21

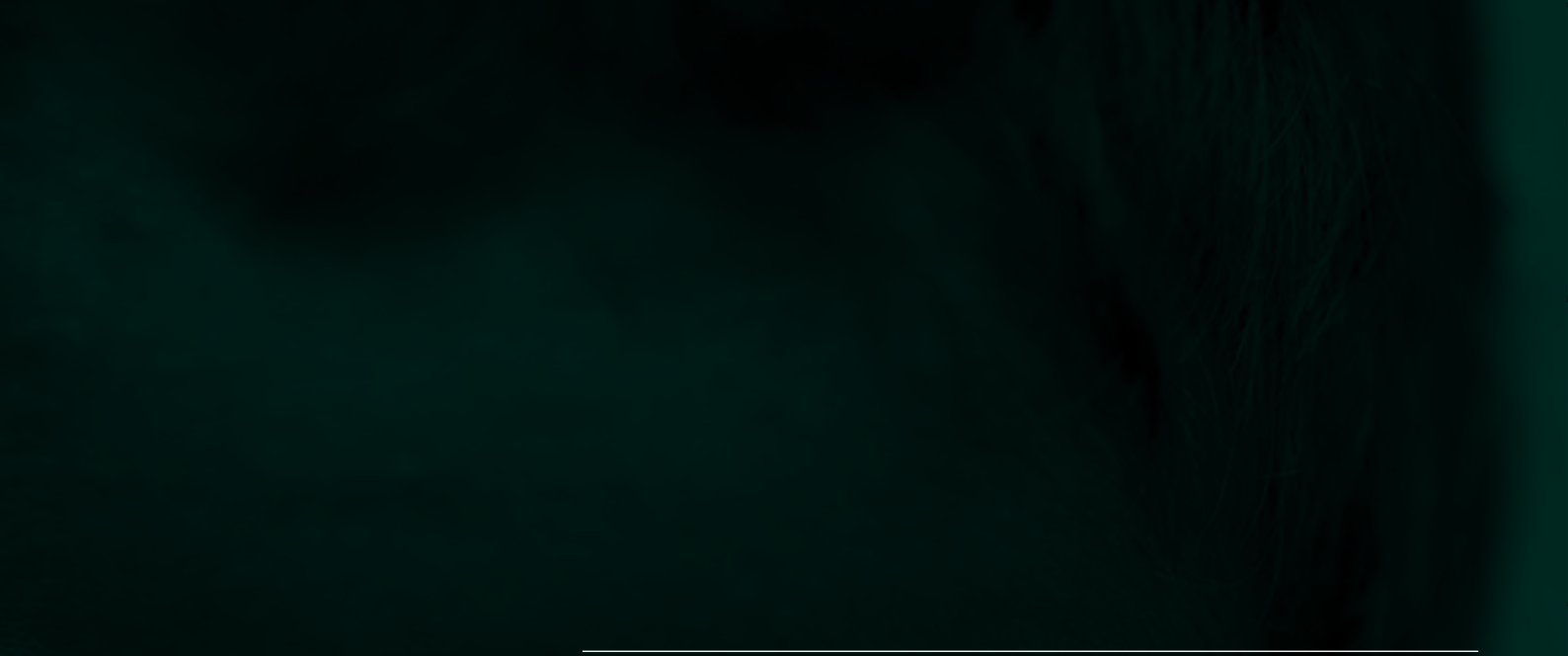
World Health Organization

Buruli ulcer
Chagas disease
Dengue and chikungunya
Dracunculiasis
Echinococcosis
Foodborne trematodiases
Human African trypanosomiasis
Leishmaniasis
Leprosy
Lymphatic filariasis
Mycetoma, chromoblastomycosis and other deep mycoses
Onchocerciasis
Rabies
Scabies and other ectoparasitoses
Schistosomiasis
Soil-transmitted helminthiases
Snakebite envenoming
Taeniasis and cysticercosis
Trachoma
Yaws

Ending the neglect to attain the Sustainable Development Goals

A road map for neglected tropical diseases 2021–2030

30



Ending the neglect to attain the Sustainable Development Goals: a road map for neglected tropical diseases 2021–2030

ISBN 978-92-4-001035-2 (electronic version)

ISBN 978-92-4-001036-9 (print version)

Suggested citation. Ending the neglect to attain the Sustainable Development Goals: a road map for neglected tropical diseases 2021–2030. Geneva: World Health Organization; 2020. Licence: CC BY-NC-SA 3.0 IGO.

Cataloguing-in-Publication (CIP) data. CIP data are available at http://apps.who.int/iris.

Sales, rights and licensing. To purchase WHO publications, see http://apps.who.int/bookorders. To submit requests for commercial use and queries on rights and licensing, see http://www.who.int/about/licensing.

Design and layout by Big Mouth Gets.

The definitive version of the road map can be found in the official records of the Seventy-third World Health Assembly (document WHA73/2020/REC/1, Annex 8).

Neglected tropical diseases (NTDs) are ancient diseases of poverty that impose a devastating human, social and economic burden on more than 1 billion people worldwide, predominantly in tropical and subtropical areas among the most vulnerable, marginalized populations.

CONTENTS

Nine years have elapsed since the World Health Organization (WHO) published its first road map for neglected tropical diseases, which set targets for 2020. With exemplary country leadership and the continued support of industry and partners, we have been able to push back many of these diseases, bringing some close to elimination and eradication.

However, despite substantial progress in reducing the overall burden, many of the targets set for 2020 were not achieved.

This road map builds on past lessons and experiences so we can better understand emerging challenges. Over the next decade, we will move from a disease-specific to an integrated approach that cuts across all 20 diseases and disease groups, to ensure country ownership and leadership, to work even more closely with countries and partners, and to promote the development of new tools for prevention, diagnosis and treatment.

We will also work with other programmes and sectors to optimize our strategy to achieve the targets: by 2030, we aim to free more than 1 billion people who currently require interventions against neglected tropical diseases, and save millions more from catastrophic out-of-pocket expenditure.

In the same spirit, the road map highlights the need for innovative approaches to achieve maximum efficiency and scalability through enhanced capacity, increased country commitment including domestic funding, and external resource mobilization. In short, this road map places people and communities at the centre of efforts to improve their health and welfare.

