Another Battle Against Infectious Diseases:

The WHO's Challenge to Lymphatic Filariasis

Editor

Kazuyo Ichimori

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感染症とのもう一つの闘い WHO がリンパ系フィラリア症に挑む

Another Battle Against Infectious Diseases The WHO's Challenge to Lymphatic Filariasis

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Preface

Over the roughly three and a half years since 2020—often referred to as the "COVID-19 pandemic era"—people's daily lives and socioeconomic activities were profoundly affected under a state of emergency. Although COVID-19 was first reported in late 2019 in the People's Republic of China as a case of pneumonia of unknown cause, it was the World Health Organization (WHO) that anticipated the threat it could pose to the world and to each human life, and issued an early warning. On January 30, 2020, the WHO declared a Public Health Emergency of International Concern (PHEIC). Later, on March 11, 2020, it stated that COVID-19 "could be characterized as a pandemic." These announcements placed the entire world under an emergency situation.

The WHO monitored the global situation, set forth the direction for international countermeasures, and promoted the establishment of frameworks for vaccine and drug development and supply. Based on this guidance, each country implemented its own measures. In Japan, the government made policy decisions informed by scientific advice, administrative bodies established systems to put these policies into practice, many medical institutions reorganized their operations, and individuals took action and made efforts to protect their own health and the health and lives of those around them as they became acutely aware of the risks.

After more than three years, the WHO announced on May 5, 2023, that the threat posed by COVID-19 had diminished and declared an end to the PHEIC. In Japan, the legal classification of COVID-19 under the Infectious Diseases Control Law was changed to Category V on May 8, effectively treating it as an "ordinary infectious disease." Humanity succeeded in preventing further explosive spread of this illness.

Infectious diseases spread from person to person. Countermeasures begin with identifying the nature of the disease, anticipating its trajectory, and clarifying the direction of response. When action is required on a global scale, it becomes necessary to set eradication goals, establish phased policies, and formulate strategies. This is precisely the role of the WHO, a specialized agency of the United Nations. Responding to requests from all member states, it evaluates the impact on human health based on scientific evidence and a comprehensive understanding of diverse circumstances, and makes

decisions accordingly.

Humans have often united to fight against pathogenic organisms—historically in the eradication of smallpox, and more recently in the response to COVID-19. The WHO affirms global solidarity through “resolutions,” sets clear objectives as a specialized agency, and presents strategies and methods of action in the form of “programmes.” Through these efforts, it brings the world together and advances collective measures for the protection of human health.

I have spent many years at the World Health Organization (WHO), consistently working on mosquito-borne diseases, particularly lymphatic filariasis. This disease, which is said to affect 120 million people, is caused when filarial parasites invade the lymphatic system and are transmitted from person to person by mosquitoes. It is found mainly in tropical regions and is classified as one of the Neglected Tropical Diseases (NTDs).

At WHO headquarters in Geneva, Switzerland, there is a dedicated Department of Neglected Tropical Diseases (NTD). Within this department, I served as the fourth coordinator of the **Global Programme to Eliminate Lymphatic Filariasis (GPELF)** (Photo 1), working toward the goal of eliminating this disease from the planet. GPELF was launched in 2000 as a WHO-led programme designed with the explicit aim of disease elimination. When viewed from above, GPELF reveals what is required for the world to achieve a single shared objective: a common understanding of the goal, political and scientific consensus, standardized guidelines, clear methodological direction, and implementation plans that are both feasible and flexible. A programme must possess both regional specificity and universal applicability, and it must follow a simple, easily understandable storyline.

Since its launch in 2000, GPELF has expanded globally through partnerships among governments, industry, academia, and civil society. Alongside environmental measures such as mosquito control, the programme has aimed to implement annual mass drug administration (MDA) for at least five consecutive years to all residents in endemic areas. To date, MDA has reached approximately 500 million people every year—from deep jungle regions to densely populated urban centers and remote Pacific islands—amounting to a cumulative total of roughly 10 billion treatments. By the end of 2024, 21 countries had achieved elimination of lymphatic filariasis.

As I approached mandatory retirement at the end of 2013, I became convinced that GPELF could serve as a model for global health programmes. Wanting to document this worldwide effort, I began planning the publication of a book. I especially wished to share this with readers in Japan, and together with Aya Yajima, then a technical officer in the WHO NTD Department, and Midori Morioka, an intern at the time, we drafted the initial manuscript in Japanese. This became Part I of the book, written from the perspective of 2013 and focusing on how GPELF was conceived, launched, and expanded. For this publication, I added Part II, which summarizes objective progress and achievements up to 2024.

Thus, this book explains the full scope of GPELF—from its inception to its accomplishments—tracing the entire sequence of processes. At the same time, I hope it serves as a record of the sincere efforts made by all those involved in GPELF. And as we approach the complete achievement of GPELF's goals, I cannot help but reflect on the filarial parasites themselves, which will disappear from the Earth once elimination is complete (Photo 2). If this book can stand as evidence that these tiny parasites once lived on our planet, I would be deeply gratified.

Acknowledgments:

We dedicate this book, with our deepest respect and gratitude, to all those around the world who suffer from lymphatic filariasis, and to everyone involved in combating the disease—those who fight on the front lines through days filled with sweat, mud, and tears, and those who support the effort from behind the scenes with unwavering commitment and compassion. Their courage and perseverance inspire us.

In preparing this book, we received support from many individuals. We extend our heartfelt thanks to the following people for their contributions and warm encouragement：Yumiko Kamogawa, Akiko Takamiya, Arata Hidano, Yuki Sawano, Miho Tada, Misaki Tsunashima, Chihiro Maruta, Sahoko Ninomiya, Kaoruko Motoe, Ayano Yoshida, Akari Watanabe, Yuzuri Yamazaki, Tomomi Fukuda, Sachiko Morita, Satoko Ohmachi, Hiroko Kumano, Sadao Nogami, Shigeyuki Kano, Eisaku Kimura, Yukiko Baba and Mariko Takahashi.

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For the English version, we collaborated with Patrica Graves from James Cook University and the WHO Collaborating Centre for Vetor-Borne and Neglected Tropical Diseases. We deeply appreciate their cooperation, dedication and warm hearts.

The contents of this book are based primarily on key points from WHO publications; however, any opinions expressed are those of the authors themselves.

June 2025 — Kazuyo Ichimori



Photo 1：Former Responsible Officers/Focal Points of the WHO Global Programme to Eliminate Lymphatic Filariasis.
（From the right side）C.P. Ramachandran 1979-1996, Eric Ottesen 1995-2001, Gautam Biswas 2002-2009, Kazuyo Ichimori 2009-2013, Jonathan King 2014- .



Photo 2：Lymphatic filariasis (filarial worms): Infective larvae are emerging from the tip of the proboscis, which extends lower-left from the head of the black mosquito on the right.

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Glossary

A

ADLA (Acute Dermatolymphangioadenitis): Acute lymphangitis

***Aedes*:** A genus of mosquitoes

AFRO: WHO Regional Office for Africa

Albendazole: An antiparasitic drug

AMRO: WHO Regional Office for the Americas

***Anopheles*:** A genus of mosquitoes, vectors of nocturnally periodic filarial parasites

A-WOL: Anti-Wolbachia Consortium

Anti-Wolbachia therapy: Wolbachia are symbiotic bacteria found in insects and infect filarial nematodes, contributing to their development and reproduction. Eliminating Wolbachia is expected to enhance treatment efficacy.

B

BMGF (The Bill & Melinda Gates Foundation)

***Brugia malayi*:** A filarial parasite causing lymphatic filariasis

***Brugia timori*:** A filarial parasite causing lymphatic filariasis

C

CDC (The U.S. Centers for Disease Control and Prevention)

COVID-19 (Corona Virus Infectious Disease)

***Culex*:** A genus of mosquitoes, vectors of nocturnally periodic filarial parasites

D

DALYs (Disability-Adjusted Life Years): A metric used to quantify the overall impact of disease or disability on health

DDT (Dichloro-Diphenyl-Trichloroethane): An organochlorine insecticide

DEC (Diethylcarbamazine Citrate): An antiparasitic drug

Diurnal sub-periodic: A pattern in which microfilariae appear predominantly in the bloodstream during daytime

DNA probe (Deoxyribonucleic Acid Probe): A probe labeled with radioactive isotopes or fluorescent dyes used to detect DNA sequences of interest

DNDi (Drugs for Neglected Diseases initiative): An international nonprofit research and development organization focused primarily on developing treatments for neglected

tropical diseases (NTDs)

DOLF (Death to Onchocerciasis and Lymphatic Filariasis): A research programme aimed at eliminating onchocerciasis and lymphatic filariasis

DTAG (Diagnostic Technical Advisory Group): WHO's advisory group on diagnostic technologies

E

EC (Expert Consultation): A meeting of subject-matter experts

Elephantiasis: A condition caused by filarial infection in which connective tissues of the skin and subcutaneous tissues proliferate and harden, producing a thickened, elephant-like appearance

ELISA (Enzyme-Linked Immunosorbent Assay): A method for detecting or quantifying antigens or antibodies using enzyme-mediated reactions

EMRO: WHO Regional Office for the Eastern Mediterranean

EURO: WHO Regional Office for Europe

F

FTS (Filariasis Test Strip): A rapid diagnostic test for lymphatic filariasis

Filarial chyluria: A condition in which lymphatic obstruction caused by filarial infection leads to leakage of lymph into the urine, resulting in a milky appearance

G

GAELF (Global Alliance to Eliminate Lymphatic Filariasis): A global alliance dedicated to eliminating lymphatic filariasis

GAVI (Global Alliance for Vaccines and Immunization): A public-private partnership aimed at increasing vaccination coverage in low-income countries

GPELF (Global Programme to Eliminate Lymphatic Filariasis): A WHO-led programme aimed at eliminating lymphatic filariasis

H

HDI (Human Development Index): An index measuring a country's development level based on health, education, and income

Helminthiasis: Infection caused by parasitic worms such as nematodes, cestodes, or trematodes

HIV (Human Immunodeficiency Virus): The virus that causes AIDS

Hydrocele: Scrotal swelling caused by lymphatic obstruction

I

ICT (Immunochromatographic Tests): A rapid diagnostic method in which samples containing antigens or antibodies migrate along a nitrocellulose membrane via capillary action, producing visually interpretable results

IDA: Simultaneous administration of ivermectin, DEC, and albendazole (triple-drug therapy)

IRIS (WHO Institutional Repository for Information Sharing): WHO's digital library of publicly available documents published since 1948

IU (Implementation Unit): A defined operational area for programme implementation

Ivermectin: An antiparasitic drug

IVM: Integrated vector management

L

LF TAG (Lymphatic Filariasis Technical Advisory Group): WHO's technical advisory group for lymphatic filariasis

LF (Lymphatic Filariasis): A parasitic infection caused by *Wuchereria bancrofti, Brugia malayi,* or *Brugia timori*. It can lead to lymphedema, hydrocele, and elephantiasis. Classified as one of the Neglected Tropical Diseases (NTD).

LF-PRG (LF Programme Review Group): A group responsible for reviewing lymphatic filariasis elimination programmes

LF-RPRG (LF Regional Programme Review Group): Regional review groups for lymphatic filariasis elimination programmes

LoaScope: A smartphone-based device used as a digital microscope to quantify *Loa loa* microfilariae in patient blood samples

Loiasis: A parasitic infection caused by *Loa loa*, transmitted by *Chrysops* (deer flies). Symptoms include localized angioedema (Calabar swelling) and migration of adult worms under the conjunctiva.

Lymphedema: Swelling caused by lymphatic obstruction

M

Malathion: An organophosphate insecticide

Malaria: A mosquito-borne disease caused by *Plasmodium* parasites, transmitted by *Anopheles* mosquitoes, prevalent in tropical and subtropical regions

Mansonia: A genus of mosquitoes

Mapping: A survey conducted to determine endemicity and define implementation units

before MDA

MDA (Mass Drug Administration): Mass drug administration; large-scale distribution of medicines to entire at-risk populations

MDGs (Millennium Development Goals): Eight international development goals adopted in 2000, to be achieved by 2015

Membrane filter method: A technique in which samples are filtered to capture microorganisms for quantification

MMDP (Morbidity Management and Disability Prevention): Care and prevention strategies for managing disease-related morbidity and disability

MOU (Memorandum of Understanding): A formal agreement outlining mutual understanding between parties

N

NGO (Non-governmental Organization): A civil society organization independent of governments and international bodies, working on social issues, human rights, environmental protection, education, and more

Nocturnal periodic: A pattern in which microfilariae appear in the bloodstream only at night

Nocturnal sub-periodic: A pattern in which microfilariae appear in the bloodstream during both day and night

NPELF (National Programme to Eliminate Lymphatic Filariasis): A national-level programme for LF elimination

NTD / NTDs (Neglected Tropical Diseases): A group of parasitic and bacterial diseases prevalent in tropical regions and among impoverished populations, designated by WHO as neglected tropical diseases

O

Onchocerciasis: Also known as river blindness. A parasitic infection caused by *Onchocerca volvulus*, transmitted by blackflies (*Simulium*). It can cause severe skin disease and visual impairment, including permanent blindness.

P

PacELF (Pacific Programme to Eliminate Lymphatic Filariasis): A regional programme involving 22 Pacific countries to eliminate lymphatic filariasis

PAHO: Pan American Health Organization

PanLF: Reszon lymphatic filariasis rapid test kit

PC (Preventive Chemotherapy): Preventive administration of medicines to at-risk populations

PC (Pest Control): Management of harmful organisms to levels that do not interfere with human activities

PCR (Polymerase Chain Reaction): A method for amplifying specific DNA sequences using polymerase enzymes

PHC (Primary Health Care): Comprehensive community-based health services

PRG (LF Programme Review Group): A review group for lymphatic filariasis programmes

Prepatent period: The interval between infection and the appearance of detectable microfilariae

Position Statement: A document expressing an official stance or viewpoint

Q

QFAT (STANDARD™ Q Filariasis Antigen Test): A diagnostic test used to detect circulating filarial antigens. It enables rapid identification of lymphatic filariasis infection using immunochromatographic methods.

QOL (Quality of Life): An indicator reflecting an individual's overall satisfaction and well-being. It encompasses physical, mental, and social aspects of daily living.

R

RPRG (LF Regional Programme Review Group): A regional advisory group that reviews lymphatic filariasis elimination programmes. It provides technical guidance and evaluates progress toward elimination goals.

S

SEARO: WHO Regional Office for South-East Asia

SDGs (Sustainable Development Goals): A set of 17 global goals adopted at the 2015 UN Summit to guide sustainable development from 2016 to 2030. They address poverty, health, education, climate action, and other global priorities.

Selective Drug Administration: A treatment strategy in which only individuals who test positive through serological diagnosis receive medication. It is used to avoid unnecessary drug exposure and to target treatment efficiently.

STAG (Strategic and Technical Advisory Group): A group providing strategic and technical advice to WHO on specific health topics. It supports evidence-based decision-making and policy development.

STAG-NTD (Strategic and Technical Advisory Group for Neglected Tropical Diseases): A WHO advisory body offering strategic and technical guidance on neglected tropical diseases. It reviews evidence and recommends approaches for global NTD control and elimination.

STH (Soil-Transmitted Helminths): A group of intestinal parasitic infections caused by helminths such as Ascaris, Trichuris, and hookworms. Eggs excreted in human feces develop into infectious forms in soil and infect humans through ingestion or skin penetration.

T

TAS (Transmission Assessment Survey): A survey used to determine whether transmission of lymphatic filariasis has fallen below target thresholds. It guides decisions on stopping mass drug administration.

TDR (Special Programme for Research and Training in Tropical Diseases): A global programme supporting research and capacity building for tropical diseases. It promotes innovation and strengthens research capabilities in endemic countries.

TPP (Target Product Profile): A document outlining the desired characteristics of a product under development. It guides research, development, and regulatory planning.

TPE (Tropical Pulmonary Eosinophilia): A hypersensitivity lung syndrome caused by microfilariae entering lung tissue. It is characterized by marked eosinophilia and respiratory symptoms.

Transmission Dynamics: The study of factors influencing how infections spread within populations. It includes vector behavior, host susceptibility, and environmental conditions.

U

UHC (Universal Health Coverage): A condition in which all people can access essential health services without financial hardship. It emphasizes equity, quality, and financial protection.

UNIDO (United Nations Industrial Development Organization): A UN agency promoting industrial development to reduce poverty and support inclusive and sustainable growth. It assists countries in achieving environmentally sound and socially equitable industrialization.

UNDP (United Nations Development Programme): The UN's primary development agency supporting sustainable development in low- and middle-income countries. It manages projects related to governance, poverty reduction, and resilience.

UNICEF (United Nations Children's Fund): A UN agency dedicated to protecting the

lives, rights, and well-being of children worldwide. It provides humanitarian assistance, health services, and education support.

V

VC (Vector Control): Measures aimed at reducing or eliminating disease-transmitting vectors such as mosquitoes. It includes environmental management, insecticide use, and community-based interventions.

W

WB (World Bank): An international organization providing financial and technical assistance for development and poverty reduction. It supports infrastructure, health, education, and economic reform projects.

WER (Weekly Epidemiological Record): A weekly WHO publication reporting global epidemiological data and updates. It provides timely information on disease trends and public health events.

Well-being: A state of positive physical, mental, and social health. It reflects overall life satisfaction and functioning.

WHA (World Health Assembly): The decision-making body of WHO composed of representatives from all member states. It sets policies, approves budgets, and reviews global health priorities.

WHO Expert Review Panel for NTD Diagnostics: A WHO panel that evaluates diagnostics for neglected tropical diseases. It reviews evidence to ensure quality, safety, and performance.

WHO (World Health Organization): The UN specialized agency responsible for international public health. It provides leadership, sets norms, and coordinates global health responses.

WHOCC (WHO Collaborating Centre for Lymphatic Filariasis): A WHO-designated institution supporting activities related to lymphatic filariasis. It contributes expertise, training, and research to global elimination efforts.

WHO PQ (WHO Prequalification): A WHO programme assessing the quality, safety, and efficacy of medicines, vaccines, and diagnostics. It supports procurement agencies in selecting reliable health products.

WPRO: WHO Regional Office for the Western Pacific

***Wuchereria bancrofti*:** A parasitic filarial worm that causes lymphatic filariasis. It is transmitted by mosquitoes and can lead to chronic lymphatic disease.

X

Xenomonitoring: A method that uses PCR to detect pathogens in vector populations. It serves as an indirect indicator of infection levels in human communities.

Z

Zoonosis: An infectious disease that can be transmitted between animals and humans. It is caused by pathogens capable of infecting multiple host species.

Part I

The Battle Begins

2000–2013

The fight against lymphatic filariasis began with understanding the enemy. When scientific research groups around the world concluded that lymphatic filariasis was a disease that could be eliminated, the World Health Organization (WHO) began assessing the global situation and identifying key challenges. This process led to political commitment, including a World Health Assembly (WHA) resolution, and in 2000 the Global Programme to Eliminate Lymphatic Filariasis (GPELF) was launched.

GPELF analyzed accumulated research findings and successful case studies to develop programme strategies, policies, and guidelines. Based on these foundations, endemic countries have been advancing their activities toward elimination.

The mission of the WHO-led GPELF is to deliver health services to all people in lymphatic filariasis-endemic countries across the globe. As a public health initiative to be implemented worldwide, the programme needed to adopt unified methods, pursue a shared goal for all humankind, and apply common standards for evaluation.

Part I summarizes how GPELF was created, how its activities expanded globally, the progress and challenges up to 2013, and the evolving circumstances surrounding implementation efforts.



Chapter 1
Understanding the Enemy: Defining the Goal

Public health programmes are built on scientific evidence. This chapter introduces the scientific knowledge underlying lymphatic filariasis (LF) elimination efforts.

1.1. What Is Lymphatic Filariasis?

1.1.1. The Parasites That Cause LF, the Mosquito Vectors, and the Disease

Lymphatic filariasis (LF), a human filarial disease, is an insect-borne parasitic infection caused by thread-like nematodes known as filarial worms, which are transmitted by mosquitoes. The disease has existed on Earth since ancient times, and as of 2000 it was estimated that at least 120 million people were infected across 73 countries. Among them, 15 million suffered from lymphoedema or elephantiasis (Figure 1, left), and 25 million experienced hydrocoele (Figure 1, right). Many endured physical pain and the social stigma resulting from their disabilities.



Figure 1: Examples of elephantiasis (left) and hydrocoele (right)

At the start of GPELF, LF was endemic in five of the six WHO regions—Africa, Southeast Asia, the Americas, the Eastern Mediterranean, and the Western Pacific—excluding only the European Region. Of all infections, 65% occurred in Southeast Asia, 30% in Africa, and the remaining 5% in other tropical and subtropical areas. Figure 2 shows the global distribution of endemic countries in 2000.



Figure 2: Lymphatic filariasis endemic countries (2000, WHO).

Although the species of filariasis parasite causing LF vary by region, approximately 90% of all LF cases are caused by *Wuchereria bancrofti*, which is found across nearly all tropical and subtropical areas of Africa, Asia, the Pacific, and the Americas. Most of the remaining infections are due to *Brugia malayi*, found mainly in Southeast Asia and the Indian subcontinent, and *Brugia timori*, found in Timor-Leste and parts of Indonesia. The transmission cycle is illustrated in Figure 3.

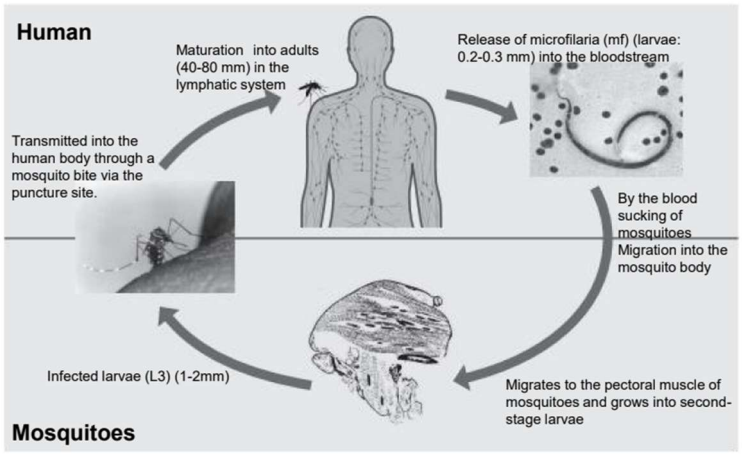


Figure 3: Life cycle of *Wuchereria bancrofti*.

In infected humans, microfilariae (mf) circulate in the bloodstream. When a mosquito takes a blood meal, the microfilariae enter the mosquito and undergo several moults without multiplying, developing into infective third-stage larvae (L3) over 1–2 weeks. During a subsequent blood meal, the L3 larvae are deposited onto the human skin and enter the body through the mosquito's feeding site. They migrate to the lymphatic vessels, where they mature into adult worms and live for approximately 4–6 years. Adult worms measure about 5–8 cm in length. Once male and female worms pair, the female produces large numbers of microfilariae, which are continuously released into the bloodstream. These microfilariae are then taken up by mosquitoes, completing the cycle and enabling further transmission.

For *W. bancrofti*, humans are the only known definitive host, meaning infected individuals serve as the sole reservoir for continued transmission between humans and mosquitoes. In contrast, some strains of *B. malayi* can infect other animals, such as monkeys.

More than 100 mosquito species across four genera are known to transmit LF. *W. bancrofti* is primarily transmitted by *Culex*, *Aedes*, *Anopheles*, and *Mansonia* mosquitoes. *B. malayi* is mainly transmitted by *Mansonia*, and in some regions by *Anopheles*.

Microfilariae hide in the capillaries of the lungs and appear in peripheral blood at specific times of day. Their periodicity varies by species and region. When microfilariae appear only at night, the pattern is called nocturnally periodic. When they appear during the day but peak at night, it is nocturnally sub-periodic. When they appear predominantly during the day, it is diurnally sub-periodic.

For transmission to occur, the mosquito's feeding time must coincide with the microfilariae's appearance in the blood. For example, in Samoa, diurnal sub-periodic *W. bancrofti* is transmitted by day-biting *Aedes* mosquitoes. In Vanuatu, nocturnal periodic *W. bancrofti* is transmitted by night-biting *Anopheles* mosquitoes (Figure 4). However, not all mosquitoes that ingest microfilariae become competent vectors. The night-biting *Culex quinquefasciatus* is a major vector of nocturnal periodic LF in India and many other regions, yet in Vanuatu it does not serve as a vector.

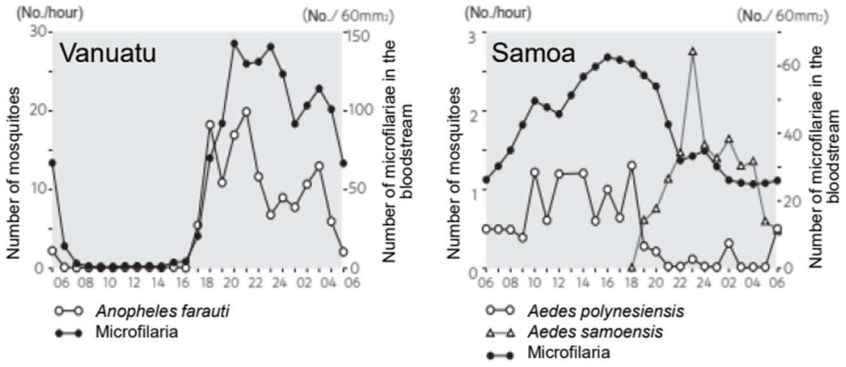


Figure 4: Microfilarial periodicity in the blood and the activity cycles of vector mosquitoes in Vanuatu and Samoa.

1.1.2. The Disease as a Social Issue

Infection with lymphatic filariasis leads to the destruction or obstruction of lymphatic vessels. As a result, the accumulation of tissue fluid and secondary infections in the affected areas are triggered, causing various symptoms such as lymphedema; elephantiasis, characterized by severe swelling of the limbs and thickening of the skin; genital disorders including hydrocele; chyluria; and tropical pulmonary eosinophilia. Even after the adult worms die, the damaged lymphatic vessels do not recover, and the continued accumulation of tissue fluid and secondary infections persist. For this reason, many patients with elephantiasis show no detectable filarial parasites in their bodies.

Although lymphatic filariasis is not a fatal disease, the recurrent painful inflammation and physical deformities limit people's ability to work, and the altered appearance often leads to social stigma.

Lymphatic filariasis has long caused suffering through physical pain and disability-related discrimination. However, with advances in science and the accumulation of epidemiological knowledge, recognition of the disease as a major public health issue has become firmly established.

Among all parasitic diseases, lymphatic filariasis is estimated to be the second leading cause of physical disability. The burden of disability—measured in disability-adjusted life years (DALYs), which represent years of life lost due to disability—caused by its chronic symptoms and acute febrile episodes is also considered the second largest.

Looking at its geographical distribution, the disease is widespread in low-income countries where sanitation infrastructure is underdeveloped and where people are more

frequently exposed to mosquito vectors. In fact, according to the Human Development Index (HDI), which incorporates indicators of health and education, 94% (30 out of 32) of the countries in the lowest HDI group (below 0.5 in 2001) are endemic for lymphatic filariasis. As symptoms worsen, infected individuals become restricted in their ability to participate in productive activities, while endemic countries bear substantial costs to provide appropriate care. This results in significant economic losses at the national level, creating a negative cycle that deepens poverty in affected regions.

Given these realities, lymphatic filariasis has come to be recognized not merely as an individual health problem but as a humanitarian issue, a problem of poverty and inequality, and an important public health challenge that society as a whole must address. Consequently, it has been given increasing prominence on the global health agenda.

Thus, combating this disease is one of the challenges humanity must confront. To do so, we must understand the causative parasites, the mosquitoes that transmit them, the mechanisms of disease transmission, and the appropriate strategies for control.

1.1.3. WHO's Mission and Structure

Effective disease control requires rational justification, scientific knowledge and tools, and a system capable of putting them into practice. Equally important is the underlying philosophy that guides decision-making throughout the planning and implementation process.

In 1948, based on the aspiration for a peaceful world and the recognition that health is one of humanity's greatest goals, the World Health Organization (WHO) was established with its headquarters in Geneva. WHO regards "health" as a fundamental human right and serves as an international organization whose objective is "the attainment by all peoples of the highest possible level of health." Each year, the World Health Assembly (WHA)—composed of the health ministers of WHO's 194 Member States—adopts resolutions that set public health priorities and outline strategies and policies to address them. Member States are expected to take action domestically to implement the adopted resolutions.

WHO operates under the leadership of a Director-General elected by its Member States and consists of the Headquarters, six Regional Offices, and 150 Country Offices. The Headquarters convenes expert committees to develop optimal global strategies and guidelines based on scientific evidence, ensuring that WHA resolutions can be implemented and their goals achieved. It also plays a crucial role in compiling data from

Member States and incorporating them into global policies.

Regional Offices adapt global strategies and guidelines to the specific conditions of their respective regions. Country Offices, in turn, provide frontline technical support to national ministries of health, helping them align national policies with global and regional strategies and implement them effectively at the country level.

The Global Programme to Eliminate Lymphatic Filariasis (GPELF), led by WHO, is developed and implemented in accordance with WHO's philosophy and organizational structure.

Column: Preamble to the WHO Constitution

The States Parties to this Constitution, in conformity with the Charter of the United Nations, declare that the following principles are fundamental to the happiness of all peoples, to peaceful relations, and to security.

Health is not merely the absence of disease or infirmity, but a state of complete physical, mental, and social well-being.

The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being, without distinction of race, religion, political belief, economic or social condition.

The health of all peoples is essential to the attainment of peace and security, and depends on the fullest cooperation of individuals and States.

The achievement of any State in the promotion and protection of health is of value to all.

Unequal development in different countries in the promotion of health and control of disease is a common danger.

The healthy development of the child is of basic importance, and the ability to live harmoniously in a changing environment is essential to such development.

The extension to all peoples of the benefits of medical, psychological, and related knowledge is essential to the fullest attainment of health.

Informed and active participation of the public is of the utmost importance in the improvement of the health of the people.

Governments have a responsibility for the health of their peoples, which can be fulfilled only by the provision of adequate health and social measures.

Accepting these principles, and for the purpose of cooperating with one another to promote and protect the health of all peoples, the Contracting Parties agree to this Constitution and hereby establish the World Health Organization as a specialized agency within the terms of Article 57 of the Charter of the United Nations.

1.2. Scientific Foundations for the Fight

1.2.1. History of Science

What kinds of scientific knowledge have been developed regarding lymphatic filariasis, a disease widely prevalent in tropical and subtropical regions? And based on that science, how were global elimination targets eventually established?

Since the 1960s, WHO has convened expert committees on a regular basis to review emerging research findings and incorporate the necessary scientific knowledge into the foundation of policy development for disease control.

1.2.1.1. Advances in Diagnostic Methods

Lymphatic filariasis is characterized by conditions such as elephantiasis, which manifests as deformities of the limbs, and hydrocele of the scrotum. However, these symptoms are not unique to lymphatic filariasis, and therefore accurate identification of the underlying cause is essential.

Diagnosis of lymphatic filariasis relied for many years on microscopic examination, which became the standard method after the causative parasites and vector insects were discovered in the late 19th century. A major challenge, however, was that most *Wuchereria bancrofti* exhibit nocturnal periodicity, requiring blood collection at night for diagnostic purposes. This posed a significant barrier to effective diagnosis.

To address this issue, numerous immunological diagnostic methods were explored. In 1986, Gary J. Weil and colleagues identified filarial antigens, leading to the development of specific monoclonal antibodies. This enabled the detection of circulating antigens using enzyme-linked immunosorbent assay (ELISA). Furthermore, the development of the immunochromatographic test (ICT), which allows rapid on-site detection of filarial antigens, made it possible to diagnose lymphatic filariasis using daytime blood samples. These new diagnostic tools not only simplified the diagnostic process but also improved accuracy. The advancement of these methods became a major driving force in global efforts to eliminate lymphatic filariasis.

In addition, the infection rate of filarial parasites in vector mosquitoes serves as an

important indicator for monitoring progress toward elimination. Initially, mosquito infection was assessed primarily through microscopic observation, similar to human diagnosis. However, with advances in molecular biology, highly sensitive, highly specific, and relatively simple methods have been introduced, contributing significantly to research and surveillance efforts.

1.2.1.2. Selection of Treatment Drugs

In 1947, Irving R. Hewitt and colleagues reported that diethylcarbamazine (DEC) was effective for treating human filarial infections. DEC rapidly reduces microfilariae in the bloodstream following oral administration and was long considered the only drug that also affects adult worms. However, although DEC tends to suppress acute dermatolymphangioadenitis (ADLA) associated with lymphatic filariasis, it has little effect on elephantiasis or hydrocele, and its precise mechanism of action remains unclear. Nevertheless, DEC has major advantages: it is rapidly absorbed and excreted after oral intake, causes minimal side effects, and is highly stable against heat and mechanical stress.

