<td>453</td>
<td>308</td>
</tr>
<tr>
<td>Reported number of people covered by MDA (million)</td>
<td>276</td>
<td>348</td>
<td>302</td>
<td>421</td>
<td>374</td>
<td>337</td>
<td>380</td>
<td>270</td>
</tr>
<tr>
<td>Reported drug coverage (%) against eligible population</td>
<td>72</td>
<td>76</td>
<td>82</td>
<td>83</td>
<td>86</td>
<td>86</td>
<td>84</td>
<td>88</td>
</tr>
<tr>
<td>Programme drug coverage % against total population</td>
<td>59</td>
<td>65</td>
<td>73</td>
<td>73</td>
<td>64</td>
<td>75</td>
<td>75</td>
<td>74</td>
</tr>
<tr>
<td>Mf rate</td>
<td>1.24</td>
<td>1.02</td>
<td>0.98</td>
<td>0.64</td>
<td>0.53</td>
<td>0.65</td>
<td>0.41</td>
<td>0.35</td>
</tr>
<tr>
<td>Number of IUs with Mf rate&lt;1% after ≥ 5 rounds</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>203</td>
</tr>
<tr>
<td>Number of IUs which stopped MDA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

*Three states could not implement MDA -2011 round.
Nation-wide MDA campaign started in 2004 since earlier MDA was taken up as a pilot project.

Impact of Mass drug administration

As a result of MDA since 2004, the overall national level microfilarial (Mf) rate declined from 1.24% (2004) to 0.35% in 2011(Figure 13). This rate varies from state to state and district to district.

The Mf rate declined to <1% in 203 out of 250 MDA districts which had completed five or more than five MDA rounds. The programme is planning a transmission assessment survey (TAS) as per the LF-TAS manual of WHO 2011 to decide about stopping MDA in the near future.
As a result of MDA, most of the endemic districts reduced Mf rate significantly (Figure 14).

**Integrated vector management**

India participated in the regional training in integrated vector management (IVM) in India held in 2011 and began implementing activities.

**Morbidity management**

- By 2011, the programme recorded 1.2 million cases of lymphoedema and hydrocele.
• Until 2011, approximately 96 121 hydrocele cases were operated.
• During 2011, 80 922 health workers were trained in disability alleviation.

### 9.3 Indonesia

*Figure 14: Mapping of baseline LF endemicity, 2010*

(1) Total population of the country: 237 641 326 million (Population Census 2010)
(2) Total number of provinces: 33
(3) Total number of districts: 497
(4) Total area: 1.9 million sq. km and population density: 119.3 per km
(5) Total number of endemic districts (implementation units): 334 districts
(6) Total number of non-endemic districts: 163
  (a) Population at risk of LF: 123 478 265 million
  (b) Mapping of endemic areas completed in 2010
(7) Mf rate baseline: 19% (ranging from 1 to 43%)
(8) Antigenaemia rate: ICT cards were used for baseline mapping (rate 0.5%)
(9) LF parasitic species: 
- W. bancrofti
- B. malayi
- B. timori

(10) Year of starting MDA: 2002
(11) Year of adopting DEC + ALB: 2002

The main vectors are C. quinquesfasciatus and Anopheles species which are responsible for W. bancrofti transmission, whereas Anopheles barbirostis and Mansonina species are responsible for B. malayi transmission. Anopheles barbirostis is known to be the vector of B. timori infections.

### Table 4: Progress in MDA implementation

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of IUs covered</td>
<td>17</td>
<td>31</td>
<td>55</td>
<td>31</td>
<td>68</td>
<td>77</td>
<td>97</td>
<td>99</td>
<td>88</td>
<td>96</td>
</tr>
<tr>
<td>Population targeted (million)</td>
<td>0.32</td>
<td>0.74</td>
<td>1.5</td>
<td>4.0</td>
<td>7.1</td>
<td>11.1</td>
<td>16.8</td>
<td>28.7</td>
<td>37.2</td>
<td>54</td>
</tr>
<tr>
<td>Population covered (million)</td>
<td>NA</td>
<td>NA</td>
<td>1.4</td>
<td>3.3</td>
<td>6.1</td>
<td>9.7</td>
<td>14.3</td>
<td>22.7</td>
<td>22.6</td>
<td>26</td>
</tr>
<tr>
<td>Reported number of people covered by MDA (million)</td>
<td>0.25</td>
<td>0.64</td>
<td>1.2</td>
<td>2.9</td>
<td>5.3</td>
<td>8.4</td>
<td>12.3</td>
<td>19.2</td>
<td>18.5</td>
<td>22</td>
</tr>
<tr>
<td>Reported drug coverage (%)</td>
<td>NR</td>
<td>NR</td>
<td>88.24</td>
<td>88.76</td>
<td>84.34</td>
<td>86.4</td>
<td>86.2</td>
<td>84.4</td>
<td>81.7</td>
<td>83.7</td>
</tr>
<tr>
<td>Programme (drug) coverage %</td>
<td>85.8</td>
<td>85.1</td>
<td>81.6</td>
<td>71.7</td>
<td>73.2</td>
<td>75.7</td>
<td>73.3</td>
<td>67.7</td>
<td>49.6</td>
<td>40.8</td>
</tr>
<tr>
<td>Mf rate</td>
<td>4.04</td>
<td>4.07</td>
<td>3.49</td>
<td>3.28</td>
<td>2.96</td>
<td>2.87</td>
<td>2.72</td>
<td>2.56</td>
<td>2.56</td>
<td>2.56</td>
</tr>
<tr>
<td>Number of IUs with Mf rate &lt;1% after ≥ 5 rounds</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Number of IUs which stopped MDA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6</td>
<td>15</td>
</tr>
</tbody>
</table>

NA: not available NR: not reported
Lymphatic filariasis is still a major public health problem in many parts of Indonesia in addition to malaria. All the three species viz. *W. bancrofti*, *B. malayi* and *B. timori* are prevalent and 22 vectors have been incriminated. There are 334 endemic districts spread out in 30 of the 33 provinces. Almost 50% of the population is living in LF-endemic areas. Mapping was completed by 2010 (Figure 15).

Being an archipelago with more than 800 inhabited islands spread from west to east, the expansion of LF-MDA poses an operational challenge to the programme.

**Integrated vector management**

Indonesia participated in the regional training in integrated vector management (IVM) in India in 2011 and began implementing activities.

**Morbidity management**

The LF programme reported 12,066 (11,955 lymphoedema and 111 hydrocele) cases in 2011. None of the hydrocele cases were operated. Disability alleviation activities were initiated involving NGOs. In 2011, 950 health workers were trained.