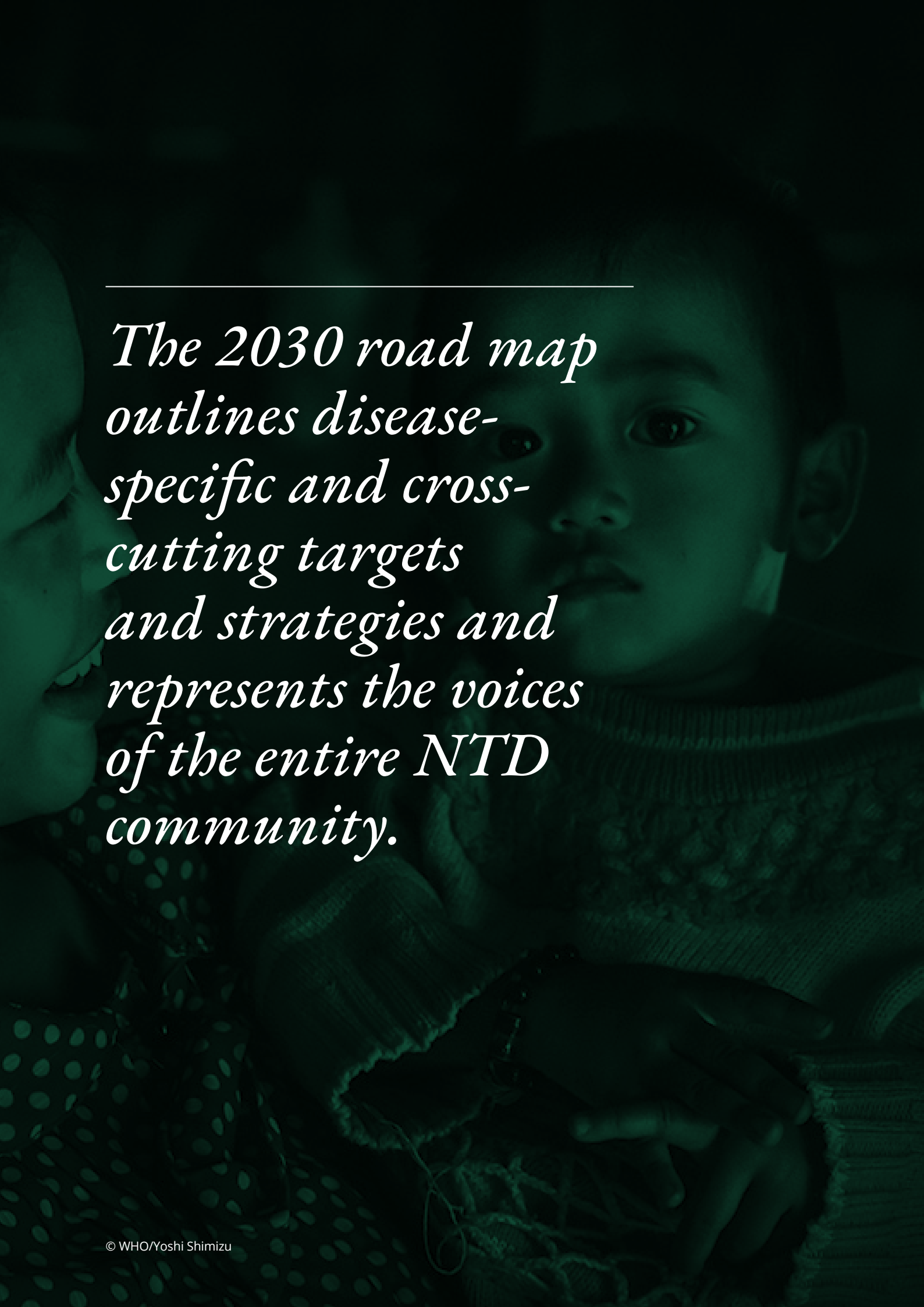
This new road map is our collective vision and was developed over the past two years through extensive consultations. WHO is committed to working with every country and partner to better deliver interventions in a coordinated manner and improve the cost–effectiveness and coverage of programmes that will guarantee that the poorest have enhanced access to quality-assured, effective and safe medicines and diagnostics.

As we demonstrated during the COVID-19 pandemic, working across sectors in unity and solidarity is not just a concept but a powerful force. This road map unites us all to work together to free those afflicted by neglected tropical diseases from unnecessary suffering, stigmatization and neglect.

The countdown to 2030 has begun: we know the destination, and we have a new road map. Now it's time to move.

Dr Tedros Adhanom Ghebreyesus
Director-General
World Health Organization

© WHO/Christopher Black



The 2030 road map outlines disease-specific and cross-cutting targets and strategies and represents the voices of the entire NTD community.

Ending the neglect to attain the Sustainable Development Goals: a road map for neglected tropical diseases 2021–2030 was endorsed by the Seventy-third World Health Assembly pursuant to decision EB146(9) of the 146th session of the Executive Board in 2020 requesting the Director-General to develop the road map for 2021–2030. Work was initiated in 2018 at the request of the Strategic and Technical Advisory Group for Neglected Tropical Diseases.

The Steering Committee was chaired by Mwelecele Ntuli Malecela, Director, Department of Control of Neglected Diseases, with members from the WHO regional offices for Africa (Maria Rebollo Polo and Alexandre Tiendrebeogo), the Americas (Luis Castellanos and Santiago Nicholls), South-East Asia (Mohammed Jamsheed and Zaw Lin), Europe (Elkhan Gasimov), the Eastern Mediterranean (Hoda Atta and Supriya Warusavithana) and the Western Pacific (Aya Yajima), who provided overall guidance and reviewed the concepts and drafts.

The road map team comprised Bernadette Abela-Ridder, Gautam Biswas and Pamela Sabina Mbabazi (Department of Control of Neglected Tropical Diseases), supported by Matt Craven, Annabelle Gerber, Lars Hartenstein and Jan Vlcek (McKinsey & Company), who developed the concept and framework, facilitated consultations with countries and stakeholders and drafted the document.

Technical focal points in the Department of Control of Neglected Tropical Diseases (Pedro Albajar Viñas, Kingsley Asiedu, Paul Cantey, Daniel Argaw Dagne, José Ramon Franco-Miguell, Albis Gabrielli, Amadou Garba Djirmay, Saurabh Jain, Jonathan King, Antonio Montresor, Denise Mupfasoni, José Ruiz-Postigo, Gerardo Priotto, Dieudonné Sankara, Anthony Solomon, Afework Tekle, Raman Velayudhan, David Williams and Rajpal Yadav) prepared the disease summaries. The online survey and epidemiological data were analysed by Junerlyn Agua, Lise Grout and Alexei Mikhailov. Input on health economics was provided by Xiao Xian Huang. Communication was supported by Ashok Moloo. Content creation was overseen by Karen Ciceri-Reynolds, Chantal Berthoud, Raquel Mercado and Linda Aimé.

The Strategic and Technical Advisory Group for Neglected Tropical Diseases reviewed the evidence summaries and developed the recommendations. Its members included Riadh Ben Ismail (Tunisia), Lucille Blumberg (South Africa), the late Marleen Boelaert (Belgium), Marcos Boulos (Brazil), Akshay Chandra Dhariwal (India), Rosa Castalia França Ribeiro (Brazil), Margaret Gyapong (Ghana), Steve Lindsay (United Kingdom), David Mabey (United Kingdom), NG Lee Ching (Singapore), Naseem Salahuddin (Pakistan) and Ning Xiao (China).

Directors and technical officers from cross-cutting departments including Pedro Alonso (Global Malaria Programme), Anshu Banerjee (Maternal, Newborn, Child and Adolescent Health and Ageing), Sophie Boisson (Water, Sanitation, Hygiene and Health), Emer Cooke (Regulation and Prequalification), Devora Kestel (Mental Health and Substance Use), Maria Neira (Environment, Climate Change and Health), John Reeder (Special Programme for Research and Training in Tropical Diseases), Agnès Soucat (Health Systems Governance and Financing) and Peter Singer (Special Advisor, Office of the Director-General) informed the discussions.

The final draft was reviewed by a group of independent expert peers: Sir Roy Anderson, Daniel Boakye, Nat Brittain, Nilanthi de Silva, Paul Emerson, Dirk Engels, Heather Ferguson, Leda Hernandez, Julie Jacobson, Martin Kollmann, Ashok Kumar, Stefanie Meredith, David Molyneux, Eric Ottesen, Katey Owen and Emily Wainwright.

The Bill & Melinda Gates Foundation and the United States Agency for International Development contributed funding to this project.

© WHO/Olivier Asselin

Glossary

The definitions given below apply to the terms as used in this document. They may have different meanings in other contexts.

Control: Reduction of disease incidence, prevalence, morbidity and/or mortality to a locally acceptable level as a result of deliberate efforts; continued interventions are required to maintain the reduction. Control may or may not be related to global targets set by WHO.