Following the report of DEC's efficacy in reducing microfilariae, several endemic countries—where national systems and public health structures were beginning to stabilize in the late 1950s—initiated mass drug administration (MDA) or selective treatment programmes aimed at eliminating lymphatic filariasis.

Subsequently, ivermectin—discovered by Satoshi Ōmura and widely used as a veterinary anthelmintic—was reported to reduce microfilariae of *Onchocerca volvulus* (the cause of river blindness) with a single dose and without significant adverse effects. Between 1982 and 1986, the WHO Special Programme for Research and Training in Tropical Diseases (TDR) conducted large-scale clinical trials of mass ivermectin administration in African countries endemic for onchocerciasis. In 1987, Joon W. Mak and colleagues reported that ivermectin was also effective against lymphatic filariasis. This marked the first new effective drug for the disease in 40 years, following DEC.

In 1990, Eric A. Ottesen and colleagues compared ivermectin with the conventional 12-day DEC regimen (6 mg/kg). They confirmed that a single annual dose of ivermectin at 125 μg/kg could sustain significant reductions in microfilariae of *Wuchereria bancrofti* and *Brugia malayi* for up to six months. However, as with onchocerciasis, ivermectin showed no substantial effect on adult worms in lymphatic filariasis.

In cases of co-infection with lymphatic filariasis and onchocerciasis or loiasis, DEC can cause severe adverse reactions—including worsening ocular pathology, blindness, severe allergic responses, and encephalopathy—making its use unsafe. Therefore, the introduction of ivermectin was particularly significant for lymphatic filariasis elimination

in regions where onchocerciasis co-infection was common. Although ivermectin also showed favorable effects against loiasis, cases of severe encephalopathy were later reported among individuals co-infected with *Loa loa* during ivermectin treatment in onchocerciasis control programmes. This condition is thought to result from large numbers of dying microfilariae entering the cerebrospinal fluid. Consequently, ivermectin administration has since been avoided in areas endemic for loiasis.

Albendazole, developed in the 1970s by SmithKline as a veterinary anthelmintic, was later found in the 1980s to be effective against human intestinal helminths such as ascariasis, hookworm infection, and echinococcosis. In 1993, it was also shown to be effective against lymphatic filariasis. In 1997, David G. Addis and colleagues reported that combining albendazole with ivermectin produced a remarkable synergistic effect in reducing microfilariae. Subsequently, in 1998, M. M. Ismail and colleagues evaluated four drug regimens for *Wuchereria bancrofti* infection by assessing microfilariae prevalence and antigen test results 15 months after treatment:

1. Albendazole (600 mg)
2. Albendazole (600 mg) + Ivermectin (400 μg/kg)
3. Albendazole (600 mg) + DEC (6 mg/kg)
4. DEC (6 mg/kg) + Ivermectin (400 μg/kg)

As a result, although all combination therapies demonstrated significant effects, the combination of albendazole and ivermectin (Regimen 2) produced the greatest reduction in circulating microfilariae. In contrast, the combination of albendazole and DEC (Regimen 3) was most effective in reducing antigen positivity. In 1999, Ranganatha Krishna Shenoy conducted a similar study on *Brugia malayi* infection and reported that the combination of albendazole (400 mg) and DEC (6 mg/kg) was the most effective in reducing microfilariae.

Based on these findings, combinations of the three drugs—DEC, ivermectin, and albendazole—were selected as effective components for mass drug administration (MDA) in lymphatic filariasis elimination programmes.

Regarding treatment frequency and dosing schedules, a large-scale long-term clinical trial conducted in the Republic of Fiji in 1996 demonstrated that administering DEC once annually for five consecutive years reduced microfilarial infection to the same extent as the traditional 12-day regimen. Since then, annual treatment repeated over several years has become the standard protocol. However, the effectiveness of these drugs in treating established clinical manifestations—such as lymphedema, elephantiasis, and hydrocele—remains inconclusive.

With the establishment of a simple diagnostic method (ICT) in 1997, the feasibility of elimination increased further. Several countries, including Japan, had already achieved national-level elimination, highlighting the reality that lymphatic filariasis is a preventable disease that continues to persist in many so-called developing countries due to poverty and limited access to healthcare.

In early malaria elimination programmes, some effectiveness had been reported for administering chloroquine by mixing it into table salt. Inspired by this, similar approaches were attempted using DEC mixed into salt (0.1%–0.4%) or beverages, and favorable therapeutic outcomes were observed. Fever and other adverse reactions sometimes seen with standalone drug administration were rarely observed. This method was used in certain regions, such as parts of the People's Republic of China, where large-scale drug distribution was necessary, and it produced substantial benefits. However, because this approach required continuous intake over several years, it did not become widely adopted. To date, no prophylactic drugs or vaccines exist for lymphatic filariasis.

1.2.1.3. Recognition of Vector Control

In 1961, WHO convened the First Expert Committee on Lymphatic Filariasis in Geneva. At this meeting, lymphatic filariasis and onchocerciasis were treated as separate diseases, and the committee focused exclusively on lymphatic filariasis. The latest scientific knowledge on the disease was compiled, and discussions were held on identifying endemic areas, standardizing diagnosis and treatment, and developing strategies for elimination. As a result, the need for further research on vector insects was recognized, leading to the establishment of a filariasis research unit in Rangoon, Burma (now the Republic of the Union of Myanmar) in 1962. In 1965, a WHO interregional seminar was held to review lymphatic filariasis elimination programmes conducted in several countries.

The Second Expert Committee meeting was held in Geneva in 1967, during a period when many African nations—second only to Asia in endemicity—were gaining independence. In the 1960s, rapid urban migration occurred in many newly independent countries without adequate sanitation infrastructure. This led to increased breeding of mosquito vectors, particularly *Culex quinquefasciatus*, and greater contact between vectors and human hosts, resulting in expanded transmission of lymphatic filariasis.

At this meeting, vector control (VC) and mass drug administration (MDA) with DEC were considered the primary strategies for lymphatic filariasis elimination. However, no effective vector control methods had yet been clearly identified. The committee concluded that improving sanitation in urban areas was essential.

1.2.1.4. Consideration of Morbidity Management

At the Fifth Expert Committee meeting held in 1991, new scientific findings, simplified diagnostic methods, and newly available therapeutic drugs were reviewed alongside approaches to patient care. It had been determined that secondary bacterial and fungal infections in affected areas play a key role in triggering the development of elephantiasis. Consequently, maintaining cleanliness of the affected limbs and administering antibiotics during episodes of infection were recommended as essential measures for symptom management and prevention. Appropriate surgical procedures for hydrocele were also examined. However, despite these discussions, scientific progress in understanding the clinical manifestations of lymphatic filariasis remained limited.

Nevertheless, interest in lymphatic filariasis elimination continued to grow. The United Nations Development Programme (UNDP), the World Bank (WB), and TDR expressed a clear commitment to strengthening research support. To promote information exchange among endemic regions, the committee also recommended holding regular meetings between Southeast Asia and the Western Pacific regions to discuss elimination strategies, including morbidity management and patient care.

1.2.2. Accumulation of Scientific Knowledge for Action

In the 1970s, the concept of Primary Health Care (PHC) was introduced. At that time, many newly independent developing countries were still struggling to escape severe economic hardship. Infrastructure essential for maintaining health—such as adequate water and sanitation systems, food safety, and access to medical care—was underdeveloped, and the widening gap in living conditions between developing and industrialized nations had become a major global concern. In this context, the Alma-Ata Declaration of 1978, adopted at a joint WHO–UNICEF conference, emphasized that a healthy population is vital for national economic and social development, and recommended maintaining good community hygiene and ensuring access to health care systems in both urban and rural areas.

Against this backdrop, WHO convened the Third Expert Committee on Lymphatic Filariasis in Athens in 1974, but scientific progress remained limited. Pharmaceutical companies, facing the high costs of drug development, focused primarily on diseases prevalent in industrialized countries, and little attention was given to research and

development of treatments for tropical diseases endemic in low-income regions, where financial returns were unlikely. In response, WHO, together with UNICEF, UNDP, and the World Bank, launched the Special Programme for Research and Training in Tropical Diseases (TDR) in 1975 to promote research aimed at developing treatments and preventive measures.

In 1980, after two decades of effort, smallpox was eradicated worldwide. Building on this success, new targets for disease elimination—such as polio and malaria—were established. In this context, the Fourth Expert Committee on Lymphatic Filariasis met in Geneva in 1983. At that time, no simple diagnostic method existed other than nighttime blood collection and microscopic examination, and there had been no remarkable scientific breakthroughs regarding lymphatic filariasis.

However, the development of the immunochromatographic test (ICT) in the 1990s provided a simple diagnostic tool, and it was confirmed that combinations of two of the three drugs—albendazole, ivermectin, and DEC—were effective treatments. Based on these findings from expert consultations, WHO increasingly recognized that practical and feasible strategies for lymphatic filariasis control were becoming attainable.

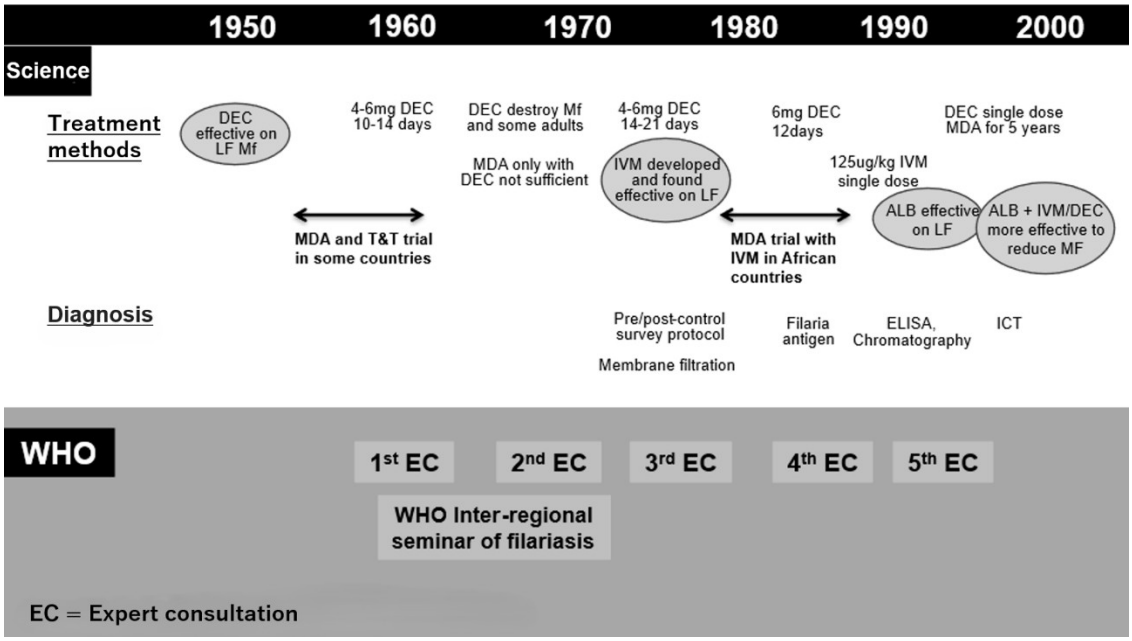


Figure 5: From research and science to WHO strategy and policy: The accumulation of evidence.

1.3. Success Stories

1.3.1. Japan's Efforts

Across the world, many countries have long attempted to control lymphatic filariasis, and several—including Japan, the People's Republic of China, and the Republic of Korea—have successfully eliminated transmission at the national level. This section introduces Japan's experience as an example of successful lymphatic filariasis elimination.

Today, human lymphatic filariasis has been eliminated in Japan, and only canine filariasis remains widely recognized. However, the disease was once widespread throughout the country (Figure 6), and even after World War II, transmission remained intense in areas such as Kagoshima Prefecture and the Nansei Islands. Japan succeeded in eliminating the disease in the 1970s through strong collaboration among government, academia, industry, and local communities.



Figure 6: Patients with lymphatic filariasis in Japan during the Heian period (top), Edo period (bottom left), and Meiji period (bottom right).

Following Japan's postwar development, lymphatic filariasis control was considered an important component of national public health policy. After the effectiveness of DEC against lymphatic filariasis was reported in 1947, Japanese university researchers and pharmaceutical companies jointly developed a domestically produced DEC formulation, "Spatonin," in 1950. From the early 1950s onward, researchers and clinicians conducted extensive studies to verify its effectiveness and determine the most efficient mass treatment methods, including dosage schedules, blood sampling volumes, and timing.

Based on these findings, the Japanese government adopted lymphatic filariasis prevention as a national policy and, in 1962, formulated the National Guidelines for Lymphatic Filariasis Control. The control strategy consisted of the following:

1. **Identification of infected individuals** through blood surveys using three parallel thick blood smears (20 μL each) collected from all residents in endemic areas
2. **Treatment of all infected individuals** with DEC at 6 mg/kg per day for 12 consecutive days
3. **Vector control** through the application of insecticides such as DDT or malathion.

Following these guidelines, universities (both basic and clinical departments), government agencies—especially public health centers—and residents of endemic communities worked together in coordinated national and prefectural programmes to combat filariasis.

As a result, by 1971, infection rates had fallen to nearly zero in all prefectures, and by 1978, Japan was considered to have achieved elimination of lymphatic filariasis. As symbolized by the monument commemorating filariasis elimination on Miyako Island (Figure 7), the programme succeeded because residents trusted science and government and actively participated in the effort. Science provided situational analysis and evidence; the government formulated policies and strategic frameworks; and administrative bodies and communities implemented the interventions collaboratively, ultimately achieving elimination.

This period coincided with the beginning of Japan's era of rapid economic growth. It is easy to imagine that lymphatic filariasis control contributed to strengthening community health systems and, in turn, supported the health of the population that underpinned Japan's economic development.

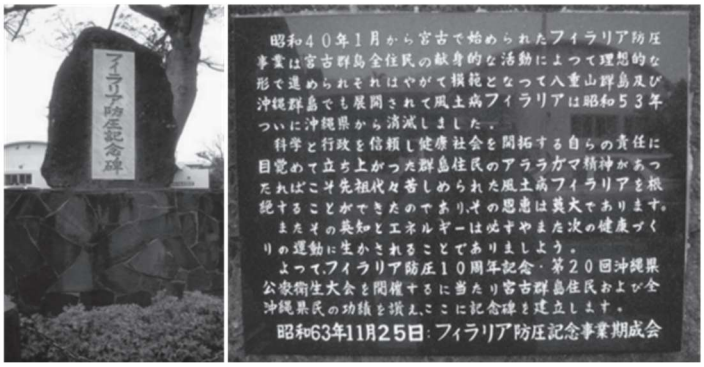


Figure 7: Monument of Lymphatic Filariasis Control in Miyako Island, Japan.

Japan's lymphatic filariasis elimination programme, when viewed through the lens of Primary Health Care (PHC), can be understood as a public health initiative that embodied key PHC principles—namely, active community participation, health care responsive to local needs, efficient use of resources, and coordination and integration across sectors. It is noteworthy that Japan implemented such PHC-aligned activities more than a decade before the Alma-Ata Declaration of 1978.

In this way, Japan possesses a valuable early success story in which strong collaboration among government, academia, industry, and local communities led to the elimination of lymphatic filariasis. Japan's experience also highlighted the limitations of selective treatment approaches, thereby stimulating subsequent research and laying the foundation for the mass drug administration (MDA) strategies later adopted under the Global Programme to Eliminate Lymphatic Filariasis (GPELF).

1.3.2. The Pioneer — PacELF

In May 1997, WHO resolved to eliminate lymphatic filariasis worldwide by the year 2020. In response, in March 1999, the health ministers of Pacific Island countries gathered in the Republic of Palau and, together with the WHO Regional Office for the Western Pacific (WPRO), committed to eliminating lymphatic filariasis from the Pacific region. This led to the launch of the Pacific Programme for the Elimination of Lymphatic Filariasis (PacELF).

Before PacELF began, filariasis control activities were virtually nonexistent in most Pacific Island countries, except for a few such as Samoa, Fiji, and French Polynesia. In many places, the population was not even aware of the filaria parasite's existence.

WHO/WPRO established the PacELF office in Fiji and initiated lymphatic filariasis elimination programmes across all 22 Pacific Island countries and territories: American Samoa, Cook Islands, Fiji, French Polynesia, Guam, Kiribati, Northern Mariana Islands, Marshall Islands, Federated States of Micronesia, Nauru, New Caledonia, Niue, Papua New Guinea, Palau, Pitcairn–Henderson–Ducie–Oeno Islands, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu, and Wallis and Futuna.

A midterm evaluation of PacELF was conducted between 2002 and 2004 in six countries and territories, confirming substantial reductions in infection rates. In 2004, Samoa and Niue completed five rounds of mass drug administration (MDA) and underwent evaluations, which showed an 85% reduction in antigen-positive individuals.

As part of WHO's Global Programme to Eliminate Lymphatic Filariasis (GPELF), PacELF has been widely recognized as a successful model for lymphatic filariasis elimination. Its organizational structure and operational strategies have served as templates for elimination programmes in other regions of the world. Detailed information is documented in *The PacELF Way: Towards the Elimination of Lymphatic Filariasis from the Pacific 1999–2005* (Figure 8).

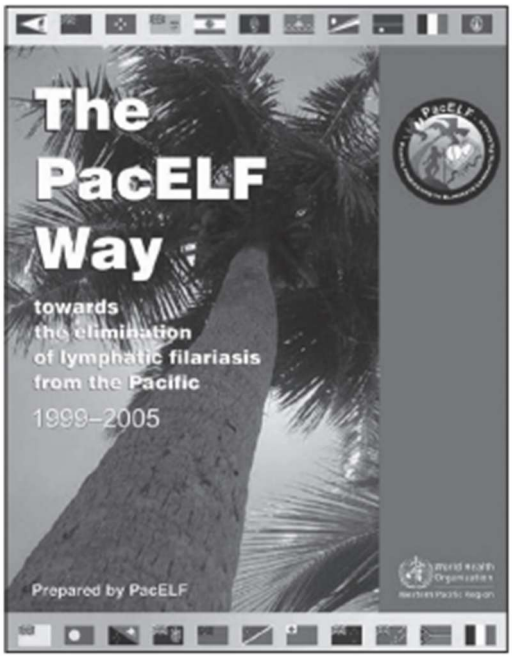


Figure 8: Cover of "The PacELF Way: Towards the elimination of lymphatic filariasis from the Pacific 1999-2005".

Chapter 2
Determining How to Fight: Global Guidelines

This chapter introduces how policy decisions shape the strategies, methods, and phased programmes of the Global Programme to Eliminate Lymphatic Filariasis (GPELF).

Determining how to conduct a global campaign requires learning from scientific evidence and successful precedents, while ensuring that the approach is operationally feasible. Logistics must be considered. Effective tools against filariasis are essential, but they must also be practical, relatively inexpensive, and acceptable across diverse societies.

The World Health Organization's (WHO) approach to disease control can be compared to climbing a mountain. First, one must decide which mountain (disease) to climb. Then, WHO pioneers a path up a previously unexplored mountain, establishes a route, and demonstrates how to ascend it (the control strategy). WHO supports climbers on their way to the summit. The mountain is chosen by the World Health Assembly (WHA), the route carved out is WHO/GPELF, and the climbers are the national governments.



Figure 9: GPELF is like climbing a mountain

To determine the optimal route, it is necessary to understand the mountain's conditions—its surrounding environment, infrastructure, and other relevant factors. By understanding the reality of lymphatic filariasis and analysing the current situation to identify feasible interventions, an efficient and optimal strategy for elimination can be developed.

It is also essential to establish support systems—medicines, tools, and financial resources—to assist those climbing the mountain (endemic countries). Although each endemic country differs in environment, culture, and values, the policies and standards of GPELF must be understood, respected, and implemented consistently across all nations (Figure 9).

2.1. Political Commitment

Scientific knowledge accumulated through numerous studies has been analysed repeatedly by WHO expert committees and incorporated into policy recommendations.

The International Task Force for Disease Eradication, following the successful eradication of smallpox, examined other diseases considered potentially eradicable. In 1993, it identified lymphatic filariasis as one of six diseases then considered eradicable worldwide (polio, cysticercosis, dracunculiasis, mumps, rubella, and lymphatic filariasis).

This report prompted WHO Member States around the world to begin moving toward elimination. In May 1997, the World Health Assembly (WHA) resolved to eliminate lymphatic filariasis (LF) globally and called on WHO to strengthen programmes and partnerships to achieve this goal. The WHA resolution had a ripple effect on national governments, donor agencies, and supporting organizations.

In January 1998, SmithKline Beecham (now GlaxoSmithKline; GSK) announced that it would donate all the albendazole required for the elimination of lymphatic filariasis. Later that same year, Merck committed to providing ivermectin free of charge to all LF-endemic countries where onchocerciasis is co-endemic, until elimination is achieved. These large-scale drug donations became a major driving force for LF elimination, especially because most endemic countries are low- and middle-income nations.

In 2000, WHO convened the first meeting of the Global Alliance to Eliminate Lymphatic Filariasis (GAELF) in Spain and launched the Global Programme to Eliminate Lymphatic Filariasis (GPELF), setting the goal of eliminating LF as a public health problem by 2020. As a global partnership supporting GPELF, GAELF established a

public–private support framework through advocacy, coordination among partners, and mobilization of resources (Figure 10).

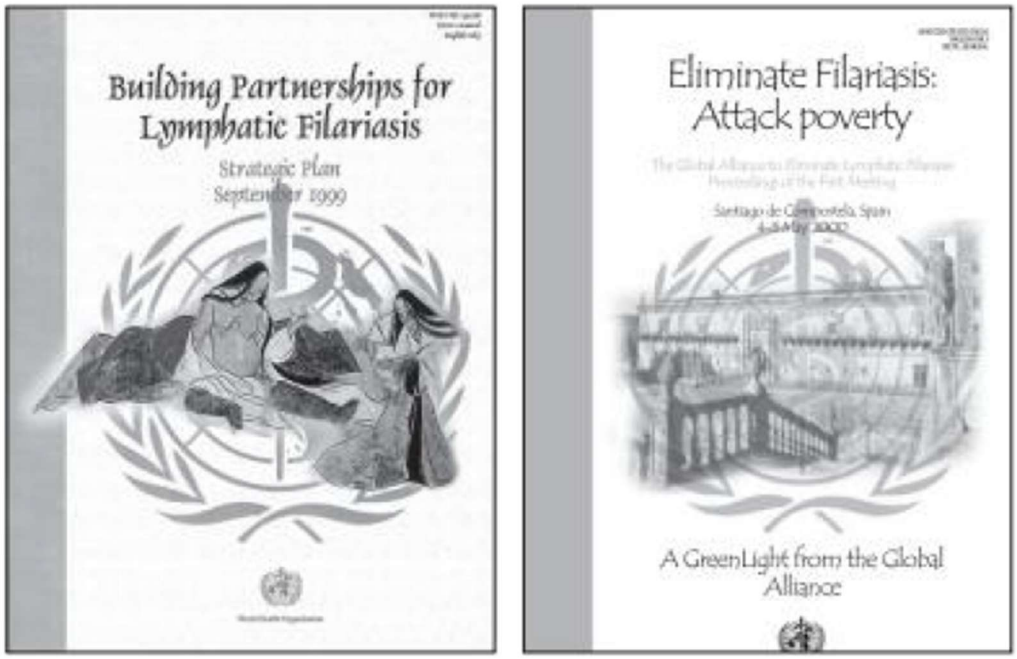


Figure 10: The strategic plan to establish a partnership (left) and the minutes of the first GAELF meeting (right)

Column: World Health Assembly Resolution on Lymphatic Filariasis (1997, WHA50.29)

Welcoming the recent studies which have defined new, simplified, highly effective strategies;

Acknowledging that an international task force on disease eradication has recently identified lymphatic filariasis as one of only six "potentially eradicable" infectious diseases,

1. URGES Member States:

(1) to take advantage of recent advances in the understanding of lymphatic filariasis and the new opportunities for its elimination by developing national plans leading to its elimination, as well as for the monitoring and evaluation of programme activities; (2) to strengthen local programmes and their integration with the control of other diseases, particularly at the community level, in order to implement simple, affordable, acceptable and sustainable activities based on community-wide treatment strategies, but supplemented where feasible by vector control and improved sanitation;

(3) to strengthen training, research, diagnostic laboratory, disease and data management capabilities in order to improve clinical, epidemiological and operational activities directed toward eliminating lymphatic filariasis as a public health problem:

(4) to mobilize support of all relevant sectors, affected communities and nongovernmental organizations for the elimination of the disease:

2. INVITES other specialized agencies of the United Nations system, bilateral development agencies, nongovernmental organizations and other groups concerned, to increase cooperation in the elimination of lymphatic filariasis through support of national and international programmes relevant to the prevention and elimination of lymphatic filariasis;

3. REQUESTS the Director-General:

(1) to bring to the attention of the other specialized agencies and organizations of the United Nations system, bilateral development agencies, nongovernmental organizations and other groups concerned the need for closer collaboration in the elimination of lymphatic filariasis as a public health problem;

(2) to mobilize support for global and national elimination activities;

(3) to keep the Executive Board and Health Assembly informed as necessary of progress in the implementation of this resolution.

Ninth plenary meeting, 13 May 1997
A50/VR/9
(excerpted from WHA50_R29_eng.pdf)

2.2. GPELF Strategies and Methods

2.2.1. Strategy Formulation

2.2.1.1. Understanding Transmission Mechanisms

Lymphatic filariasis, often referred to as an endemic tropical disease, is a mosquito-borne parasitic infection caused by filarial worms that are transmitted exclusively through the blood-feeding behaviour of mosquitoes. Transmission involves three biologically distinct organisms—humans, parasites, and mosquitoes—making the process complex and influenced by multiple limiting factors.

Filarial parasites mature into adult worms within the human lymphatic system. Once a male and female worm pair, they produce microfilariae (mf) for a period of four to six years. These microfilariae circulate in the bloodstream and are taken up by mosquitoes during blood feeding, leading to new infections. Importantly, each microfilaria ingested by a mosquito develops into only one infective larva (L3). These L3 larvae can infect humans, but unless both male and female worms establish themselves in the host, no new microfilariae will be produced.

In other words, filarial infection develops slowly, transmission efficiency is relatively low, and in most situations, transmission is estimated to occur essentially from one person to one other person at a time (Figure 11).

To interrupt transmission of lymphatic filariasis, the period during which microfilariae are produced must be targeted. By administering effective medicines that kill microfilariae circulating in human blood, new infections can be prevented. This approach, grounded in the biological understanding of transmission, was identified as the most effective strategy for breaking the cycle of transmission.

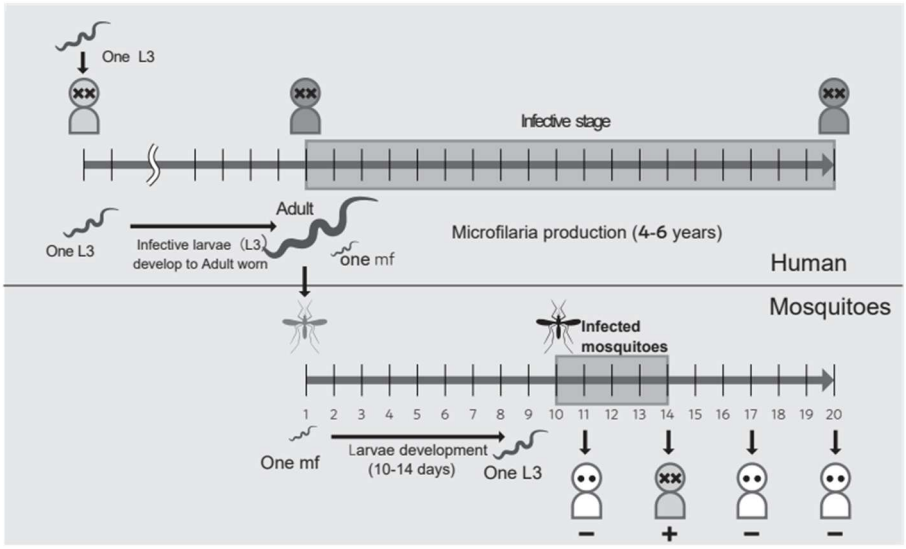


Figure 11: Transmission mechanism of lymphatic filariasis: A single microfilaria (Mf) develops into a single infective larva (L3), which then infects a single individual.

2.2.1.2. Evidence-Based Strategies

It was considered appropriate, as a countermeasure against lymphatic filariasis, to administer medicines to infected individuals in order to block transmission, as described above. Although there are drugs effective against microfilariae, their effect on adult worms is limited. Unfortunately, no vaccine exists that is effective for preventing infection. Vector control measures are considered effective locally, but the mosquitoes that transmit filariasis are diverse, and it has been reported that the species of vector mosquitoes differ in each region. Therefore, in many countries where lymphatic filariasis is endemic, it is difficult to establish standardized vector control measures. For these reasons, in aiming for the elimination of lymphatic filariasis, the strategy of targeting microfilariae circulating in the blood of infected individuals and selecting infection prevention was considered the most scientific, effective, and feasible approach (Figure 12).

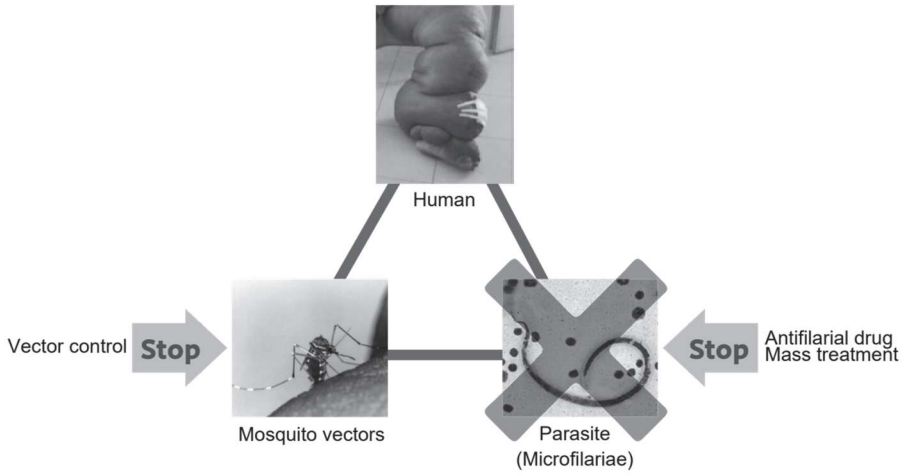


Figure 12: Strategies to eliminate lymphatic filariasis

2.2.1.3. Intervention Methods Based on Strategy

The strategy of using drug administration to target microfilariae circulating in the blood of infected individuals in order to achieve infection prevention is the most effective countermeasure for the elimination of lymphatic filariasis. Next, in order to formulate this programme, it becomes necessary to standardize, based on existing knowledge, which medicines should be used and how they should be administered.

There are two methods of drug administration: one is to administer therapeutic drugs only to individuals who test positive for microfilariae, the source of infection; the other is to administer drugs to all residents in endemic areas. The former selective administration may seem relatively easy and efficient in small communities, but in large populations, it becomes financially and institutionally difficult because it requires conducting highly accurate examinations for everyone, managing the data, and ensuring correct drug administration.

Fortunately, because the existing therapeutic drugs do not show major side effects and the medicines are relatively inexpensive, it was considered realistic in endemic areas to choose the method of uniform administration to the entire population.

In the programme, a method was established to interrupt the cycle of transmission by combining two drugs—diethylcarbamazine (DEC) and albendazole, or ivermectin and albendazole—and conducting annual mass drug administration for five consecutive years, covering nearly the entire population of endemic areas.

This is the method known as mass drug administration (MDA) (Figure 13). This approach actually has many advantages. First, it eliminates the possibility of missing treatment for false-negative individuals in examinations. Second, administering drugs to

the entire population allows people to share a sense of unity in fighting lymphatic filariasis. Third, because knowledge about lymphatic filariasis is necessarily shared by everyone for the purpose of drug administration, that knowledge becomes useful for the prevention and treatment of the disease. Furthermore, it also helps create a social environment that accepts people suffering from the chronic consequences of lymphatic filariasis.



Figure 13: MDA in the field

2.2.2. A Clear, Stepwise Programme

At the ten-year mark after the start of GPELF, WHO published a concise strategic plan in 2010. The vision of GPELF was to regard lymphatic filariasis as a public health issue and to eliminate it by 2020. Elimination was defined as “reaching a level at which it is no longer a public health problem; that is, in a population, the number of infected individuals is reduced to a level that does not lead to further infections, and that level is maintained for five years.”

In lymphatic filariasis control, an initial mapping survey is conducted to identify endemic areas, and countermeasures are implemented in those endemic areas.