*Figure 15: Pre-MDA, 2003  Figure 16: Post-MDA, 2009*
9.4 Maldives

(1) Total population of the country: 371 507 (2011)
(2) Total number of divisions: 20 atolls
(3) Total number of inhabited islands: 201
(4) Total area: 300 sq. km land area
(5) Total number of endemic districts (implementation units): 1
   - Total number of non-endemic districts: 200
(6) Population at risk of LF: 2000
(7) Mapping of endemic areas completed in 2003
(8) Mf rate baseline: 10.8% (ranging from >1% to 20%)
(9) LF parasitic species: W. bancrofti; ✓
   : B. malayi  ☐
   : B. timori  ☐
(10) Main vectors: C. quinquesfasciatus
(11) Year of starting MDA: 2004
(12) Year of adopting DEC + ALB: 2004
(13) Year of stopping MDA: 2009

Maldives comprises a group of about 2000 islands in the Indian Ocean covering a total land area of 300 km². There are 20 atolls (natural islands) and 201 of these islands are inhabited.

W. bancrofti infection was prevalent for several decades in the country, but micro Mf rates have been steadily declining over the last 50 years. Five atolls were considered highly endemic in the southern part of the country. C. fatigans (quinquesfasciatus) was reported to be the most predominant species in the islands: out of 1729 mosquitoes dissected, 24.8% were infected. Anopheles tessellatus was also present and filarial infection was recorded in 18.2% of the mosquitoes dissected. The observations suggest that the former is the principal vector and the latter the secondary vector. Stepwells were reported to be the major breeding source of C. fatigans.
The National Programme for the Control of Lymphatic Filariasis began in 1969. LF case detection and treatment as well as anti-larval measures were carried out in endemic islands. In 1998, 10 islands were found to be endemic and the Mf prevalence rate ranged between 0.19–0.91%. A sample survey carried out in 2003 in Fonadhoo Island in Laamu atoll showed that 223 (17.9%) children were positive for filarial antigenaemia. A small population group (about 2000) in the island was considered as LF endemic and mapping was completed in 2003 (Figure 16). MDA was launched only in Laamu atoll in 2004 and was stopped in 2009 after completing five rounds (Figure 17). No children in the age group of 2–8 years were found positive during an antigenaemia survey carried out at the end of the fifth round and the programme stopped MDA in 2009. The epidemiological drug coverage was more than 65% (Table: 5)

The programme initiated vector control (larval control) along with environmental improvement and selected case treatment as early as 1950 when the Mf rate was 18.5%. This rate declined to zero by 2000 (Figure 18).

Table 5: Progress in MDA implementation in Maldives

<table>
<thead>
<tr>
<th></th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of IUs covered</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Population targeted (million)</td>
<td>1 740</td>
<td>1 900</td>
<td>1 900</td>
<td>1 927</td>
<td>1 901</td>
</tr>
<tr>
<td>Population covered (million)</td>
<td>1 740</td>
<td>1 740</td>
<td>1 800</td>
<td>1 900</td>
<td>1 901</td>
</tr>
<tr>
<td>Reported number of people covered by MDA (million)</td>
<td>1 574</td>
<td>1 210</td>
<td>1 270</td>
<td>1 351</td>
<td>1 477</td>
</tr>
<tr>
<td>Reported drug coverage (%)</td>
<td>91</td>
<td>70</td>
<td>71</td>
<td>71</td>
<td>78</td>
</tr>
<tr>
<td>Programme (drug) coverage %</td>
<td>91</td>
<td>64</td>
<td>67</td>
<td>70</td>
<td>78</td>
</tr>
</tbody>
</table>

Post-MDA surveillance

Maldives continued surveillance of expatriate or migrant workers to check LF infection. During 2008, a total of 1221 workers were tested with ICT cards and eight were found to be positive. Vector control including environmental improvement is being continued to check transmission of LF infection.
Initiating process of verification of LF elimination

WHO initiated the process of verification of LF elimination in 2011 since Maldives had reached the point of LF elimination. A WHO expert team visited Maldives in June 2011 and verified retrospective data and a sample of school children (grades 1 and 2) were tested with ICT and all were found to be negative. The programme is continuing ICT testing in previously endemic islands also. The programme is in the process of developing a dossier to obtain certification from WHO.

Integrated vector management

Maldives participated in the regional training in integrated vector management (IVM) in India in 2011 and began implementing activities.

Morbidity management

Morbidity management is in progress in the islands and health workers are being trained.
9.5 Myanmar

Figure 18: Baseline endemicity map

Figure 19: Impact of LF-MDA

<table>
<thead>
<tr>
<th>2007</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LF-endemic</strong>&lt;br&gt;(45 Districts; 45.6M)</td>
<td><strong>LF Endemic</strong>&lt;br&gt;(42 Districts; 46.7M)</td>
</tr>
<tr>
<td><strong>LF Non-endemic</strong>&lt;br&gt;(20 Districts; 8.2M)</td>
<td><strong>LF Non-endemic</strong>&lt;br&gt;(23 Districts; 9.1M)</td>
</tr>
</tbody>
</table>

Stop MDA

(1) Total population of the country: 55 million (2011)
(2) Total number of provinces/states: 15
(3) Total number of districts: 65
(4) Total number of townships: 330
(5) Total area: 676 578 km² and population density: 81 per km²
(6) Total number of endemic districts (implementation units): 45
   - Total number of non-endemic districts: 20
(7) Population at risk of LF: 47 million
(8) Mapping of endemic areas completed in 2007
The parasite *W. bancrofti* is the only species prevalent in Myanmar. The national LF programme was integrated in 1971 with the vector-borne diseases control programme and is being implemented through the primary health care system. A National Mosquito Control Programme was launched in 1998 to reduce filariasis morbidity, interrupt transmission and treat infected persons. The main focus in the past was vector control through bioenvironmental measures with community participation, supplemented with periodic mass blood survey and selective treatment.

More than 70% of the mapping was done by the end of 2003 and was completed by 2007 (Figure 19). A total of 45 of the 65 districts were classified as LF-endemic with a population of 47 million at-risk. By 2007, MDA was expanded to 22 districts. However, MDA could not be implemented in 2005 due to operational problems and DEC was not available. The overall Mf rate at the national level declined from 7.1% to 2.7% in 2011. Three IUs stopped MDA in 2008 as per WHO guidelines of 2005. By 2011, another 11 districts reached Mf rate <1% after completing five or more MDA rounds.

**Post-MDA surveillance**

The programme implemented post-MDA surveillance in three districts where MDA was stopped in 2008 (Figure 20).