Coordination: Collaboration among adjacent sectors and programmes, within and beyond health, in the broader NTD network. Sectors such as vector control, animal health and WASH make critical contributions to progress against NTDs, and working together more effectively will accelerate and sustain progress towards elimination and control of NTDs.

Disability-adjusted life year (DALY): A measure of overall disease burden, expressed as the number of years lost due to ill health, disability or early death; introduced in the 1990s to compare overall health and life expectancy in different countries. DALYs for a disease or health condition are calculated as the sum of the years of life lost due to premature mortality in the population and the years lost due to disability resulting from the health condition or its consequences.

Disability: Inability to adequately or independently perform routine daily activities such as walking, bathing and toileting; the negative aspects of the interaction between a person with a health condition and his or her context (environmental and personal factors).

Elimination (interruption of transmission): Reduction to zero of the incidence of infection caused by a specific pathogen in a defined geographical area, with minimal risk of reintroduction, as a result of deliberate efforts; continued action to prevent re-establishment of transmission may be required. Documentation of elimination of transmission is called **verification**.

Elimination as a public health problem: A term related to both infection and disease, defined by achievement of measurable targets set by WHO in relation to a specific disease. When reached, continued action is required to maintain the targets and/or to advance interruption of transmission. Documentation of elimination as a public health problem is called **validation**.

Equity: The absence of avoidable or remediable differences among groups of people defined socially, economically, demographically, geographically or by sex.


© WHO/Asad Zaidi

Eradication: Permanent reduction to zero of the worldwide incidence of infection caused by a specific pathogen, as a result of deliberate efforts, with no risk of reintroduction. Documentation of eradication is termed **certification**.

Extinction: Eradication of a specific pathogen, so that it no longer exists in nature or in the laboratory, which may occur with or without deliberate work.

Hygiene: Conditions or practices conducive to maintaining health and preventing disability.

Integrated vector management: A rational decision-making process to optimize the use of resources for vector control.

Integration: Grouping or "packaging" of several diseases, depending on their burden in countries, to facilitate joint delivery of interventions through a common platform such as preventive chemotherapy and use of multiplex diagnostics, and integrated monitoring, evaluation and reporting for all relevant endemic NTDs.

Mainstreaming: Planning and delivery of interventions against NTDs through the national health system infrastructure to build capacity and contribute to sustainable, efficient disease prevention and control.

Mass drug administration (MDA): Distribution of medicines to the entire population of a given administrative setting (for instance, state, region, province, district, subdistrict or village), irrespective of the presence of symptoms or infection; however, exclusion criteria may apply. (In this document, the terms mass drug administration and preventive chemotherapy are used interchangeably.)

Monitoring and evaluation: Processes for improving performance and measuring results in order to improve management of outputs, outcomes and impact.

Morbidity: Detectable, measurable clinical consequences of infections and disease that adversely affect the health of individuals. Evidence of morbidity may be overt (such as the presence of blood in the urine, anaemia, chronic pain or fatigue) or subtle (such as stunted growth, impeded school or work performance or increased susceptibility to other diseases).

Platform: Structure through which public health programmes or interventions are delivered.

Preventive chemotherapy: Large-scale use of medicines, either alone or in combination, in public health interventions. Mass drug administration is one form of preventive chemotherapy; other forms could be limited to specific population groups such as school-aged children and women of childbearing age. (In this document, the terms preventive chemotherapy and mass drug administration are used interchangeably.)

Reverse logistics: Relating to the reuse of products and materials, it is the process of moving goods from their typical final destination for the purpose of capturing value or proper disposal.

Ending the neglect to attain the Sustainable Development Goals

Neglected tropical diseases (NTDs) are ancient diseases of poverty that impose a devastating human, social and economic burden on more than 1 billion people worldwide, predominantly in tropical and subtropical areas among the most vulnerable, marginalized populations.

Driving progress

Since WHO's first road map for the prevention and control of NTDs (*Accelerating work to overcome the global impact of neglected tropical diseases*) was published in 2012, substantial progress has been made. Today, 600 million fewer people require interventions against several NTDs than in 2010, and 42 countries, territories and areas have eliminated at least one disease.

Dracunculiasis is on the verge of eradication, with 54 human cases reported in four countries in 2019; lymphatic filariasis and trachoma have been eliminated as public health problems in 17 and 10 countries, respectively; onchocerciasis has been eliminated in four countries in the Region of the Americas; the annual number of cases of human African trypanosomiasis has fallen from more than 7000 in 2012 to fewer than 1000 in 2019, halving the original target of 2000 cases by 2020; and the number of new leprosy cases reported globally has continued to decline since 2010 at an average of 1% per year after most endemic countries achieved elimination as a public health problem, defined as less than one case on treatment per 10 000 population.[1]

Progress against NTDs has alleviated the human and economic burden they impose on the world's most disadvantaged communities.

Over the past nine years, it has demonstrated the effectiveness of aligning the work of Member States with that of diverse partners. Two important facts have emerged, namely the recognition that:

(i) interventions to prevent and control NTDs are one of the "best buys" in global public health, yielding an estimated net benefit to affected individuals of about US$ 25 per US$ 1 invested in preventive chemotherapy; and

(ii) NTDs are important tracers for identifying disparities in progress towards both universal health coverage and equitable access to high-quality health services.

Renewing momentum

Despite the substantial progress that has been made since 2010, many of the targets set for 2020 in the earlier road map were not met. The new road map identifies critical gaps and the actions required to reach the targets set for 2030, established through global consultation. Experience from the past decade shows that further multisectoral action is required for all 20 diseases and disease groups, particularly in diagnostics, monitoring and evaluation, access and logistics, and advocacy and funding. Ambitious, impact-oriented targets are required to achieve the Sustainable Development Goals (SDGs) and accelerate control and elimination.

Concerted action in multiple dimensions and agile responses to challenges will be necessary to achieve the targets. The recognition, for example, of *Dracunculus medinensis* infection in mammals other than human beings shows how challenges to eradication can manifest in the last stages – the last mile – of eradication. Circumstances such as epidemics, political instability, migration, the consequences of climate change and antimicrobial resistance increase the complexity of the situation and will require additional action.

[1] See Global Health Observatory (GHO) data: https://www.who.int/data/gho/data/themes/neglected-tropical-diseases


© WHO/Simon Lim


© WHO/Olivier Asselin


© WHO/Andy Craggs

Targets and strategies for the next decade

The road map for 2021–2030 sets global targets and milestones to prevent, control, eliminate or eradicate 20 diseases and disease groups. It also sets cross-cutting targets aligned with both WHO's Thirteenth General Programme of Work, 2019–2023 and the SDGs, with strategies for achieving the targets during the next decade.

The new road map was prepared by extensive global consultation. This process involved regional workshops with managers of national NTD prevention and control programmes, meetings with stakeholders in NTDs and related areas of work, country workshops with stakeholders in NTDs and related areas of work, input from disease experts, disease modellers, donors and partners obtained through more than 100 bilateral interviews and consideration of more than 300 responses from three rounds of online consultations. The document therefore reflects the perspectives of Member States and a wide range of stakeholders.

The road map also describes the integrated approaches needed to achieve these targets through cross-cutting activities that intersect multiple diseases. It is built on three pillars that will support global efforts to control, eliminate and eradicate neglected tropical diseases:

Pillar 1	*Accelerate programmatic action*
Pillar 2	*Intensify cross-cutting approaches*
Pillar 3	*Change operating models and culture to facilitate country ownership*

Pursuant to decision EB146(9) of the Executive Board at its 146th session in February 2020, the road map was submitted to the Seventy-third World Health Assembly for consideration and endorsed by Member States in November 2020.