GPELF has two main strategies:

(1) To conduct mass drug administration of anthelmintic medicines to all people in need in endemic areas of every country, in order to interrupt the transmission of lymphatic filariasis

(2) To provide access to minimum care for morbidity management and disability

prevention (MMDP) to all people in need in endemic areas of every country

GPELF has established the programme step framework shown in Figure 14 so that the National Programmes to Eliminate Lymphatic Filariasis (NPELF) of all endemic countries can advance each of the two strategies, MDA and MMDP, step by step using standardized methods, and so that, ultimately, transmission elimination can be demonstrated at both the national and global levels. It provides guidelines and manuals for programme implementation and monitoring and evaluation.

GPELF has announced the following policies for each step—MDA, Transmission Assessment Survey (TAS), integrated vector management (IVM), and MMDP.

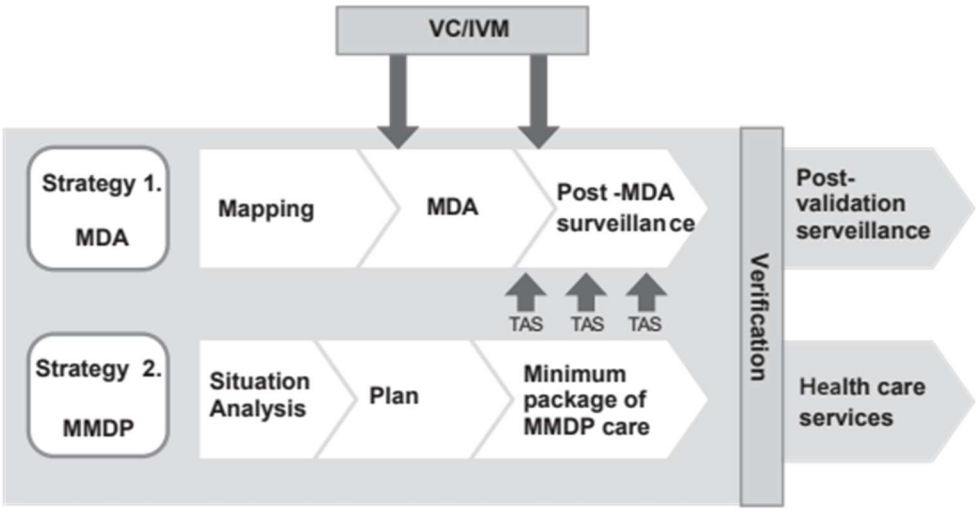


Figure 14: Programme steps recommended by GPELF. Mapping is a survey to determine MDA implementation areas. TAS is explained later.

2.2.2.1. Interruption of Transmission Through Mass Drug Administration (MDA)

MDA is the mass administration of two anthelmintic drugs (albendazole and ivermectin, or albendazole and DEC, Figure 15) to all people living in lymphatic filariasis endemic areas, and it is the most important strategy in GPELF. The aims of MDA are:

(1) To reduce the microfilarial density in the blood of infected individuals to a level at which transmission to new hosts by mosquito vectors cannot occur

(2) To reduce the overall microfilarial prevalence in the community to a level at which transmission cannot be sustained even if vector mosquitoes are present

MDA must be implemented once a year for at least five consecutive years. This is

generally considered to correspond to the period during which adult worms parasitizing infected individuals produce microfilariae.



Figure 15: Three principal medicines: albendazole (GSK; left), DEC (Eisai; center) , and ivermectin (Merck; right)

In the MDA strategy, GPELF recommends the following four steps:

(1) To create maps showing the geographical distribution of infection status for each implementation unit (IU) in order to determine the need for MDA (mapping)

(2) To implement MDA

(3) To conduct TAS as "post-MDA surveillance" for approximately five years after stopping MDA, in order to monitor infection levels

(4) To confirm elimination of transmission and provide evidence that transmission has been interrupted

2.2.2.2. Transmission Assessment Surveys (TAS)

In response to the fact that many countries were making steady progress with MDA, WHO, together with stakeholders, re-examined the monitoring and evaluation methods for MDA and established TAS as the method for determining whether MDA can be stopped. In 2011, WHO issued a revised monitoring and evaluation manual that clearly outlined the steps leading to TAS, and in 2012, it published WHO guidelines on TAS (Figure 16). TAS is a step for determining whether MDA can be stopped, and it is also applied as a method to confirm, during post-MDA surveillance, that transmission has not re-emerged. WHO also held TAS workshops in three regions—Western Pacific, South-East Asia, and Eastern Mediterranean—to train stakeholders. Similar workshops were held in the remaining regions of Africa and the Americas in June and July 2013 to ensure the dissemination of this new policy (see Appendix 1.3).

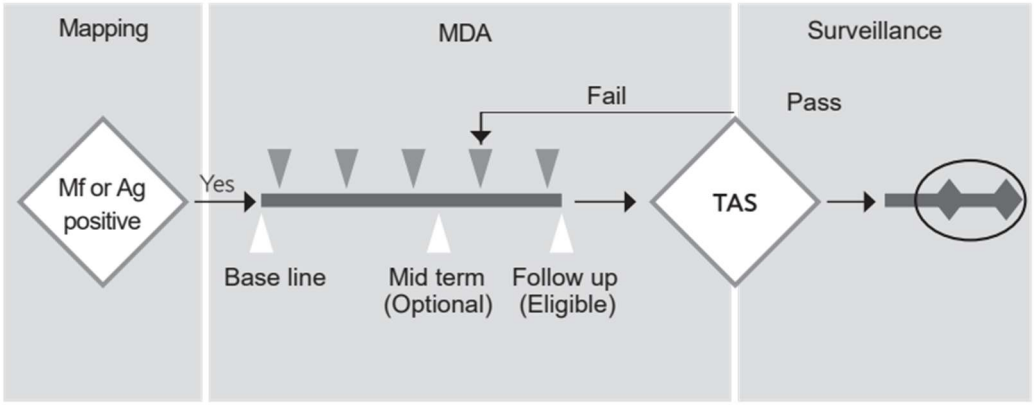


Figure 16: TAS for monitoring and evaluation of MDA

2.2.2.3. Vector Control and Integrated Vector Management (IVM)

In the interruption of transmission of lymphatic filariasis, MDA is essential, but in certain areas, vector control was considered to play an important supplementary role to the effects of MDA. Such specific areas include regions where elimination through MDA alone is expected to be difficult, for example, areas where drug administration is difficult because *Loa loa* is co-endemic, areas with very high infection rates, or areas that have completed MDA and entered the stage of preventing the resurgence of transmission (Figure 17).

WHO promotes Integrated Vector Management (IVM) in addressing diseases transmitted by multiple mosquito species, aiming to improve cost-effectiveness, strengthen programme implementation capacity and partnerships, and deepen interdepartmental cooperation. In lymphatic filariasis and malaria control as well, it is expected that introducing IVM will reduce the incidence of both diseases and increase public health impact by making effective use of resources. In 2011, WHO issued guidelines outlining this policy, the elements leading to success, and its broader effects. Furthermore, in 2013, it clarified the role and strategy of vector control in GPELF and published *Lymphatic filariasis: a handbook of practical entomology for national lymphatic filariasis elimination programme* as the operational guidance for such measures (see Appendix 1.2).

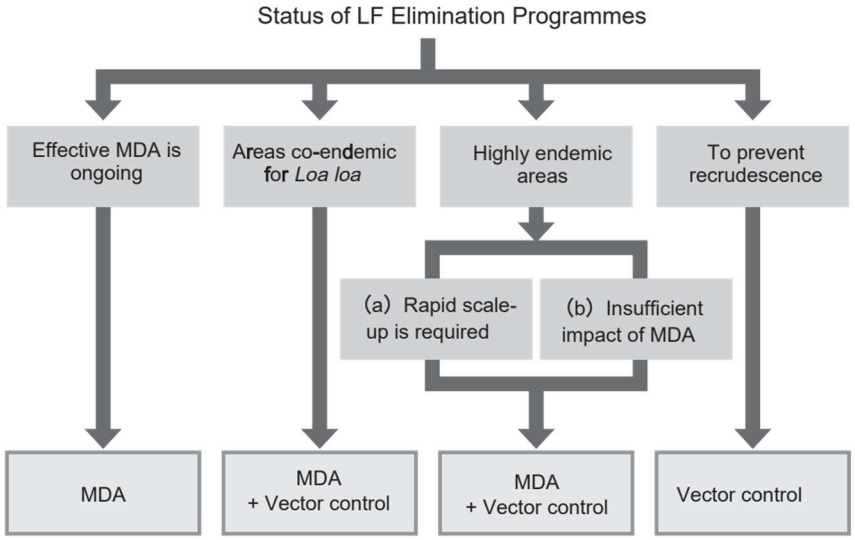


Figure 17: Decision-making algorithm to determine the need of IVM in countries endemic for lymphatic filariasis

2.2.2.4. Morbidity Management and Disability Prevention (MMDP)

Functional impairment and disability caused by lymphedema, elephantiasis, and hydrocele are important public health issues of lymphatic filariasis. In order to eliminate lymphatic filariasis as a public health problem, it is necessary not only to prevent new infections but also to implement strategies focusing on morbidity management and disability prevention for patients who already have symptoms such as lymphedema, elephantiasis, and hydrocele (Figure 18).

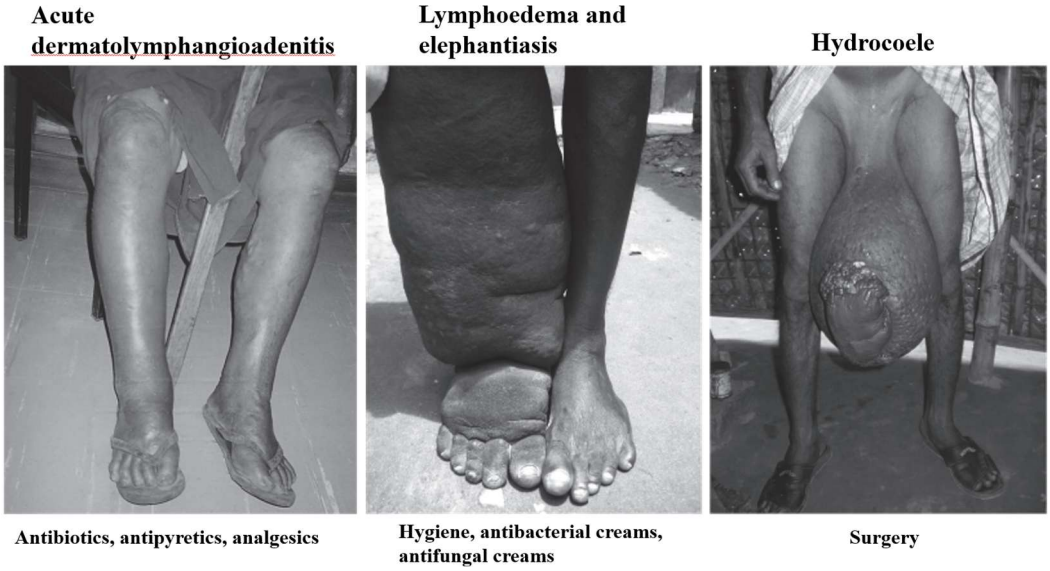


Figure 18: Methods for care by symptoms

MMDP is one of the important strategies of GPELF, focusing on the care of chronic symptoms that continue to exist even after transmission has been interrupted. However, compared with MDA, progress has been slow, and the establishment and dissemination of policies toward the 2020 elimination deadline were urgent. Therefore, in 2011 WHO issued guidelines summarizing the care methods, policies, and challenges of MMDP. In 2013, it published guidelines based on discussions with experts and stakeholders, presenting more detailed policies including monitoring and evaluation methods.

GPELF aims to ensure that all patients suffering from acute dermatolymphangioadenitis (ADLA), lymphedema, elephantiasis, and hydrocele in lymphatic filariasis endemic areas have access to the recommended basic care, and that their quality of life is improved by alleviating suffering.

The recommended basic care package includes the following:

- Treatment of acute symptoms in patients with ADLA, lymphedema, and elephantiasis
- Prevention of debilitation and pain associated with the progression of ADLA, lymphedema, and elephantiasis
- Provision of surgical operations for hydrocele
- Administration of antifilarial medicines through MDA or individual treatment to promote the death of remaining worms in the body

For all lymphatic filariasis endemic countries, it is a priority to establish MMDP within the NPELF and expand its dissemination through planning based on situational analysis and programme implementation.

GPELF aims to provide access to the recommended basic care package to all patients suffering from lymphedema, elephantiasis, and hydrocele in all areas where lymphatic filariasis is endemic. Therefore, it recommends promoting and sustainably expanding MMDP in collaboration with existing health systems and other disease programmes (see Appendix 1.1).

2.2.2.5. Strategies for Areas Co-endemic with Loiasis

Because ivermectin or DEC used in MDA for lymphatic filariasis can cause severe adverse reactions in patients with loiasis, their use in MDA is difficult, and establishing an alternative strategy was an urgent need. In 2012, WHO convened a meeting by inviting experts and representatives of national programmes responsible for lymphatic filariasis and malaria control to examine a new strategy for certain areas of Africa where loiasis and lymphatic filariasis are co-endemic, and the results of the discussions were compiled as a new strategic plan. In that plan, it was recommended that, limited to areas where

onchocerciasis is not endemic, albendazole alone be administered twice a year. In addition, the African regions where loiasis is endemic also have malaria, and the same species of mosquitoes transmit both diseases. Therefore, as a strategy to complement transmission interruption through MDA, the introduction of vector control measures similar to malaria control—such as insecticide-treated nets and indoor residual spraying—was also recommended. This strategy, when implemented by utilizing the health-care system infrastructure developed through MDA, also provides synergistic benefits to malaria elimination programmes.

Chapter 3
Taking on the Fight: Activities and Support

The frontline activities for the elimination of lymphatic filariasis are community-based programmes implemented as National Programmes to Eliminate Lymphatic Filariasis (NPELF), carried out under the responsibility of each endemic country according to its specific circumstances. To ensure the smooth implementation of NPELF activities, the Global Programme to Eliminate Lymphatic Filariasis (GPELF) provides two main types of assistance:

(1) Frontline support: technical support

(2) Logistical support: logistics.

In this chapter, the specific contents of the frontline activities implemented by NPELF and the support mechanisms provided by GPELF to NPELF are introduced, along with a summary of the progress and challenges of GPELF (Figure 19).

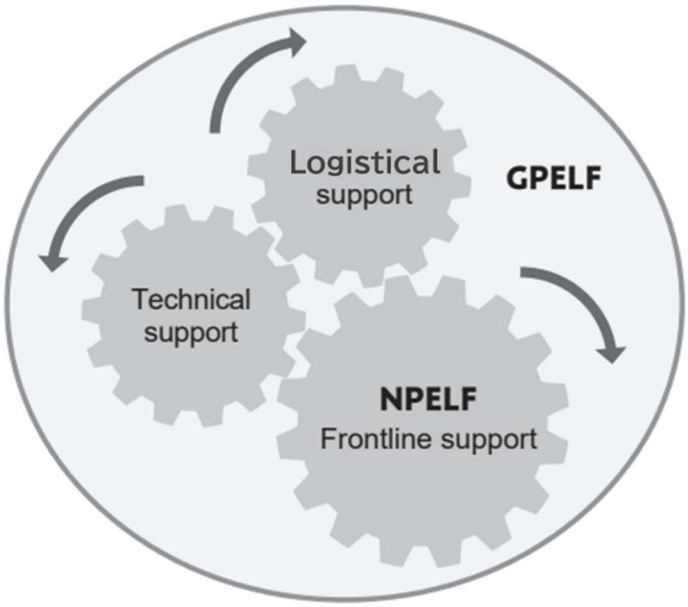


Figure 19: Support structure provided by GPELF to National Programmes (NPELF)

3.1. NPELF Activities

The main activities of NPELF are the implementation of the following two strategic pillars described in Section 2.2.2:

(1) Mass drug administration (MDA), in which a combination of medicines is administered once a year for 5–6 years to all eligible residents in at-risk areas (excluding infants, pregnant women, etc.)

(2) Morbidity management and disability prevention (MMDP), which provides access to a basic care package for all people who have developed lymphedema, elephantiasis, or hydrocele

Both strategies are carried out as part of the public health administration of each endemic country under the leadership of the NPELF manager, who is responsible for the programme in that country. The provision of MDA and MMDP is a large-scale public health activity conducted ultimately by health care workers in each endemic area, or by community volunteers under their supervision.

To implement this programme smoothly throughout the entire country, NPELF usually proceeds with annual activities following the steps shown in Figure 20, including identifying the population at the district level, procuring medicines and supplies, conducting public awareness activities for residents, training those involved in distribution, and compiling and reporting data after the activities.

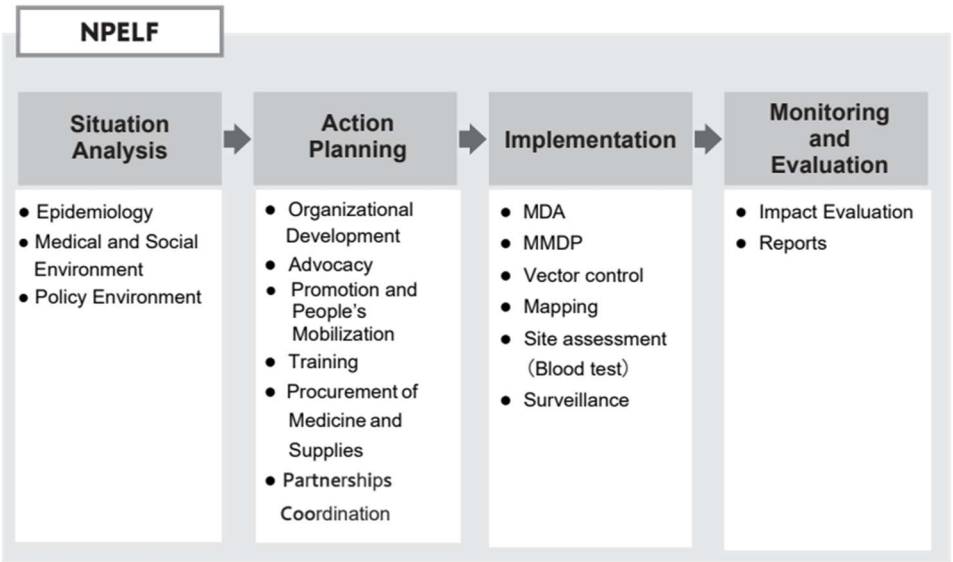


Figure 20: Activities under each step of NPELF

3.1.1. Situation Analysis

In order for the government to determine the necessity and appropriateness of implementing lymphatic filariasis (LF) elimination as a national programme and to formulate an action plan, it identifies and analyses the endemic situation of lymphatic filariasis within the country, as well as the medical and social infrastructure, existing policy environment, status of infrastructure development, and the number and distribution of health-care workers that may be relevant to implementing control and elimination measures.

3.1.2. Action Plan Development

Based on the results of the situation analysis, once the government reaches agreement, NPELF is organized and established. This includes the selection and appointment of programme managers and support staff, the formulation of policies and strategies for lymphatic filariasis elimination in accordance with GPELF strategies, the establishment of a lymphatic filariasis task force to lead monitoring, evaluation, and responses to challenges, and the development of a partnership and cooperation framework with external and internal stakeholders.

Once the organizational structure of NPELF is established, an action plan is formulated for the implementation of the main strategies. The action plan includes medium- and long-term goals for lymphatic filariasis elimination, basic national and epidemiological information, the schedule and division of roles for activity implementation, monitoring and evaluation methods, and a budget proposal. This formulation is carried out under the leadership of NPELF through discussions and reviews with the lymphatic filariasis task force and external and internal stakeholders, and is finalized upon adoption by the government.

3.1.3. Implementation

The most important activity of NPELF is the execution of the action plan. In accordance with the planned schedule and the division of roles agreed upon among the central government level, provincial and district levels, local health staff and volunteers, and

supporting partners, all activities necessary for the implementation of the MDA/MMDP programme are carried out. These include more accurate mapping of endemic status (prevalence surveys), advocacy to obtain cooperation from various local stakeholders, social mobilization activities to actively involve communities, training of local health staff and volunteers, implementation of MDA campaigns, provision of MMDP care, coordination of vector control measures, and prevalence surveys to measure the effects after implementation of activities (Figure 21).

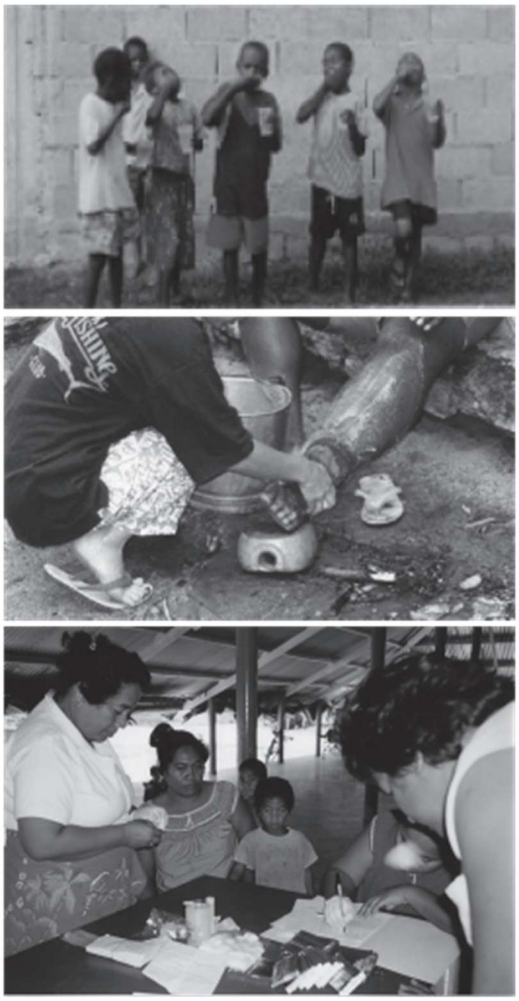


Figure 21: MDA (top), MMDP activities (center), and blood survey (bottom)

3.1.4. Monitoring and Evaluation

After implementing the plan, data concerning the implementation status and results of

the main strategies are collected and analyzed, reported to GPELF, and used to identify challenges and take corrective measures. For challenges that are technically difficult to resolve solely by domestic stakeholders, consultation is made with the World Health Organization (WHO) and its expert groups to seek advice. Then, planning for the following year's activities, procurement of funds and medicines, and other necessary steps are carried out.

3.2. GPELF Support to NPELF

In order for all endemic countries to equally achieve the goal of eliminating lymphatic filariasis and ultimately reach the global elimination target, GPELF recommends that all NPELFs advance their MDA/MMDP programmes using standardized steps and methods. To ensure that NPELFs can implement activities smoothly and in a scientifically sound manner, GPELF provides support for all steps of NPELF through cooperation between WHO headquarters and regional and country offices. This support mainly includes:

(1) Frontline support: technical support, such as establishing technical standards and guidelines necessary for frontline efforts, setting indicators and pathways based on scientific evidence, and capacity building and training for NPELF staff

(2) Logistical support: procurement of medicines, equipment, and funds, information and data management, advocacy, preparation of publications, and coordination with partners (Figures 22, 23)



Figure 22: Different roles of WHO HQ, Regional Offices and Country Offices

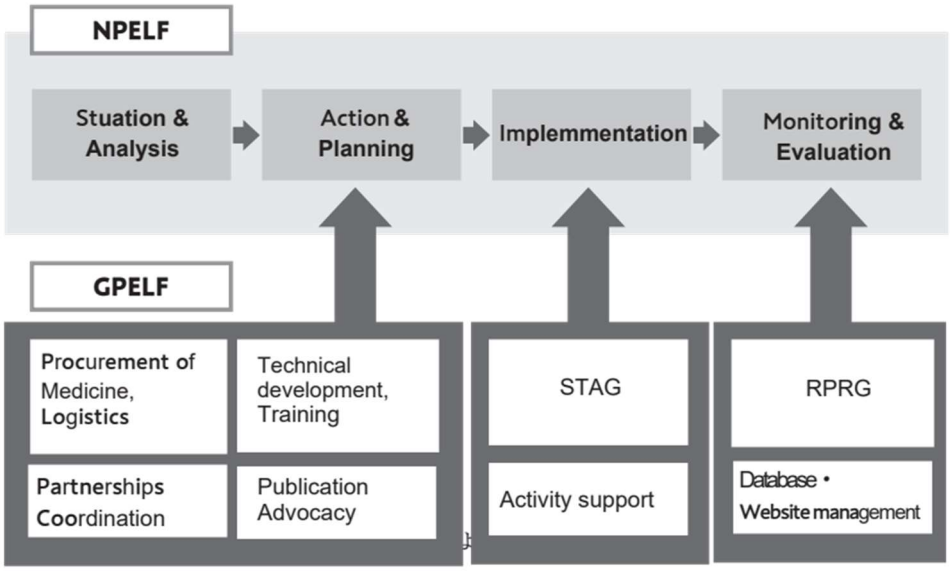


Figure 23: GPELF's support to NPELF

3.2.1. Frontline Support: Technical Assistance

3.2.1.1. Strategic and Technical Advisory Group (STAG)

At the inception of GPELF, WHO established the "Lymphatic Filariasis Technical Advisory Group (LF-TAG)," composed of experts in fields related to lymphatic filariasis

and representatives of NPELF programme managers. Regular committee meetings were held to obtain expert opinions and advice on technical issues and guidelines, thereby striving to build and advance the programme based on scientific evidence.

Subsequently, in 2007, the LF-TAG, which specialized in lymphatic filariasis, was replaced by the "Strategic and Technical Advisory Group for Neglected Tropical Diseases (STAG-NTD)," the highest advisory body for neglected tropical disease elimination and control efforts. Since then, the lymphatic filariasis subgroup within STAG-NTD has served as the expert committee dedicated to lymphatic filariasis elimination, discussing challenges that hinder global progress and formulating global-level guidelines and recommendations through STAG-NTD.

In addition to disease-specific committees within STAG-NTD, there are also thematic committees on issues such as access to medicines, monitoring and evaluation, research, and diagnostic tools. Depending on the issue, the relevant committee conducts discussions and provides advice.

3.2.1.2. Regional Programme Review Group (RPRG)

At the inception of GPELF, the "Lymphatic Filariasis Programme Review Group (LF-PRG)" was established at the global level alongside LF-TAG, but three years later, in line with WHO's trend toward regional decentralization, it was reorganized into the "Regional Programme Review Group for Lymphatic Filariasis (LF-RPRG)," with the WHO regional offices serving as secretariats. LF-RPRG is composed of experts involved in lymphatic filariasis elimination activities at each WHO regional level. Regular meetings are held in each of the five regional offices where lymphatic filariasis is endemic—excluding the WHO Regional Office for Europe (EURO)—namely the Regional Office for the Americas (AMRO), the Regional Office for Africa (AFRO), the Regional Office for the Eastern Mediterranean (EMRO), the Regional Office for the Western Pacific (WPRO), and the Regional Office for South-East Asia (SEARO).

These meetings evaluate the progress of each country in the region, assess applications for and distribution status of medicines donated by pharmaceutical companies, identify technical challenges in NPELF implementation, and provide advice to support NPELF activities. In particular, for technical issues specific to certain regions, RPRG provides guidance and recommendations to countries, contributing to rapid problem-solving.

3.2.1.3. Guideline Development

GPELF guidelines must present concise, feasible methods based on concepts understandable to everyone so that they can be accepted in all countries with different

religions, cultures, and values.

When scientific and technical priority issues are identified through national NPELFs or LF-RPRGs, and the need for new strategies, recommendations, or guideline development is recognized, GPELF convenes expert committees as needed—either the lymphatic filariasis subgroup of STAG or thematic committees. By gathering the latest scientific knowledge and formulating new strategies and guidelines based on this evidence, GPELF provides operational guidance to NPELFs.

Each country's NPELF formulates and implements its action plan in accordance with the strategies and guidelines developed by GPELF (Figure 24).

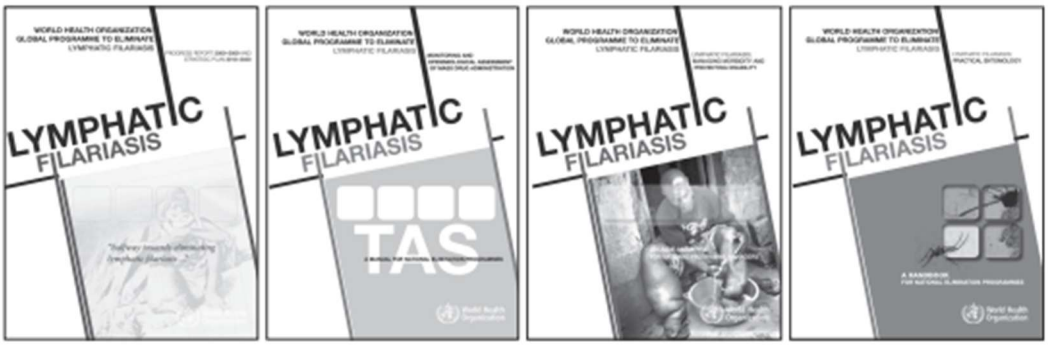


Figure 24: GPELF guidelines and policies published by WHO since 2010

3.2.1.4. Capacity Building and Training

When GPELF introduces new guidelines or technical recommendations, WHO headquarters works in collaboration with WHO regional and country offices to conduct training sessions and workshops for NPELF programme managers and staff on the implementation of the new methods. Through this, GPELF aims to strengthen the capacity of NPELF and promote a shared understanding. NPELF staff who participate in the training then conduct similar training sessions regularly within their own countries at the provincial, district, and community levels, thereby working to strengthen and maintain capacity for lymphatic filariasis elimination at all levels of the health system.

3.2.1.5. Operational and Technical Support

WHO regional offices, in cooperation with country offices and headquarters, regularly hold programme manager meetings to continuously monitor the implementation status of NPELF activities and provide support in coordination with partners. In the process of implementing NPELF activities, they provide technical, financial, and operational

support, including assistance with the formulation of action plans and national-level guidelines and recommendations, procurement of funds and medicines for prevalence surveys and MDA implementation, technical advice on MDA strategies, health communication, and survey methods, as well as support for preparing annual reports.

3.2.2. Back-End Support: Logistics

3.2.2.1. Drug Procurement

Of the medicines required for MDA, albendazole is pledged for free donation to lymphatic filariasis endemic countries by GlaxoSmithKline (GSK), ivermectin by Merck, and diethylcarbamazine (DEC) by Eisai.

WHO's GPELF has established and operates a system for reviewing applications and supporting supply so that countries receive the necessary quantities of medicines in a timely manner (Figure 25). Each year, the Ministry of Health of the respective country submits, through the WHO regional office, an annual report summarizing the previous year's MDA implementation (implementation districts, number of targeted individuals, number of people who took the medicines) and the results of blood examinations, along with a medicine application form summarizing the MDA plan for the following year (planned implementation districts, number of targeted individuals, and required tablet quantities of albendazole, DEC, and ivermectin) to the LF-RPRG.

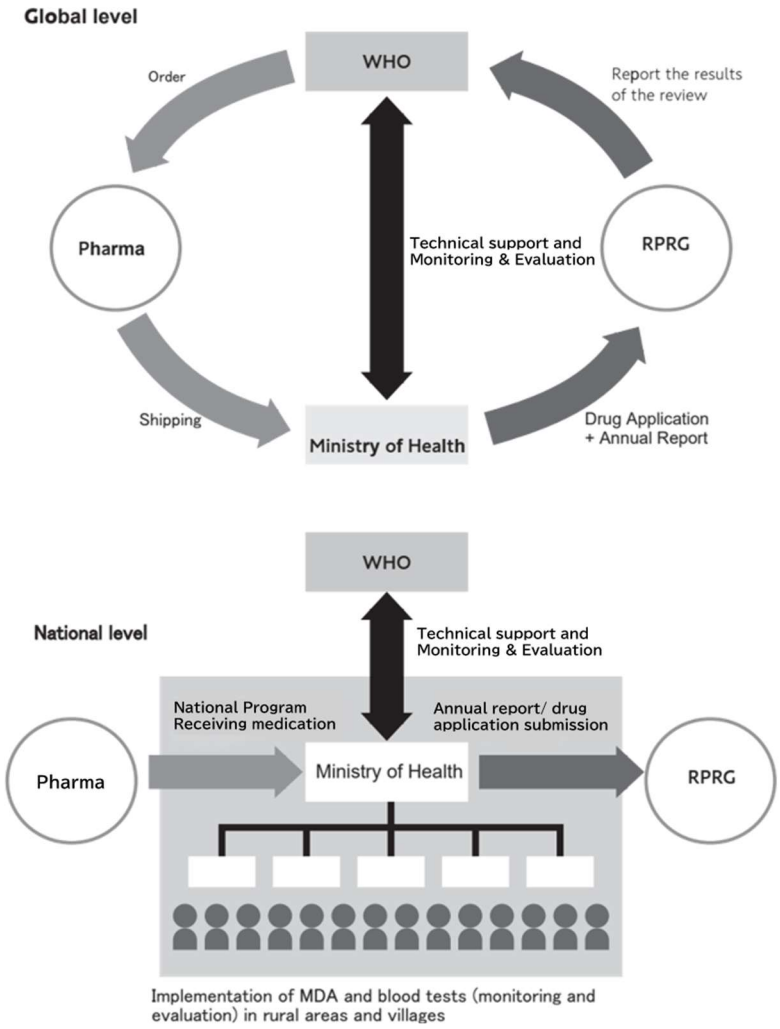


Figure 25: GPELF's mechanism to apply, review and supply donation of medicines at the global (above) and national (below) level

LF-RPRG reviews the programme progress and the appropriateness of the requested quantities for each country and reports the results to WHO. Based on this, WHO headquarters places orders with the pharmaceutical companies, which then ship the required quantities to the respective countries in a timely manner. In most cases, the WHO country office receives the medicines and provides them to the Ministry of Health. After receiving the medicines, the Ministry stores them in national warehouses and transports them to provincial and district authorities according to the MDA plan. Together they conduct MDA, and the provincial and district authorities report the results back to the Ministry of Health. Based on this, the Ministry prepares the next annual report and medicine application form and submits them to WHO, completing the annual cycle.