**Integrated vector management**

Myanmar participated in the regional training in integrated vector management (IVM) in India in 2011 and began implementing activities.
Morbidity management

The LF programme reported 72 (no lymphoedema case reported and hydrocele 72) cases in 2011. The information is being updated. While 72 hydrocele cases were operated, 85 health workers were trained in 2011.

Table 6: Progress in MDA Implementation in Myanmar

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of IUs covered</th>
<th>Population targeted (million)</th>
<th>Population covered (Million)</th>
<th>Reported number of people covered by MDA (million)</th>
<th>Reported drug coverage (%)</th>
<th>Programme (drug) coverage %</th>
<th>Mf rate</th>
<th>Number of IUs with Mf rate&lt;1% after ≥ 5 rounds</th>
<th>Number of IUs which stopped MDA</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>2</td>
<td>1.9</td>
<td>1.8</td>
<td>1.8</td>
<td>93</td>
<td>93</td>
<td>7.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>11</td>
<td>8.6</td>
<td>7.6</td>
<td>7.4</td>
<td>97</td>
<td>86</td>
<td>15.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>11</td>
<td>7.8</td>
<td>7.8</td>
<td>7.8</td>
<td>100</td>
<td>100</td>
<td>7.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>22</td>
<td>18</td>
<td>18</td>
<td>16</td>
<td>91</td>
<td>89</td>
<td>6.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005*</td>
<td>N</td>
<td>O</td>
<td>M</td>
<td>D</td>
<td>A</td>
<td>A</td>
<td>3.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>N</td>
<td>O</td>
<td>M</td>
<td>D</td>
<td>A</td>
<td>99</td>
<td>5.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>15</td>
<td>12</td>
<td>11</td>
<td>11</td>
<td>99</td>
<td>92</td>
<td>2.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>22</td>
<td>20</td>
<td>17</td>
<td>16</td>
<td>96</td>
<td>89</td>
<td>2.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>19</td>
<td>23</td>
<td>17</td>
<td>16</td>
<td>96</td>
<td>91</td>
<td>2.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>12</td>
<td>10</td>
<td>17</td>
<td>9</td>
<td>90</td>
<td>90</td>
<td>2.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>19</td>
<td>17</td>
<td>16</td>
<td>15</td>
<td>90</td>
<td>88</td>
<td>2.7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* 2005: Since no drugs and operational costs were available to implement MDA in Mandalay Region, MDA was not implemented. During 2006, supply of DEC was much delayed, as a result, MDA round was implemented only in 2007.
9.6 Nepal

Figure 20: Baseline mapping of LF endemicity in Nepal, 2005

![Map of Nepal showing endemic and non-endemic districts]

- Total population of the country: 26.6 million (2011 census)
- Total number of districts: 75
- Total area: 147,181 km² and population density: 181 per km²
- Total number of endemic districts (implementation units): 60
  - Total number of non-endemic districts: 15
- Population at risk of LF: 25 million
- Mapping of endemic areas completed in 2005
- Mf rate baseline: 3.20% (ranging from 0% - 39.8%)
- Antigenaemia rate: ICT cards were used for baseline mapping (13% (37 districts, done in 2001); 2.24% in 3 districts, 2005)
- LF parasitic species: W. bancrofti; ✓
  - B. malayi  
  - B. timori  

(1) Total population of the country: 26.6 million (2011 census)
(2) Total number of districts: 75
(3) Total area: 147,181 km² and population density: 181 per km²
(4) Total number of endemic districts (implementation units): 60
  - Total number of non-endemic districts: 15
(5) Population at risk of LF: 25 million
(6) Mapping of endemic areas completed in 2005
(7) Mf rate baseline: 3.20% (ranging from 0% - 39.8%)
(8) Antigenaemia rate: ICT cards were used for baseline mapping (13% (37 districts, done in 2001); 2.24% in 3 districts, 2005)
(9) LF parasitic species: W. bancrofti; ✓
(10) Main vectors: C. quinquesfasciatus
(11) Year of starting MDA : 2003
(12) Year of adopting DEC + ALB : 2003

Table 7: Progress in MDA Implementation in Nepal

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of IUs covered</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>21</td>
<td>N</td>
<td>21</td>
<td>30</td>
<td>36</td>
</tr>
<tr>
<td>Population targeted (million)</td>
<td>0.5</td>
<td>1.54</td>
<td>3</td>
<td>2.07</td>
<td>10.9</td>
<td>O</td>
<td>14.2</td>
<td>14.2</td>
<td>15.5</td>
</tr>
<tr>
<td>Pop. covered (million)</td>
<td>0.5</td>
<td>1.45</td>
<td>2.8</td>
<td>1.96</td>
<td>10.27</td>
<td>M</td>
<td>10.0</td>
<td>13.3</td>
<td>15.0</td>
</tr>
<tr>
<td>Reported number of people covered by MDA (million)</td>
<td>0.4</td>
<td>1.2</td>
<td>2.6</td>
<td>1.7</td>
<td>8.8</td>
<td>D</td>
<td>8.3</td>
<td>11.5</td>
<td>12.3</td>
</tr>
<tr>
<td>Reported drug coverage (%)</td>
<td>81</td>
<td>83</td>
<td>83</td>
<td>83</td>
<td>86</td>
<td>A</td>
<td>83</td>
<td>81</td>
<td>84</td>
</tr>
<tr>
<td>Epidemiological (drug) coverage %</td>
<td>81</td>
<td>98</td>
<td>83</td>
<td>83</td>
<td>81</td>
<td>77</td>
<td>81</td>
<td>79</td>
<td></td>
</tr>
<tr>
<td>Mf rate**</td>
<td>16.1</td>
<td>ND@</td>
<td>2.6</td>
<td>6.4</td>
<td>0.8</td>
<td>2.5</td>
<td>1.0</td>
<td>0.07</td>
<td>0.38#</td>
</tr>
<tr>
<td>Number of IUs with Mf rate&lt;1% after ≥ 5 rounds</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Number of IUs which stopped MDA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>

*Since investigations were on in 2008 regarding severe adverse events occurred during 2007 MDA round, MDA round in 2008 was postponed to 2009.
**Mf rate assessment was done in selected districts. @ ND: Not done
# ICT result from five districts where TAS was done in 2011 and MDA was stopped

In line with WHO’s global targets and strategies to eliminate lymphatic filariasis (LF) by 2020, Nepal formulated a National Plan of Action (2003–2015) in 2002 for elimination of lymphatic filariasis from the country and established a national task force under the chairmanship of the Director-General, Department of Health Services, Ministry of Health and Population (MOHP). Baseline surveys were conducted and epidemiological mapping of LF distribution was done in 2001 and completed in 2005 which identified 60 out of 75 districts as LF...
endemic. Most of the non-endemic districts are mountainous (Figure 21). The national guidelines and tentative plan of action for the elimination of LF in Nepal (2011–2020) have been revised and are being processed for endorsement by the national authorities.