Integrating and mainstreaming approaches

Continued programmatic action is called for, particularly in targeted areas where serious gaps exist across multiple diseases. Adequately structured operational and implementation investigations, including community-based and applied research, are also essential for building a solid foundation on which effective NTD interventions can be designed and delivered.

More radical change is needed for approaches to be integrated and mainstreamed into national health systems and for coordination of actions across sectors. Such cross-cutting concepts are not new; they are outlined in various existing NTD plans, but their operationalization has been problematic in some instances.

The road map aims to renew momentum through its proposed concrete actions within integrated platforms for delivery of interventions, and thereby to improve the cost–effectiveness, coverage and geographical reach of programmes. Strengthening the capacity of national health systems will ensure delivery of interventions through existing infrastructures, improve the sustainability and efficiency of interventions and ensure that patients have equitable access to all aspects of treatment, care and support. Close coordination and multisectoral action within and beyond the health sector, encompassing not only vector control, water and sanitation, animal and environmental health and health education, but also, for instance, education and disability, will maximize synergies.

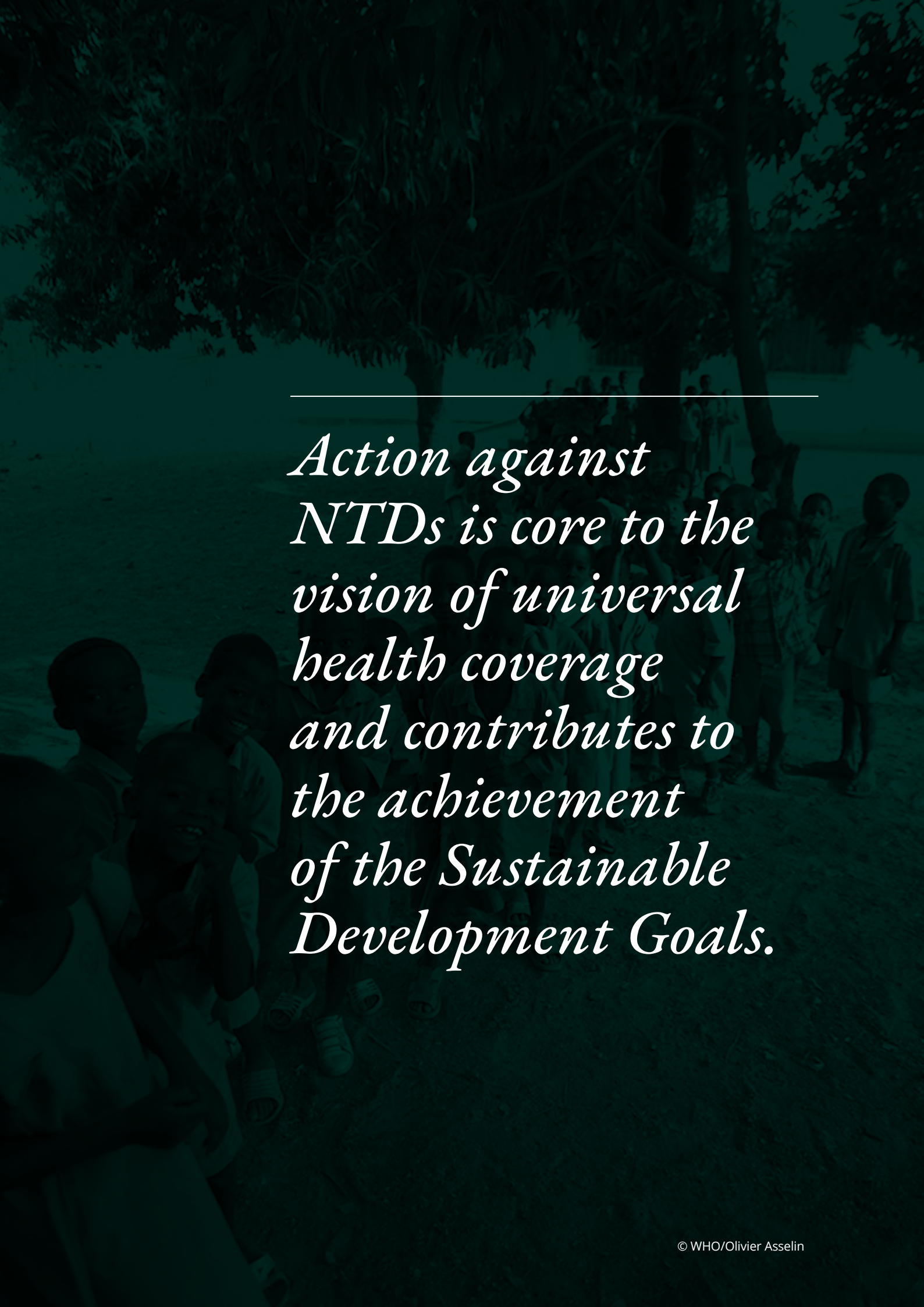
Delivering results, achieving impact

Countries are both the drivers and the beneficiaries of progress towards the 2030 NTD targets. National and local governments must therefore lead work to define agendas and realize their objectives, with financing partly or fully from domestic funds. Countries must integrate and prioritize prevention and control of endemic NTDs in national health plans and dedicate a corresponding line item in national health budgets. Multisectoral action must be fostered and planned well in advance at ministerial and higher levels in order to build the high-level political will required to support NTD plans.

As countries define their national NTD plans, the support of partners will be essential for filling gaps, strengthening capacity and enabling targets to be achieved. Deliberate efforts are needed to engage the community, especially, young people, in processes that support national NTD programme implementation, follow-up and review.

Given the shift to cross-cutting approaches, structures and ways of working may have to be adapted accordingly, for example by making funding streams more flexible and reporting structures less cumbersome.

Much work will be required during the next decade to reach the at least 1.74 billion people who still require interventions against NTDs. These diseases of poverty must be overcome in order to attain the SDGs and ensure universal health coverage. The road map sets out global targets and actions to align and re-focus the work of stakeholders during the next decade. It encourages all parties to evaluate the efficiency and effectiveness of their contributions and approaches and seeks to foster greater collaboration and openness in order to lessen and remove the profound global burden of NTDs.



Action against NTDs is core to the vision of universal health coverage and contributes to the achievement of the Sustainable Development Goals.

Buruli ulcer

Chagas disease

Dengue and chikungunya

Dracunculiasis

Echinococcosis

Foodborne trematodiases

Human African trypanosomiasis

Leishmaniasis

Leprosy

Lymphatic filariasis

Mycetoma, chromoblastomycosis and other deep mycoses

Onchocerciasis

Rabies

Scabies and other ectoparasitoses

Schistosomiasis

Soil-transmitted helminthiases

Snakebite envenoming

Taeniasis and cysticercosis

Trachoma

Yaws

01

Context and purpose of the road map

Context and purpose of the road map


© WHO/Anna Kari

The road map for neglected tropical diseases 2021–2030 is WHO's second blueprint for preventing, controlling and, where feasible, eliminating and eradicating neglected tropical diseases. It follows the first road map, *Accelerating work to overcome the global impact of neglected tropical diseases*, issued in 2012 *(1)*, which set out global targets and milestones to 2020 for the 17 NTDs that then comprised WHO's NTD portfolio. The aim of the new road map is to facilitate alignment among Member States and other stakeholders and to accelerate progress towards the prevention, control, elimination and eradication of the 20 NTDs and disease groups now prioritized by WHO and attaining the SDGs.

