

Chapter 5

Unburdening the Poor: Elimination of Lymphatic Filariasis in the Maldives



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Abstract The Maldives is one of three countries in the WHO South-East Asia Region to have eliminated lymphatic filariasis as a public health problem. Efforts to address the problem in the Maldives go back to much before the country became free in 1965. WHO-supported surveys were undertaken in 1951 in 34 habitable islands. It was found that 37% of inhabitants in these islands were either infected with *W. bancrofti* or exhibited clinical signs of lymphatic filariasis. Since 1968, when the National Filaria Control Programme was established, the unswerving political commitment and allocation of dedicated financial resources for case detection and treatment served as cornerstones of the Maldives' successful effort to eliminate lymphatic filariasis. The unique geography and scattered population in the country poses logistical challenges in rolling out health initiatives. However, highly trained health workers, linked to the WHO-supported global surveillance system for lymphatic filariasis, helped catalyse case-finding and treatment services in the Maldives. Another significant move was to make lymphatic filariasis a notifiable disease under the Public Health Protection Act, which came into force in 2012. The law provides for mandatory reporting of communicable diseases. The elimination of lymphatic filariasis from the Maldives has also demonstrated how technical capabilities, backed by strong political will and financial backing, help countries to tackle the scourge of NTDs. The resolve of the Maldives to achieve the elimination target ahead of the global deadline of 2020 set for elimination of lymphatic filariasis could serve as a template worth emulating by health systems in the Region and other countries facing the challenge of NTDs.

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5.1 Background

The Maldives is one of three countries in the WHO South-East Asia Region to have eliminated lymphatic filariasis as a public health problem. It is a painful and disfiguring disease that affects this Region more than any other in the world. WHO officially validated the Maldives for having eliminated lymphatic filariasis as a public health problem in 2016. The country's success in eliminating the disease is a story of political commitment, focused action and rigorous public health surveillance spanning decades.

Popularly known as elephantiasis, lymphatic filariasis affects people of all age groups. Although children can acquire the disease, it may visibly manifest much later in adulthood [1]. The disease is caused by three species of thread-like worms known as filariae—*Wuchereria bancrofti*, *Brugia malayi* and *Brugia timori*. An estimated 90% of infections with lymphatic filariasis are caused by *Wuchereria bancrofti*, of which humans are the only host [2]. Mosquitoes are the primary vector of *W. bancrofti*. Globally, Brugian parasites are found only in South-East Asia, primarily Indonesia, Timor-Leste, Malaysia and Thailand [2]. Factors influencing the risk of transmission in a community include the number of infected persons, the density of microfilaria in infected persons' blood, density of vector mosquitoes and the frequency of human–vector contact [2].

Male and female worms join together in the human lymphatic system, which is a key component of the body's immune mechanism that maintains the fluid balance between the blood and body tissues [1]. The majority of infected people are asymptomatic, although virtually all infected individuals experience lymphatic damage and up to 40% have associated kidney damage. The clinical manifestations of lymphatic filariasis vary, such as swelling of the limbs and various genital disorders (including swelling of the scrotum and penis). The disease can recur through painful attacks that may be accompanied by fever [1].

5.2 Blueprint for Elimination

The disease is now in global focus, as the Sustainable Development Goals (SDGs) seek to eliminate neglected tropical diseases (NTDs), including lymphatic filariasis, by 2030. WHO too has a global strategy for the elimination of lymphatic filariasis, with two main pillars. The first aims to end transmission through preventive chemotherapy in the form of mass administration of the drug diethylcarbamazine citrate (DEC) in all endemic districts. WHO recommends annual mass drug administration (MDA) for at least 5 years in all endemic areas, with coverage reaching at least 65% of the at-risk population [3]. The use of common table or cooking salt fortified with DEC has also been recommended [3]. The second pillar of the global elimination strategy is the alleviation of suffering of infected individuals through the administration of a minimum recommended package of care. In endemic settings,