3.2.2.2. Information and Data Management

GPELF continuously collects data from NPELF using standardized forms, including information on medicine procurement and shipment status, MDA implementation status, and monitoring and evaluation results, and manages these data centrally in a database. A databank page is also provided on the WHO website, where information such as the lymphatic filariasis endemic status of each country and annual MDA progress is published. This facilitates information sharing among all stakeholders involved in lymphatic filariasis elimination and promotes situation analysis and identification of challenges. In addition, the progress of GPELF for each year is published annually in September in the *Weekly Epidemiological Record* as the LF Global Progress Report.

3.2.2.3. Publications and Advocacy

Through STAG, GPELF regularly publishes WHO documents such as scientifically recommended strategies, guidelines, meeting reports, and progress reviews. These publications not only disseminate information widely to governments and partners and promote understanding, but also help convey the dynamism and momentum of the programme. At the regional and country levels, WHO regional and country offices hold advocacy meetings regularly to maintain political commitment from national governments toward lymphatic filariasis elimination. Furthermore, strategies, guidelines, and manuals tailored to specific regions are developed and published as needed to translate recommendations issued at the WHO headquarters level into regional and national contexts and to strengthen and maintain cooperation for lymphatic filariasis elimination at those levels.

3.2.2.4. Stakeholder Coordination

Since its establishment, GPELF has had a partnership framework involving stakeholders known as GAELF, enabling collaboration among the public sector, private sector, academia, and civil society to advance NPELF activities toward achieving the global lymphatic filariasis elimination target for 2020.

International development assistance and financing agencies are categorized into multilateral institutions—such as UN agencies and the World Bank—and bilateral agencies. Traditionally, external assistance was largely provided independently by each country based on its own circumstances, strategies, and interests. However, since the 1990s, in order to improve the efficiency of economic assistance, the international community increasingly adopted a partnership-based “common pool (basket)” approach, in which priority areas and strategies are jointly determined, financial resources are

pooled, and decisions on their use are made through consultation (Figure 26).

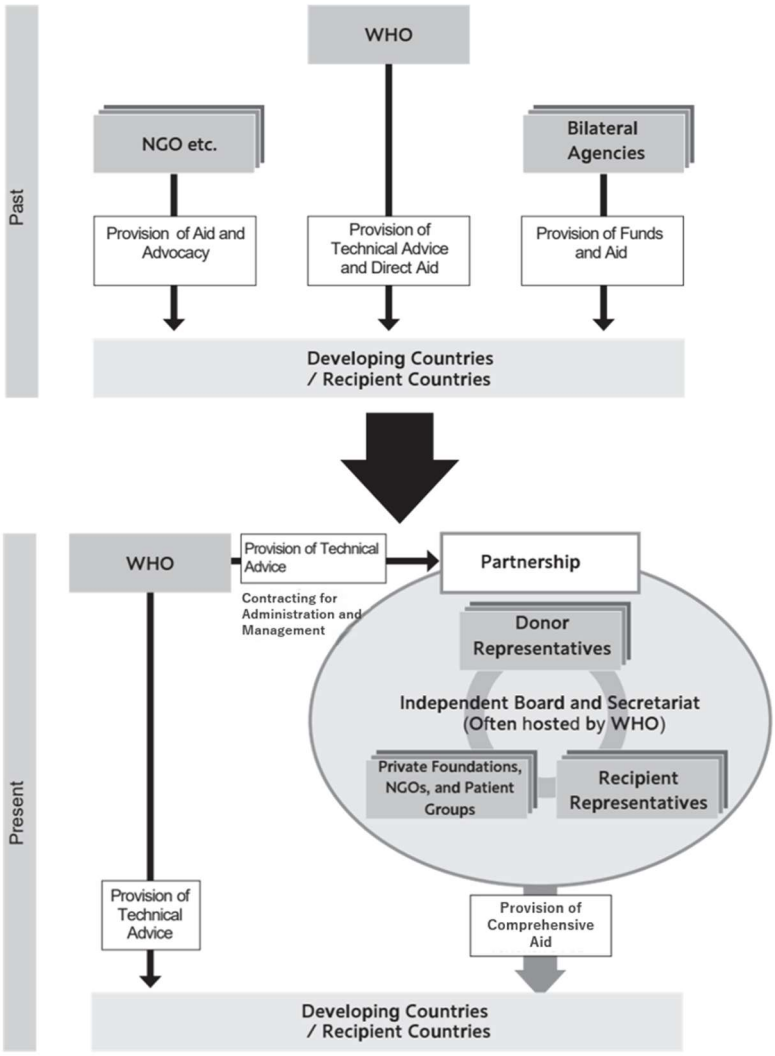


Figure 26: Changing structure of foreign aid

Multilateral initiatives in the field of global health include examples such as the Global Alliance for Vaccines and Immunization (GAVI), established in 2000; the Global Fund, established in 2002; and partnerships hosted at WHO headquarters such as the Stop TB Partnership and the Roll Back Malaria Partnership. For GPELF to overcome all challenges and achieve global elimination, it is essential that a wide range of stakeholders unite and act together. GPELF clearly defines the roles and responsibilities that major partners should fulfill.

GPELF has been supported by an innovative public–private partnership involving WHO, governments of lymphatic filariasis endemic countries, non-governmental organizations (NGOs), donors, foundations, universities and research institutions, and two pharmaceutical companies (GSK and Merck), which have pledged to donate the

necessary medicines since the launch of the programme. The number of partners has continued to grow since the programme's establishment. In 2010, Eisai announced its commitment to donate DEC to GPELF, marking the first participation by a Japanese company.

The roles and responsibilities of each stakeholder are as follows (Figure 27):

- WHO manages and operates GPELF. It formulates strategies, policies, and guidelines based on scientific evidence, continuously monitors NPELF progress, and provides technical support as needed.
- GAELF supports resource mobilization, advocacy, communication, and research networks for lymphatic filariasis elimination. It also holds biennial partner meetings to review progress and challenges.
- Endemic country governments lead NPELF by developing national plans and necessary policies, and by implementing MDA/MMDP in collaboration with domestic, regional, and global partners.
- NGOs support NPELF by assisting with programme implementation at the national level.
- Universities and research institutions conduct strategically important research—often in collaboration with WHO collaborating centres—and provide scientific evidence.
- Donor foundations (such as the Gates Foundation, previously known as the Bill & Melinda Gates Foundation (BMGF)) provide financial support.
- Pharmaceutical companies (GSK, Merck, and Eisai) support programme implementation by donating medicines.

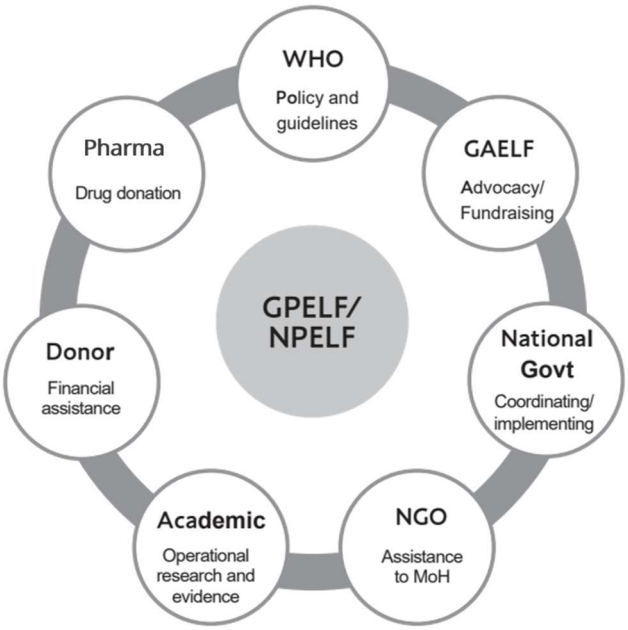


Figure 27: Schematic diagram of the GPELF/NPELF partnership

3.3. Progress of GPELF to Date

Through the operations of NPELF and GPELF described above, MDA and MMDP programmes have been implemented in countries around the world since the establishment of GPELF in 2000.

In this section, the progress and results of MDA are summarized first at the global level, and then at the regional level.

3.3.1. Global Progress

To ensure the achievement of the elimination goal by 2020, it is necessary not only to continue existing efforts but also to broaden the scope of action.

3.3.1.1. Expansion of MDA-Implementing Countries and Challenges

GPELF is one of the fastest-expanding global programmes in the history of public health. During its first decade, GPELF focused on developing guidelines based on accumulated

scientific evidence, initiating the programme in all lymphatic filariasis endemic areas, and rapidly scaling up implementation. MDA is typically carried out stepwise at the level of local administrative units. Therefore, countries with many endemic administrative districts require more time than those with fewer districts, resulting in varied progress.

However, thanks to tremendous efforts by each country, as of 2013, MDA had begun in 60 of the 73 countries where lymphatic filariasis endemicity had been reported. Of these 60 countries, 15 had already transitioned to post-MDA surveillance. Between 2000 and 2013, a cumulative total of 4.9 billion tablets were distributed worldwide. Most people receiving MDA live in low-income countries in Africa, Asia, and Latin America, demonstrating that GPELF is a humanitarian health programme targeting populations at the bottom of the economic pyramid (Figure 28).

On the other hand, the most critical challenge is the implementation of MDA in the 13 countries where MDA has not yet begun despite being necessary. Progress has been particularly slow in the African region, where only 66% of countries (23 of 35) have started MDA. In regions affected by ongoing or recent conflict, where national infrastructure is fragile, and in at least nine African countries where lymphatic filariasis and loiasis are likely co-endemic, the recommended combination therapy for MDA cannot be used, preventing programme initiation.

Furthermore, programme expansion has remained a challenge in Bangladesh, the Democratic Republic of the Congo, India, Indonesia, and Nigeria, which together account for approximately 70% of the global population at risk of lymphatic filariasis. In addition, new strategies were needed to ensure appropriate and reliable MDA implementation in urban areas with high population mobility.

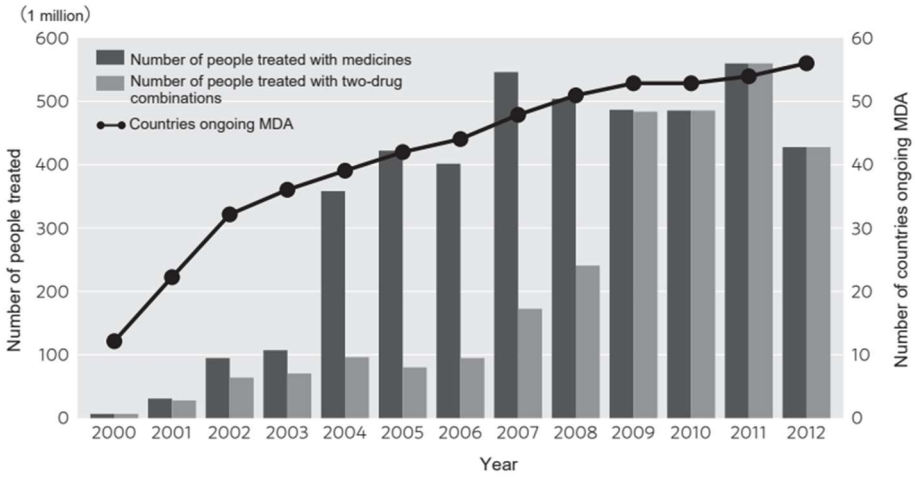


Figure 28: The number of countries implementing MDA and the associated number of individuals who have received MDA (2000-2012)

India, which had long implemented MDA using DEC monotherapy, has changed its strategy and transitioned to combination therapy.

3.3.2. Regional Progress

The progress status for each WHO regional office in 2013 is shown (Figure 29).

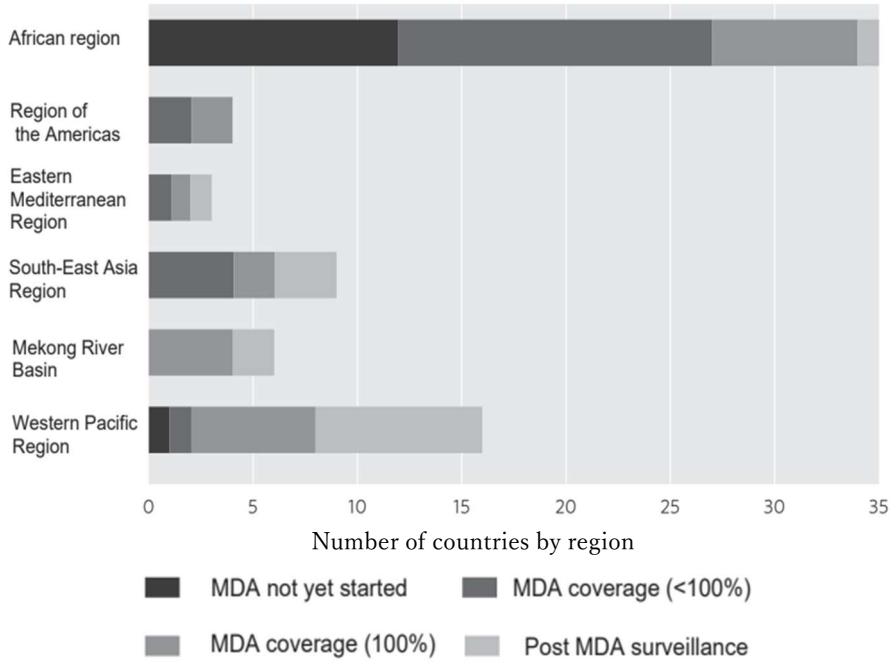


Figure 29: Progress on GPELF programme steps by WHO Regions (2013)

3.3.2.1. African Region (AFRO)

According to the 2013 report, in the African Region, 35 of the 48 WHO Member States were endemic for lymphatic filariasis, and approximately 472 million people required MDA. MDA began in 2000 in Ghana, Nigeria, Togo, and the United Republic of Tanzania, and by 2013, 23 countries were implementing MDA. Of these, 10 countries had completed MDA in some endemic districts and begun conducting Transmission Assessment Surveys (TAS).

In recent years, financial support has increased through integration with other NTD programmes, enabling some countries to expand MDA to all endemic districts and others

to complete MDA in certain implementation units (IUs). Although MMDP has not expanded due to limited resources, nearly all countries implementing MDA have some activities related to lymphedema management or hydrocele surgery.

In Burkina Faso, the start of MDA elevated the national priority of lymphatic filariasis elimination, leading to the establishment of a dedicated budget line for NPELF implementation. This is a good example of strengthened country ownership.

Column: Burkina Faso Case Study — Securing National Budget for NPELF

In 2001, the Government of Burkina Faso launched NPELF with support from WHO and the Liverpool School of Tropical Medicine. Securing funding was essential for national-level programme expansion, and a consultant specialized in resource mobilization assisted in developing the action plan to obtain national funding.

After demonstrating the programme's success during the first four years and showing that the per-person MDA cost was less than US$0.10, the Ministry of Health succeeded in securing a sustained annual budget of US$400,000 for the programme in 2005. Following Burkina Faso's example, other Ministries of Health also began allocating budgets for MDA to eliminate lymphatic filariasis.

While global support remains important, such national budget allocation by endemic countries enables long-term programme sustainability and contributes to strengthening health systems and programme coordination capacity.

3.3.2.2. Region of the Americas (AMRO)

According to the 2013 report, four countries in the Region of the Americas were endemic for lymphatic filariasis, and approximately 12 million people required MDA. Among the three countries implementing MDA, Haiti had the largest number of endemic districts, yet showed a dramatic decline in infection rates between 2000 and 2005, and achieved a high MDA coverage rate of 82.8% in 2013.

Since the late 1990s, many collaborative studies by researchers and clinicians have been conducted in this region on the pathology and morbidity management of lymphatic filariasis. The region has produced important research findings that helped establish globally applied policies and techniques, and continued to contribute to the development of new technologies, such as molecular biological methods for vector mosquitoes.

However, challenges remain in the technical and operational aspects of MDA monitoring and evaluation. A resolution adopted at the 2009 Regional Committee meeting set the goal of eliminating lymphatic filariasis by 2015.

3.3.2.3. Eastern Mediterranean Region (EMRO)

A resolution adopted at the 2000 Regional Committee meeting called on countries to strengthen epidemiological monitoring of lymphatic filariasis and to develop national plans with clear timelines, while also encouraging participation from public and private partners.

According to the 2013 report, three countries in the Eastern Mediterranean Region were endemic for lymphatic filariasis, and approximately 20 million people required MDA. Egypt conducted MDA in 2013, followed by TAS, and subsequently ended MDA based on the results. Yemen ended MDA in 2011 and continues surveillance.

Going forward, it will be necessary to develop innovative, sustainable, and cost-effective strategies to implement community-based programmes in resource-limited settings.

3.3.2.4. South-East Asia Region (SEARO)

According to the 2013 report, nine countries in the South-East Asia Region were endemic for lymphatic filariasis, and approximately 700 million people required MDA. The overall regional MDA coverage in 2013 was 70.9%. In India, TAS has already been conducted in 11 implementation units, and MDA has been completed in 53 units, with transition to TAS underway. Coverage has increased since 2010 in Indonesia, Myanmar, Nepal, and Thailand. Many implementation units are progressing toward TAS.

Sri Lanka and the Maldives have continued surveillance since completing MDA in 2007 and 2009, respectively, and Thailand began surveillance after completing MDA in 2012 (WER 2014). Challenges in the region include insufficient funding and human resources for community mobilization, TAS, and surveillance; frequent turnover of programme managers; delays in procuring high-quality medicines; and the need to improve data quality.

3.3.2.5. Western Pacific Region (WPRO)

According to the 2013 report, six countries in the Mekong subregion were endemic for lymphatic filariasis, and approximately 30 million people required MDA. The overall MDA coverage in the Mekong subregion in 2013 was 73.8%. All six countries implemented MDA, and some have transitioned to post-MDA surveillance. In Brunei Darussalam, MDA began in three implementation units, with coverage increasing from 27% to 88%.

The same 2013 report notes that in the Pacific subregion, 16 countries were endemic for

lymphatic filariasis, and approximately 6 million people required MDA. As of 2013, ten countries had transitioned to post-MDA surveillance, while two countries continued MDA. The overall MDA coverage in the Pacific was 78.5%.

In Papua New Guinea, which has the largest number of endemic districts in the region, population size, geography, and safety concerns make MDA difficult, requiring careful planning and additional resource support. The Pacific Programme to Eliminate Lymphatic Filariasis (PacELF), implemented in the Pacific region, has been a pioneer in integrating approaches with other disease control and vector control (VC) programmes, but progress in MMDP remains insufficient.

In both the Mekong and Pacific subregions, countries must develop strategies tailored to their specific needs, challenges, contexts, and historical approaches. Strengthening capacity for procuring quality-assured DEC is also necessary. Technical and financial support is needed to conduct TAS and post-MDA surveillance based on evidence.

The WHO Regional Office for the Western Pacific adopted a regional resolution on lymphatic filariasis in 2002. At the regional office level, efforts continue to strengthen commitment among Member States and ensure effective implementation of lymphatic filariasis elimination activities.

Column: Stories of People Involved in Lymphatic Filariasis Elimination (Experiences of the Authors)

A Story from the Republic of Kiribati — Hope

During the early period of PacELF, while on a mission in the Republic of Kiribati, we met a man with extraordinarily large elephantiasis-affected legs. His name was L. Laweaitina, age 50, a former schoolteacher. His only wish was simple: *"I want to walk on my own."*

Lymphatic filariasis is not a disease that kills its human host. However, the mere presence of the parasite in the body—even if only in the past—can harm a person's health and, in some cases, permanently alter the shape of the body. It is heartbreaking to imagine living the rest of one's life with legs grotesquely enlarged like those of an elephant.

Mr. Laweaitina said he wanted to help ensure that such misfortune would not be passed on to the next generation, and that if he could contribute even a little to that goal, he would be glad to do so. With great courage, he allowed his photograph to be used in PacELF pamphlets and posters.

Perhaps being helped by someone—and feeling that one can help others in return—is a source of light and hope.

A Story from the People's Republic of Bangladesh — Lymphatic Filariasis as a Social Issue

I worked on the lymphatic filariasis elimination programme in the People's Republic of Bangladesh. One day, I met a man who begged on the streets. He walked around showing his leg, deformed by lymphatic filariasis, and collected money from passers-by.

I explained to him how to perform self-care and told him about hospitals where he could receive treatment. He nodded and walked away. Then, one of the people who had been listening said something I will never forget:

"It's useless. He has no intention of curing his leg."

Indeed, the money he earned from begging was likely essential for his daily survival. For him, immediate income may have been more important than treating his leg.

But at the same time, he listened intently to my poor Bengali, and he told me with pain in his voice that his leg hurt. He said he would try consulting a doctor at the hospital. Of course, he *did* have the desire to heal his leg.

Patients live each day with both poverty and illness. That man is probably still begging today. For patients, the challenge is not only medical treatment. Their social lives, their daily realities, and their values must also be understood and supported. I felt strongly that our response must embrace the whole of their lives, not just their disease.

National Programme–Based Elimination of Lymphatic Filariasis (Thailand)

In Narathiwat Province of the Kingdom of Thailand, which borders Malaysia, progress in MDA had been delayed due to ongoing conflict since 2004 between armed groups seeking independence for the southern region and government security forces. To eliminate lymphatic filariasis, teams had to enter every endemic village in the province—never knowing where armed groups might be hiding—to administer antifilarial medicines to all residents and conduct blood examinations every year.

Narathiwat Province eventually reached the stage of conducting TAS, and we went to observe it. During our visit, a schoolteacher was shot dead in an attack on a local school, and several agricultural officers were killed in an attack on a civilian bus. At the school where TAS was being conducted, and along the route to reach it, groups of police officers and soldiers carrying large machine guns were stationed everywhere.

Even under such circumstances, it was clear that provincial and district staff were managing the surveys smoothly, demonstrating high-level blood examination skills, and that schoolteachers were cooperating fully. The national programme manager had

taken responsibility for translating all TAS training materials into Thai, thoroughly training filariasis teams at the provincial and district levels, and ensuring coordinated planning and steady implementation across all levels.

Elimination of lymphatic filariasis in Narathiwat Province has been a major concern of the King of Thailand, and both the King and Queen personally visited the area multiple times, even establishing a lymphatic filariasis museum. Narathiwat demonstrates that even in conflict zones, if a government adopts lymphatic filariasis elimination as national policy and teams work together with conviction, the disease can indeed be eliminated.

WHO's Sense of Responsibility — Leadership

My first visit to WHO came some time after returning from an NGO medical mission in the Republic of India. Even in the remote mountainous regions of Kashmir where I had been stationed, WHO's medical standards formed the foundation of care, and vaccines supplied by UNICEF were trusted medical tools.

But when I visited the neglected tropical diseases section at WHO headquarters in Geneva, I was astonished. For tropical diseases affecting hundreds of millions of people worldwide, WHO headquarters had only one or two officers responsible for the entirety of each disease.

In particular, lymphatic filariasis was at the midpoint of GPELF, a global-scale programme. WHO officers had to track programme progress, make appropriate adjustments based on the situation, coordinate logistics, respond quickly to problems arising daily around the world, and maintain balance among major partners—governments, pharmaceutical companies, NGOs, and donors—while continuing to lead the programme forward.

Previously, WHO had separate teams for each disease, with multiple staff sharing responsibilities. But with the creation of the NTD framework, multiple diseases came under unified management, drastically reducing the number of disease-specific experts. Even under such conditions, WHO officers work tirelessly every day, demonstrating strong leadership.

Under that leadership, I am confident that the day is near when lymphatic filariasis disappears from the world and people in tropical regions can live in safety and peace.

3.4. Future Challenges

At present, GPELF is progressing generally well both globally and regionally; however, many challenges remain, and these must be resolved in order to move toward further success. This section describes how GPELF is addressing these challenges.

3.4.1. Challenge 1: Geographic Gaps in MDA Coverage

In some areas of Africa where lymphatic filariasis and loiasis are co-endemic, the use of DEC or ivermectin—both used in MDA—cannot be recommended due to concerns about severe adverse reactions. As a result, the basic MDA strategy of combination therapy with these medicines and albendazole cannot be applied, and MDA has not been initiated.

Therefore, for areas with little or no onchocerciasis transmission, a new strategy has been proposed: twice-yearly albendazole monotherapy combined with vector control (VC). The monitoring and evaluation process for this approach is currently under review.

To increase MDA coverage, GPELF recommends expanding existing school-based soil-transmitted helminth (STH) programmes into community-based approaches and integrating them with MDA. Combining MDA with vector control is also expected to have spillover benefits for other mosquito-borne diseases such as malaria, making it a highly humanitarian and resource-efficient strategy.

3.4.2. Challenge 2: Transition from MDA to TAS

As more countries implement MDA, strengthening national capacity for data analysis and programme management is essential to enable appropriate decisions on when to stop MDA and transition to TAS. Capacity building for TAS implementation standards and evaluation is also needed.

To support this, GPELF has established an advisory system composed of expert groups. The TAS expert group has highlighted the need for immunochromatographic test (ICT) cards in TAS and the current shortage in supply. To ensure procurement based on accurate forecasting, new platforms involving pharmaceutical companies, foundations, and donors were developed.

Advocacy efforts have also been underway to promote the development and introduction of more sensitive ICTs that can be used even in areas with low filariasis prevalence. GPELF is working to strengthen partnerships so that new policies can be implemented effectively at the country level.

3.4.3. Challenge 3: Post-MDA Surveillance Methods

Countries that have ended MDA based on TAS results must appropriately determine the possibility of transmission resurgence and demonstrate that transmission has been completely interrupted. Currently, for post-MDA surveillance, the use of antibody tests that measure human exposure to infective larvae and polymerase chain reaction (PCR) techniques—known as xenomonitoring—to measure infection rates in vector species is being considered.

There is growing recognition that PCR technology, which sensitively detects parasite presence in mosquitoes, the vector species, enables the identification of new infections. To establish this surveillance as a robust and valid evaluation step, active research participation and empirical analysis by academic institutions on PCR technology and surveillance methodologies are being explored.

3.4.4. Challenge 4: Criteria and Processes for Verifying Elimination

To validate elimination of transmission at the national level, clear evaluation criteria and processes for post-MDA assessment are required, and standards for evaluating MMDP in validation of elimination must also be established.

For these important policy decisions and guideline development, advisory groups with technical expertise and oversight of NTD programmes, as well as regional review groups that monitor NPELF progress and address technical challenges, have been established. Through information sharing, discussion, and approval processes with these groups, clear policies supported by expert opinion can be formulated, strengthening the implementation of NPELF in each country.

3.4.5. Challenge 5: Geographic Expansion of Evidence-Based Care and Integration with Health Systems

In recent years, research on morbidity management and disability prevention for lymphatic filariasis has advanced, leading to the establishment of an evidence-based care package. However, the coverage of this care has remained low, with implementation in only 27 of the 73 endemic countries.

Patients require continuous care and support. The recommended care for lymphedema and elephantiasis caused by lymphatic filariasis consists of basic methods that are also applicable to lymphedema and elephantiasis caused by other conditions, as well as other chronic diseases. Therefore, rather than targeting lymphatic filariasis alone, integrating care with other disease programmes and national health systems enables more effective dissemination and sustained implementation.

For hydrocele, surgical intervention is recommended, and strengthening the capacity of local hospitals through the provision of surgery is also anticipated.

Chapter 4
Moving the Fight Forward

In the previous chapter, the results achieved so far by the Global Programme to Eliminate Lymphatic Filariasis (GPELF) were presented, along with the remaining challenges to achieving the global elimination target for lymphatic filariasis by 2020. This chapter evaluates GPELF. It then outlines a new framework and future vision to address the changes occurring in the global health environment that this programme now faces.

4.1. The Rise of Neglected Tropical Diseases (NTDs)

In 1978, the Alma-Ata Declaration—later becoming the foundation of subsequent health and medical policies—was proclaimed, and as a strategy to implement it, the concept of Primary Health Care (PHC) was proposed. PHC aimed to build a social system that realizes people's health by responding to community needs, ensuring community participation, and utilizing local resources and infrastructure. In 1979, it was approved by the member states of the World Health Organization (WHO) as the key to achieving the "Health for All by the Year 2000" initiative. However, recognizing the difficulty of introducing comprehensive PHC across all countries of the world—each with different needs and socioeconomic conditions—the approach of selective PHC, which promotes PHC implementation by focusing on specific diseases or issues, gradually became the mainstream strategy in health development.

Later, at the United Nations Millennium Summit held in 2000, the challenges and goals that the international community should address in the 21st century—including development and poverty, global warming, human rights, and issues in Africa—were adopted in the form of the United Nations Millennium Declaration. Based on this declaration, the Millennium Development Goals (MDGs), with a target year of 2015, were announced as the shared goals of the international community in the field of development.

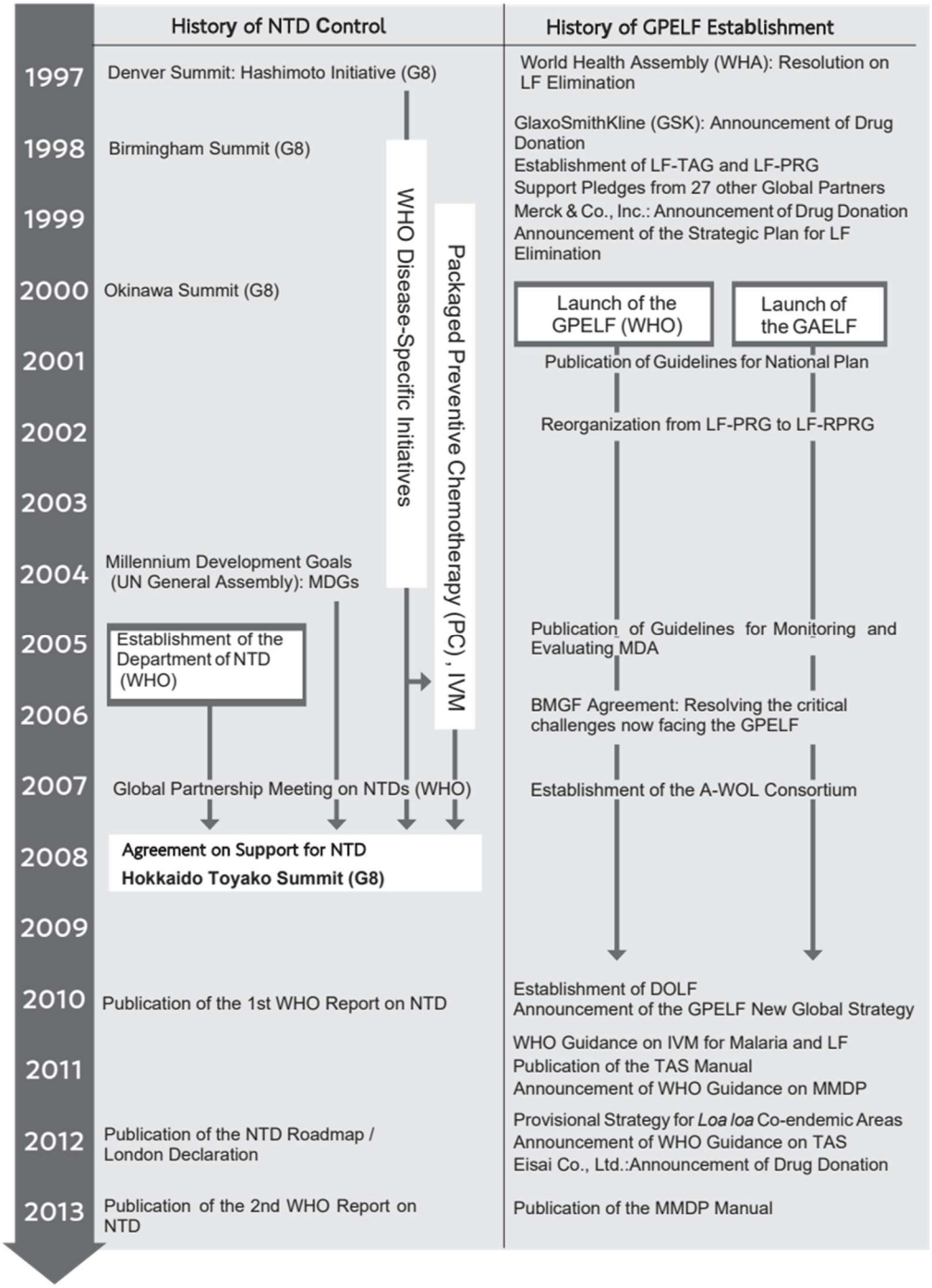


Figure 30: A brief chronology of the history of NTD control and the establishment of GPELF

Among the eight MDGs, three were health-related, and global health was positioned as a particularly important issue, especially as a strategy for poverty reduction in Africa and tropical regions. In response, large-scale financial inflows into global health began to occur worldwide to achieve the MDGs. As a result, adverse effects such as the migration

of human resources due to concentrated funding for specific diseases became increasingly evident, and recognition grew once again of the need for a more integrated PHC that cuts across sectors and diseases.