In Nepal, *W. bancrofti* is the only recorded parasite and the mosquito, *Culex quinquesfasciatus*, is the only efficient vector in all endemic areas of the country. Topographically, LF is more prevalent in the southern plains than in the hills, but the distribution ranges from 300 ft. to 5800 feet above sea level.

As a strategy to eliminate LF, Nepal adapted the MDA approach in 2003 using combination therapy of DEC and albendazole in one implementation unit (Parsa district) targeting more than half a million population. MDA was then scaled up to other districts/implementation units in phases and 41 districts were covered by the end of 2011, five of which have completed six rounds and have been phased out from further rounds. Severe adverse events (SAE) in Nepal resulted in postponement of the 2008 MDA round to 2009 and also affected treatment coverage. The programme is strengthening public and media education to reduce the fear about Serious Adverse Events (SAE) and appropriate training of health workers including community volunteers is being conducted to deliver MDA.

**Post MDA surveillance**

Nepal is planning to initiate post-MDA surveillance in districts where MDA has been stopped. The NTD Steering Committee also recommended introducing post-MDA surveillance including vector surveillance in 2011. Active case-finding for lymph oedema and hydrocele cases is done during MDA campaigns.

**Integrated vector management**

Nepal participated in the regional training in integrated vector management (IVM) in India in 2011 and began implementing activities. Distribution of LLIN in high-risk malaria districts and indoor residual spraying of insecticides are major IVM components.

**Transmission assessment survey and stopping MDA**

A transmission assessment survey (TAS) was conducted in five districts where six rounds of MDA have been completed and the survey was done as per the current LF TAS manual of WHO 2011(Table 8). Since the net primary school
enrolment ratio was ≥ 75%, the school survey method was selected. A sample of school children (grades 1 & 2) using survey sample builder (LFSC, USA) was obtained. Of the total 2720 schools in the evaluation units with grades 1 and 2, a sample of 142 schools was selected and 2836 children of grades 1 and 2 were tested using ICT card. A total of 11 positive cases were detected and the results were well below the cut-off point and all the evaluation units (EUs) were qualified to stop MDA. The programme stopped MDA in these five districts (shown in yellow colour) in 2011 (Figure 21).

**Morbidity management**

LF-related morbidity management is also another important aspect of the national LF elimination programme. The LF programme reported 17 075 (lymphoedema: 4017 and hydrocele: 11 249 and other swellings: 1809) cases

<table>
<thead>
<tr>
<th>Evaluation Unit</th>
<th>Districts</th>
<th>Population</th>
<th>Number of schools sampled</th>
<th>Sample size (Grades 1 &amp; 2)</th>
<th>Cut-Off point</th>
<th>ICT result positive cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Parsa</td>
<td>618 698</td>
<td>22</td>
<td>451</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Makwanpur</td>
<td>479 291</td>
<td>20</td>
<td>479</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Chitwan</td>
<td>584 725</td>
<td>25</td>
<td>433</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>Nawalparasi</td>
<td>658 418</td>
<td>35</td>
<td>700</td>
<td>16</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Rupandehi</td>
<td>883 845</td>
<td>40</td>
<td>773</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3 224 977</strong></td>
<td><strong>142</strong></td>
<td><strong>2 836</strong></td>
<td><strong>11</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 21: Post-TAS endemicity mapping of Nepal in 2011*
in 2011. A total of 5580 health workers were trained in 2011 on LF morbidity management. Some districts have done/are doing LF morbidity-related surgical camps, especially for hydrocele cases.

**Integrating LF elimination into other neglected tropical disease control**

In 2011, the MoHP Nepal formulated an Integrated Plan of Action for NTDs, consisting of LF, trachoma and soil-transmitted helminths (STH), as these three diseases represent a significant public health burden and can be tackled through a mixture of preventive chemotherapy programmes, and behaviour change initiatives. At the national level, a steering committee and technical working group (TWG) were formed in 2010 under the chairmanship of the Director-General of Health Services, MoHP, Nepal.

The United States Agency for International Development/Research Triangle Institute (USAID/RTI) is providing additional funds required to plan and implement the integrated NTD control plan.

### 9.7 Sri Lanka

**Figure 22: LF endemicity map**

**Figure 23: Post-MDA map**

1. Total population of the country: 21 million (2011)
2. Total number of provinces: 9
3. Total number of districts: 25
Total area: 65 610 km² and population density: 300 per km²

Total number of endemic districts (implementation units): 8 in 3 provinces

Total number of non-endemic districts: 17

Population at risk of LF: 10 million

Mapping of endemic areas completed in 2000

Mf rate base line: <1% (Ranging from 0.36% in 1993 to 0.03% in 2010)

LF parasitic species : W. Bancrofti; ☑
                   : B. malayi
                   : B. timori

Main vectors: C. quinquesfaciatus

Year of starting MDA: 2001 (In Colombo only)

Year of adopting DEC + ALB: 2001 (in Colombo district)

An island-wide survey as early as 1940 found a microfilaria rate (Mf) of 20%-24%. W.bancrofti is the main species in the country since 1969. The anti-filaria campaign (AFC) was initiated in 1947 and the programme to eliminate lymphatic filariasis started in 2001 covering eight endemic districts with a population of about 11 million. When MDA was implemented, the Mf rate was already less than 1% (Figure 25). Each district with a population of 1–2 million was identified as one IU. In 2001, Colombo district was taken up for DEC and albendazole (other seven districts with DEC) and later expanded to other districts by 2002. Five consecutive MDA rounds were completed in 2006 and MDA was stopped in 2007. Side reactions were minimal and self-limiting without any reports of serious adverse events (SAE).