MDA status in SEA Region, 2016

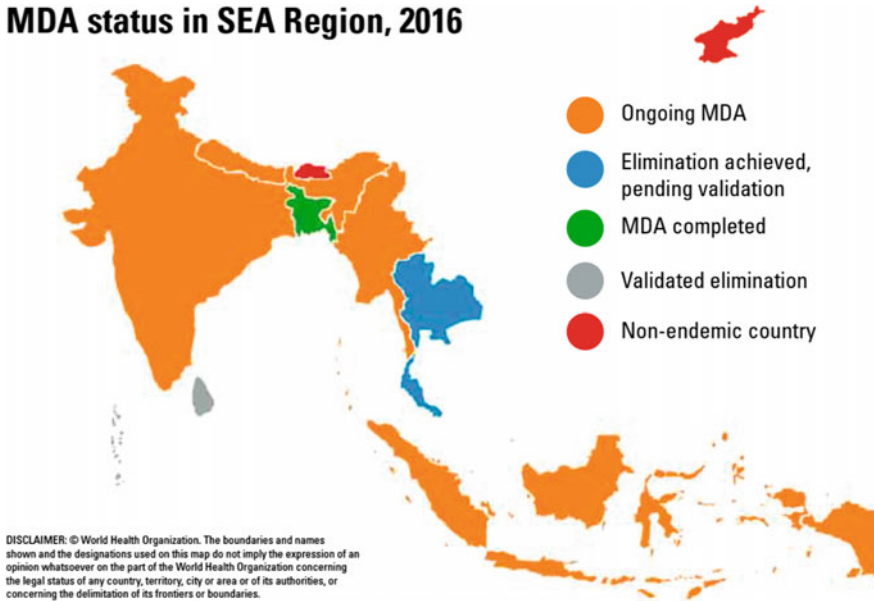


Fig. 5.1 Status of mass drug administration in the South-East Asia Region. *Source* WHO-generated map based on the endemicity of lymphatic filariasis in the Region and progress made by countries

all primary health systems should be prepared to administer this package to patients with lymphatic filariasis [3].

South-East Asia accounts for 57% of the 1.1 billion people worldwide who are at risk of lymphatic filariasis [2]. Nine countries in the South-East Asia Region of WHO are endemic for lymphatic filariasis (Fig. 5.1). Three countries in South-East Asia have been validated as having eliminated the disease as a public health problem—the Maldives, Sri Lanka and Thailand—and Bangladesh is in the surveillance phase following MDA in all endemic areas [4]. In 2000–2014, India accounted for 70.3% of all people in the South-East Asia Region needing preventive chemotherapy, and for 62.3% of all people who received these treatments [4].

To facilitate the roll-out of MDA, all endemic countries in South-East Asia have mapped the geographical distribution of the disease. In 2016, over 449 million people in South-East Asia were targeted for receiving preventive chemotherapy, and 272.9 million (60.7%) received treatment [5]. Regionally, 88.9% of endemic districts achieved effective coverage with preventive chemotherapy [5], with India, Nepal and Timor-Leste having achieved 100% coverage [4]. The number of total treatments provided, as well as the number of people targeted for chemoprophylaxis, have declined in recent years, as countries are able to scale down interventions following implementation of MDA and confirmation of the successful interruption of transmission through transmission assessment surveys [4]. However, hotspots of high prevalence and substantial ongoing transmission persist in some countries in South-East Asia despite several rounds of MDA [4]. Particular challenges have

been experienced in the roll-out of MDA in urban districts, as many urban dwellers perceive lymphatic filariasis as a problem of rural people [4].

The Maldives now serves as a success story in the effort to end lymphatic filariasis, having reached the milestone after decades of sustained effort and considerable energy. Efforts to address the problem in the Maldives go back to much before the country became free in 1965. WHO-supported surveys were undertaken in 1951 in 34 of the habitable islands. It was found that 37% of inhabitants in these islands were either infected with *W. bancrofti* or exhibited clinical signs of lymphatic filariasis [6].

5.3 Overcoming Challenges to Eliminating Lymphatic Filariasis

At the time of Independence, the Maldives was among the poorest countries in the South-East Asia Region. The burden of communicable diseases and NTDs was high, while the health infrastructure was in a poor stage. The lack of health facilities and an acute shortage of health workers impeded progress with regard to various disease control programmes initiated after 1965 [6]. In the case of lymphatic filariasis, efforts to deliver preventive chemotherapy and manage the care of people with the symptomatic disease were hindered in the early stages of the response by inadequate mapping of endemic areas [6].