Against this backdrop of changes in the global health environment, development partners began shifting parasite control efforts away from traditional disease-specific vertical programmes. Instead, they moved toward integrated control and elimination of certain tropical diseases—previously categorized as "other communicable diseases"—under the unified concept of "Neglected Tropical Diseases (NTDs)." In 2005, WHO established the Department of Control of Neglected Tropical Diseases (Figure 30).

NTDs are concentrated in tropical regions—including Africa, Central and South America, and Asia—which together account for two-thirds of the planet. Initially 17, and later 21, specific tropical diseases were included. Most of the diseases classified as NTDs are parasitic or bacterial infections transmitted by vectors such as mosquitoes and flies. The vast majority of those infected live in developing countries in tropical and subtropical regions, where sanitation infrastructure is inadequate and vector organisms thrive. Because infections occur through prolonged exposure to such poor living environments, it is rare for travelers from developed countries to contract these diseases, unlike major infectious diseases such as malaria, HIV/AIDS, or tuberculosis. Moreover, because mortality rates are not particularly high, these diseases have not attracted much attention from donors in developed countries. In addition, because infections are concentrated among impoverished populations, patients often lack the financial means to obtain treatment, giving pharmaceutical companies little incentive to develop new drugs. As a result, these diseases have long been assigned low priority within the global health agenda. Lymphatic filariasis (LF) is currently included among these NTDs.

Looking at NTDs as a whole, the number of infected people worldwide is estimated to reach one billion. Disabilities and disfigurements caused by NTDs—such as elephantiasis and hydrocele from lymphatic filariasis, blindness from onchocerciasis, and skin ulcers from leprosy or Buruli ulcer—lead to stigma and discrimination, and require difficult treatment and rehabilitation, resulting in significant social impact. Soil-transmitted helminth infections (STH) do not cause prominent physical disabilities, but they have been reported to impair children's growth, leading to declines in academic performance and school attendance. In other words, the spread of NTDs creates a vicious cycle: they arise from living environments shaped by poverty, and at the same time, the resulting social and economic losses further reinforce poverty. For this reason, NTDs have come to be recognized as an issue that cannot be overlooked among the challenges faced by developing countries. Therefore, by addressing and controlling these diseases

collectively, the aim is ultimately to promote poverty reduction and social development in tropical and subtropical regions, particularly in Africa (Figure 31).

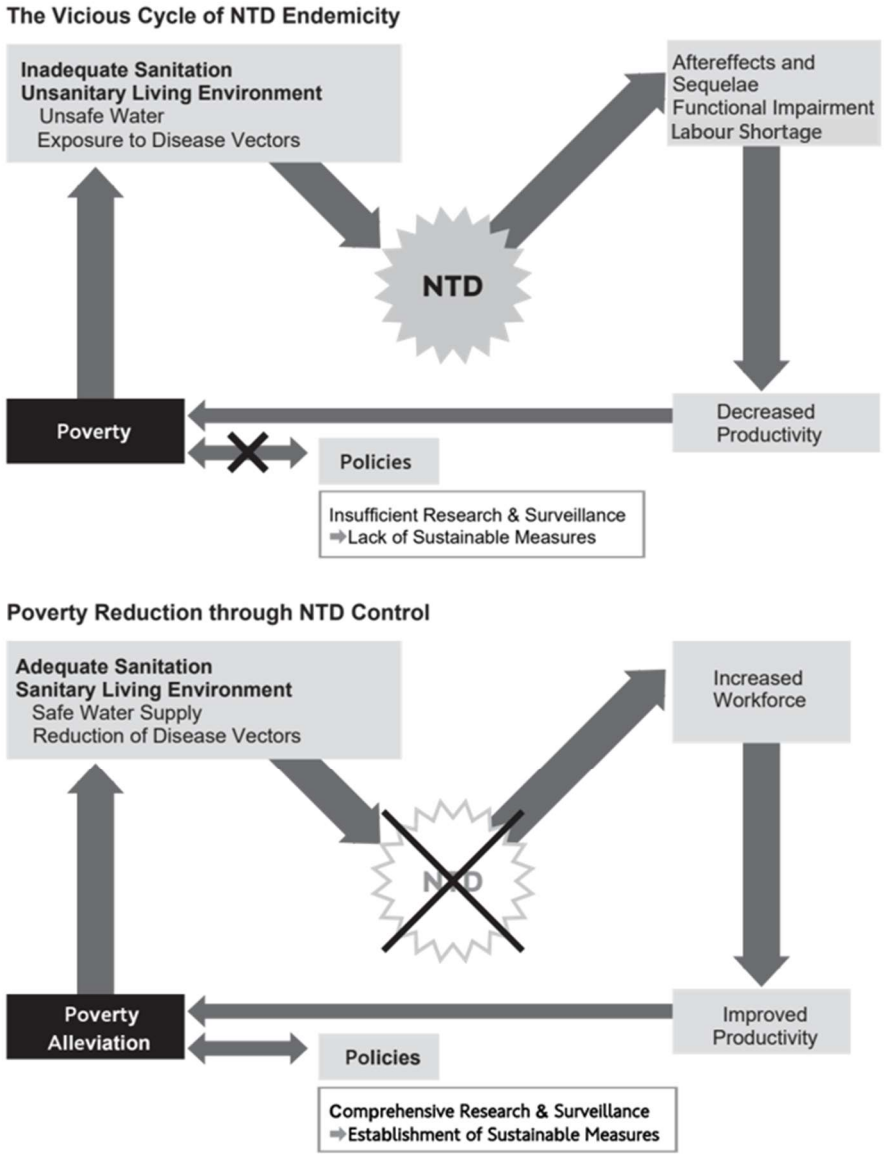


Figure 31: Conceptual diagram of the vicious cycle associated with NTD endemicity (top) and poverty reduction associated with NTD control (bottom)

Since 1948, numerous WHA resolutions have been adopted regarding each NTD, and clear elimination and control targets have been established for each disease. As one of the strategies under the new paradigm described above, WHO and other development partners, as well as related academic institutions, advocate achieving Universal Health Coverage (UHC), which provides integrated interventions combining treatment and

infection control to all people who need them, focusing not on each disease individually but on the needs of population groups infected with NTDs. This approach is based on the reality that in many NTD-endemic areas, multiple NTDs are prevalent simultaneously, and in many cases, a single intervention is effective against several NTDs.

Accordingly:

(a) an analysis is conducted in each endemic area regarding the epidemiological situation of NTDs;

(b) when the same population group requires interventions for multiple NTDs, it is examined whether a single intervention can be effective for several NTDs; and

(c) instead of providing interventions separately for each disease, they are integrated and delivered across diseases as much as possible, in order to make efficient use of limited resources.

To achieve this, WHO recommends the following five interventions that can be integrated across diseases:

(1) Preventive chemotherapy (PC) (see column)

(2) Innovation and strengthening of disease management

(3) Integrated vector management (IVM) (see column)

(4) Veterinary public health services

(5) Safe water and sanitation

The strategy of GPELF is based on the concepts of PC and IVM (Figure 32).

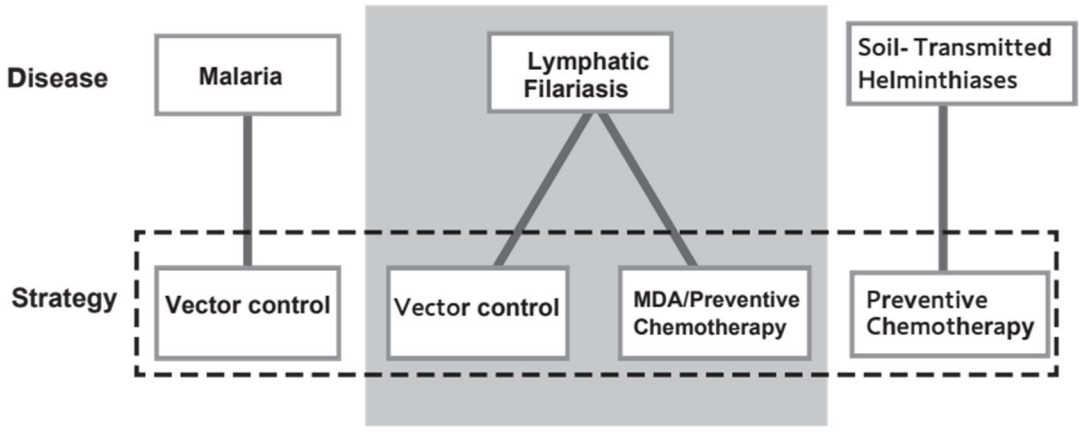


Figure 32: Conceptual diagram of the integrated approach of preventive chemotherapy (PC or MDA) and vector control (VC) or IVM among GPELF, malaria programmes, and soil-transmitted helminthiasis control programmes

Column: The Hashimoto Initiative

At the G8 Summit held in Denver in 1997, Prime Minister (at the time) Ryutaro Hashimoto emphasized the importance of international measures against parasitic diseases—including lymphatic filariasis, which Japan had already succeeded in eliminating—and stressed that the G8 countries should share responsibility and cooperate in addressing them.

In 1998, this proposal was incorporated into an official document stating that "mutual cooperation regarding infectious and parasitic diseases should be strengthened, and developing countries should be supported."

In response to this proposal, known as the "Hashimoto Initiative," the world began to expand international parasitic disease strategies toward the 21st century.

Subsequently, based on the United Nations Millennium Declaration adopted at the United Nations Millennium Summit held in 2000, the Millennium Development Goals (MDGs)—the shared goals of the international community in the field of development, with a target year of 2015—were announced.

This led to a paradigm shift in parasitic disease control among development partners: moving away from traditional disease-specific vertical programmes and instead grouping certain tropical diseases—previously referred to as "other communicable diseases"—under the category of Neglected Tropical Diseases (NTDs), and controlling them collectively to contribute to poverty reduction and ultimately to the achievement of the MDGs.

In 2005, WHO established the Department of Control of Neglected Tropical Diseases.

Column: On Preventive Chemotherapy

Preventive chemotherapy (PC) is a public health strategy in which regular, population-based surveillance is conducted and safe medicines are administered, either alone or in combination, as an intervention against specific diseases. It is recommended as one of the key strategies for the control and elimination of NTDs.

In 2012, WHO published *Accelerating work to overcome the global impact of neglected tropical diseases: a roadmap for implementation*, which highlighted the importance of globally scaling up preventive chemotherapy in order to achieve worldwide elimination and control of several NTDs by 2020.

The NTDs targeted by preventive chemotherapy often occur within the same population groups in tropical and subtropical regions where poverty is widespread,

access to safe water and sanitation is limited, and vectors that transmit disease are abundant. Several medicines have been confirmed to be effective against multiple diseases.

By implementing these preventive chemotherapy interventions in an integrated manner, improvements can be expected in cost-effectiveness and logistical convenience, increased participation of target populations, spillover and synergistic effects of programmes, enhanced visibility leading to stronger policy consensus, and reduced risk of drug resistance. This can improve the overall efficiency of programmes. Integrated implementation may also strengthen existing resources and capacities.

To achieve this, it is necessary to analyze each disease and programme, epidemiological information, socioeconomic conditions, and ecological characteristics, and to appropriately select useful integrated approaches based on cost-effectiveness, synergistic effects, political advantages, logistical convenience, acceptability, and safety.

For integrated chemotherapy to succeed, mechanisms must be established to coordinate the programmes, stakeholders, and partners involved in each disease, and to promote national government commitment, collaboration, and evidence-based policymaking.

Furthermore, annual improvement of action plans based on monitoring and evaluation is required to facilitate implementation and enhance impact.

To advance integrated chemotherapy, WHO has prepared integrated planning and costing tools, as well as common systems for drug applications and reporting, and is also working to strengthen management capacity related to integration.

Column: Integrated Vector Management

In recent years, increasing attention has been directed toward biological vectors—such as mosquitoes—that transmit diseases, and the importance of vector control has come to be widely recognized. This trend is thought to be influenced by the growing global focus on health issues such as climate change and poverty, highlighted through frameworks like the United Nations Millennium Development Goals (MDGs), which have drawn international attention toward Africa, tropical regions, and infectious diseases.

In 2004, WHO proposed the basic concept of Integrated Vector Management (IVM) as the *Global Strategic Framework for Integrated Vector Management*. In 2008, WHO issued the *WHO Position Statement on Integrated Vector Management*, which outlined the concept of IVM and global developments related to it. The following introduces

this statement issued under WHO's initiative.

IVM is defined as "a rational decision-making process for the optimal use of resources for vector control," and its goal is "to contribute significantly to the prevention and control of vector-borne diseases."

The concept of "integrated management" originates from the agricultural sector's "Integrated Pest Management (IPM)."

To implement IVM, it is necessary to establish institutional structures, create regulatory frameworks and decision-making criteria, and develop procedures that can also be applied at the community level. It is also essential to establish policy-making capacity and technical expertise that support cross-sectoral collaboration and enable vector control activities.

In November 2009, the First IVM Stakeholder Meeting was held at WHO headquarters in Geneva. Participants included vector-borne disease control programmes from countries around the world, governments, international organizations, donor agencies, researchers, and many other stakeholders.

At this meeting, a roadmap was developed to further strengthen evidence-based policy-making for IVM, and commitments were made to establish partnership mechanisms to support its implementation.

4.1.1. Partnerships

As with the partnerships in GPELF, NTD control efforts also promote a strategy in which evidence-based policymaking and advocacy mobilize the necessary resources from the international community—that is, collaboration among the public sector, private sector, academia, and civil society. WHO is responsible for developing guidelines and strategies; endemic-country governments are responsible for formulating and implementing national plans and policies; donors, foundations, and non-governmental organizations (NGOs) provide financial and human resource support for the implementation of national plans; pharmaceutical companies donate medicines free of charge and provide logistical support; and universities and research institutions provide scientific evidence and technical assistance through operational research. In this way, each partner across the public, private, academic, and civil sectors shares roles and responsibilities, working together to advance NTD elimination. The first global partnership meeting related to NTD control was held in 2007. In January 2012, following WHO's release of a roadmap toward achieving NTD elimination targets, 13

pharmaceutical companies, major donors, the Bill & Melinda Gates Foundation (BMGF), the World Bank (WB), and other international organizations adopted the London Declaration, pledging coordinated action toward the control and elimination of NTDs (Figure 33). From Japan, Eisai Co., Ltd. participated and formally concluded a Memorandum of Understanding (MOU) regarding the free provision of DEC for global lymphatic filariasis elimination. With the emergence of the largest public-private partnership in history, further progress toward achieving the 2020 elimination and control targets is anticipated.

NTDs represent a relatively new and broad framework. For GPELF, the vision is shared, and the direction of interventions aligns with this broader framework. Approaching lymphatic filariasis as one disease within the larger NTD category is promising from the standpoint of advocacy and partnership strengthening. However, because the diseases included under NTDs differ from one another, GPELF must continue to advance its own elimination programme with unwavering commitment.



Figure 33: Photograph from the adoption of the London Declaration (WHO)

4.2. A New Framework

As described in the previous section, GPELF is currently positioned as a programme addressing one of the NTDs. Since its establishment, however, it has continued to expand without interruption and can be said to be advancing toward success ahead of other

disease-control programmes.

The first decade, in particular, saw remarkable growth. At the start of mass drug administration (MDA) in 2000, only 12 countries were implementing the programme. Yet just three years later, in 2003, the number had expanded to 38 countries—more than half of the 73 endemic countries today—and despite region-specific challenges, the number reached 60 countries by 2013. Between 2000 and 2013, a cumulative total of 4.9 billion tablets of anthelmintic medicines were delivered to one billion people. A 2012 report noted that more than 2 billion tablets of albendazole had been donated by GSK, and a cumulative 1.2 billion tablets of ivermectin had been donated by Merck. Following the 2012 MOU, Eisai agreed to donate 2.2 billion tablets of DEC, and further programme expansion is anticipated.

According to estimates by Kapa D. Ramaiah and colleagues, the global prevalence of lymphatic filariasis decreased by 59%, from 3.55% in 2000 to 1.47% in 2012. Pamela J. Hooper and colleagues estimated that the population at risk of lymphatic filariasis decreased by 46%, from 1.46 billion in 2000 to 790 million in 2012.

At the programme's midpoint in 2010, WHO reviewed progress to date and re-examined priorities and new strategies needed for the next decade toward the 2020 goal. At this point, the strategic objective—eliminating transmission—was reaffirmed, and WHO emphasized that by 2020, transmission should be interrupted in all countries.

Under the new strategy, all endemic areas must initiate MDA, other interventions, or both, and expand intervention coverage so that all transmission areas are included before the programme concludes. After confirming that transmission has been interrupted, MDA should be stopped and surveillance implemented, with final verification of elimination to follow. At the same time, goals were established for morbidity management and disability prevention (MMDP), ensuring that all patients suffering from lymphatic-filariasis-related disease receive basic care. All endemic countries are instructed to initiate MMDP programmes, develop guidelines, establish monitoring and reporting formats, and expand interventions so that all individuals requiring care can access appropriate services.

4.2.1. Milestones

To achieve success, it is essential to steadily accomplish the challenges that remain. In the new strategy, the tasks for both MDA and MMDP are clearly defined as milestones, outlining the steps that must be taken in the remaining years leading up to the elimination deadline for lymphatic filariasis, so that the programme can advance one step at a time.

The milestones specify that by 2013, MDA based on the new policy must begin in areas where loiasis coexists. They also call for scaling up and strengthening MDA in densely populated urban areas with high population mobility and in countries with severe endemicity. At the same time, in countries where transmission interruption has already been confirmed, MDA should be scaled down. As a result, by 2020, 70% of countries should have verified elimination, and the remaining 30% should be conducting post-MDA surveillance. For MMDP as well, through the dissemination of a basic care package, systems must be established to ensure that all patients have sustainable access to care (see Table 1).

In January 2012, WHO released a roadmap toward NTD elimination. This roadmap clearly outlines goals and targets for the prevention, control, elimination, and eradication of 17 NTDs, including lymphatic filariasis. For lymphatic filariasis elimination, the roadmap—aligned with the new strategy described above—presents the following three targets:

- By 2015, elimination in all Pacific Island countries except Papua New Guinea
- By 2017, 70% of endemic countries meet the criteria to conduct Transmission Assessment Surveys (TAS) to determine whether MDA can be stopped
- By 2020, all endemic countries either confirm interruption of transmission or complete MDA and transition to surveillance

In January 2013, the second edition of the NTD Report was published, and lymphatic filariasis elimination was described as follows:

> Goal: Eliminate lymphatic filariasis worldwide by 2020: In all endemic areas of all endemic countries, the infection rate of *Wuchereria bancrofti*, *Brugia malayi*, or *Brugia timori* must fall below the threshold determined by the combination of filarial species and vector type, as demonstrated by TAS results.

Year	Milestone
2011	• Revised WHO guidelines on interrupting transmission and conducting post-intervention surveillance completed and available • WHO guidelines and criteria for verifying absence of transmission completed and available • WHO guidelines and training modules for morbidity management completed and available
2012	• Mapping completed in all countries • MDA started in all countries without co-endemic loiasis • Provisional strategy for interrupting transmission in loiasis-endemic countries developed and circulated • 25% of endemic countries have met the criteria for stopping interventions and entered post- intervention surveillance phase
2013	• Revised strategy for interrupting transmission implemented in all loiasis-endemic countries • Metrics for annual reporting on morbidity-management programmes developed by WHO and disseminated
2014	• 20% of endemic countries verified free of transmission • All endemic countries collecting and reporting data on morbidity management to WHO
2015	• Full geographical coverage with MDA or other interventions, or both, achieved in all endemic urban areas • Full geographical coverage with MDA or other interventions, or both, achieved in all countries where loiasis is not endemic • Progress, global impact and remaining challenges assessed mid-plan
2016	• Full geographical coverage with MDA or other interventions, or both, achieved in countries with heaviest burden • Full geographical coverage with MDA or other interventions, or both, achieved in all countries with co-endemic loiasis • 70% of endemic countries have met the criteria for stopping interventions and entered into post-intervention surveillance phase
2020	• 70% of countries verified as free of LF and 30% under post-intervention surveillance • Full geographical coverage and access to basic care for lymphoedema (and hydrocoele in areas of bancroftian filariasis) offered in all countries

Table 1: Milestones for GPELF between 2010 and 2020

4.2.2. Approaches

To achieve these goals, the capabilities of all partners must be brought together, and WHO must take the lead in addressing the identified challenges. The strategic direction

for the future must involve key areas such as governance, partnerships, operational research, and integration, and decisions should be made after careful consideration of these fields. At the same time, these areas are also where the benefits of success are expected to emerge.

4.2.2.1. Strengthening Governance

Under the clear strategy and implementation system of GPELF, each national lymphatic filariasis elimination programme (NPELF) has gained experience in conducting large-scale MDA targeting nearly all residents in endemic areas, as well as in coordinating stakeholders and building consensus. This has strengthened programme management capacity. In some countries, programme implementation authority has been delegated to local levels, contributing to capacity building at the local level as well. Governance strengthened through GPELF and NPELF also enhances the efficiency of other disease-control programmes and the broader health system.

4.2.2.2. Expanding Partnerships

The global partnership that is a major strength of GPELF has expanded since the establishment of GAELF in 2000, with new organizations joining, broadening funding schemes, and strengthening scientific and technical support systems. Going forward, as disease-specific programmes that were previously implemented separately shift toward integrated NTD partnerships, synergistic effects—such as more efficient use of resources—are expected.

4.2.2.3. Advancement of Operational Research

As GPELF has expanded, operational research has accumulated to analyze programme status and respond to the need for new policies and technologies. These studies have verified programme performance and impact, provided scientific evidence for new policies and technologies, and contributed to programme success. Some findings from operational research can be applied to other disease-control efforts and to NTD control as a whole, enabling programme operations based on scientific evidence and further highlighting the importance of operational research itself.

4.2.2.4. Benefits of Integration

By integrating and implementing GPELF's MDA and STH control measures, improvements can be expected in cost-effectiveness and logistical convenience, increased participation of target populations in the programme, spillover and synergistic effects of the programme, and enhanced

policy consensus through improved visibility. It also makes it possible to reduce the risk of drug resistance. Furthermore, in MMDP and vector control (VC), conducting situation analysis and planning and then organically integrating these activities with other disease control measures has generated synergistic effects not only for GPELF but also for other disease control programmes and the broader health system (Figure 34).

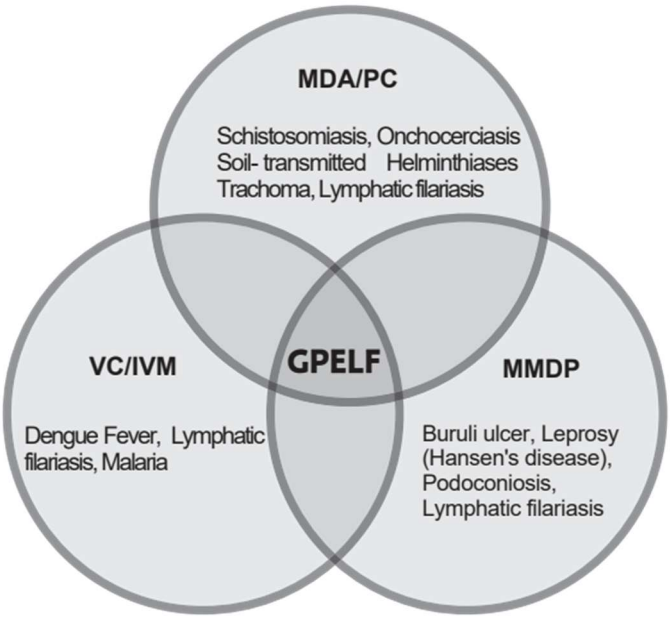


Figure 34: Three GPELF strategies that can be integrated with other disease programmes for NTD control and elimination

4.2.3. The 2013 Vision for the Future

As noted earlier, in 2011 WHO established the methodology for the Transmission Assessment Survey (TAS), which determines whether MDA can be stopped, and published a revised monitoring and evaluation manual that clearly outlined the policies and steps leading to verification of transmission interruption. TAS is groundbreaking in that it provides a scientifically robust survey protocol capable of demonstrating transmission interruption while offering sampling options applicable to all regions. It accounts for differences in transmission dynamics arising from combinations of filarial species and vector types, as well as differences in the target population (children aged 5–

6 years) depending on the size and conditions of endemic areas. At the same time, TAS is not merely a survey protocol; it represents a major decision-making step for NPELFs, marking the transition from one programme phase (MDA) to the next (surveillance). With the emergence of this decision point, each NPELF can clearly envision not only how to begin and advance the programme but also how to bring it to completion. Following the publication of the TAS manual, three WHO regional TAS training workshops were held in 2012 (Western Pacific Region, South-East Asia Region, Eastern Mediterranean Region). All endemic countries in these regions received training on TAS planning and implementation, and many have already begun conducting TAS. In 2013, three additional WHO regional TAS training workshops were planned for the African Region and the Region of the Americas. A training manual for NPELFs to conduct TAS training within their own countries for each endemic area was also published in 2013.

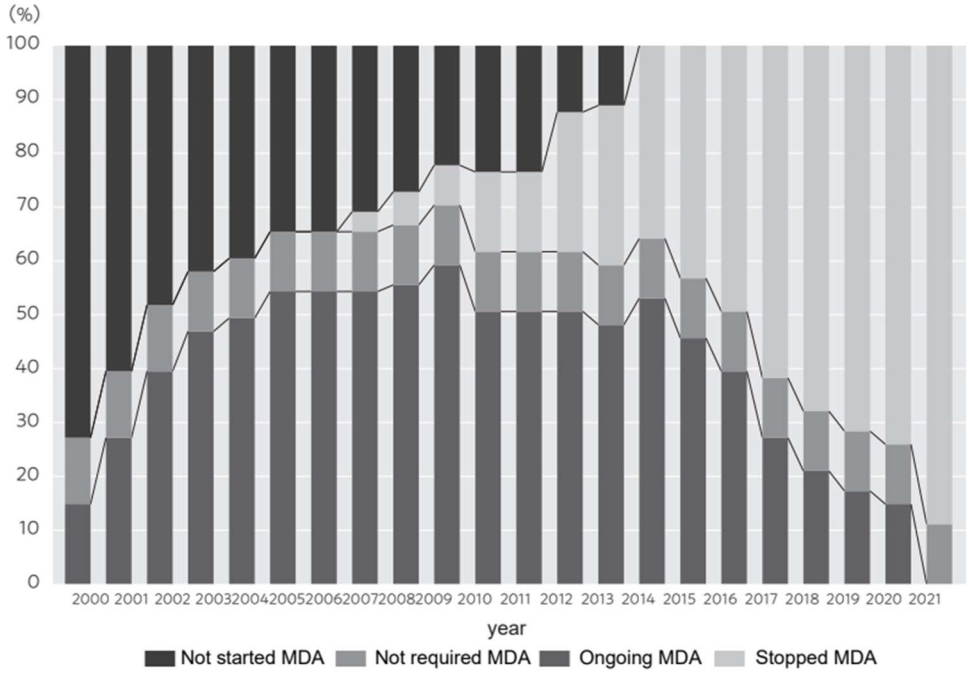


Figure 35: Projections as of 2013: MDA progress up to 2021

In 2014, Kazuyo Ichimori and colleagues presented the clear operational process of GPELF, summarized achievements up to 2013, and projected future developments. According to their analysis, GPELF is expected to undergo major changes as the number of countries implementing MDA decreases. The number of endemic countries engaged in each implementation step—mapping, MDA, TAS—is predicted to gradually scale down toward the 2020 elimination deadline (Figure 35). By 2013, mapping had been completed

in all endemic countries. By 2019, MDA is expected to have ended in approximately 80% of endemic countries, and by 2021, all endemic countries are expected to have completed MDA and transitioned to surveillance. In African regions where loiasis coexists, progress has been slower due to the need to apply the new strategy, but even there, transition to post-MDA surveillance is anticipated by 2020. This means that the number of tablets required for MDA will fall to zero by 2021. Consequently, the focus of discussion will shift from MDA-centered issues to addressing resource, capacity, and technical gaps necessary for reliable implementation of TAS (Figure 36). Operational research topics are also expected to shift toward developing additional surveillance methods to further ensure confirmation of transmission interruption, as well as establishing processes and criteria for formally verifying elimination. For MMDP, basic care packages and monitoring and evaluation methods are expected to be established, and systems will be strengthened to improve coverage.

In 2008, Eric A. Ottesen and colleagues concluded that "GPELF is an international health 'best buy' program that has progressed more rapidly than expected." Similarly, WHO's 2010 publication *Lymphatic filariasis: Progress report 2000–2009 and strategic plan 2010–2020* stated that "GPELF has been one of the most rapidly expanding global health programmes in the history of public health."

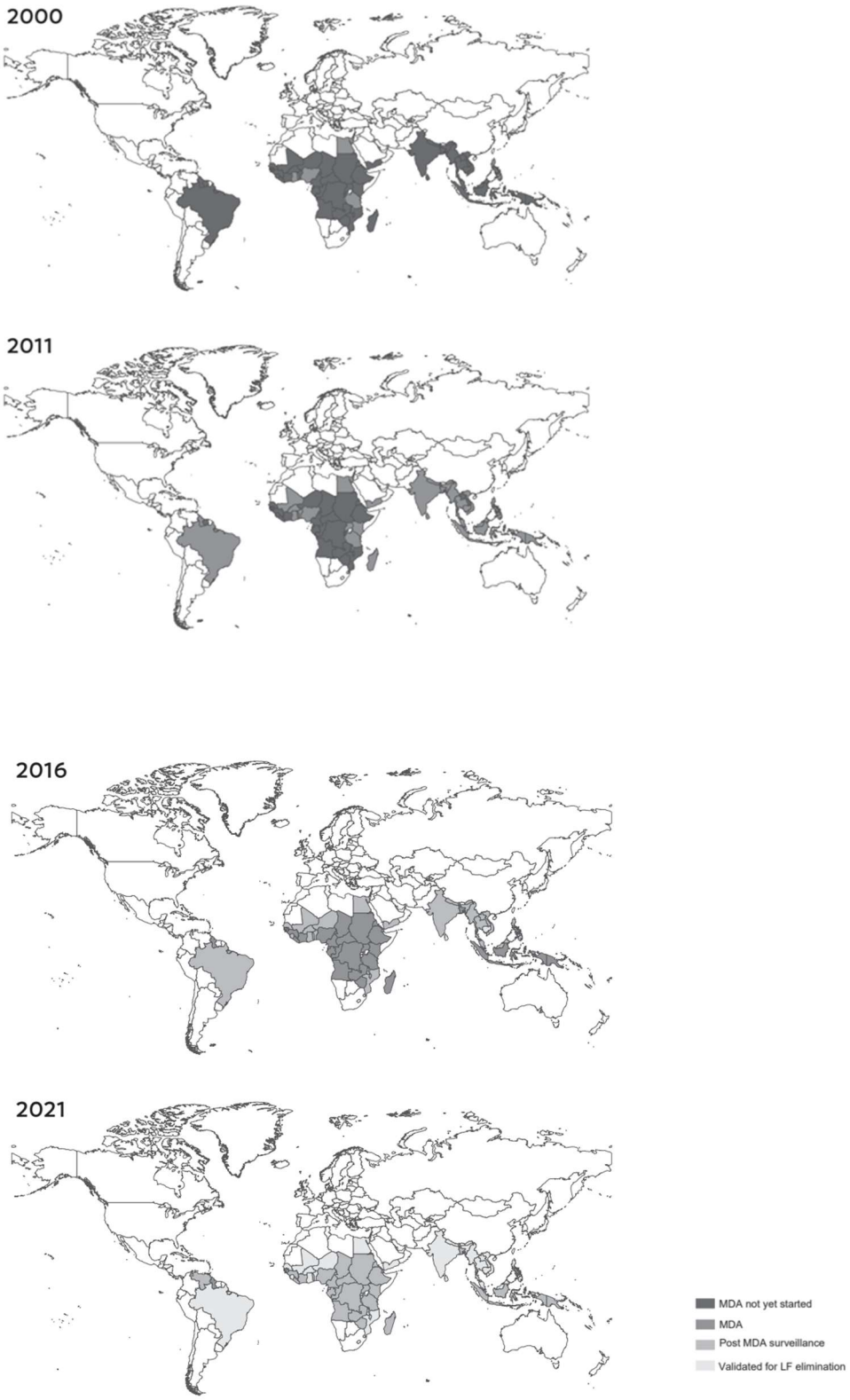


Figure 36: Projections as of 2013: Projected map of MDA progress by country up to 2021

4.3. Expected Benefits

This programme is an unprecedented global undertaking in which all of humanity is moving toward a single shared goal. Its purpose is, of course, the elimination of lymphatic filariasis, but beyond that achievement lies a world in which the term “neglected people” no longer exists—a society without lymphatic filariasis, where every person is seen, valued, and able to live with hope.