After five rounds of MDA (Figures 23 and 24), the microfilaraemia prevalence rate decreased to 0.05% (range: 0.02–0.11%). No children in the age group of 2–4 years were positive for antigenaemia in the IUs, justifying the decision to stop MDA. Sri Lanka also implemented the COMBI plan in 2002 to improve the MDA coverage. Sentinel surveillance showed all districts implementing MDA having a steadily declining infection rate. The vector infection rate showed a marked declining trend. No change was observed in vector infectivity.
Figure 24: Mf prevalence in the endemic districts in Sri Lanka: 1993–2010 (Pre-MDA, MDA and post-MDA periods)

Table 9: Progress in MDA Implementation in Sri Lanka

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of IUs covered</td>
<td>1</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>S</td>
</tr>
<tr>
<td>Population targeted (million)</td>
<td>2.2</td>
<td>10</td>
<td>10</td>
<td>9.9</td>
<td>10</td>
<td>10</td>
<td>T</td>
</tr>
<tr>
<td>Population covered (million)</td>
<td>2.1</td>
<td>9.2</td>
<td>9.8</td>
<td>9.2</td>
<td>9.4</td>
<td>9.6</td>
<td>O</td>
</tr>
<tr>
<td>Reported number of people covered by MDA (million)</td>
<td>1.7</td>
<td>6.4</td>
<td>8.6</td>
<td>8.5</td>
<td>8.6</td>
<td>8.8</td>
<td>P</td>
</tr>
<tr>
<td>Reported drug coverage (%)</td>
<td>77</td>
<td>70</td>
<td>87</td>
<td>93</td>
<td>91</td>
<td>91</td>
<td>MDA</td>
</tr>
<tr>
<td>Programme(drug) coverage%</td>
<td>75</td>
<td>64</td>
<td>86</td>
<td>86</td>
<td>84</td>
<td>84</td>
<td></td>
</tr>
<tr>
<td>Mf rate %</td>
<td>0.21</td>
<td>0.15</td>
<td>0.07</td>
<td>0.05</td>
<td>0.03</td>
<td>0.03</td>
<td>0.05</td>
</tr>
<tr>
<td>Number of IUs with Mf rate&lt;1% after ≥ 5 rounds</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Number of IUs which stopped MDA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8</td>
</tr>
</tbody>
</table>
Since 1993, the programme has undertaken vector monitoring to study infection and infectivity levels during pre-MDA, MDA and post-MDA periods (Figure 25).

**Xeno monitoring in Sri Lanka**

In January 2011, the AFC laboratory was refurbished with support from the Control of Neglected Tropical Diseases (CNTD), Liverpool, United Kingdom. It is now equipped with instruments including PCR machine and provided with reagents to conduct highly sensitive tests to monitor the burden of the disease. Xenomonitoring tests in mosquitoes based on DNA techniques was also commenced (CNTD will support the research on other NTDS in Sri Lanka such as leishmaniasis, leptospirosis and leprosy). Enhanced surveillance studies are continuing simultaneously in hot spot areas among school children, the community and vectors with the help of foreign donors.

**Initiating process of verification LF elimination**

WHO initiated the process of verification of LF elimination in 2011, as Sri Lanka has completed five years’ post-MDA surveillance including mosquito and xeno monitoring showing no transmission of LF infection.
A WHO expert mission team visited Sri Lanka in June 2011 and verified retrospective data. In total, a sample of 13,000 school children (grades 1 and 2) was calculated using the survey sample builder following LF TAS manual of WHO 2011 and ICT card testing was used. Samples of school children (grades 1 and 2) were tested with ICT and all were found to be negative. The programme is in the process of developing a dossier.

**Integrated Vector Management**

One medical officer of AFC participated in the regional training in integrated vector management (IVM) in India in 2011.

**Morbidity management**

The anti-filaria campaign and regional filariasis units manage lymphoedema cases at anti-filaria clinics. Training of lymphoedema patients on morbidity management including washing was initiated from 2002 onwards.

**9.8 Thailand**

*Figure 26: Mapping of LF endemicity 2001 and 2011*
Towards eliminating lymphatic filariasis: Progress in the South-East Asia Region

Total population of country: 64 million (2011)

Total population at risk of LF: 167,000

Administrative Uunits:
(a) No. of regions: 5
(b) No. of provinces: 76
(c) No. of districts or townships: 927
(d) No. of sub-districts: 7,410
(e) No. of villages: 75,000

Total number of endemic implementation units (sub-villages): 355

Baseline mapping completed: 2001

LF Parasitic species:
- W. Bancrofti
- B. malayi
- B. timori

Main vectors: Aedes species for Bancrofti infections and Mansonia species for B. malayi infections.

Two-drug MDA started: 2002

MDA was stopped in 2007 in 268 implementation units

MDA continued in 87 IUs in Narathiwat province

Baseline micro-filarial (Mf) rate: <1% and antigenaemia rate was 0.08%

W. bancrofti and B. malayi continued to be prevalent in the inter-country borders with an estimated 167,000 people exposed to the risk in 355 implementation units (sub-villages and villages in Narathwat province). Filariasis control is undertaken by the Department of Communicable Diseases (current name: Department of Disease Control). The programme is integrated with the vector-borne diseases control programme. Surveillance has been intensified in low compliance areas in the entire endemic belt.

Mapping was completed in Thailand in 2001 (Figure 26). Each sub-village was considered as an implementation unit. Approximately 167,000 people are at risk. Thailand commenced the MDA with DEC + albendazole in 2002 targeting the people living in the entire endemic area. Reported drug coverage and programme (drug) or epidemiological coverage was well above 80%
The programme stopped MDA in 268 IUs in 2007 and continued MDA in 87 IUs in Narathiwat province since the coverage was not satisfactory due to communal and local problems (Figure 27). The Mf rate was less than 1% in 2002 when MDA was expanded (Figure 28). WHO Regional Office for South-East Asia-Reginal Programme Review Group-LF recommended stopping MDA after the transmission assessment survey in Narathiwat province and initiating verification of LF elimination as soon as possible. The process will take place in 2012.

**Table 10: Progress in MDA implementation in Thailand**

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of IUs covered</td>
<td>336</td>
<td>340</td>
<td>343</td>
<td>346</td>
<td>355</td>
<td>87</td>
<td>87</td>
<td>87</td>
<td>87</td>
<td>87</td>
</tr>
<tr>
<td>Population covered (million)</td>
<td>0.13</td>
<td>0.14</td>
<td>0.15</td>
<td>0.16</td>
<td>0.17</td>
<td>0.07</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
</tr>
<tr>
<td>Population targeted (million)</td>
<td>0.13</td>
<td>0.14</td>
<td>0.15</td>
<td>0.16</td>
<td>0.17</td>
<td>0.07</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
</tr>
<tr>
<td>Reported number of people covered by MDA (million)</td>
<td>0.12</td>
<td>0.12</td>
<td>0.13</td>
<td>0.14</td>
<td>0.11</td>
<td>0.06</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
</tr>
<tr>
<td>Reported drug coverage (%)</td>
<td>93</td>
<td>90</td>
<td>83</td>
<td>87</td>
<td>84</td>
<td>84</td>
<td>96</td>
<td>95</td>
<td>95</td>
<td>100</td>
</tr>
<tr>
<td>Programme (drug) coverage%</td>
<td>91</td>
<td>89</td>
<td>89</td>
<td>89</td>
<td>68</td>
<td>83</td>
<td>96</td>
<td>95</td>
<td>95</td>
<td>100</td>
</tr>
<tr>
<td>Mf rate</td>
<td>0</td>
<td>0.77</td>
<td>0.15</td>
<td>0.16</td>
<td>0.04</td>
<td>0.06</td>
<td>0.03</td>
<td>0.05</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ag+ rate</td>
<td>0.08</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ab+ rate</td>
<td></td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.60</td>
<td></td>
</tr>
<tr>
<td>Number of IUs with Mf rate &lt;1% after ≥5 rounds</td>
<td>268</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>355</td>
<td></td>
</tr>
<tr>
<td>Number of IUs which stopped MDA</td>
<td>268</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Impact of MDA on microfilarial rate**

As a result of good coverage and Mf rate <1%, MDA was stopped in 2007 in 268 implementation units. Meanwhile, 87 IUs continued MDA in Narathiwat province, although the Mf rate was <1% since MDA coverage was disrupted due to operational difficulties.
**Post-MDA surveillance:**

Thailand implemented post-MDA surveillance in 268 IUs in 2007.