This text issues a call to action for Member States, donors, implementing partners, disease experts and all other stakeholders to align their strategies and plans towards the prevention of infections and alleviation of the suffering of people affected by WHO's expanded portfolio of 20 diseases and disease groups.[1]

The NTDs prioritized by WHO are a diverse set of 20 diseases and disease groups with a singular commonality: their devastating impact on impoverished communities.

The 2030 road map covers a medically diverse set of diseases and disease groups[2] that disproportionately affect people living in poverty, predominantly in tropical and subtropical areas. NTDs impose a human, social and economic burden on more than one billion people in all countries of the world, particularly in low-income countries and the most disadvantaged communities in middle-income countries **(Fig. 1)**. More than 200 000 people die each year from snakebite envenoming, rabies and dengue alone, and lack of timely access to affordable treatment leaves hundreds of millions severely disabled, disfigured or debilitated, often resulting in social exclusion, stigmatization and discrimination.

[1] Buruli ulcer; Chagas disease; dengue and chikungunya; dracunculiasis; echinococcosis; foodborne trematodiases; human African trypanosomiasis; leishmaniasis; leprosy; lymphatic filariasis; mycetoma, chromoblastomycosis and other deep mycoses; onchocerciasis; rabies; scabies and other ectoparasitoses; schistosomiasis; soil-transmitted helminthiases; snakebite envenoming; taeniasis and cysticercosis; trachoma; and yaws.

[2] All infectious diseases except snakebite envenoming.

The NTDs prioritized by WHO are a diverse set of 20 diseases and disease groups with a singular commonality: their devastating impact on impoverished communities.

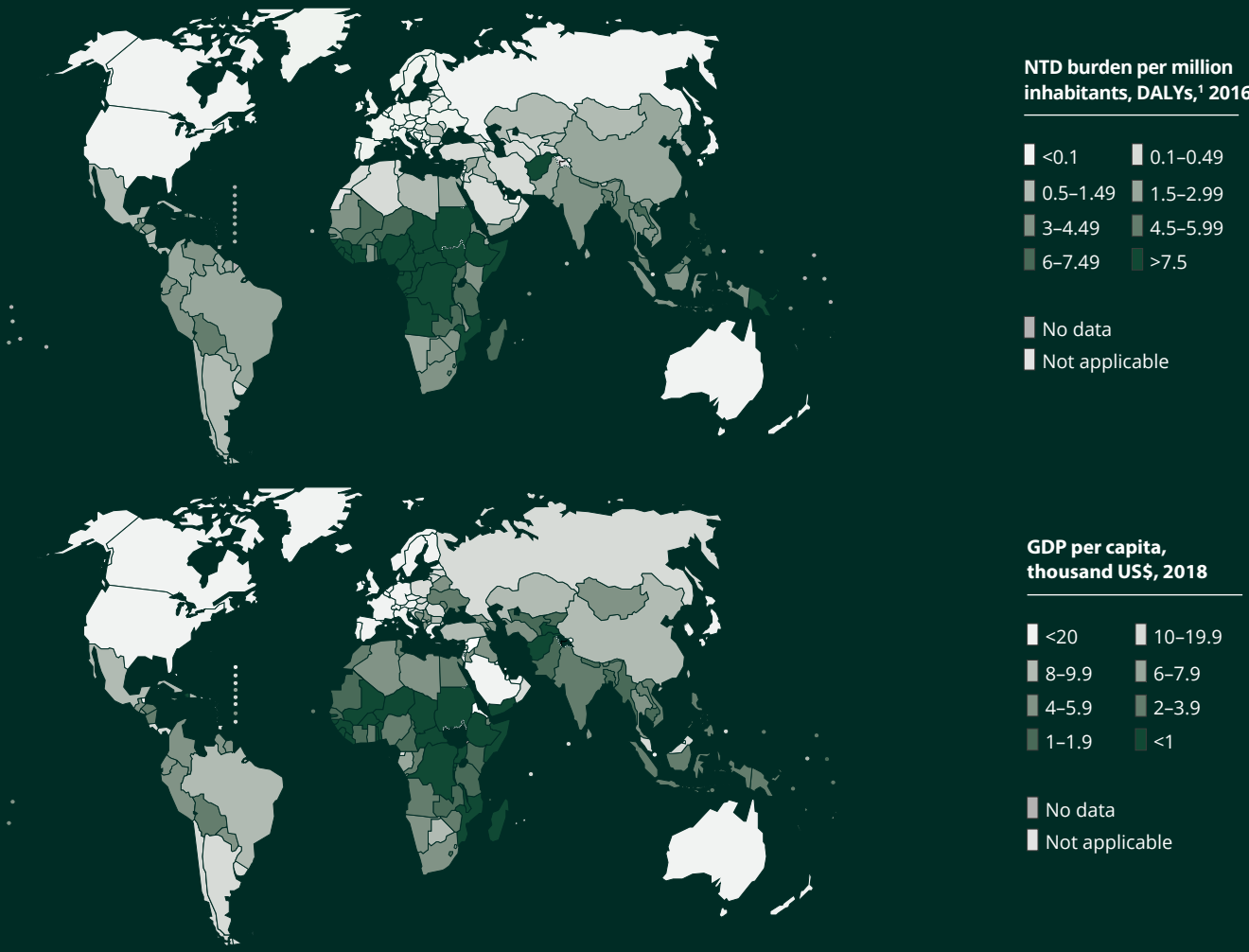


Fig. 1. Geographical spread of the NTD burden, by DALY and gross domestic product

[1] Data for cumulative DALYs are available only for Chagas disease, cysticercosis, dengue, echinococcosis, human African trypanosomiasis, leishmaniasis, leprosy, lymphatic filariasis, onchocerciasis, rabies, schistosomiasis, soil-transmitted helminthiases and trachoma.
Note: The number of NTD-related DALYs would be significantly higher if issues such as stigmatization, mental health (e.g. anxiety and depression) and co-morbidity were considered.
Data source: WHO (https://www.who.int/healthinfo/global_burden_disease/estimates/en/index1.html) for DALYs and the World Bank (https://data.worldbank.org/indicator/NY.GDP.PCAP.CD) for GDP per capita.


© WHO/Yoshi Shimizu

NTDs cost developing communities the equivalent of billions of United States dollars each year in direct health costs, loss of productivity and reduced socioeconomic and educational attainment *(2)*. NTDs also place considerable financial strain on patients and their families – human African trypanosomiasis in the Democratic Republic of the Congo costs affected households in a typical rural community more than 40% of their annual household income *(3)*, and up to 75% of households affected by visceral leishmaniasis in Bangladesh *(4,5)*, India *(6)*, Nepal *(7)* and Sudan *(8)* experience some type of financial catastrophe in obtaining diagnosis and treatment, even when tests and medicines are nominally free of charge.

Although the resources for NTDs are often not commensurate with the vast need, NTD interventions are one of the best buys in global public health. The end of NTDs is expected to result in an estimated net benefit to affected individuals of about US$ 25 for every US$ 1 invested in preventive chemotherapy, representing a 30% annualized rate of return, and to contribute significantly towards universal health coverage and social protection for the least well-off *(9)*.

Interventions against NTDs contribute to achievement of the SDGs.

NTDs are formally recognized as targets for global action in SDG target 3.3, which calls to "end the epidemics of ... neglected tropical diseases" by 2030, as part of Goal 3 (Ensure healthy lives and ensure well-being for all at all ages). The SDGs can therefore be achieved only if the NTD goals are met. Successful interventions against NTDs contribute to meeting other SDGs, such as alleviating poverty (Goal 1) and hunger (Goal 2), enabling people to pursue an education (Goal 4) and lead productive working lives (Goal 8) and promoting equality, for example with regard to gender (Goals 5 and 10). Progress towards other Goals can accelerate the achievement of NTD goals.