Inadequate sanitation and various local practices often enabled the breeding of mosquitoes. The country's geographical spread—being a conglomeration of hundreds of islands spread across different natural atolls—posed a formidable challenge for any vector control activities. The hot, humid climate, coupled with heavy rainfall days, are ideal conditions for vectors to breed and thrive, making it tougher for control activities to be implemented. Yet another challenge was the fact that most countries in the South-East Asia Region from where the Maldives gets a substantial number of the migrant workforce, are endemic for lymphatic filariasis. This meant that even if vector control measures were successful, the risk of the disease being imported via migration continued [6].

5.4 Long Campaign to Eliminate Lymphatic Filariasis

Historical records show that filariasis has existed in the islands of the Maldives for a long time, with several misconceptions around it. In the early days, people believed that filariasis was transmitted through direct contact with someone who had developed clinical signs such as elephantiasis of the leg or an enlarged scrotum. This belief resulted in a system of segregation and isolation of people with filariasis. They were shifted to uninhabited islands and kept in isolation there with support from the

State. The practice of segregating symptomatic cases of filariasis was in place in the Maldives till as late as 1959. It was discontinued only after WHO recommended doing so following the shocking results of the filariasis survey it conducted in 1951. The survey, covering 34 islands in three atolls, included mass night blood testing to detect microfilaria (Mf) carriers, recording clinical cases and sampling to identify mosquito breeding sites. It revealed that all the 34 islands were endemic, while disease prevalence was 19.5% in females and 28.0% in males. *Cx. quinquefasciatus* emerged as the principal vector while *An. tessellatus* was the secondary vector. Step wells were reported to be a major breeding source of *C. fatigans* [7].

In the years following Independence, a programme for control of filariasis was launched in collaboration with WHO. The initiative, launched in 1968, focused on passive case detection and treatment, larvicide-based vector control with Abate 500C, and 12-week treatment of all positive cases with a weekly regimen of DEC [6]. A clinic to address lymphatic filariasis was established in Malé on the lines of those for tuberculosis and leprosy. In rural islands that lacked medical facilities, the island chiefs were given the responsibility of treating the Mf-positive cases and conducting follow-up blood film testing after treatment as per instructions given by visiting filaria teams. All these efforts showed early results—the Mf rate in Malé fell from 5.5% in 1969 to 1.3% in 1973 [6]. Nevertheless, lymphatic filariasis persisted in many parts of the country, with Mf prevalence ranging between 1 and 21% on 34 islands in 1974 [6]. A change in programme management was effected in 1984 when the malaria control programme reached its maintenance phase. Till then, the malaria and filaria control programmes were being run as separate vertical programmes. Filaria control activities, such as case detection and treatment as well as vector control, were intensified and expanded to cover the entire country in 1984, and the services for filariasis were integrated with malaria control activities to extend their reach and public health impact. In 1985, a mobile filariasis survey team was introduced. Its job was to provide a full package of primary health care, including activities of all national disease control programmes. Besides supervision and follow-up of filaria control activities, team members also trained other health professionals. Such a decentralized model helped in improving the quality of filariasis case detection and treatment. These efforts, in conjunction with the work of atoll health facilities and the malaria control programme, led to a sharp decline in Mf-positive cases.

In the 1990s, nearly all hospitals, health centres and health posts were equipped with diagnostic facilities for screening for Mf. In addition, all regional and atoll hospitals as well as health centres were staffed with doctors, nurses, community health workers and laboratory technicians. All these helped to further strengthen filaria control activities throughout the country. They also helped to decentralize vector control as well as case-finding and treatment activities under the supervision and support of the filaria control programme. From 1978 to 1998, the national programme analysed 560000 blood samples—equivalent to 1.6 times the population of the Maldives [6].

In 2000, WHO formally joined together with the Ministry of Health to establish the Vector-Borne Disease Control Unit [6]. The National Task Force on Filariasis Elimination was constituted in 2003. It was headed by the Medical Director, Ministry

of Health and had members representing the Ministry of Health, Ministry of Atolls Administration, Ministry of Education, Department of Public Health, and Vector-Borne Disease Control Unit. The responsibility of this Task Force was to oversee and coordinate the implementation of the National Plan for Elimination of Lymphatic Filariasis. The Task Force subsequently ceased to exist, following the dissolution of the Atolls Administration.