GPELF is a global programme carried out as a project with a clear goal: the elimination of disease. Therefore, once interventions end and elimination is achieved, it is expected that the programme will yield not only the direct outcome of eliminating lymphatic filariasis but also additional, and even ultimate, benefits.

4.3.1. Strengthening Health Infrastructure

GPELF positions MDA as one of its core strategies because of its efficiency and effectiveness in interrupting transmission. At the same time, MDA is an approach that delivers health services annually to nearly the entire population of endemic areas.

MMDP, meanwhile, is a strategy that provides access to a basic care package for impoverished patients suffering from symptoms and disabilities caused by lymphatic filariasis. It has clear objectives and provides guidelines for achieving them.

Achieving 100% coverage of both MDA and MMDP requires health infrastructure capable of delivering services to populations in developing countries—where health systems are often fragile—and especially to impoverished groups who face barriers to accessing care. Through GPELF activities, it has long been expected that health infrastructure would be strengthened and improved as a result.

Indeed, between 2000 and 2013, a cumulative 4.9 billion high-quality anthelmintic tablets donated by pharmaceutical companies were delivered to one billion people. Community mobilization and participation promoted through MDA have also contributed to the development of Primary Health Care (PHC).

4.3.2. Humanitarian and Economic Benefits

WHO's vision is for all people on Earth to "live better physically, mentally, and socially (well-being)." If a person becomes infected with lymphatic filariasis, what negative impacts might they face?

- Physical disability — psychological and emotional harm from ostracism, exclusion, or bullying due to visible disfigurement
- Poverty — caused by reduced ability to work due to physical deformities
- Beyond the individual, the burden on society — hindered development, reduced productivity, and socioeconomic losses.

These burdens exist with many diseases, but the tragedy of lymphatic filariasis is that many affected individuals do not raise their voices—or even if they do, their voices do not reach the world. There are still places on Earth where light does not reach—"neglected" places—and people who live there.

According to the report from the Sixth GAELF Meeting in 2010, MDA conducted through GPELF between 2000 and 2007 prevented approximately 8.7 million new infections, equivalent to an economic benefit of 2.3 billion USD. It also prevented approximately 10.7 million clinical cases, equivalent to 16.5 billion USD and prevented progression of symptoms in approximately 2.6 million people, equivalent to 5.4 billion USD. In total, the health of 22 million people was protected. Furthermore, if GPELF overcomes remaining challenges and achieves 100% MDA coverage in all endemic areas of all endemic countries, the cumulative economic benefit is projected to exceed 55 billion USD.

Eliminating lymphatic filariasis is expected to fulfill a fundamental human need—health—while generating economic benefits and contributing to economic growth and poverty reduction in endemic countries, where many affected individuals belong to the poorest populations.

4.3.3. Improvement of Quality of Life (QOL)

The disease burden of lymphatic filariasis extends beyond physical pain and limitations in daily activities; it also encompasses psychological and social disabilities,

leading to a decline in quality of life (QOL). Reports have documented the physical, psychological, and social negative impacts caused by acute dermatolymphangioadenitis (ADLA) and chronic conditions such as lymphedema and elephantiasis. A study conducted among schoolchildren in India found that episodes of ADLA resulted in school absenteeism and reduced academic performance.

The basic care provided through MMDP under GPELF not only alleviates the physical burden on patients but also contributes to improving QOL. The MMDP strategy addresses the economic burden caused by treatment and reduced productivity, as well as social isolation resulting from stigma and exclusion. It defines types of disabilities based on WHO's International Classification of Functioning, Disability and Health (ICF), and provides comprehensive disease management and QOL-enhancing activities through primary, secondary, and tertiary prevention. Achieving 100% coverage of MMDP—one of GPELF's core goals—reduces the burden on patients, families, and communities, enriches the lives of affected individuals, and enhances the well-being of society as a whole. This represents a public health success for GPELF.

To sustain the achievements described in the previous section, it is necessary to embed the programme's principles into social, humanitarian, and foundational agendas as GPELF approaches its conclusion. Leveraging major global health agendas as opportunities will be useful in accomplishing this.

4.3.4. Universal Health Coverage (UHC)

Although GPELF is a global programme, its implementation is carried out by national governments as NPELFs, functioning as public health programmes within national administrative systems. The goal of GPELF is to ensure that all people who need treatment and care can receive it, supported by the combined efforts of partners around the world.

As discussions among stakeholders regarding the post-MDG agenda accelerate, Universal Health Coverage (UHC) frequently appears as a central topic. UHC has been included in resolutions adopted by the United Nations General Assembly and the World Health Assembly (WHA), but debates often focus on financial systems and social protection mechanisms. However, according to WHO's definition, UHC means that "All people can obtain the health services they need, of sufficient quality to be effective, without suffering financial hardship." This concept aims to achieve equity in access to

health services.

Beyond the elimination of “neglected diseases of neglected people,” the realization of UHC and equity awaits—and the ripple effects generated by GPELF are expected to contribute significantly to this goal.

Part II

The Battle Continues

2013–2024

The Global Programme to Eliminate Lymphatic Filariasis (GPELF), led by the World Health Organization (WHO), began in 2000 and has since been built up with the aim of eliminating lymphatic filariasis on a global scale. Its ultimate goal is to bring light to people who have long been "neglected."

With the introduction of GPELF's new strategy in 2010 and WHO's 2012 roadmap outlining disease-specific targets for Neglected Tropical Diseases (NTDs), the path forward for GPELF has become increasingly solid. Within this new NTD framework, the roles that each partner must play to achieve the programme's goals have also become clear. As a result, endemic countries around the world have begun to take action, and control efforts are steadily advancing. Furthermore, in 2022, WHO updated the roadmap for a new era, anticipating the actions of each country and presenting a future vision for GPELF. To complete this roadmap, it is essential to ensure the reliable implementation of mass drug administration (MDA), and pharmaceutical companies have committed to supplying the necessary medicines.

Part II summarizes the efforts and achievements from 2013 to 2024 and presents the outlook for the future.

Chapter 1
The Environment Surrounding GPELF

1.1. Changes in the Global Health Landscape: From MDGs to SDGs

In 2000, the United Nations announced the Millennium Development Goals (MDGs) as international targets in the field of development. According to the 2015 MDG Report, the final year of the MDGs, "we have come close to ending extreme poverty within a generation," and "the MDGs have become the most successful anti-poverty movement in history."

While the MDGs achieved certain results, they also revealed areas where progress fell short. Gaps between the poor and the wealthy, and between urban and rural areas, continued to widen, becoming a serious issue, and it was pointed out that socially vulnerable populations were still being left behind.

In response to these outcomes, the Sustainable Development Goals (SDGs)—international targets with a deadline of 2030—were adopted in 2015 under the theme "Leaving no one behind: From MDGs to SDGs."

The SDGs consist of 17 goals, and Goal 3 states: "Ensure healthy lives and promote human well-being for all at all ages." This includes countermeasures for Neglected Tropical Diseases (NTDs), including lymphatic filariasis (LF). The ultimate goal of the Global Programme to Eliminate Lymphatic Filariasis (GPELF)—a world free of LF for all people—aligns with the SDGs' vision, and both aim for the completion of this shared mission.

1.2. Impact of the COVID-19 Pandemic

The global spread of COVID-19 affected 65 of the 72 LF-endemic countries. Due to COVID-19 response measures, mass drug administration (MDA) was interrupted, and compared with 2019, the number of people treated decreased by 34%. Some countries also postponed Transmission Assessment Surveys (TAS), recommended by WHO to evaluate whether MDA can be stopped. These disruptions posed significant obstacles to achieving GPELF's goals.

Figure 1 shows the proportion of countries that were in the MDA implementation phase but did not conduct MDA for various reasons. Between 2013 and 2019, around 15% of countries failed to conduct MDA each year, but this increased to 35% in 2020 and 2021. Among the 65 LF-endemic countries affected by COVID-19, 11 countries did not conduct MDA in both 2020 and 2021, and 7 countries in 2022. Half of these were in the African Region.

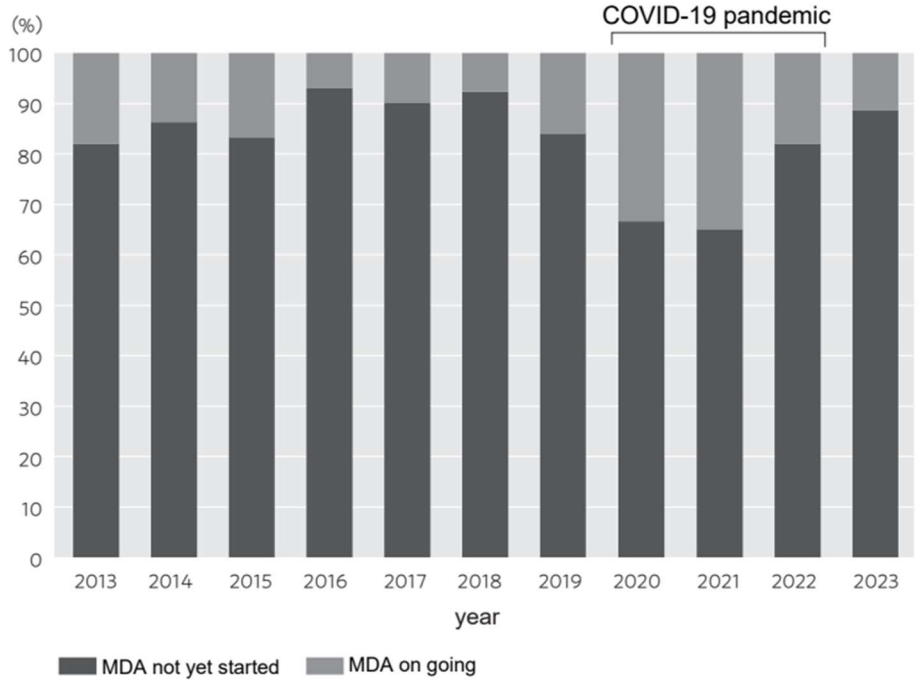


Figure 1: Annual changes in the proportion of countries in the MDA implementation phase that did not conduct MDA (2013–2023)

As shown in Figure 2, until 2019, an average of 500 million people received treatment

annually. However, during the three years starting in 2020, this number dropped to the 300-million range. There is no doubt that the COVID-19 pandemic had a major impact on GPELF. However, WHO's Weekly Epidemiological Record (WER) states that implementing the new strategy (Section 2.2)—which includes twice-yearly triple-drug therapy in countries where it is needed—has strong potential to mitigate LF resurgence and even accelerate transmission interruption. By 2023, the number of countries that did not conduct MDA had decreased to four, with only two in Africa, indicating a recovery to pre-pandemic levels.

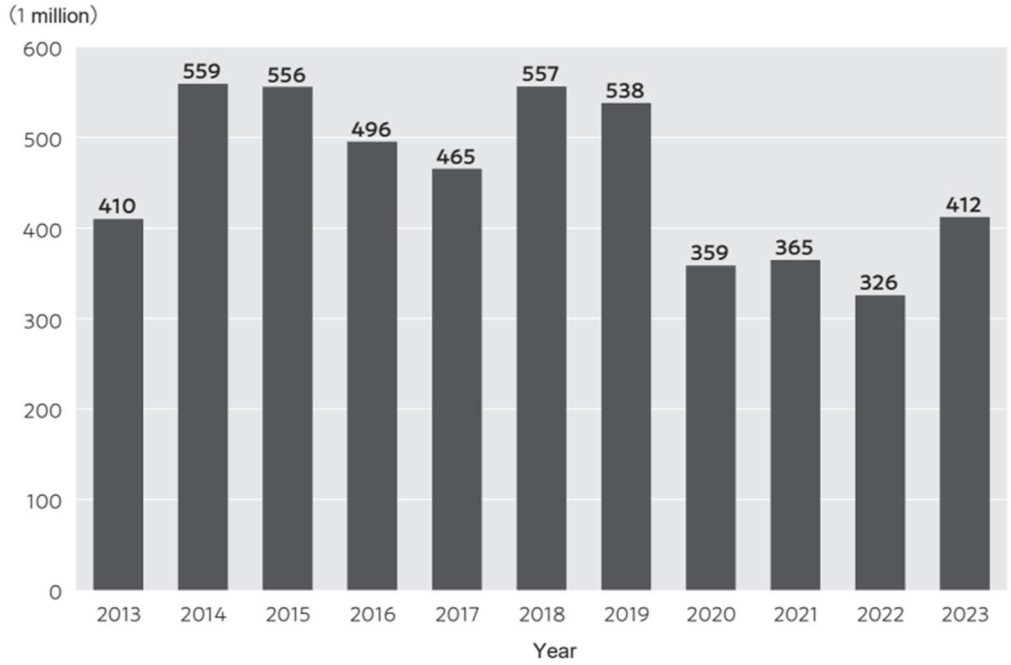


Figure 2: Annual changes in the number of people treated in MDA-implementing countries (2013–2023)

Chapter 2
New Technical Guidelines

2.1. Evolution of Diagnostic Tools

In the Global Programme to Eliminate Lymphatic Filariasis (GPELF), the immunochromatographic test (ICT) kit produced by Binax was used from the 2000s as the WHO-recommended test for detecting circulating filarial antigen in *Wuchereria bancrofti*–endemic areas. Although Binax was acquired by Alere Medical in 2011, production and supply of the lymphatic filariasis diagnostic kit continued under the name BinaxNOW.

However, ICT had several limitations: a short room-temperature shelf life of only three months (requiring refrigeration for long-term storage), a short 10-minute reading window after reaction (delayed reading increases false positives), and a large test size that increased transportation costs.

These drawbacks created the need for a next-generation diagnostic kit. Alere Medical therefore developed the Filariasis Test Strip (FTS), a rapid diagnostic test for detecting circulating filarial antigen in LF patients. WHO conducted laboratory and field evaluations of FTS and reported that its sensitivity was comparable to ICT.

FTS also had advantages: lower cost per test, a longer room-temperature shelf life of one year, and easier scalability for LF programme.

s. As a result, from 2015 onward, LF-endemic countries began transitioning from ICT to FTS, enabling scale-up across GPELF. In 2017, Abbott Laboratories acquired Alere Medical and has since continued manufacturing and supplying FTS.

As LF programmes advanced, global demand for rapid diagnostic tests increased sharply, and countries began requesting additional suppliers. In response, WHO published a Target Product Profile (TPP) in 2021 outlining performance criteria required for newly developed LF rapid diagnostic tests. A search for new LF rapid diagnostic tools began.

Under the leadership of WHO's Diagnostic Technical Advisory Group (DTAG) LF subgroup, the SD Biosensor LF antigen rapid test (QFAT) underwent laboratory and field evaluations in 2021. In 2024, QFAT received a recommendation from the WHO Expert Review Panel for NTD diagnostic tools.

QFAT offers several advantages over FTS: a two-year room-temperature shelf life (longer than FTS), lower cost, a durable plastic cassette format that reduces damage during transport and field use, and use of buffer solution, ensuring smooth blood flow within the test. Because of these benefits, QFAT is now recommended alongside Abbott's FTS for widespread use in GPELF.

Meanwhile, in areas endemic for *Brugia malayi* and *Brugia timori*, no antigen-detection test has been successfully developed. Instead, since the early 2000s, the PanLF rapid test by Reszon Diagnostics—which detects antibodies to *W. bancrofti*, *B. malayi*, and *B. timori*—was used. Later, the company developed Brugia Rapid, an antibody test specific to *Brugia* species. After WHO-led laboratory and field evaluations, Brugia Rapid was recommended for use in GPELF from 2013. However, several *Brugia*-endemic countries reported lot-to-lot variability in Brugia Rapid's accuracy.

In 2022, the WHO South-East Asia Regional Programme Review Group recommended suspending its use until quality improvements were made. This prompted the search for a more accurate *Brugia* rapid diagnostic test. Currently, a new test from one manufacturer has completed WHO-led laboratory evaluation and is undergoing field evaluation.

Through the collaboration of endemic countries, WHO, diagnostic developers, donors, and partner organizations, LF diagnostic tools continue to evolve—becoming more accurate, easier to use in field settings, and more scalable for global elimination efforts.

2.2. From Two-Drug to Three-Drug Therapy: Evolution of the Elimination Strategies

As noted in Section 2.2.2.1 of Part I, GPELF had established two-drug combinations (albendazole + diethylcarbamazine [DEC], and albendazole + ivermectin) as the standard protocol for mass drug administration (MDA). These two-drug strategies are effective in reducing microfilariae but have limited impact on adult worms. This raised the question: *What would happen if ivermectin, DEC, and albendazole were administered simultaneously?*

In 2016, under the leadership of the Bill & Melinda Gates Foundation (BMGF),

multi-country studies were conducted focusing on the combination known as IDA (ivermectin + DEC + albendazole). The results showed that a single treatment cleared microfilariae for 24 months and suggested permanent sterilization or death of adult worms. This indicated that IDA could significantly reduce the number of treatment rounds needed to reach the threshold for stopping MDA. However, because DEC is contraindicated for onchocerciasis, IDA can only be used in areas where onchocerciasis is not endemic. In 2017, WHO released new MDA guidelines recommending annual or twice-yearly IDA as an alternative strategy for countries using albendazole + DEC (the required number of rounds depends on past MDA performance).

As shown in Figure 3, the demonstrated effectiveness of the three-drug strategy has led more countries to shift from two-drug to three-drug MDA, accelerating LF transmission suppression. With the expansion of three-drug MDA, global demand for ivermectin will increase. Merck has committed to scaling up ivermectin supply for three-drug MDA to a maximum of 100 million treatments per year through 2025.

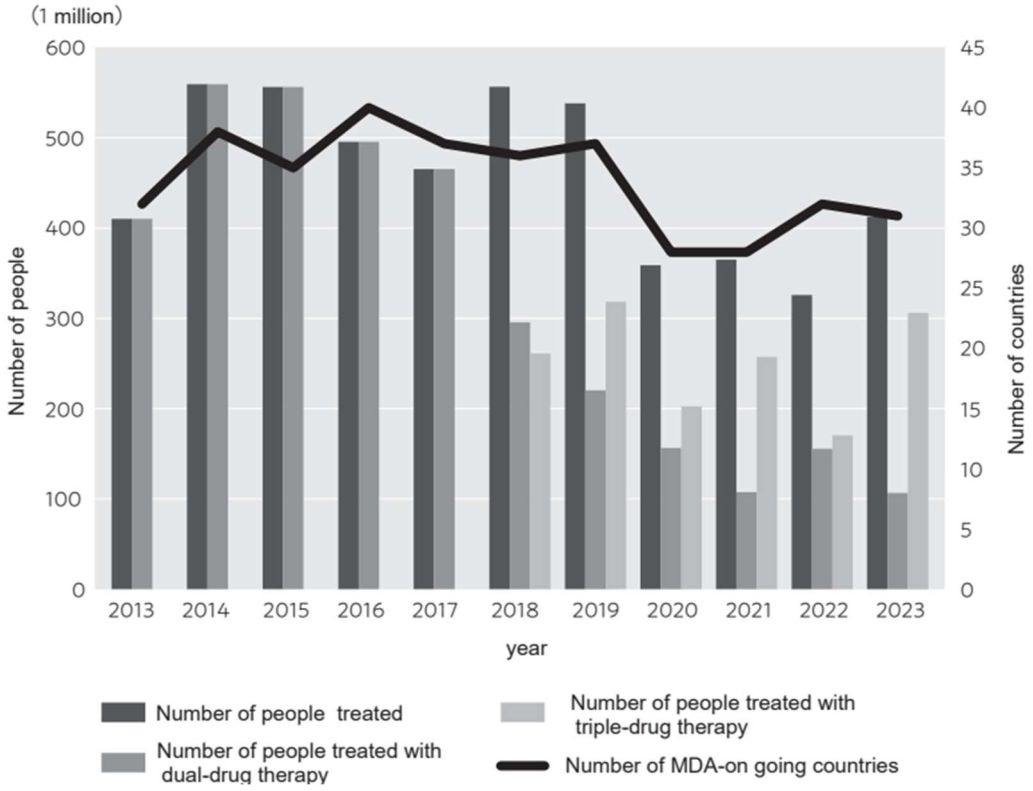


Figure 3: Trends in MDA-implementing countries and number of people treated (2013–2023)

As shown in Table 1, since 2018 the number of countries implementing three-drug

MDA has been increasing globally. However, in the African Region, only one of the 23 endemic countries (Madagascar) has implemented the three-drug regimen. In 16 countries where LF and onchocerciasis are co-endemic, treatment continues with the two-drug combination of ivermectin and albendazole. In the Central African Republic, Republic of the Congo, Democratic Republic of the Congo, and Equatorial Guinea—where LF and loiasis are co-endemic—only albendazole MDA is conducted.

Given that Africa represents a major share of the global LF burden, intensified efforts in the region are essential for achieving worldwide LF elimination.

Table 1: Countries that implemented three-drug MDA and number of people treated (2018–2023)

Year	No. of people treated	No. of Countries	Name of Countries
2018	261,066,750	3	Fiji, Samoa, India
2019	318,155,760	10	Kenya, Sao Tome and Principe, Guyana, Malaysia, American Samoa, Papua New Guinea, Fiji, Tuvalu, India, Timor-Leste
2020	202,557,231	5	Madagascar, Sao Tome and Principe, Malaysia, India, Indonesia
2021	257,408,520	5	Comoros, Guyana, Malaysia, India, Indonesia
2022	170,299,166	13	Madagascar, Malaysia, Philippines, American Samoa, Fiji, French Polynesia, New Caledonia, Papua New Guinea, Tuvalu, India, Indonesia, Myanmar, Nepal
2023	305,975,421	11	Madagascar, Haiti, Malaysia, Philippines, Fiji, French Polynesia, New Caledonia, Papua New Guinea, India, Indonesia, Nepal

Chapter 3
GPELF Progress

3.1. MDA Implementation Since 2013

3.1.1. Annual Trends

Since 2013, mass drug administration (MDA) under the Global Programme to Eliminate Lymphatic Filariasis (GPELF) has steadily advanced. The 12 countries that had not yet begun MDA gradually decreased in number, reaching 2 countries by 2021, and by 2023 only one country—Gabon—remained.

As shown in Figure 4, the number of endemic implementation units receiving MDA has increased year by year, and the proportion of countries achieving elimination—defined as reducing transmission to a level no longer considered a public health problem based on follow-up Transmission Assessment Surveys (TAS) conducted after MDA—has also risen. In 2013, no country had yet achieved elimination. In 2015, for the first time, six countries reached elimination status, and by 2023, this number had increased to nineteen.

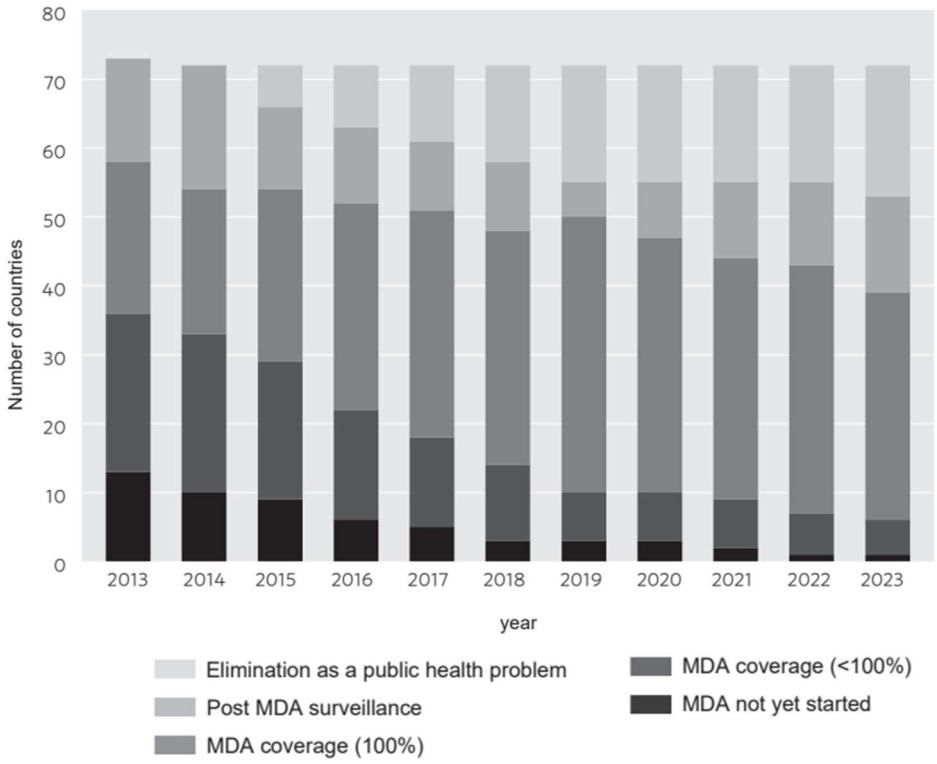


Figure 4: Changes in the number of countries by status of MDA implementation (2013–2023)

3.1.2. Regional Trends

When examining the progress of MDA by region, it becomes clear that the African Region is progressing at a significantly slower pace. In 2013, 11 of the 34 countries in the region had not yet implemented MDA. Togo became the first African country to achieve elimination in 2016, followed by Malawi in 2019. To date, only two countries in the region have achieved elimination.

Overall progress may appear limited, but the 2023 report highlights several positive developments: Madagascar achieved 100% coverage of all endemic implementation units requiring MDA. Nigeria reduced the population requiring MDA by 22%, and assessments are ongoing. Zambia has conducted TAS and is on the verge of confirming elimination.

To accelerate progress in the African Region, further measures tailored to local conditions are essential.

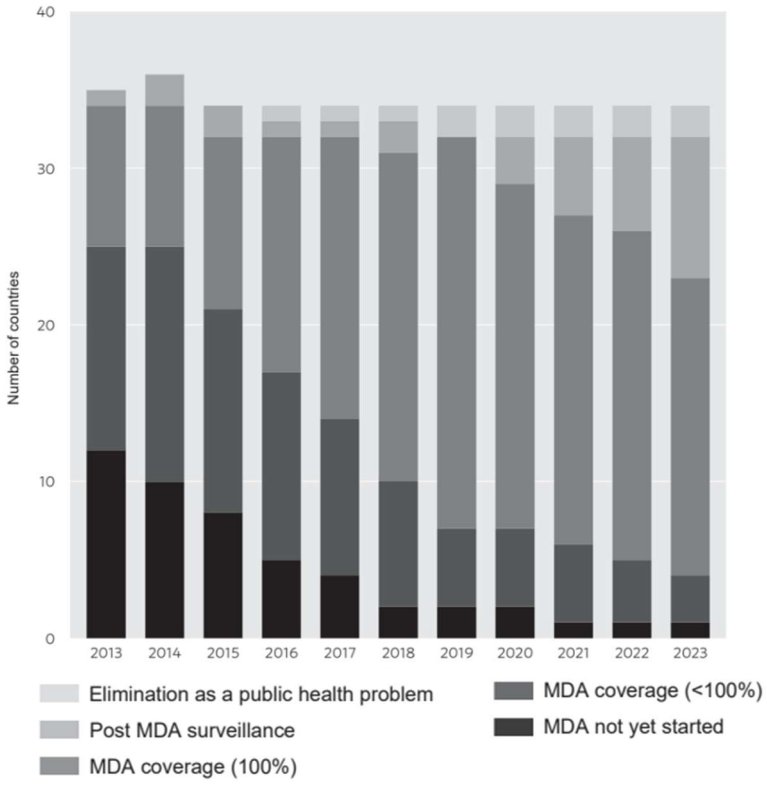
The Western Pacific Region consists largely of small island nations. In 2013, roughly 30% of countries had not yet begun MDA, and establishing implementation systems took time. However, once MDA began, countries rapidly achieved 100% coverage of all

endemic areas and transitioned to surveillance. In 2022, New Caledonia—the only country in the region where MDA had not yet started—finally launched MDA, and about half of the countries in the region have now achieved elimination.

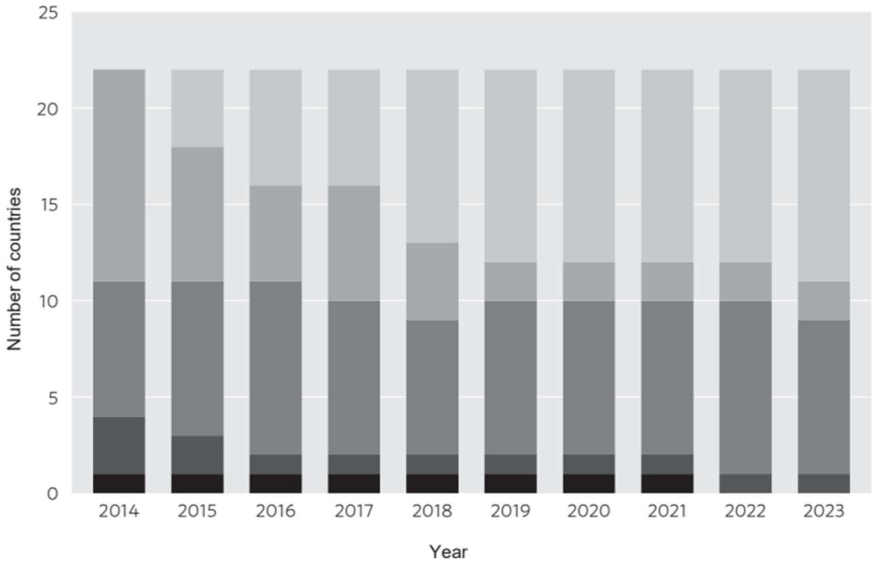
In the South-East Asia Region, countries quickly achieved full coverage of all endemic areas requiring MDA and transitioned to surveillance. By 2023, four of the nine countries in the region had achieved elimination (Figure 5).

(1) African Region (34 countries)

Note: The African Region includes 35 countries in 2013 and 36 countries in 2014. This is because the Republic of the Gambia was included (until it was validated as non-endemic in 2015), and the United Republic of Tanzania was counted as two separate entities (Mainland and Zanzibar) in 2014.



(2) Western Pacific Region (22 countries)



(3) South-East Asia Region (9 countries)

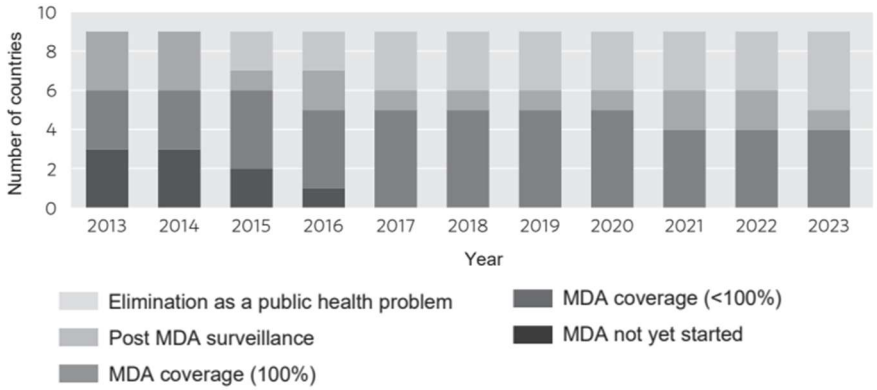


Figure 5: Changes in the number of countries by status of MDA implementation (2013–2023)

3.1.3. Trends in Number of People Treated

In 2023, 410 million people received MDA through GPELF. Except for the three pandemic-affected years (2020–2022), nearly 500 million people have been treated every year (see Figure 2 on p. 91). This corresponds to roughly 7% of the world's population, meaning that one out of every fifteen people on Earth took LF medication annually.