For example, wider provision of clean water, sanitation and hygiene (WASH) (Goal 6) is believed to help to eliminate or control NTDs; the availability of resilient infrastructure (Goal 9) should facilitate delivery of medicines and outreach to remote communities; the goals of sustainable cities (Goal 11) and climate action (Goal 13) can support the environmental management necessary for control of disease vectors. Attaining all SDGs and NTD goals is founded on strong global partnerships (Goal 17) **(Fig. 2)**. The interlinkages with the 2030 Agenda for Sustainable development are expected to encourage the NTD community to think differently about the impact of interventions and to work proactively across sectors and disciplines to ensure progress towards sustainable development. Ending the epidemic of NTDs could therefore have an impact on and improve prospects for attaining the SDGs *(10)*.

Fig. 2. Interactions among interventions against NTDs and the SDGs

Action against NTDs is core to the vision of universal health coverage.

Tackling NTDs supports the vision of universal health coverage, which means that all individuals and communities receive the health services they need without suffering financial hardship *(11)*. Universal health coverage, the objective of SDG target 3.8, is a cornerstone of WHO's Thirteenth General Programme of Work, 2019–2023. Actions against NTDs and their monitoring and evaluation reinforce each other: NTD interventions reach some of the world's most remote communities and can thus improve the potential for equitable access to health care services for these populations.

The endemicity of NTDs means that treatment coverage can indicate the extent of universal health coverage *(12)*, which can be achieved only if people at risk of or affected by NTDs have equitable access to high-quality health services. Investment in NTDs can have important benefits for both health and economies.

Considerable progress has been made in the fight against NTDs, with strong support from Member States and the global NTD community.

The past decade saw significant progress in the battle against NTDs **(Fig. 3)**, including new preventive measures and interventions, expanded donor support, new strategies and guidelines and strengthening of NTD-related structures, collaboration and country commitment. Establishment of public–private partnerships has vastly facilitated progress towards the elimination and control of NTDs: pharmaceutical companies have donated nearly three billion tablets of safe, quality-assured medicines annually to support the control and elimination of NTDs in countries where they are endemic.

These achievements are a testament to the long-standing support and dedication of the global NTD community, from the first meeting of NTD global partners convened by WHO in 2007 to bring together various disease initiatives under the umbrella of the NTD "brand", to the pledges made in the 2012 London Declaration on Neglected Tropical Diseases and the 2017 meeting of global partners. They demonstrate the immense potential that can be unlocked by working in partnership to ensure that NTDs have a prominent position on the global health agenda.

Fig. 3. Progress against NTDs

Delivery of interventions and impact

- **66% preventive coverage** (2019) for populations at risk in endemic areas, up from 42% in 2012
- **Today, 600 million fewer people require interventions against NTDs than in 2010**
- **More than 1 million surgical treatments provided** for trachomatous trichiasis since 2014
- **42 countries, territories and areas had eliminated at least one NTD by 2020**

Strengthening NTD structures and cross-sectoral collaboration

- **45 WHO collaborating centres** support WHO's activities on NTDs globally
- **Formation of the NNN (NTD NGO Network)** to coordinate the work of organizations engaged in the fight against NTDs, and other NTD-related alliances
- **Establishment of the Coalition for Operational Research on NTDs** as a leading scientific body focused on NTDs
- **Stronger multisectoral collaboration,** e.g. development of global 2015–2020 WASH strategy for NTDs, NTDs included in Global Vector Control Response, One Health approach
- **Creation of the Expanded Special Project for Elimination of Neglected Tropical Diseases (ESPEN)** to strengthen WHO capacity to tackle five NTDs amenable to preventive chemotherapy in Africa

Extension of overall scope and support for NTDs

- **Three new disease groups added to the portfolio of NTDs:** mycetoma, chromoblastomycosis and other deep mycoses, scabies and other ectoparasitoses and snakebite envenoming, increasing the total to 20 diseases and disease groups
- **New donor commitment of over US$ 1 billion** pledged since 2017
- **Drug donation commitments secured for six additional drugs;** 11 pharmaceutical companies annually donate a total of nearly 3 billion tablets of safe, quality-assured medicines worth the equivalent of hundreds of millions of US dollars

Creation of strategies, guidelines and resolutions

- **Resolution WHA66.12 adopted on NTDs** (2013)
- **Health Assembly adopted resolutions for two diseases:** mycetoma (2016) and snakebite envenoming (2018); additional resolution on the global vector control response (2017); in total, the Health Assembly has adopted resolutions for 17 the 20 diseases.
- **15 NTDs with global disease strategies** in place
- **14 NTDs for which WHO disease guidelines and manuals** are available
- **Development of integrated strategies** e.g. for skin NTDs and vector control

New interventions, tools and diagnostics

- **New treatment approaches** e.g. ivermectin–diethylcarbamazine citrate–albendazole (IDA) for lymphatic filariasis, fexinidazole for human African trypanosomiasis, paediatric praziquantel (in the pipeline) for schistosomiasis, antibiotics for Buruli ulcer (instead of surgical treatment) and azithromycin for yaws (instead of injected benzathine benzylpenicillin)
- **New diagnostics** e.g. rapid and multiplex diagnostic tests for onchocerciasis, lymphatic filariasis, yaws and human African trypanosomiasis; circulating cathodic antigen assay for *Schistosoma mansoni*; others in the pipeline, e.g. mycolactone rapid diagnostic test for Buruli ulcer
- **Novel vector control tools** such as sterile insect technique, incompatible insect technique, cytoplasmic incompatibility technique and population replacement techniques (by *Wolbachia spp.*), new traps and insecticides

Increase in country ownership and commitment

- **Over 50 countries have national plans** related to NTDs
- **An increasing number of countries include NTDs in their national health care budgets** and contribute domestic funding to tackle these diseases

Dengue	· **Sustainable dengue vector control interventions established** in 10 endemic priority countries · **Dengue control and surveillance systems established** in five of the six WHO regions
Dracunculiasis	· Currently on the verge of eradication with **54 human cases reported in four countries** (Angola, Cameroon, Chad and South Sudan) in 2019, down from over 500 cases in 2012; **187 Member States certified free of the disease**
Human African trypanosomiasis	· **Reduction in the annual number of cases from over 7000 in 2012 to fewer than 1000 today**, eclipsing the original target of 2000 cases by 2020
Leishmaniasis (visceral)	· **Reduction in the number of cases reported annually in South-East Asia from more than 50 000 cases to fewer than 5000 in 2018**; 93% of cases in 2018 were reported from India and 7% from Bangladesh and Nepal
Leprosy	· **21.4% reduction in number of cases with grade 2 disabilities**, with possibility to reach the target of reducing grade 2 disabilities to less than one case per million population · Donation of multidrug therapy is assured
Lymphatic filariasis	· **43% (or 648 million) reduction in the population requiring MDA** since the beginning of the Global Programme to Eliminate Lymphatic Filariasis; **disease eliminated as a public health problem in 17 countries**
Onchocerciasis	· **Transmission eliminated in four countries in the Region of the Americas** (Colombia, Ecuador, Guatemala, Mexico)
Rabies	· **Elimination of dog-mediated human rabies in one country** (Mexico)
Schistosomiasis	· **67% preventive chemotherapy coverage rate achieved for school-aged children**
Soil-transmitted helminthiases	· **59% of preschool and school-aged children who require treatment are regularly treated**, almost reaching 2020 target coverage rate of 75% · **In 2019, only 21 countries with 75% treatment coverage in preschool and school-aged children**
Trachoma	· **Eliminated as a public health problem in 10 countries** (Cambodia, China, Ghana, Islamic Republic of Iran, Lao People's Democratic Republic, Mexico, Morocco, Myanmar, Nepal, Oman)
Yaws	· **Elimination of transmission verified in one country** (India) · Donation of azithromycin secured

© WHO/Yoshi Shimizu

Concerted action among all sectors is required to sustain and build on the progress of the past decade.