During 2002–2007, a five-year focused effort was undertaken to eliminate lymphatic filariasis. The first round of MDA was carried out in 2004. Simultaneously, training of family health officers was undertaken and they were deployed to work on 34 islands in 10 atolls [6]. The training also included methods of morbidity management and disability prevention (MMDP) due to lymphatic filariasis. The teams travelled to 10 endemic islands and carried out vector surveys and also trained people with chronic filariasis in MMDP methods. For MDA, local teams were formed for each round and team members were trained prior to drug administration. By 2003–2004, only one island (L. Fonadhoo) remained endemic, prompting the country to launch five annual MDA rounds on the island. Drug consumption surveys were also conducted in 2007 and 2008 to assess the level of non-compliance and reasons for the same (Fig. 5.2).

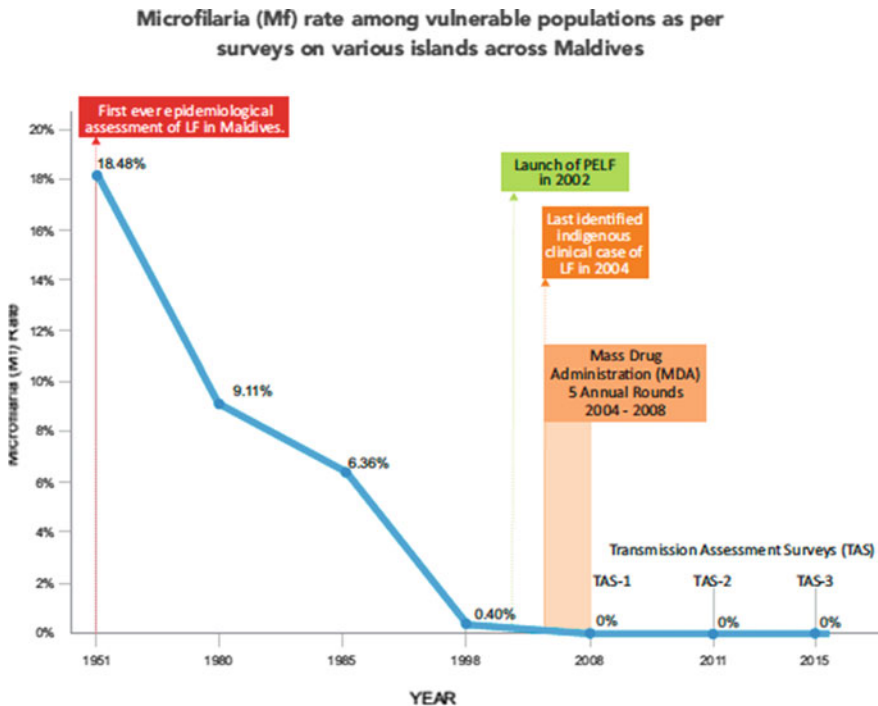


Fig. 5.2 Microfilaria (Mf) rate among vulnerable populations as per surveys on various islands across the Maldives. *Source* Graph generated by WHO based on data provided in the country dossier for validation of elimination of LF as a public health problem

In addition to MDA, the elimination strategy placed equal emphasis on vector control activities, particularly following the tsunami in December 2004, which affected a number of previously filariasis-endemic islands [8]. Since no indigenous malaria case had been reported since 1984, malaria-specific vector control activities were not in place but dengue was still endemic and a community-based source reduction system was in place. The practice was to conduct thermal fogging with synthetic pyrethroids during epidemics. On the ground, there is no formal vector control programme and all vector control as well as vector surveillance activities have been integrated with the primary healthcare system. In most of the islands, underground drainage has been provided, practically eliminating vector breeding sources like open drains, cess pits and septic tanks. Yet the threat exists of importation from endemic countries. The Maldives, being a global tourist destination, attracts a huge inflow of people from all over the world. About 18000 aircraft land in the Maldives every year. Those from malaria- and yellow fever-endemic zones are disinfected regularly. In 2013, as many as 5340 aircraft were disinfected. Passenger surveillance and ship inspections at international seaports are also key elements of the surveillance strategy.