**Initiating process of elimination of LF**

Since 268 IUs completed almost five years’ surveillance and maintained Mf rate<1%, the programme is planning to initiate the process of verification of LF elimination in 2012 after completing TAS as per the WHO TAS Manual (2011). In 2012, 87 IUs will be taken up for TAS to decide about stopping MDA.

**Integrated vector management**

Thailand participated in the regional training in integrated vector management (IVM) in India in 2011 and began implementing activities.

**Morbidity management**

The LF programme reported about 200 lymphoedema cases and implemented disability alleviation activities.
9.9 Timor-Leste

Figure 28: Baseline LF endemicity mapping in Timor-Leste: 2004

(1) Total population of country: 1.1 million (2010 Census)
(2) Population at risk of LF infection: 1.1 million
(3) No. of districts: 13 (all are endemic)
(4) Administrative unit selected as implementation unit for MDA: district
(5) LF Parasitic species : W. bancrofti ✔
                  : B. malayi ✔
                  : B. timori ✔
(6) Main vectors: An. Barbirostris and c. quinquesfasciatus
(7) Mapping status: Completed in 2004 and all 13 districts were considered endemic for LF
(8) Year of MDA implementation: 2005-2007 (MDA stopped in 2007)

All the three species viz. W. bancrofti, B. malayi and B. timori are prevalent. Baseline endemicity mapping was completed in 2004 and the micro-filarial rate (Mf) was 12% in the general population. Historically, B timori is considered to be the most prevalent species in Timor-Leste accounting for about 95% of cases.
The only known vector of *B timori* is *An barbirostris* which prefers to breed in clean water flowing from fresh water springs and has particular affinity for irrigated rice-paddy fields.

Timor-Leste completed baseline mapping in 2004 (Figure 28), MDA was implemented in 4 IUs in 2005 and expanded to 7 IUs in 2007 (Table 11). However, due to several constraints and operational reasons, MDA was discontinued after 2007.

Following a series of advocacy meetings, the Ministry of Health is planning to restart MDA for LF and STH soon as an integrated NTD control activity.

**Table 11: Progress in MDA implementation**

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of IUs covered</td>
<td>4</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Population targeted (million)</td>
<td>0.3</td>
<td>0.34</td>
<td>0.36</td>
</tr>
<tr>
<td>Population covered (Million)</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Reported number of people covered by MDA(million)</td>
<td>0.29</td>
<td>0.32</td>
<td>0.27</td>
</tr>
<tr>
<td>Reported drug coverage (%)</td>
<td>90</td>
<td>90</td>
<td>92</td>
</tr>
<tr>
<td>Programme (drug) coverage%</td>
<td>91</td>
<td>93</td>
<td>74</td>
</tr>
</tbody>
</table>

The MoH began treatment for STH along with LF in selected areas (Table 12).

**Integrated vector management**

Timor-Leste participated in the integrated vector management (IVM) training in India in 2011.

**Integrated NTD control plan**

Timor-Leste has drafted an integrated NTD control plan covering LF, STH and yaws: 2012–2017.
Table 12: MDA coverage in Timor-Leste

<table>
<thead>
<tr>
<th>District</th>
<th>Population</th>
<th>2005 People Registered</th>
<th>People treated for LF (% of eligible people)</th>
<th>People treated for STH (% of eligible people)</th>
<th>People Registered</th>
<th>Eligible people treated for LF (%)</th>
<th>Eligible people treated for STH (%)</th>
<th>People Registered</th>
<th>Eligible people treated for LF (%)</th>
<th>Eligible people treated for STH (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baucau</td>
<td>103 894</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lost data</td>
</tr>
<tr>
<td>Bobonaro</td>
<td>83 579</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Covalima</td>
<td>54 720</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>33 783 (94%)</td>
</tr>
<tr>
<td>Dili</td>
<td>181 195</td>
<td>158 207</td>
<td>144 672 (91%)</td>
<td>46 323 (95%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquica</td>
<td>56 688</td>
<td>60 774</td>
<td>52 912 (87%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lost data</td>
</tr>
<tr>
<td>Lautern</td>
<td>58 053</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>60 682</td>
<td>54 673 (90%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manatuto</td>
<td>38 049</td>
<td>43 894</td>
<td>40 966 (93%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>36 636 (94%)</td>
</tr>
<tr>
<td>Manufahi</td>
<td>46 487</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>42 658 (95%)</td>
</tr>
<tr>
<td>Oecusse</td>
<td>59 416</td>
<td>57 096</td>
<td>51 204 (90%)</td>
<td>24 447 (95%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>47 303 (95%)</td>
</tr>
<tr>
<td>Viqueque</td>
<td>67 495</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>84 156 (96%)</td>
</tr>
</tbody>
</table>
Towards eliminating lymphatic filariasis: Progress in the South-East Asia Region

Global and regional initiatives for LF elimination

The Fiftieth World Health Assembly in 1997 adopted Resolution WHA 50.29 urging Member States to consider the problem of LF and work towards its elimination. Along with the preparations for this massive public health undertaking, the Global Alliance to Eliminate Lymphatic Filariasis (GAELF), a partnership of many organizations including major donors and national governments, was formed to support this effort. The first meeting of GAELF was held in Santiago, Spain in May 2000, while the second meeting was held in New Delhi, India on 2–3 May 2002. During these meetings, attention was focused on support for effective country action, empowering countries and their people to design and manage public health programmes and pursue poverty alleviation through the elimination of LF, as an important component.

Technical Advisory Group

The Regional Technical Advisory Group (RTAG) on Dengue advises WHO on key issues such as policy, strategy and operations which are relevant to elimination efforts. This Group meets annually and makes recommendations for further improvement of the programme. The global strategic plan of WHO would be modified in the future based on TAG recommendations.