Substantial progress has been made on various fronts, but not all the 2020 targets were met, and the journey to eliminating and controlling NTDs is not over. The past decade showed that further action is required for all 20 diseases and disease groups, including: finding new interventions, diagnostic methods and tools; operational and implementation research; programme management and delivery; effective surveillance, monitoring and evaluation; and adequate financing mechanisms for each disease and for cross-cutting approaches. Sustained efforts are crucial with respect to diseases that are on the verge of eradication; the detection of dracunculiasis in other mammals than human beings shows that new challenges can emerge even towards the end of the road. Efficiency could be improved with cross-cutting approaches, notably by integrating interventions for several NTDs and fostering greater collaboration among groups within and beyond the NTD community.

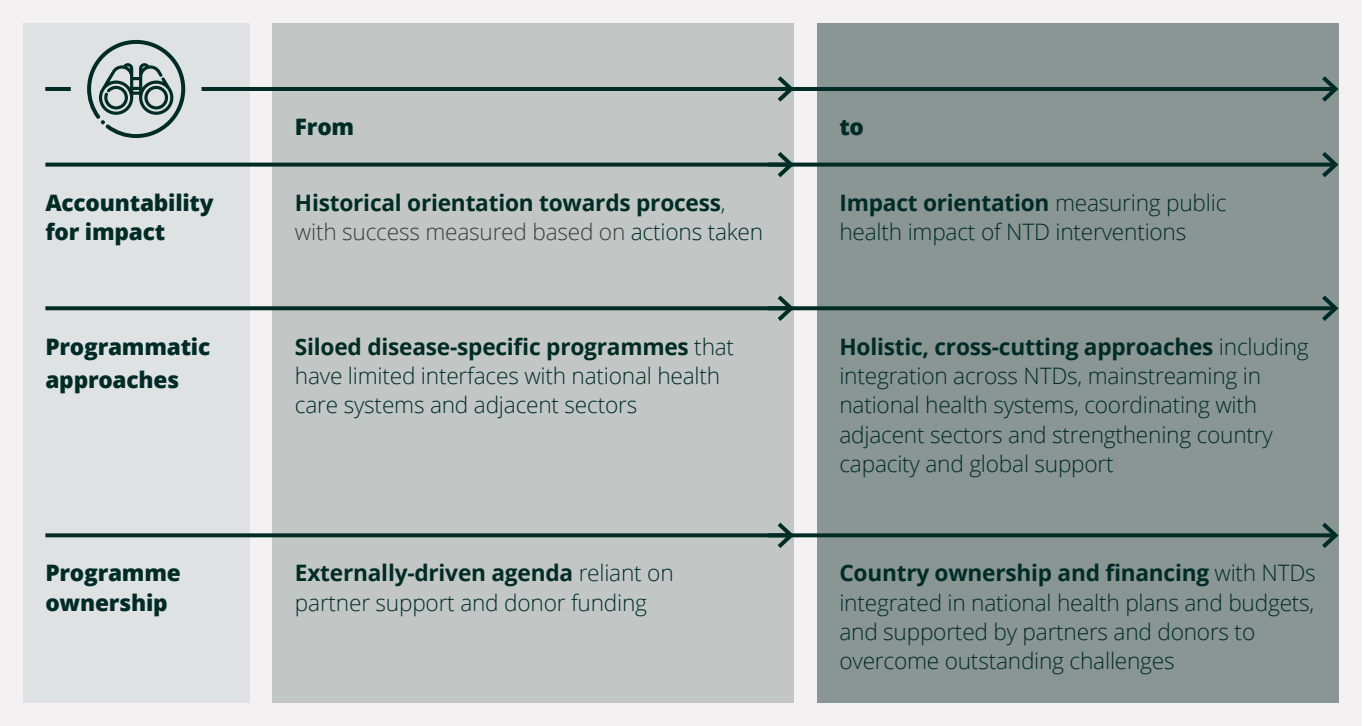
The 2030 road map outlines disease-specific and cross-cutting targets and strategies and represents the voices of the entire NTD community.

The road map outlines specific, measurable targets for 2030 with interim milestones for 2023 and 2025 for the eradication, elimination and control of each of the 20 diseases and disease groups, as well as cross-cutting targets aligned with WHO's Thirteenth General Programme of Work, 2019–2023 and the SDGs. The road map includes the strategies and approaches for achieving these targets, with cross-cutting themes for several diseases.

The road map and the 2030 targets are based on extensive consultation with the NTD community. The consultative process included regional workshops with NTD programme managers, and country workshops[1] with stakeholders in NTDs and related areas (e.g. WASH and education). The road map also reflects input from more than 100 bilateral interviews with disease experts and modellers, donors and other partners, as well as more than 300 responses gathered from an online consultation. This document is therefore shaped by the perspectives of Member States and a wide range of stakeholders. It was prepared by the Secretariat under the guidance of the WHO Strategic and Technical Advisory Group for Neglected Tropical Diseases.

[1] In Egypt, Ethiopia and Indonesia.

Fig. 4. Shifts in approaches to addressing NTDs



The purpose of this document is to guide work to overcome NTDs during the next 10 years and to encourage a fundamental shift in the approach.

The road map has two main objectives: to enable national governments to take the lead in delivering NTD interventions to reach SDG target 3.3 by providing clear milestones and disease-specific, cross-cutting approaches to reach them; and to encourage the global community of stakeholders – donors, pharmaceutical companies, implementing partners, nongovernmental organizations and academic institutions – to increase their commitments to overcoming NTDs in the coming decade.

Broadly, the road map is expected to encourage three fundamental shifts in the approach to tackling NTDs **(Fig. 4)**: first, increase accountability for impact by using impact indicators instead of process indicators, as shown by the targets and milestones in section 2 and accelerate programmatic action (section 3); secondly, move away from siloed, disease-specific programmes by mainstreaming programmes into national health systems and intensifying cross-cutting approaches centred on the needs of people and communities (section 4); and thirdly, change operating models and culture to facilitate greater ownership of programmes by countries (section 5).

Today, 600 million fewer people require interventions against NTDs than in 2010.

Buruli ulcer
Chagas disease
Dengue and chikungunya
Dracunculiasis
Echinococcosis
Foodborne trematodiases
Human African trypanosomiasis
Leishmaniasis
Leprosy
Lymphatic filariasis
Mycetoma, chromoblastomycosis and other deep mycoses
Onchocerciasis
Rabies
Scabies and other ectoparasitoses
Schistosomiasis
Soil-transmitted helminthiases
Snakebite envenoming
Taeniasis and cysticercosis
Trachoma
Yaws

02

2030 targets and milestones

2030 targets and milestones


© WHO/Yoshi Shimizu

This section provides an overview of the targets and milestones for NTDs, which were determined by extensive global consultation with Member States and with other organizations in the United Nations system, scientific and research groups, nongovernmental organizations, implementing partners, donors and private sector organizations. The process is summarized on the next page.