By 2008, transmission assessment surveys found zero Mf prevalence and no immunochromatographic test (ICT)-positive persons, and no indigenous case of lymphatic filariasis countrywide since 2004 (although a few imported cases were reported among foreign migrants) (Fig. 5.2) [6]. Subsequent surveys, using updated guidelines, confirmed the absence of transmission in Fonadhoo Island and Laamu Atoll. WHO in 2016 formally validated the Maldives to have eliminated lymphatic filariasis as a public health problem.

5.5 Key Elements of Success

Since 1968, when the National Filaria Control Programme was established, the unswerving political commitment and allocation of dedicated financial resources for case detection and treatment served as cornerstones of the Maldives' successful effort to eliminate lymphatic filariasis [6].

The unique geography and scattered population in the country poses logistical challenges in rolling out health initiatives. In the case of control and elimination initiatives for lymphatic filariasis, the challenge was greater because internal migration was very high in the 1980s and 1990s, taking people from endemic areas to non-endemic ones and vice versa. The intense effort brought down the endemicity to smaller pockets. In the final phase, the target population was more or less confined to one island and could be reached with the delivery of interventions such as MDA. Tasks such as conducting impact assessment surveys could also be implemented as this population moved out of the island. Another key decision was to integrate surveillance with the primary health care system.

The programme was fully financed with domestic resources, which was especially challenging in the years immediately following Independence, given the country's

precarious economic situation in that era. Support from WHO as well as dedicated work by numerous health facilities and health workers helped the Government of Maldives in its elimination efforts. The government ensured access to MMDP in all parts of the country and, in 2012, made lymphatic filariasis a reportable condition to support post-elimination surveillance and vigilance [6].

Highly trained health workers, linked to the WHO-supported global surveillance system for lymphatic filariasis, helped catalyse case-finding and treatment services in the Maldives. A national regulation enacted in 1996 required all recruits to national security services and sailors, as well as students seeking education abroad, to undergo Mf blood screening as part of the health check-up. Strong surveillance efforts ensured the mapping of endemic areas to guide the implementation of the five annual rounds of MDA in 2004–2008. Since 2011, post-surveillance activities, including ongoing vector control to eliminate breeding grounds for mosquitoes, have worked to maintain the elimination of lymphatic filariasis in the Maldives.

A significant move was to make lymphatic filariasis a notifiable disease under the Public Health Protection Act, which came into force in 2012 [8]. The law provides for mandatory reporting of communicable diseases. Care providers are required to report communicable diseases so as to help in identifying outbreaks and epidemics at an early stage. Yet another measure was to enforce strict controls to prevent importation, as migrants from neighbouring endemic countries is a major concern. Therefore, impact assessment through Mf and antigenaemia surveys also covered migrant populations.

The social aspects of the response to lymphatic filariasis had an important effect on the country's successful response. Whereas it was common practice prior to 1951 to segregate and isolate people living with lymphatic filariasis in camps on uninhabited islands, this approach was abandoned following the results of early prevalence and transmission studies. Instead, the country focused on reducing stigma and mobilizing communities to aid in the fight against the disease, through island chiefs, frontline health workers and door-to-door awareness campaigns.

5.6 Moving Forward: Lessons Learnt

The Maldives has committed to continuing post-elimination surveillance, including regular entomological monitoring, and screening of migrants for lymphatic filariasis. Efforts continue to reduce mosquito-breeding sites. All of the country's 124 health centres and 23 hospitals are equipped to manage morbidity, and an action plan has been prepared to assess the quality of medical services for people affected by the disease.

With the country's efforts aligned so closely to the strategies recommended under the Global Programme to Eliminate Lymphatic Filariasis, the Maldives' success is a powerful demonstration of the effectiveness of these recommended approaches. The elimination of lymphatic filariasis from the Maldives has also demonstrated how technical capabilities, backed by strong political will and financial backing, help

countries to tackle the scourge of NTDs. The resolve of the Maldives to achieve the elimination target ahead of the global deadline of 2020 set for elimination of lymphatic filariasis could serve as a template worth emulating by health systems in the Region and other countries facing the challenge of NTDs. It is also an important step towards fulfilling the global commitment to address NTDs under the Sustainable Development Goals (SDGs) framework. The presence of a strong health system, based on the principles of universal health care, can help countries achieve the goal, as ably shown by the Maldives. However, vigilance needs to be maintained to sustain the elimination status, in light of the challenge posed by climate change [9].

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