Regional Programme Review Groups

A Regional Programme Review Group was set up under the scheme of drug donation from GlaxoSmithKline with the task of reviewing applications received from the national ministries for donated drugs. With the rapid increase in
programme activities, it became necessary to regionalize this activity; thus six Regional Programme Review Group (RPRG) were formed, one for each Region. In addition to reviewing the initial applications and subsequent re-applications to make recommendations for donation of albendazole, RPRGs also review the annual reports on LF submitted by countries and make recommendations for improvement of elimination activities. WHO is the secretariat to the RPRG.
Relevant technical support

Technical guidelines

WHO has distributed necessary guidelines to programme managers including comprehensive guidelines for preparing and implementing a national plan to eliminate LF, community home-based prevention of disability due to LF and guidelines/training modules for drug distributors and for monitoring and epidemiological assessment. Programme managers will be updated on new guidelines, additions and modifications to the existing ones. They will be encouraged to follow these guidelines while adapting to the local situation as necessary.

11.1 Drug quality, drug supplies and logistics

WHO and other partners will provide assistance to Member States for free access and distribution of qualified medicines and other logistics to the endemic communities and also help in the alternative method of DEC fortified salt distribution wherever warranted. The principal issues and strategies are as follows:

- linkage between programme managers and drug companies;
- availability of information on reliable sources for supply of DEC;
- logistics of drug supply;
- monitoring and reporting mechanism;
distribution mechanism from national level to individuals;
• annual stock-taking and replenishments;
• preparatory and planning process for drugs requirement by the ministries of health.

11.2 Surveillance including mapping and programme monitoring

Surveillance and programme monitoring are essential to achieve the elimination of LF, delimit the problem, identify the endemic groups, evaluate ongoing interventions and process validation methods. These also help in using appropriate technology.
The partners and their roles

The prerequisite for successful partnership is mutual respect, trust, transparency and free sharing of credit.

12.1 Local partners

(1) National health authorities

The local health authorities are focal partners to define and prioritize the problem, strengthen surveillance capabilities and improve the drug distribution system.

(2) Intersectoral role

The ministries of local government, information and broadcasting, education, agriculture, environment, rural welfare and urban development play an important role in the successful implementation of strategies for elimination of LF.

(3) Local NGDOs

The national task force will manage the involvement of local NGDOs in the successful implementation of the programme.
12.2 Bilateral agencies

The national task force would coordinate the work of bilateral agencies, such as the Japanese International Cooperation Agency (JICA), Australian Agency for International Development) (AUSAID) and the United Kingdom, Department of International Development (DFID).

12.3 International agencies

Global alliance

International agencies will contribute towards elimination through the Global Alliance for Elimination of Lymphatic Filariasis (GAELF). The Global Alliance is a partnership forged between many organizations including the national governments and many donor agencies each with a different mandate, but with the common goal to eliminate LF.

WHO

WHO is the Secretariat to RPRG and the coordinating agency in planning, monitoring, assessment, importation of drugs and NGDO’s activities for elimination of LF among partners.

Through the South-East Asia RPRG, the Regional Office for South-East Asia would provide technical support and formulate regional action plans. It would also participate in regular assessment, including basic risk factor analysis, mapping, support programme managers’ meetings, training, evaluation, research and surveillance activities.

WHO will provide technical leadership, mobilize resources, develop training modules and teaching guidelines, promote improved surveillance, monitoring and evaluation, IEC, support national regulatory authorities, management methods, operational research, ensure annual and periodic review of strategic plans and certify elimination of LF wherever applicable.

12.4 Academic institutions

National research and academic institutes in endemic countries (to be identified by national authorities) will provide technical support related to planning and
implementation during the coming five years. They will also assist in identifying areas for operational and applied research, capacity-building and monitoring and evaluation in different stages of the programme.

12.5 Pharmaceutical partners

GlaxoSmithKline Beecham (GSK): GSK and WHO pledged in January 1998 to work together through a Collaboration Coordinating Committee (CCC) to launch the global effort to eliminate LF. GSK is a partner of GAELF. GSK will donate 5 billion tablets of albendazole that may be required over a period of 20 years. GSK would also support with grants and additional help with coalition-building, planning, training and communication initiatives.

Eisai Foundation of Japan, another pharma partner with WHO, has signed a Memorandum of Understanding (MoU) to donate DEC to endemic countries from 2014.

Sanofi-Aventis of France who are partners with WHO, have come forward to donate DEC to some selected countries who cannot afford to procure DEC in 2012. In the South-East Asia Region, Myanmar is a beneficiary of this donation.

12.6 International donor/developmental partners

International donor/developmental partners would play a critical role in providing funds to selected Member States to expand LF-MDA, TAS to stop MDA, capacity building, and implementing integrated NTD control plans. They also provide funds to WHO for organizing technical missions, meetings and providing technical support to Member States for LF elimination activities.

The door is open for inducting a wide range of organizations and individuals who can recognize that important opportunities are available to make a major public health and economic impact through their active participation and contribution to the LF elimination programme.
Integration with other disease control programmes

The fundamental prerequisite for accelerating the elimination of lymphatic filariasis is the integration of the programme with other disease control/eradication programmes. The two programmes mentioned below are ideal for integrating with LF elimination efforts.

13.1 Soil-transmitted helminthiasis and other neglected tropical diseases

The strategies for control/elimination of filariasis and control of intestinal nematodes have many similarities; in the former, a two-drug regimen once a year is given, while in the latter, a single-drug regimen is followed 1–2 times a year. Attempts will be made to integrate strategies for intestinal parasite control among school-going children and other high-risk groups (pre-school children and pregnant women) with LF elimination programmes at every level. This will improve efficiency and more effective resource mobilization.

Since mass drug administration/preventive chemotherapy is also applicable in soil-transmitted helminthiases, trachoma and schistosomiasis, it is advisable to integrate LF elimination activities into these diseases, to reduce cost of drug delivery and burden on health workers if they are co-endemic in a district.
13.2 Malaria control programme

Malaria control activities will provide synergistic benefits for ELF programme from IRS and use of ITNs in the endemic areas where the disease is transmitted by anopheline mosquitoes or in areas co-endemic with malaria. LF programmes will be encouraged to establish links between LF and malaria control programmes.


To advocate integrating of LF elimination including morbidity management into other co-endemic NTDs as applicable, the WHO-Regional Office for South-East Asia developed a Regional Strategic Plan for integrated NTD control: 2012–2016.