Between 2013 and 2023, the cumulative number of treatments administered in endemic countries reached 5 billion, and since the start of GPELF, the total approaches

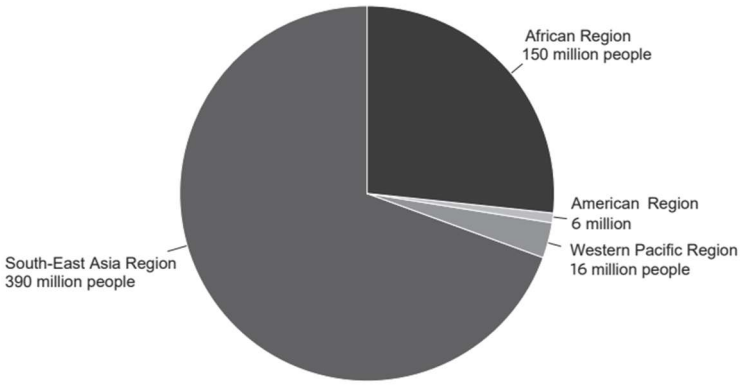
10 billion. The scale of this achievement is unmistakably enormous. In 2013, the global population was approximately 7.2 billion.

Within the South-East Asia Region, the three LF-endemic countries—India, Indonesia, and Bangladesh—together accounted for 1.7 billion people, or 23.6% of the world's population. As shown in Figure 2, in 2014, 560 million people received treatment in LF-endemic countries worldwide, and about 70% of them were in the South-East Asia Region. This illustrates how crucial progress in South-East Asia is for GPELF. The next most populous region is Africa, with 1.1 billion people (15.3% of the global population). Among LF-endemic countries in Africa, Nigeria (170 million) and Ethiopia (100 million) are particularly large. Roughly 30% of all global LF treatments occur in the African Region. Compared with South-East Asia, Africa has more countries and more dispersed endemic areas, making comprehensive intervention more challenging.

Figures 6 and 7 show the regional distribution of people treated in 2014 and 2023. Globally, the proportional distribution has changed very little. However, the number of people treated in South-East Asia decreased by 25.6% (100 million) compared with 2014. A major factor is Bangladesh's success in achieving elimination (certified in 2022), as it was the third most populous LF-endemic country. In the African Region, the number of people treated also decreased by about 30 million.

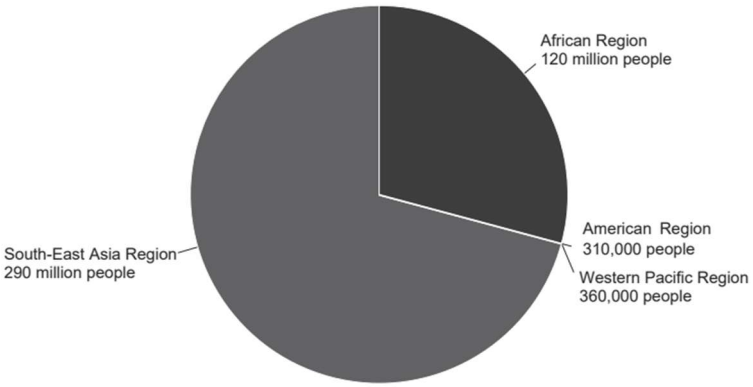
According to the 2023 report: India, Indonesia, Myanmar, and Nepal still require MDA. India has stopped MDA in 40% of endemic areas but must continue nationwide until elimination is achieved. IDA-MDA has expanded, but some states have not yet implemented it. Indonesia has stopped MDA in 83.1% of endemic areas. Remaining challenges include: lack of rapid diagnostic tests for *Brugia malayi* and *Brugia timori*, difficulty accessing remote eastern provinces, and persistent zoonotic transmission of *B. malayi* involving monkeys and cats. Myanmar has been unable to implement IDA-MDA as planned due to ongoing civil conflict, limiting treatment to a single district. Nepal expanded IDA-MDA, achieving 83.8% population coverage, and successfully stopped MDA in 76.5% of endemic areas.

Because India accounts for 99.6% of all people treated in South-East Asia, progress in India will dramatically accelerate the entire programme.



In the Eastern Mediterranean Region, MDA has ended and surveillance is ongoing in 2 of 3 countries, so no treatment was administered. In the remaining country, MDA was not implemented.

Figure 6: Number of people treated by region in 2014



In the Eastern Mediterranean Region, elimination was achieved in 2 of 3 countries. In the remaining country, MDA was not implemented.

Figure 7: Number of people treated by region in 2023

3.2. Country-Level Progress

In 2013, a total of 72 LF-endemic countries were reported worldwide. Among the five WHO regions, the African Region accounted for almost half (47%) of all endemic

countries. The next largest number of endemic countries was in the Western Pacific Region, which includes island nations in Oceania and parts of Southeast Asia, accounting for 30% of the total (Figure 8).

Through the implementation of MDA in LF-endemic countries, by 2023, 19 of the 72 countries had achieved elimination to a level where LF was no longer considered a public health problem. However, in the African Region, only two countries had succeeded in achieving elimination, even though the region accounts for 60% of all endemic countries. In contrast, in the Southeast Asia Region, four countries, and in the Western Pacific Region, eleven countries had achieved elimination, meaning that nearly half of the endemic countries in these regions had reached elimination compared with 2013.

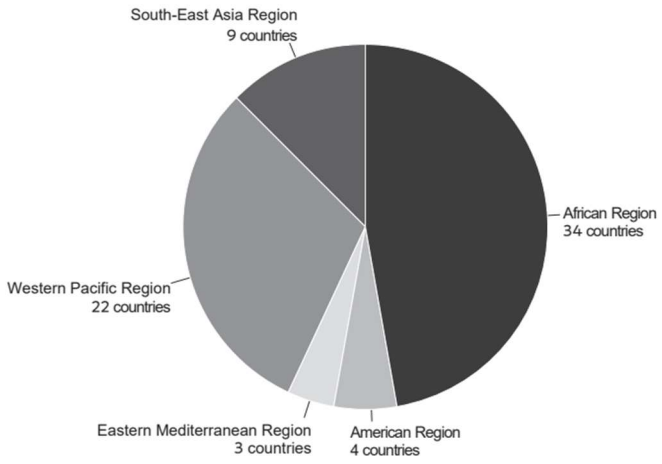


Figure 8: The number of countries endemic for LF by WHO Region in 2013

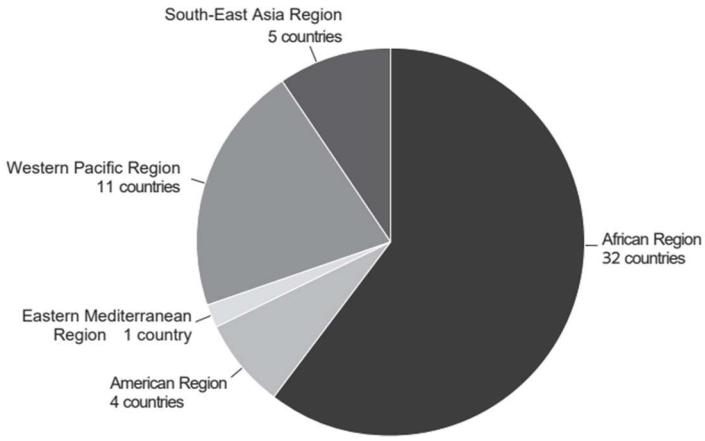


Figure 9: The number of countries endemic for LF by WHO Region in 2023

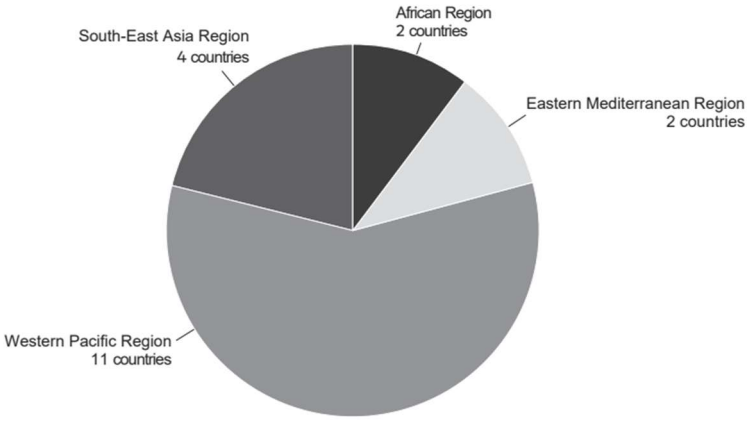


Figure 10: The number of countries that have achieved elimination by WHO Region in 2023

The progress in the Western Pacific Region is remarkable. The current global elimination rate is 28.4%, and it is essential to continue the programme toward the 2030 elimination target (Figures 9 and 10).

3.3. Challenges for the Next Step

It has been clearly shown by the trends in lymphatic filariasis endemic countries up to the present that GPELF is working efficiently and very effectively toward elimination, although there are some delays in the plan.

In 2020, the World Health Organization (WHO) announced a new roadmap for neglected tropical diseases (NTDs), setting 2030 as the elimination goal. To achieve this, it is necessary to address the problems that have become apparent so far. The roadmap calls for efforts with a particular focus on the African Region. For countries and areas where progress is slow, the use of the three-drug regimen (IDA), which has demonstrated effectiveness, is recommended. However, as mentioned earlier, diethylcarbamazine (DEC) cannot be used in onchocerciasis-endemic areas, and ivermectin cannot be used for loiasis. In the African Region, it is difficult to conduct community-wide treatment in areas where LF-endemic areas overlap with loiasis-endemic or onchocerciasis-endemic areas. This is considered to be one of the reasons for delays in progress. To address this,

it is also important to collaborate with malaria control programmes to conduct vector control. Therefore, the following measures are required.

- *Loa loa* infection may cause false-positive results with the currently recommended filariasis test strip (FTS), and it is necessary to develop a rapid diagnostic test that does not cross-react with *Loa loa*. This will make it possible to improve the evaluation of post-MDA surveys.
- Using the LoaScope, a field-friendly diagnostic tool that can measure *Loa loa* microfilarial density in peripheral blood, individuals at high risk of severe adverse events can be rapidly identified and treated.
- To address delays in the African Region, it is necessary to ensure that MDA can be implemented even in remote rural areas, islands, and conflict zones.

By solving these problems and further strengthening the programme, it will be possible to reliably eliminate lymphatic filariasis from the entire world.

Chapter 4.
Achievements

4.1. Elimination Verification Process

For a country to receive recognition from the World Health Organization (WHO) that lymphatic filariasis (LF) has been eliminated as a public health problem, it must submit documentation to WHO proving that it meets the required criteria. A country wishing to obtain certification may, before submitting the documents, submit them through the WHO Regional Office to the Regional Programme Review Group (RPRG) for a preliminary review. After that, the documents are submitted to the WHO Country Office, which notifies the submitting country that the documents have been received, and then forwards them to the LF focal point at the WHO Regional Office. The WHO Regional Office then notifies the Department of Neglected Tropical Diseases at WHO Headquarters.

Through these steps, elimination is validated (Figure 11).

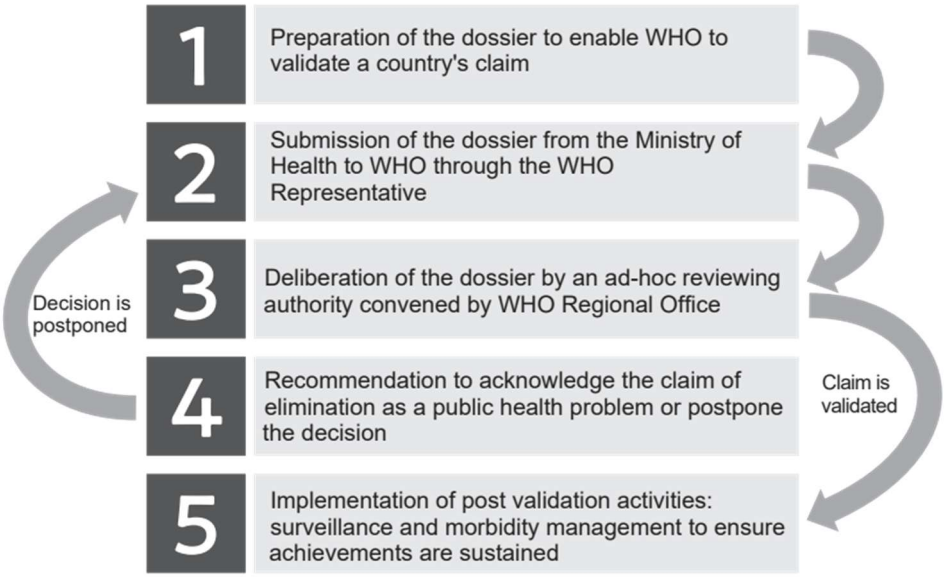


Figure 11: Key steps toward validation of lymphatic filariasis elimination

4.2. WHO-Verified Countries

As shown in the previous chapters, endemic countries around the world are steadily advancing their countermeasures, and the day when this disease disappears from the planet is now foreseeable. By 2024, twenty-one countries had been validated by WHO as having eliminated lymphatic filariasis as a public health problem, and GPELF is steadily moving toward success.

Table 2 shows the year of validation and the names of the countries.

Table 2: Countries validated as having achieved elimination as a public health problem by WHO as of 2024

Year	Countries validated for LF elimination
2015	Cook Islands, Niue, Vanuatu, Cambodia, Maldives, Sri Lanka
2016	Togo, Marshall Islands, Tonga
2017	Egypt, Thailand
2018	Wallis and Futuna, Palau, Viet Nam
2019	Malawi, Yemen, Kiribati
2020	
2021	
2022	
2023	Lao People's Democratic Republic, Bangladesh
2024	Timor-Leste, Brazil



Photo 1: Cambodia, the Cook Islands, Niue, and Vanuatu successfully eliminated lymphatic filariasis as a public health problem.
(October 2016)

Photo 2: Marshall Islands successfully eliminated lymphatic filariasis as a public health problem.
(March 2017)





Photo 3: Tonga successfully eliminated lymphatic filariasis as a public health problem.
(July 2017)

Figure 12: LF elimination validated countries announced by WHO since 2016 (from the WHO website): Photos 1-3



Photo 4: Kiribati successfully eliminated lymphatic filariasis as a public health problem. (October 2019)



Photo 5: The Lao People's Democratic Republic successfully eliminated lymphatic filariasis as a public health problem. (October 2023)



Photo 6: Timor-Leste successfully eliminated lymphatic filariasis as a public health problem. (August 2024)



Photo 7: Brazil successfully eliminated lymphatic filariasis as a public health problem. (October 2024)

Figure 12: LF elimination validated countries announced by WHO since 2016 (from the WHO website): Photos 4-7

Chapter 5
The Impact of GPELF

The Global Programme to Eliminate Lymphatic Filariasis (GPELF) was established by the World Health Organization (WHO) in 2000, with the objective of eliminating lymphatic filariasis (LF) as a public health problem worldwide. At the start of GPELF in 2000, the estimated number of infected individuals was 120 million, but by 2023 this number had decreased to about 50 million. In addition, by 2024, elimination had been validated in 21 countries.

The ultimate purpose beyond GPELF's elimination goal is to bring light to socially vulnerable populations and to contribute to humanity. It aims to free people from the stigma caused by LF symptoms (see column), enable them to live productive and fulfilling lives, and realize a world where no one is left behind—that is, Universal Health Coverage (UHC).

Column: Stigma — The Case of Vanuatu

In 1998, we visited the Pacific island nation of Vanuatu for preparatory surveys for PacELF (see Part I, Section 1.3.2, p. 21). In a small village on a remote island, when we showed photos of LF symptoms and asked, "Have you seen a patient like this?", the villagers told us that there was one such person. However, they said, "He is not sick." They believed his condition was caused by "the anger of ancestors," "stepping on soil inhabited by spirits," or "eating something forbidden," meaning he was considered a cursed person. It was a place where the concept of black magic still remained.

The man lived quietly in a small hut on the edge of the village. Although he was at an age considered to be in the prime of life, he lived hidden away, shunned by the villagers, with both elephantiasis and hydrocele. He likely lived unable to bathe properly, surrounded by the thickened skin and odor characteristic of elephantiasis.

We washed his feet, showed him how to care for himself, and explained that his condition was not his fault, that it was a mosquito-borne disease anyone could get, and that it was possible to eliminate this disease. We conveyed this both to him and to the villagers around him. The shy, fleeting smile he showed at that moment left a strong impression. For him to live recognized as a member of the village, as a human being—that was his wish, and it is also ours.

Various reports have been published regarding the health benefits brought by GPELF. According to these, significant benefits were achieved during the first 20 years of GPELF. It is predicted that MDA provided between 2000 and 2020 prevented 44.3 million chronic cases and averted 244 million disability-adjusted life years (DALYs). Moreover, GPELF includes additional benefits that are not quantified by DALY burden indicators, such as activities related to morbidity management and disability prevention (MMDP). Furthermore, the medicines used for LF MDA also have effects on other co-endemic neglected tropical diseases (NTDs), such as soil-transmitted helminths, onchocerciasis, and scabies. Although these benefits are difficult to measure precisely, the total health benefit is assumed to be even greater.

These results represent the value of GPELF and justify the importance of continued efforts.

Health economic studies on large-scale programmes such as GPELF cannot yet provide definitive answers regarding their full impact, but one example suggests that the economic benefit of GPELF from 2000 to 2007 may amount to 24.2 billion USD.

The impact of GPELF lies in the public health benefit of preventing new infections and reducing the number of people suffering from the disease itself, as well as in generating significant social and economic benefits.

Chapter 6
A New Vision for the Future

According to the Neglected Tropical Diseases (NTD) roadmap newly announced by the World Health Organization (WHO) in 2021, lymphatic filariasis (LF) aims for elimination in 34 of the 72 endemic countries (47%) by 2025, and in 58 countries (81%) by 2030. In accordance with this elimination target, Figure 13 shows the implementation status of mass drug administration (MDA) from 2010 and the predicted implementation status from 2024 to 2030. In addition, the MDA implementation status and predictions for endemic countries in 2020, 2025, and 2030 are shown on a world map (Figure 14). According to the prediction, by 2030, MDA will have ended in all countries, and although some countries in the African Region will still be conducting surveillance, other regions are expected to have achieved elimination.

LF, a human disease, is believed to have already existed around 1500 BCE, as a depiction of a person with symptoms resembling elephantiasis is carved on an Egyptian wall painting. After a long period of time, in the 1800s, scientific efforts began, new discoveries continued, and the recognition of LF as a parasitic disease was established. In 1877, Patrick Manson of the United Kingdom discovered microfilariae in China (present-day People's Republic of China) and further discovered that they were transmitted by mosquitoes, clarifying the true nature of the disease. After returning to the United Kingdom, he founded the London School of Hygiene and Tropical Medicine and is known as the father of tropical medicine. About 100 years later, in 1976, Manabu Sasa of Japan published *Human Filariasis*, a comprehensive 800-page work considered a culmination of filariasis research.

Since the discovery of the disease, humanity has continued to fight it in various ways. Now, under the Global Programme to Eliminate Lymphatic Filariasis (GPELF), a global initiative, LF is disappearing.

Reaching this stage of progress toward success is truly the result of the world—humanity—coming together to fight as one. For all endemic countries to continue moving toward elimination, it is necessary to steadily overcome new challenges one by one and to proceed carefully on a global scale.

More than ever, the unwavering passion and sense of mission of those involved in GPELF- “not leaving the misfortune caused by this disease to the next generation”- and WHO’s strong and fair leadership are required.

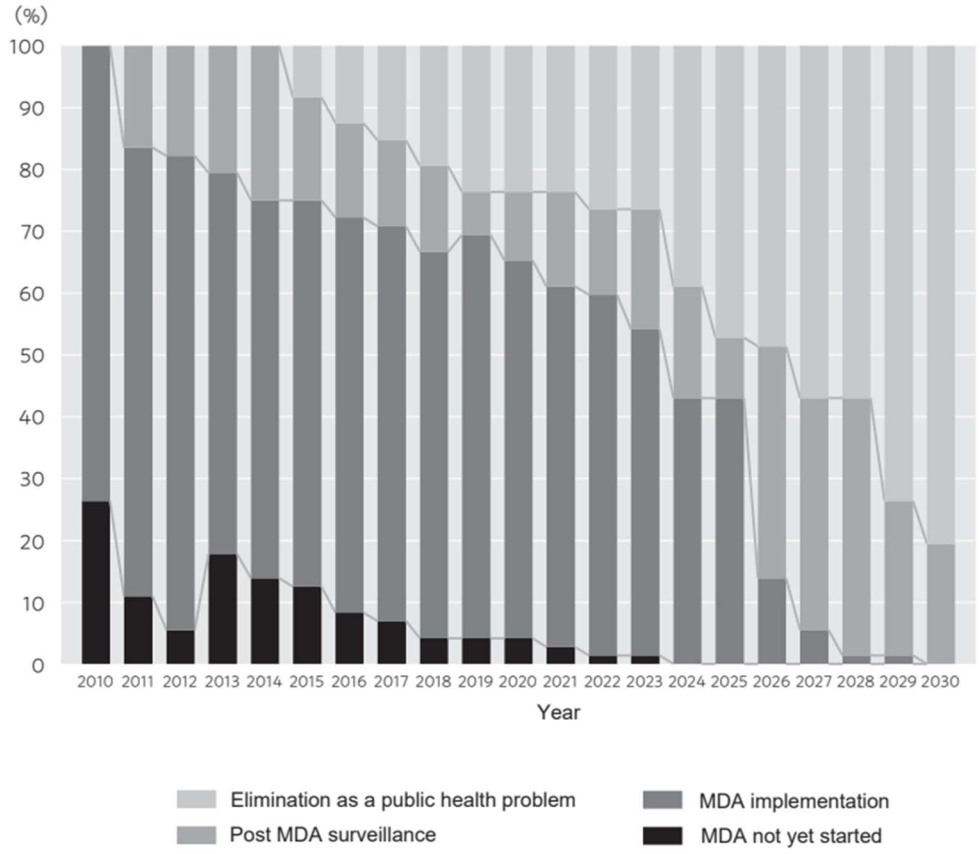


Figure 13: Predicted annual trends in MDA implementation status in endemic countries (2010–2030)

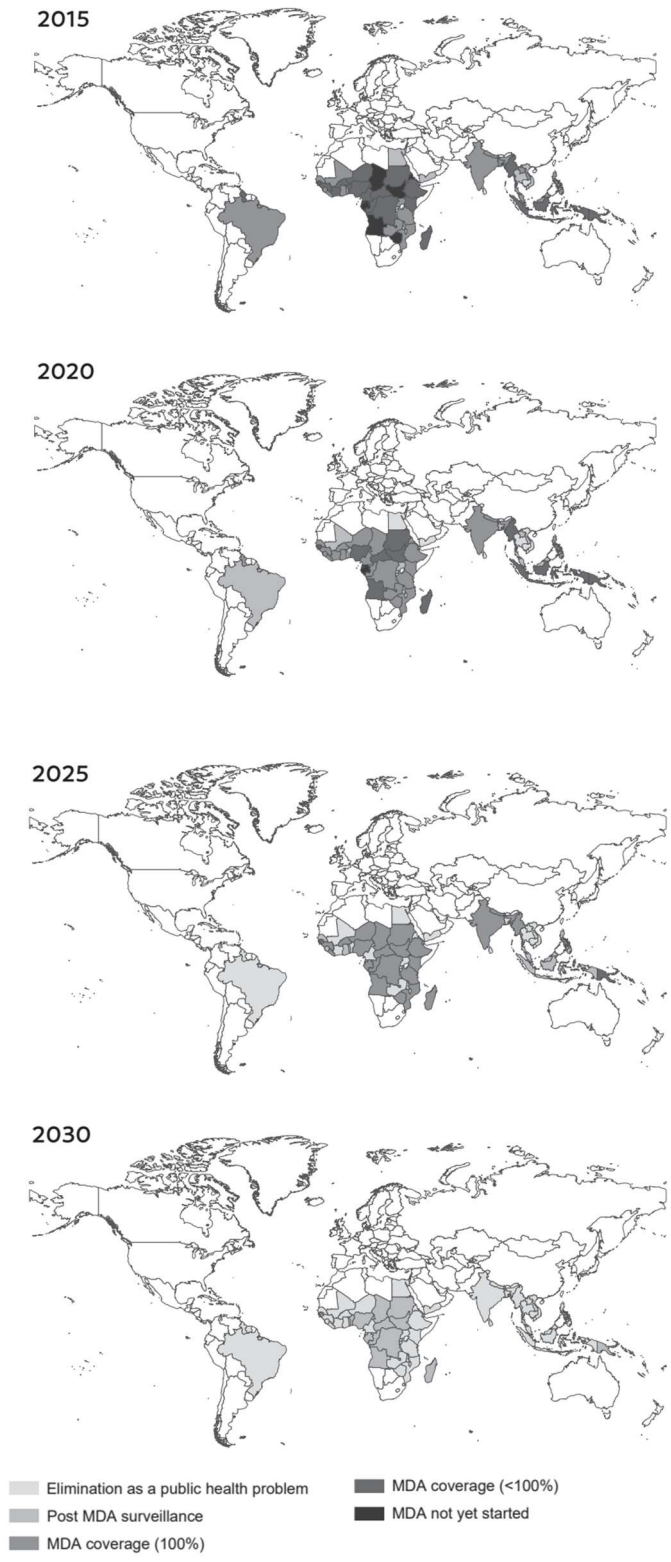


Figure 14: Global map showing MDA implementation status and predictions in endemic countries (2015, 2020, 2025, 2030)

Appendices

Appendix 1:
WHO Statements Related to GPELF

Position Statements

The World Health Organization (WHO) has published three Position Statements related to the Global Programme to Eliminate Lymphatic Filariasis (GPELF) in 2011,2012.

1. Managing morbidity and preventing disability in the Global Programme to Eliminate Lymphatic Filariasis: WHO position statement, 2011
2. Integrated vector management to control malaria and lymphatic filariasis: WHO position statement, 2011
3. Transmission assessment surveys in the Global Programme to Eliminate Lymphatic Filariasis: WHO position statement, 2012

Appendix 2

Country Progress in MDA Implementation

(2013-2023)

Year	WHO region	MDA not started	MDA started and not scaled to all endemic districts	MDA scaled to all endemic districts	Under surveillance	Validated as having eliminated LF as a public health problem.
2013	Africa	Angola, Chad, Democratic Republic of Congo, Equatorial Guinea, Eritrea, Gabon, Gambia*, Guinea, São Tomé and Principe, South Sudan, Zambia, Zimbabwe	Benin, Cameroon, Central African Republic, Comoros, Congo, Côte d'Ivoire, Ethiopia, Guinea-Bissau, Kenya, Madagascar, Nigeria, Senegal, Sierra Leone	Burkina Faso, Ghana, Liberia, Malawi, Mali, Mozambique, Niger, Uganda, United Republic of Tanzania Mainland	Togo	
	Americas		Brazil, Guyana, Haiti	Dominican Republic		
	Eastern Mediterranean		Sudan	Egypt	Yemen	
	Western Pacific		Papua New Guinea, Tuvalu	Fuji, French Polynesia, Kiribati, Federated States of Micronesia, Samoa	American Samoa, Cook Islands, Kiribati, Marshall Islands, Niue, Palau, Tonga, Vanuatu, Wallis and Futuna	
			Malaysia	Brunei Darussalam, Lao People's Democratic Republic, Philippines	Cambodia, Viet Nam	
	South-East Asia		Indonesia, Myanmar, Timor-Leste	Bangladesh, India, Nepal	Maldives, Sri-Lanka, Thailand	
	Total (%)	13 (17.8%)	23 (31.6%)	22 (30.1%)	15 (20.5%)	0 (0.0%)

*Recognized as a non-endemic country in 2015

Year	WHO region	MDA not started	MDA started and not scaled to all endemic districts	MDA scaled to all endemic districts	Under surveillance	Validated as having eliminated LF as a public health problem.
2014	Africa	Angola, Chad, Equatorial Guinea, Eritrea, Gabon, São Tomé and Principe, South Sudan, Zambia, Zimbabwe	Benin, Cameroon, Central African Republic, Comoros, Congo, Côte d'Ivoire, Democratic Republic of Congo, Ethiopia, Guinea, Guinea-Bissau, Kenya, Madagascar, Nigeria, Senegal, Sierra Leone	Burkina Faso, Ghana, Liberia, Mali, Mozambique, Niger, Uganda, United Republic of Tanzania Mainland, United Republic of Tanzania Zanzibar	Malawi, Togo	
	Americas		Guyana	Brazil, Dominican Republic		
	Eastern Mediterranean		Sudan		Egypt, Yemen	
	Western Pacific	New Caledonia	Papua New Guinea, Tuvalu	Fiji, French Polynesia, Federated States of Micronesia, Samoa	American Samoa, Cook Islands, Kiribati, Marshall Islands, Niue, Palau, Tonga, Vanuatu, Wallis and Futuna	
			Malaysia	Brunei Darussalam, Lao People's Democratic Republic, Philippines	Cambodia, Viet Nam	
	South-East Asia		Indonesia, Myanmar, Timor-Leste	Bangladesh, India, Nepal	Maldives, Sri Lanka, Thailand	
	Total (%)	11 (14.9%)	24 (32.4%)	21 (28.1%)	18 (24.3%)	0 (0.0%)

*Recognized as a non-endemic country in 2015

Year	WHO region	MDA not started	MDA started and not scaled to all endemic districts	MDA scaled to all endemic districts	Under surveillance	Validated as having eliminated LF as a public health problem.
2015	Africa	Angola, Chad, Equatorial Guinea, Eritrea, Gabon, São Tomé and Principe, South Sudan, Zimbabwe	Benin, Cameroon, Central African Republic, Comoros, Congo, Côte d'Ivoire, Democratic Republic of Congo, Ethiopia, Guinea, Guinea-Bissau, Kenya, Madagascar, Nigeria	Burkina Faso, Ghana, Liberia, Mali, Mozambique, Niger, Senegal, Sierra Leone, Uganda, United Republic of Tanzania Mainland, Zambia	Malawi, Togo	
	Americas		Guyana, Haiti	Brazil, Dominican Republic,		
	Eastern Mediterranean		Sudan		Egypt, Yemen	
	Western Pacific	New Caledonia	Papua New Guinea, Tuvalu	Fiji, French Polynesia, Federated States of Micronesia, Samoa	American Samoa, Kiribati, Marshall Islands, Palau, Tonga, Wallis and Futuna	Cook Islands, Niue, Vanuatu
				Brunei Darussalam, Lao People's Democratic Republic, Malaysia, Philippines	Viet Nam	Cambodia
	South-East Asia		Indonesia, Myanmar	Bangladesh, India, Nepal, Timor-Leste	Thailand	Maldives, Sri Lanka,
	Total (%)	9 (12.5%)	20 (27.8%)	25 (34.7%)	12 (16.7%)	6 (8.3%)

Year	WHO region	MDA not started	MDA started and not scaled to all endemic districts	MDA scaled to all endemic districts	Under surveillance	Validated as having eliminated LF as a public health problem.
2016	Africa	Equatorial Guinea, Eritrea, Gabon, São Tomé and Principe, South Sudan	Angola, Cameroon, Central African Republic, Chad, Comoros, Congo, Democratic Republic of Congo, Ethiopia, Guinea, Guinea-Bissau, Madagascar, Nigeria	Benin, Burkina Faso, Côte d'Ivoire, Ghana, Kenya, Liberia, Mali, Mozambique, Niger, Senegal, Sierra Leone, Uganda, United Republic of Tanzania Mainland, Zambia, Zimbabwe,	Malawi	Togo
	Americas		Guyana	Dominican Republic, Haiti	Brazil	
	Eastern Mediterranean		Sudan		Egypt, Yemen	
	Western Pacific	New Caledonia	Papua New Guinea	Fiji, French Polynesia, Federated States of Micronesia, Samoa, Tuvalu	American Samoa, Kiribati, Palau, Wallis and Futuna	Cook Islands, Marshall Islands, Niue, Tonga, Vanuatu
				Brunei Darussalam, Lao People's Democratic Republic, Malaysia, Philippines	Viet Nam	Cambodia
	South-East Asia		Indonesia	India, Myanmar, Nepal, Timor-Leste	Bangladesh, Thailand	Maldives, Sri Lanka
	Total (%)	6 (8.3%)	16 (22.2%)	30 (41.7%)	11 (15.3%)	9 (12.5%)