While Indonesia, Myanmar, Nepal and Timor-Leste have developed their country-specific integrated action plans, Indonesia and Nepal are progressing in implementation.
Timeframe (2011–2020)

14.1 Regional targets

2011

- Mapping completed in all the nine endemic countries.
- Maldives and Sri Lanka reached a point of LF elimination and initiated the process of verification with WHO support.
- MDA scaled up in all endemic countries except Timor-Leste.
- Advocacy to restart LF-MDA in Timor-Leste completed successfully.
- All countries will be at various stages of scaling up community-based disability alleviation activities.
2012

- Seven remaining endemic Member States continued MDA at various stages of scaling-up.
- Thailand planned to stop MDA in Narathiwat and initiate verification of LF elimination in other IUs.
- Timor-Leste has begun planning LF-MDA.
- Maldives and Sri Lanka continued TAS and began dossier preparation.
- Country LF programme managers received training in revised TAS guidelines of WHO 2011.
- Stop-MDA was planned in districts which had completed more than five MDA rounds with Mf rate<1%.
- Post-MDA surveillance implemented in some countries.
- All countries were at various stages of scaling up community-based disability alleviation activities.

2013

- Bangladesh, India, Nepal will cover all the endemic districts with MDA and Indonesia, Myanmar and Timor-Leste will scale-up MDA.
- Bangladesh, India, Indonesia, Myanmar and Nepal will initiate TAS to stop MDA in pre-TAS qualified districts.
- Maldives and Sri Lanka will submit dossier of LF elimination to the Tenth Regional Programme Review Group (RPRG) meeting.
- Thailand will continue TAS in Narathiwat and other IUs and start preparing dossier.
- Post-MDA surveillance including vector surveillance will be continued by some countries.
- Most of the LF patients will have access to community-based disability alleviation care in all endemic countries.
### 2014
- Indonesia, Myanmar and Timor-Leste will cover entire country with MDA.
- Bangladesh, India, Indonesia, Myanmar and Nepal will continue to stop MDA in prequalified districts.
- TAS implemented in selected post-MDA districts.
- Post-MDA surveillance expanded in more districts.
- Most patients will have access to community-based disability alleviation care in all endemic countries.
- Maldives and Sri Lanka will eliminate LF.

### 2015
- Bangladesh, India, Myanmar and Nepal will have stopped MDA in most of the districts.
- Post-MDA surveillance will have been expanded in more districts.
- TAS will have been implemented in most of the post-MDA districts.
- Most LF patients will have access to community based disability alleviation care in all endemic countries.

### 2016
- Bangladesh, India and Nepal will stop MDA in all districts.
- Indonesia, Myanmar and Timor-Leste will stop MDA in most of the districts.
- Post-MDA surveillance will be continued in almost all the IUs.
- Thailand continues post-MDA surveillance and submitted dossier.

### 2017
- Thailand eliminated LF.
- Remaining countries implemented post-MDA TAS in pre-qualified IUs.
- Dossier preparations initiated by most of the countries.
<table>
<thead>
<tr>
<th>Year</th>
<th>Achievements</th>
</tr>
</thead>
</table>
| 2018 | • Post-MDA TAS is completed in majority of IUs.  
      • Post-MDA surveillance is continued.  
      • Dossier preparations for LF elimination to the Tenth Regional Programme Review Group (RPRG) meeting. |
| 2019 | • Most LF patients will have access to community-based disability alleviation care in all endemic countries.  
      • Post-MDA TAS completed in majority of IUs.  
      • Post-MDA surveillance is continued.  
      • Dossier preparation in progress and submitted by some countries.  
      • Verification process initiated in Bangladesh and Nepal. |
| 2020 | • Most known LF patients will have access to community-based disability alleviation care in all endemic countries.  
      • Post-MDA surveillance is continued in some IUs and verification process initiated in all the countries. |
Towards eliminating lymphatic filariasis: Progress in the South-East Asia Region

Millennium Development Goals

Lymphatic filariasis (LF) is one of the poverty-related diseases affecting the often-poor and marginalized populations in developing countries. It is a vector-borne disease transmitted by mosquitoes, and could lead to irreversible disabilities. Disabilities are associated with social discrimination, loss of human rights, social problems and in general cause a heavy burden on the health system and other sectors. Among the population at risk, 30% are children. Infection in childhood leading to lifelong disabilities eventually result in long-term social and economic problems including education.

While the global numbers are often overlooked, the impact of this disease on extreme poverty is severe and often catastrophic for the people and communities affected. While LF affects women and men equally, the disfigurement and disability can have a greater impact on women. As LF is strongly linked to poverty and many other social aspects, the elimination of LF in this Region would substantially improve progress towards achieving the Millennium Development Goals (MDG).

Human rights

LF affects the human rights of the people infected, their families and communities, as there is strong stigma and discrimination that they have to suffer. Patients with LF are denied work, economic improvement or even social opportunities such as marriage. This social element is often being ignored, although from the ethical and psychological point of view, the effects are devastating. The efforts to eliminate LF, therefore, could contribute to address this issue by increasing awareness of the community and eventually minimizing the human rights discrimination that they have to face.
Experiences within and outside the Region have shown that elimination of LF as a public health problem is indeed an achievable goal and conditions are in place to ensure its elimination in the South-East Asia Region. However, experience has also shown that success can lead to complacency, and then these diseases return. The most important challenge will, therefore, be to continue adequate surveillance so that we know whether these diseases remain in previously endemic areas, and to continue advocacy to ensure political commitment remains high and national health strategies continue to recognize the importance of these diseases.

Ongoing monitoring, research and partnerships will be required. Further mobilization of resources is needed to build country capacity. The resources required are not substantial in global terms, but are significant for the poorest countries of the Region. Elimination of LF in all endemic communities will substantially improve the lives of the poorest people.
References


(4) Country reports.
Lymphatic filariasis (LF) is one of the most debilitating neglected tropical diseases known since ancient times. Caused by three species of filarial worms and transmitted by mosquitoes, LF occurs among deprived, poor populations across the world. Globally, 1.34 billion people are at-risk, and the South-East Asia Region is where 63% of them reside. In the past two decades, the commitment to control and eliminate LF has gained momentum with advancement in knowledge and science of LF, with the Global Programme to Eliminate Lymphatic Filariasis launched in 2000, led by WHO. The target is to eliminate LF by 2020, relying on two main strategies: preventive chemotherapy through mass distribution of effective drugs; and morbidity management. Nine LF-endemic countries in South-East Asia Region have adopted the strategy, completed mapping and implementing the plan.

This report elaborates the efforts in the past decade towards eliminating LF in the Region, highlighting key components for success, challenges and the way forwards. The use of simplified tools, strengthening partnership and collaboration and integration with other programmes to control NTDs should be lessons learnt to attain the target by 2020.