Year	WHO region	MDA not started	MDA started and not scaled to all endemic districts	MDA scaled to all endemic districts	Under surveillance	Validated as having eliminated LF as a public health problem
2017	Africa	Equatorial Guinea, Gabon, São Tomé and Principe, South Sudan	Angola, Cameroon, Central African Republic, Chad, Congo, Democratic Republic of Congo, Ethiopia, Guinea-Bissau, Madagascar, Nigeria	Benin, Burkina Faso, Comoros, Côte d'Ivoire, Eritrea, Ghana, Guinea , Kenya, Liberia, Mali, Mozambique, Niger, Senegal, Sierra Leone, Uganda, United Republic of Tanzania Mainland, Zambia , Zimbabwe	Malawi	Togo
	Americas		Guyana	Dominican Republic, Haiti	Brazil	
	Eastern Mediterranean		Sudan		Yemen	Egypt
	Western Pacific	New Caledonia	Papua New Guinea	American Samoa, Fiji, French Polynesia, Federated States of Micronesia, Samoa, Tuvalu	Kiribati, Palau, Wallis and Futuna	Cook Islands, Marshall Islands, Niue, Tonga, Vanuatu
				Malaysia, Philippines	Brunei Darussalam, Lao People's Democratic Republic, Viet Nam	Cambodia
	South-East Asia			India, Indonesia, Myanmar, Nepal, Timor-Leste	Bangladesh	Maldives, Sri Lanka, Thailand
	Total (%)	5 (6.9%)	13 (18.1%)	33 (45.8%)	10 (13.9%)	11 (15.3%)

Year	WHO region	MDA not started	MDA started and not scaled to all endemic districts	MDA scaled to all endemic districts	Under surveillance	Validated as having eliminated LF as a public health problem
2018	Africa	Equatorial Guinea, Gabon	Angola, Central African Republic, Chad, Congo, Democratic Republic of Congo, Madagascar, Nigeria, South Sudan	Benin, Burkina Faso, Comoros, Côte d'Ivoire, Eritrea, Ethiopia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Mali, Mozambique, Niger, São Tomé and Principe, Senegal, Sierra Leone, Uganda, United Republic of Tanzania Mainland, Zambia, Zimbabwe	Cameroon, Malawi	Togo
	Americas		Guyana	Haiti	Brazil, Dominican Republic	
	Eastern Mediterranean		Sudan		Yemen	Egypt
	Western Pacific	New Caledonia	Papua New Guinea	American Samoa, Fiji, French Polynesia, Federated States of Micronesia, Samoa, Tuvalu	Kiribati	Cook Islands, Marshall Islands, Niue, Palau, Tonga, Vanuatu, Wallis and Futuna
				Philippines	Brunei Darussalam, Lao People's Democratic Republic, Malaysia	Cambodia, Viet Nam
	South-East Asia			India, Indonesia, Myanmar, Nepal, Timor-Leste	Bangladesh	Maldives, Sri Lanka, Thailand
	Total (%)	3 (4.2%)	11 (15.3%)	34 (47.2%)	10 (13.9%)	14 (19.4%)

Year	WHO region	MDA not started	MDA started and not scaled to all endemic districts	MDA scaled to all endemic districts	Under surveillance	Validated as having eliminated LF as a public health problem
2019	Africa	Equatorial Guinea, Gabon	Angola, Central African Republic, Madagascar, Nigeria, South Sudan	Benin, Burkina Faso, Cameroon, Chad, Comoros, Congo, Côte d'Ivoire, Democratic Republic of Congo, Eritrea, Ethiopia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Mali, Mozambique, Niger, São Tomé and Principe, Senegal, Sierra Leone, Uganda, United Republic of Tanzania Mainland, Zambia, Zimbabwe		Malawi, Togo
	Americas			Guyana, Haiti	Brazil, Dominican Republic	
	Eastern Mediterranean		Sudan			Egypt, Yemen
	Western Pacific	New Caledonia	Papua New Guinea	American Samoa, Fiji, French Polynesia, Federated States of Micronesia, Samoa, Tuvalu		Cook Islands, Kiribati, Marshall Islands, Niue, Palau, Tonga, Vanuatu, Wallis and Futuna
				Malaysia, Philippines	Brunei Darussalam, Lao People's Democratic Republic	Cambodia, Viet Nam
	South-East Asia			India, Indonesia, Myanmar, Nepal, Timor-Leste	Bangladesh	Maldives, Sri Lanka, Thailand
	Total (%)	3 (4.2%)	7 (9.7%)	40 (55.6%)	5 (6.9%)	17 (23.6%)

Year	WHO region	MDA not started	MDA started and not scaled to all endemic districts	MDA scaled to all endemic districts	Under surveillance	Validated as having eliminated LF as a public health problem
2020	Africa	Equatorial Guinea, Gabon	Angola, Central African Republic, Madagascar, Nigeria, South Sudan	Burkina Faso, Cameroon, Chad, Comoros, Congo, Côte d'Ivoire, Democratic Republic of Congo, Eritrea, Ethiopia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Mozambique, Niger, São Tomé and Principe, Senegal, Sierra Leone, United Republic of Tanzania Mainland, Zambia, Zimbabwe	Benin, Mali, Uganda	Malawi, Togo
	Americas			Guyana, Haiti	Brazil, Dominican Republic	
	Eastern Mediterranean		Sudan			Egypt, Yemen
	Western Pacific	New Caledonia	Papua New Guinea	American Samoa, Fiji, French Polynesia, Federated States of Micronesia, Samoa, Tuvalu	,	Cook Islands, Kiribati, Marshall Islands, Niue, Palau, Tonga, Vanuatu, Wallis and Futuna
				Malaysia, Philippines	Brunei Darussalam, Lao People's Democratic Republic	Cambodia, Viet Nam
	South-East Asia			India, Indonesia, Myanmar, Nepal, Timor-Leste	Bangladesh	Maldives, Sri Lanka, Thailand
	Total (%)	3 (4.2%)	7 (9.7%)	37 (51.4%)	8 (11.1%)	17 (23.6%)

Year	WHO region	MDA not started	MDA started and not scaled to all endemic districts	MDA scaled to all endemic districts	Under surveillance	Validated as having eliminated LF as a public health problem
2021	Africa	Gabon	Angola, Central African Republic, Madagascar, Nigeria, South Sudan,	Burkina Faso, Chad, Comoros, Congo, Côte d'Ivoire, Democratic Republic of Congo, Equatorial Guinea, Eritrea, Ethiopia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Mozambique, Niger, Senegal, Sierra Leone, United Republic of Tanzania Mainland, Zambia, Zimbabwe	Benin, Cameroon, Mali, São Tomé and Principe, Uganda	Malawi, Togo
	Americas			Guyana, Haiti	Brazil, Dominican Republic	
	Eastern Mediterranean		Sudan			Egypt, Yemen
	Western Pacific	New Caledonia	Papua New Guinea	American Samoa, Fiji, French Polynesia, Federated States of Micronesia, Samoa, Tuvalu		Cook Islands, Kiribati, Marshall Islands, Niue, Palau, Tonga, Vanuatu, Wallis and Futuna
				Malaysia, Philippines	Brunei Darussalam, Lao People's Democratic Republic	Cambodia, Viet Nam
	South-East Asia			India, Indonesia, Myanmar, Nepal	Timor-Leste, Bangladesh,	Maldives, Sri Lanka, Thailand
	Total (%)	2 (2.7%)	7 (9.7%)	35 (48.6%)	11 (15.3%)	17 (23.6%)

Year	WHO region	MDA not started	MDA started and not scaled to all endemic districts	MDA scaled to all endemic districts	Under surveillance	Validated as having eliminated LF as a public health problem
2022	Africa	Gabon	Angola, Central African Republic, Madagascar, Nigeria	Burkina Faso, Chad, Comoros, Congo, Côte d'Ivoire, Democratic Republic of Congo, Equatorial Guinea, Ethiopia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Mozambique, Niger, Senegal, Sierra Leone, South Sudan, United Republic of Tanzania Mainland, Zambia, Zimbabwe	Benin, Cameroon, Eritrea, Mali, São Tomé and Principe, Uganda	Malawi, Togo
	Americas			Guyana, Haiti	Brazil, Dominican Republic	
	Eastern Mediterranean		Sudan			Egypt, Yemen
	Western Pacific		Papua New Guinea	American Samoa, Fiji, French Polynesia, Federated States of Micronesia, New Caledonia, Samoa, Tuvalu		Cook Islands, Kiribati, Marshall Islands, Niue, Palau, Tonga, Vanuatu, Wallis and Futuna
				Malaysia, Philippines	Brunei Darussalam, Lao People's Democratic Republic	Cambodia, Viet Nam
	South-East Asia			India, Indonesia, Myanmar, Nepal	Bangladesh, Timor-Leste	Maldives, Sri Lanka, Thailand
	Total (%)	1 (1.4%)	6 (8.3%)	36 (50.0%)	12 (16.7%)	17 (23.6%)

Year	WHO region	MDA not started	MDA started and not scaled to all endemic districts	MDA scaled to all endemic districts	Under surveillance	Validated as having eliminated LF as a public health problem
2023	Africa	Gabon	Angola, Central African Republic, Nigeria	Burkina Faso, Chad, Congo, Côte d'Ivoire, Democratic Republic of Congo, Equatorial Guinea, Ethiopia, Ghana, Guinea, Guinea-Bissau, Liberia, Madagascar, Mozambique, Niger, Senegal, Sierra Leone, South Sudan, United Republic of Tanzania Mainland, Zimbabwe	Benin, Cameroon, Comoros, Eritrea, Kenya, Mali, São Tomé and Principe, Uganda, Zambia	Malawi, Togo
	Americas			Guyana, Haiti	Brazil, Dominican Republic	
	Eastern Mediterranean		Sudan			Egypt, Yemen
	Western Pacific		Papua New Guinea	American Samoa, Fiji, French Polynesia, New Caledonia, Samoa, Tuvalu	Federated States of Micronesia	Cook Islands, Kiribati, Marshall Islands, Niue, Palau, Tonga, Vanuatu, Wallis and Futuna
				Malaysia, Philippines	Brunei Darussalam	Cambodia, Lao People's Democratic Republic, Viet Nam
	South-East Asia			India, Indonesia, Myanmar, Nepal	Timor-Leste	Bangladesh, Maldives, Sri Lanka, Thailand
	Total (%)	1 (1.4%)	5 (6.9%)	33 (45.9%)	14 (19.4%)	19 (26.4%)

Appendix 3

List of WHO publication

Most of these publications are available on IRIS (WHO's digital library for institutional repositories) at https://iris.who.int/. These publications also include News and Activities published on the WHO official website at https://www.who.int/.

1962

1. Expert Committee on filariasis (*Wuchereria* and *Brugia* infections) [meeting held in Geneva from 25 July to 1 August 1961]: report. 1962.

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1974

3. WHO Expert Committee on Filariasis: third report [of a meeting held in Athens from 8 to 13 October 1973]. 1974.

1984

4. Lymphatic filariasis: fourth report of the WHO Expert Committee on Filariasis [meeting held in Geneva from 31 October to 8 November 1983]. 1984.

1987

5. Control of lymphatic filariasis：a manual for health personnel. 1987

1992

6. Lymphatic filariasis: the disease and its control, fifth report of the WHO Expert Committee on Filariasis [meeting held in Geneva from 1 to 8 October 1991]. 1992.

1993

7. Update：International Task Force for Disease Eradication. *Weekly Epidemiological Record*, 68(30):217-219, 1993.
8. Lymphatic filariasis: diagnosis and pathogenesis. WHO expert committee on filariasis. *Bulletin of the World Health Organization*, 71 (2): 135-141, 1993.

1995

9. The World health report 1995 — Bridging the gaps. *World health forum*, 16(4): 377-385, 1995.

1997

10. Control of tropical diseases: elimination of lymphatic filariasis as a public health problem. 1997.
11. Lymphatic filariasis: reasons for hope. 1997.

12. Strategies and tools for the control/elimination of lymphatic filariasis. *Bulletin of the World Health Organization*, 75(6): 491-503, 1997.

1999

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14. Guidelines for certifying lymphatic filariasis elimination (including discussion of critical issues and rationale). 1999.
15. Programme background and overview towards initiating a national programme to eliminate lymphatic filariasis.1999.
16. Building partnerships for lymphatic filariasis: strategic plan, Working version: September 1999. 1999.
17. Issues relating to the integration of lymphatic filariasis control into the Onchocerciasis control programmes in Africa: background paper. 1999.

2000

18. Eliminate Filariasis: Attack poverty — the Global Alliance to Eliminate Lymphatic Filariasis: Proceedings of the First Meeting. Santiago de Compostela, Spain 4-5 May 2000. 2000.
19. Lymphatic filariasis: ready for global elimination. 2000.
20. Preparing and implementing a national plan to eliminate filariasis: (in countries where onchocerciasis is co-endemic). 2000.
21. Operational guidelines for rapid mapping of bancroftian filariasis in Africa. Revised during an inter-country workshop held in Ouagadougou, 8-12 march 2000. 2000.
22. Community-directed treatment of lymphatic filariasis in Africa: report of a multi-centre study in Ghana and Kenya. 2000.
23. Elimination of lymphatic filariasis in the Eastern Mediterranean Region. 2000.

2001

24. Filariasis elimination, Zanzibar. First round of mass drug administration. *Weekly Epidemiological Record*, 76 (51/52): 406-407, 2001.
25. Weekly Epidemiological Record, 2001, vol. 76, 20 [full issue]. *Weekly Epidemiological Record*, 76 (20): 149-156, 2001.
26. Lymphatic Filariasis. Social Mobilization and Training Team. (2001). 2001
27. Stop filariasis now: take your pills once a year. 2001.

28. Lymphoedema staff manual: treatment and prevention of problems associated with lymphatic filariasis. Part 1. Learner's Guide. 2001.

29. Lymphoedema staff manual: treatment and prevention of problems associated with lymphatic filariasis. Part 2. Tutor's Guide. 2001

2002

30. Lymphatic Filariasis: Progress report on mass drug administration in 2001. *Weekly Epidemiological Record*, 77(16): 125-131, 2002.

31. Global Programme to Eliminate Lymphatic Filariasis: Annual report on lymphatic filariasis 2001. 2002.

32. The global elimination of lymphatic filariasis: The story of Zanzibar. 2002.

33. Weekly Epidemiological Record, 2002, vol. 77, 22 [full issue]. Weekly Epidemiological Record, 77(22): 177-184, 2002.

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35. Guidelines for rapid assessment of *Loa loa.* 2002.

36. Report of an informal consultation on surgical approaches to the urogenital manifestations of lymphatic filariasis: 15-16 April 2002. 2002

37. Report of the second meeting of the Global Alliance to Eliminate Lymphatic Filariasis: out filariasis now. 2002.

38. PacELF Progress report Jan — Dec 2002 Our Work 2002. 2002.

39. PacELF Atlas (describes the filariasis situation and vectors in each PacELF member country), 2002.

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40. Global Programme to Eliminate Lymphati Filariasis: Annual report on lymphatic filariasis 2002. 2003.

41. Lymphatic filariasis：Progress report on the Programme in 2002. *Weekly Epidemiological Record*, 78 (20), 171-179, 2003.

42. The global elimination of lymphatic filariasis: the story of Egypt. 2003.

43. Support groups for women with lymphatic filariasis in Haiti / Jeannine Coreil, Gladys Mayard, and David Addiss. 2003.

44. Report on active surveillance for adverse events following the use of drug co-administrations in the Global Programme to Eliminate Lymphatic Filariasis. Weekly Epidemiological Record, 78(36):315-317, 2003.

45. The involvement of community-directed distributors of ivermectin in other health and development activities. Report of a multi-country study. 2003.

46. Training module on community home-based prevention of disability due to lymphatic filariasis. Part 1, Learner's guide. 2003

47. Training module on community home-based prevention of disability due to lymphatic filariasis. Tutor's guide. 2003.

48. Training module on community home-based prevention of disability due to lymphatic filariasis. Display charts. 2003.

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50. Technical Advisory Group on the global elimination of Lymphatic filariasis: report of the fourth meeting, Fondation Mérieux, Veyrier-du-Lac, Annecy, France, 25-28 March 2003. 2003.

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52. Our work PacELF Progress report 2003.

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54. Report on the mid-term assessment of microfilaraemia reduction in sentinel sites of 13 countries of the Global Programme to Eliminate Lymphatic Filariasis. Weekly Epidemiological Record, 79(40):358-365, 2004

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59. Technical Advisory Group on the Global Elimination of Lymphatic Filariasis (TAG-ELF): Report of the fifth meeting, Geneva, Switzerland, 3-6 February 2004. 2004.

60. Global strategic framework for integrated vector management. 2004

61. Our work PacELF Progress report 2004

62. PacELF handbook (PacELF manual, part 1), 2004

63. PacELF handbook (PacELF manual, part 2), 2004

2005

64. Global Programme to Eliminate Lymphatic Filariasis: Progress report for 2004. *Weekly Epidemiological Record*, 80(23): 202-212, 2005.

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73. Neglected tropical diseases: preventive chemotherapy and transmission control: soil-transmitted helminthiasis, onchocerciasis, lymphatic filariasis, schistosomiasis, Guinea-worm disease. 2006.

2007

74. Global programme to eliminate lymphatic filariasis: Progress report on mass drug administrations in 2006. Weekly Epidemiological Record, 82(42): 361 380, 2007.

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2008

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78. Conclusions of the meeting of the Technical Advisory Group on the Global Elimination of Lymphatic Filariasis, November 2007. Weekly Epidemiological Record, 83 (37/38), 341-347, 2008.
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2009

80. Global programme to eliminate lymphatic filariasis: Progress report on mass drug administration in 2008. Weekly Epidemiological Record, 84(42): 437 444, 2009.
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82. Report on the eighth meeting of the regional programme review group on the elimination of lymphatic filariasis. Cairo, Egypt, 17-18 March 2009.

2010

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91. Integrated vector management to control malaria and lymphatic filariasis— WHO position statement. 2011.

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95. Transmission assessment surveys in the Global Programme to Eliminate Lymphatic Filariasis: WHO position statement. Weekly Epidemiological Record, 87(48): 478-482, 2012.

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98. Accelerating work to overcome the global impact of neglected tropical diseases — A roadmap for implementation. 2012.

2013

99. Global programme to eliminate lymphatic filariasis: report of an informal meeting on transmission assessment surveys for review of the training modules and coordinaton for country support: WHO headquarters, Geneva, 12-13 September 2012. 2013.

100. Global programme to eliminate lymphatic filariasis: progress report, 2012. Weekly Epidemiological Record, 88(37): 389-399, 2013.

101. Lymphatic filariasis elimination programme in the South-East Asia: report of the regional capacity-building workshop on transmission assessment survey, India. 2013.

102. Towards eliminating lymphatic filariasis：progress in the South-East Asia Region. 2013

103. Training in monitoring and epidemiological assessment of mass drug administration for eliminating lymphatic filariasis：Learners' guide. 2013

104. Lymphatic filariasis：a handbook of practical entomology for national lymphatic filariasis elimination programmes. 2013

105. Thirteenth Meeting of the Western Pacific Regional Programme Review Group on Neglected Tropical Diseases, Manila, Philippines, 19 July 2013: meeting report. 2013.

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108. Sustaining the drive to overcome the global impact of neglected tropical diseases：second WHO report on neglected tropical diseases. 2013.

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2014

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111. Elimination of lymphatic filariasis in the South-East Asia Region: Report of the Tenth Meeting of the RPRG, Dili, Timor-Leste, 25-27 June 2013. 2014.

112. FAQs：Frequently asked questions on Lymphatic Filariasis (elephantiasis), 2014.

113. Fact sheet: Lymphatic filariasis. 2014.

114. Surveillance of lymphatic filariasis 5 years after stopping mass drug administration in Menoufiya Governorate, Egypt. *EMHJ*, 20(5): 295-299, 2014

115. Meeting of the International Task Force for Disease Eradication, January 2014. *Weekly Epidemiological Record*, 89(15): 153-160, 2014.

116. Health Systems Governance for universal health coverage action plan： department of health systems governance and financing. 2014.

2015

117. Global programme to eliminate lymphatic filariasis: progress report, 2014. Weekly Epidemiological Record, 90(38): 489-504, 2015.

118. Summary report on the Thirteenth meeting of the Regional Programme Review Group on Lymphatic Filariasis Elimination and other Preventive Chemotherapy Programmes, Khartoum, Sudan, 17-19 November 2014. 2015.

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122. Report on the Fourteenth meeting of the Regional Programme Review Group on lymphatic filariasis elimination and other preventive chemotherapy programmes, Cairo, Egypt, 12-14 October 2015. 2016.
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124. More than 556 million people receive treatment for lymphatic filariasis in 2015. News, 2016.
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126. Responding to failed transmission assessment surveys: Report of an ad hoc meeting: Strategic and technical advisory group for neglected tropical diseases subgroup on disease-specific indicators, 4 December 2015, Washington (DC), USA. 2016.
127. Meeting Report: Consultation to Accelerate Elimination of *Brugia malayi* Transmission in Indonesia and Malaysia, Kota Kinabalu, Malaysia, 13-15 December 2016: meeting report. 2016.
128. WHO congratulates 4 countries for eliminating lymphatic filariasis as a public health problem. News, 2016

2017

129. Summary of global update on preventive chemotherapy implementation in 2016: crossing the billion. Weekly Epidemiological Record, 40(92): 589-593, 2017.
130. Meeting of the International Task Force for Disease Eradication, June 2017. Weekly Epidemiological Record, 92(37): 537-556, 2017.
131. Guideline：alternative mass drug administration regimens to eliminate lymphatic filariasis. 2017.

132. Summary report on the sixteenth meeting of the Regional Programme Review Group on lymphatic filariasis elimination and other preventive chemotherapy programmes, Cairo, Egypt, 23-26 October 2017. 2017.

133. Validation of elimination of lymphatic filariasis as a public health problem. 2017.

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135. Crossing the billion: Lymphatic filariasis, onchocerciasis, schistosomiasis, soil-transmitted helminthiases and trachoma: Preventive chemotherapy for neglected tropical diseases. 2017.

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137. Informal Consultation on Post-elimination Surveillance of Neglected Tropical Diseases, Siem Reap, Cambodia, 13-14 June 2017: meeting report. 2017.

138. Finishing off lymphatic filariasis: How Maldives eliminated a once-prominent scourge. News, 2017.

139. Congratulations, Tonga! Pacific island state eliminates lymphatic filariasis as a public health problem. News, 2017.

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141. Elimination of Lymphatic Filariasis as a Public Health Problem in Thailand. Activities, 2017.

142. Unprecedented progress against neglected tropical diseases, WHO reports. News, 2017.

2018

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145. Programme Managers Meeting on Neglected Tropical Diseases (NTD) in the Pacific, Nadi, Fiji, 20-22 February 2018: meeting report. 2018.

146. WHO validates 3 more countries for eliminating lymphatic filariasis. News, 2018.

147. Lymphatic filariasis. 465 million treatments delivered through expanded coverage, combined medicines. News, 2018.

148. Egypt: first country in Eastern Mediterranean region to eliminate lymphatic filariasis. News, 2018

2019

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150. Report of the twenty-ninth meeting of the International Task Force for Disease Eradication, 15 January 2019. Weekly Epidemiological Record, 94(17): 204-210, 2019.
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152. Surgical approaches to the urogenital manifestations of lymphatic filariasis: Report from an informal consultation among experts. 2019.
153. Preventive chemotherapy: Tools for improving the quality of reported data and information: a field manual for implementation. 2019.
154. Regional plan of action 2019-2023 for implementation of the global vector control response 2017-2030, 2019
155. Despite challenges, Yemen eliminates lymphatic filariasis. News, 2019.
156. Kiribati eliminates lymphatic filariasis. News, 2019.

2020

157. Global programme to eliminate lymphatic filariasis: progress report, 2019. Weekly Epidemiological Record, 95(43): 509-524, 2020.
158. Ending the neglect to attain the sustainable development goals：a road map for neglected tropical diseases 2021-2030：overview. 2020
159. Ending the neglect to attain the sustainable Development Goals: A road map for neglected tropical diseases 2021-2030. 2020.
160. Thirteenth meeting of the WHO Strategic and Technical Advisory Group for Neglected Tropical Diseases, 15-17 September 2020. 2020.
161. Programme Managers Meeting to Accelerate Control and Elimination of Neglected Tropical Diseases in the Western Pacific Region, Virtual meeting, 2020：meeting report. 2020.
162. Indonesia firmly committed to eliminating lymphatic filariasis as a public health problem. News, 2020

2021

163. Global programme to eliminate lymphatic filariasis: progress report, 2020. *Weekly Epidemiological Record*, 96(41): 497-508, 2021.
164. Diagnostic test for surveillance of lymphatic filariasis：target product profile. 2021.

165. Diagnostic test for lymphatic filariasis to support decisions for stopping triple-therapy mass drug administration：target product profile. 2021.

166. Lymphatic filariasis：managing morbidity and preventing disability：an aide-mémoire for national programme managers, second edition: web annex B：lymphatic filariasis situation analysis tool for morbidity management and disability prevention. 2021.

167. Papua New Guinea steps up efforts to eliminate lymphatic filariasis. News, 2021.

2022

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171. Ending the neglect to attain the sustainable development goals：a strategic framework for integrated control and management of skin-related neglected tropical diseases. 2022

172. Standard operating procedures for supply chain management of health products for neglected tropical diseases amenable to preventive chemotherapy. 2022.

2023

173. Global programme to eliminate lymphatic filariasis: progress report, 2022. *Weekly Epidemiological Record*, 98(41): 489-502, 2023.

174. Lymphatic filariasis. Fact Sheet, 2023.

175. Meeting of National Programme Managers for lymphatic filariasis, soil transmitted helminthiasis and schistosomiasis and the Regional Programme Review Group of the WHO South-East Asia Region: 28 June-1 July 2022, New Delhi, India. 2023.

176. WHO announces the elimination of lymphatic filariasis as a public health problem in the Lao People’s Democratic Republic. 2023 Departmental update. News, 2023.

177. 19th Regional Lymphatic Filariasis Elimination Program Managers Meeting. 18th Regional Program Review Group Meeting, 25-26 August 2020. 2023.

178. Bangladesh eliminates lymphatic filariasis as a public health problem. News, 2023.

2024

179. Global programme to eliminate lymphatic filariasis: progress report, 2023. *Weekly Epidemiological Record*, 99(40): 565-576, 2024.
180. Brazil eliminates lymphatic filariasis as a public health problem. News, 2024.
181. Elimination of lymphatic filariasis as a public health problem in Timor-Leste. News, 2024.
182. Lymphatic filariasis: Fact Sheet, 2024.
183. World health statistics 2024：monitoring health for the SDGs, sustainable development goals. 2024.
184. Meeting of the National Programme Managers and Regional Technical Advisory Group for Lymphatic Filariasis Elimination: Kathmandu, Nepal, 25-27 June 2024. 2024.

Appendix 4
Chronology (1947-2024)

Abbreviations
ELISA: Enzyme-Linked Immunosorbent Assay
BMGF: Bill & Melinda Gates Foundation
DEC: Diethylcarbamazine
DOLF: Death to Onchocerciasis and Lymphatic Filariasis Project
GAELF: Global Alliance to Eliminate Lymphatic Filariasis
GPELF: Global Programme to Eliminate Lymphatic Filariasis
GSK: GlaxoSmithKline
ICT: Immunochromatographic Test
IVM: Integrated Vector Management
LF: Lymphatic Filariasis
MMDP: Morbidity Management and Disability Prevention
NTD: Neglected Tropical Disease
PacELF: Pacific Programme to Eliminate Lymphatic Filariasis
SDGs: Sustainable Development Goals
TAS: Transmission Assessment Survey
TDR: Special Programme for Research and Training in Tropical Diseases
WHOCC: WHO Collaborating Centre for Lymphatic Filariasis

Year	Science_Research	Strategy_Policy	Implementation	WHO Publications
1947	Confirmation of DEC efficacy against LF			
1961		First WHO LF Expert Committee meeting (identification of endemic areas, standardization of diagnosis and treatment, strategy for elimination)		1
1962	Promotion of vector mosquito research through establishment of filariasis research unit			
1965		WHO inter-regional seminar (review of LF elimination programme)		
1966		Second WHO LF Expert Committee meeting (new drug development and sanitation improvement due to rapid urbanization)		2
1973		Third WHO LF Expert Committee meeting (new diagnostics and drug development beyond DEC)		3
1975	Promotion of tropical disease research through establishment of WHO TDR			
1976	Report of DEC side effects in co-infected Onchocerciasis and Loa loa patients			
1979	Discovery of ivermectin			
	Confirmation of single-dose			

1982	ivermectin efficacy for onchocerciasis → shift from vector control to mass drug administration			
1983		Fourth WHO LF Expert Committee meeting (no major scientific progress but rising demand for LF elimination)		4
1986	Discovery of filarial antigen			
1987	Confirmation of ivermectin efficacy for LF			5
1990	Development of antigen detection using ELISA			
1991	Report of ivermectin side effects in co-infected Onchocerciasis and Loa loa patients	Fifth WHO LF Expert Committee meeting (simple diagnostics, new drugs, disease management)	Merck announces free ivermectin donation for onchocerciasis	6
1993		International Task Force for Disease Eradication identifies six eradicable diseases (LF, polio, cysticercosis, dracunculiasis, mumps, rubella)		7, 8

1994	Confirmation of combined DEC + ivermectin efficacy			
1995				9
1996	Confirmation of annual single-dose DEC efficacy over 5 years → foundation of MDA strategy			
1997	Confirmation of combined DEC+albendazole and ivermectin+albendazole efficacy; ICT development	World Health Assembly resolves to eliminate LF as a public health problem		10, 11, 12
1998	Establishment of LF Technical Advisory Group and LF Programme Review Group		GSK announces free albendazole donation; Merck announces free ivermectin donation	13
1999			PacELF launched; Samoa begins MDA under WHO strategy	14, 15, 16, 17
2000		Start of GPELF (WHO HQ secretariat, regional staff deployment)	GAELF, LF-WHOCC established; GAELF1 meeting; 80 endemic countries	18, 19, 20, 21, 22, 23
2001	LF Programme Review Group reorganized into Regional Programme Review Group			24, 25, 26, 27, 28, 29, 30, 31
2002			GAELF2 meeting "To accelerate LF elimination"	32, 33, 34, 35, 36, 37, 38, 39, 40, 41
2003			Three countries added as endemic (total 83)	42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52
2004		Global strategic framework for ivermectin	GAELF3 meeting "Taking action to free the world from LF"	53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64

2005	BMGF agrees to support major GPELF challenges	WHO establishes NTD Department	1.3 billion require MDA; 380 million treated	65, 66, 67, 68, 69, 70
2006	Integration of LF Technical Advisory Group into NTD-STAG; Anti-Wolbachia Consortium established		GAELF4 meeting; 1.3 billion require MDA; 170 million treated	71, 72, 73, 74, 75
2007			1.3 billion require MDA; 550 million treated; China validated for LF elimination (82 endemic countries) Note 1	76, 77, 78
2008		WHO guidance on vector control using ivermectin	GAELF5 meeting; 1.3 billion require MDA; 500 million treated; Korea validated for LF elimination (81 endemic countries) Note2	79, 80
2009			1.3 billion require MDA; 500 million treated	81, 82, 83
2010	DOLF established	WHO GPELF Strategic Plan 2010–2020	GAELF6 meeting; 1.39 billion require MDA; 470 million treated; 9 countries validated (72 endemic)	84, 85, 86, 87, 88
2011		WHO guidance on vector control for malaria & LF	1.4 billion require MDA; 540 million treated; South Sudan independence (73 endemic)	89, 90, 91, 92, 93, 94

Note1: See reference GAELF4.

Note2: See reference GAELF5.

2012	Eisai DEC tablets receive WHO prequalification	WHO Roadmap to accelerate NTD elimination	GAELF7 meeting	95, 96, 97, 98, 99, 100
2013		WHO MMDP handbook; WHO TAS manual; WHO vector control handbook	1.24 billion require MDA; 440 million treated	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111
2014			1.1 billion require MDA; 560 million treated; GAELF8 meeting	112, 113, 114, 115, 116, 117, 118
2015			940 million require MDA; 560 million treated; Gambia validated; 6 countries validated	119, 120, 121, 122, 123, 124, 125, 126
2016		WHO handbook on integrated LF–onchocerciasis programmes	860 million require MDA; 500 million treated; 9 countries validated; new diagnostic partnership announced; GAELF9 meeting	127, 128, 129
2017		WHO guidelines on LF elimination verification; WHO guidelines on MDA co- administration	890 million require MDA; 470 million treated; 11 countries validated; Eisai & Merck extend donations	130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143
2018			890 million require MDA; 560 million treated; 14 countries validated; GAELF10 meeting	144, 145, 146, 147, 148, 149

2019			860 million require MDA; 540 million treated; 17 countries validated	150, 151, 152, 153, 154, 155, 156, 157
2020			COVID-19; 860 million require MDA; 360 million treated; GAELF11 meeting	158, 159, 160, 161, 162, 163, 177
2021		WHO NTD Roadmap 2021–2030; updated MMDP guidelines	COVID-19; 880 million require MDA; 360 million treated; World NTD Day established	164, 165, 166, 167, 168
2022		WHO strategy on integrated skin NTDs	COVID-19; 790 million require MDA; 330 million treated; Kigali Declaration commitments; continued pharma support	169, 170, 171, 172, 173
2023			660 million require MDA; 410 million treated; 19 countries validated	174, 175, 176, 178, 179
2024			21 countries validated for LF elimination	180, 181, 182, 183, 184

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