The overarching and cross-cutting targets, derived from the SDGs and WHO's Thirteenth General Programme of Work, 2019–2023, are relevant for following progress in integration, coordination, country ownership and equity for several diseases. The targets for sectors such as WASH and vector control are based on established targets. Disease-specific targets for 2030 and milestones for 2023 and 2025 were set for each of the 20 diseases and disease groups for one of the following:

(a) eradication, defined as permanent reduction to zero of the worldwide incidence of a specific pathogen, as a result of deliberate efforts, with no risk of reintroduction;

(b) elimination (interruption of transmission), defined as reduction to zero of the incidence of infection caused by a specific pathogen in a defined geographical area, with minimal risk of reintroduction, as a result of deliberate efforts; continued action to prevent re-establishment of transmission may be required;

(c) elimination as a public health problem, is a term related to both infection and disease, defined by achievement of measurable targets set by WHO in relation to a specific disease. When reached, continued action is required to maintain the targets and/or to advance interruption of transmission; or

(d) control, defined as reduction of disease incidence, prevalence, morbidity and/or mortality to a locally acceptable level as a result of deliberate efforts; continued interventions are required to maintain the reduction.

The targets for each NTD are shown in the Table; additional sub-targets and summaries for each disease can be found in the **Annex**. Annual reporting and a substantive review of progress against these targets will be conducted in 2022, 2024, 2026 and 2031, as well as in 2029, the year after the conclusion of WHO's Fourteenth General Programme of Work. The reviews in 2024, 2026 and 2029 may result in updated targets in line with changing contexts.

Process used to set targets for 2021–2030

2018

- The Strategic and Technical Advisory Group for Neglected Tropical Diseases requests a broad, evidence-based process to prepare the new road map.
- Disease-specific expert groups review global progress, national programme data and research outcomes and propose targets.

2019

- An NTD Steering Committee consisting of the relevant director in headquarters and regional advisors on NTDs from all WHO regions is established to oversee the development process.
- Targets and their determinants are reviewed through epidemiological models with the NTD Modelling Consortium.
- Two rounds of online surveys are administered on the targets and disease summaries, and more than 300 responses are received.
- Detailed multisectoral consultations are held with selected Member States, national NTD programme managers and WHO regional offices on overall road map strategy and to endorse targets and milestones.

2019

- Leads of disease programmes review and confirm targets, in consultation with relevant stakeholders and disease experts,
  - focus on outcome, impact and cross-cutting indicators
  - review process and outcome indicators for diseases targeted for control or new NTDs
- Regional workshops attended by national programmes and various stakeholders are convened to formulate targets and the strategic approach for attaining them and how to monitor progress.
- The Strategic and Technical Advisory Group for Neglected Tropical Diseases and the NTD Steering Committee review and endorse the targets and milestones.

2020

- The Executive Board at its 146th session requests the Director-General to develop the road map for neglected tropical diseases 2021–2030.
- Following the decision of the Executive Board, the draft road map is made available for online consultation, an informal briefing is held with Member States (9 March) and feedback is incorporated.
- The finalized draft road map is submitted to the Seventy-third World Health Assembly for consideration.
- The road map is endorsed by Member States at the Seventy-third World Health Assembly in November 2020.

Stakeholders who provided input into the creation of the road map, 2019

Integrated approaches

3 regional workshops

with country NTD programme managers and partners in WHO's African, Eastern Mediterranean and South-East Asia regions

3 country workshops

with country-level stakeholders in Egypt, Ethiopia and Indonesia

Interviews and meetings

At least 60 interviews

with NTD stakeholders, e.g. donors, United Nations agencies, nongovernmental organizations and pharmaceutical companies

2 reviews

by the Strategic and Technical Advisory Group for Neglected Tropical Diseases

At least 75 disease expert calls

on all 20 NTDs, with external experts from all 6 WHO regions and WHO experts

Meetings with WHO directors

of adjacent WHO programmes, e.g. WASH, mental health, malaria and maternal, newborn, child and adolescent health

Web consultation

At least 85 responses

from first round of web consultation

At least 240 responses

from second round of web consultation

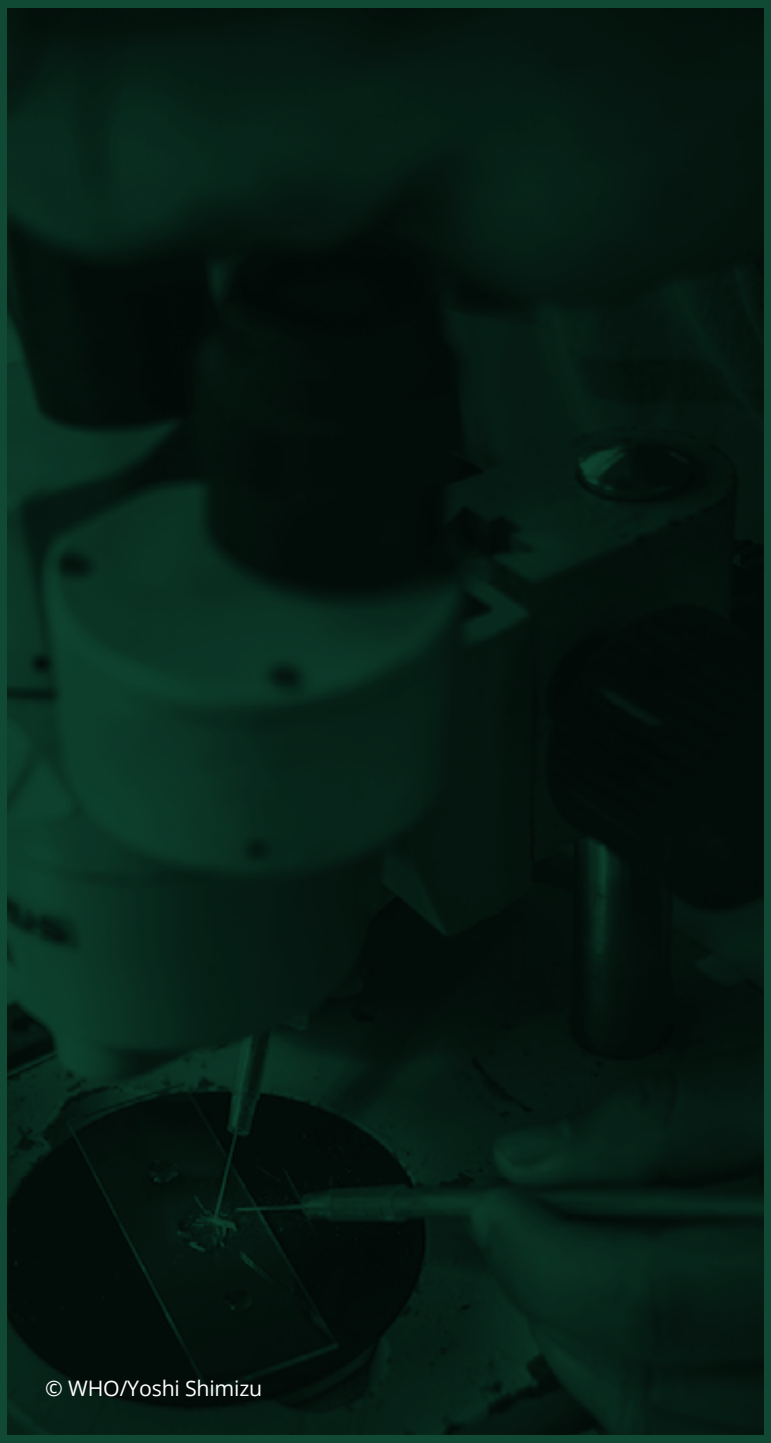
Respondents:
38% from nongovernmental organizations
26% from government, health ministry and health care providers
26% from research and academia
9% from multilateral organizations
1% from philanthropic and pharmaceutical donors


© WHO/Yoshi Shimizu

Table 1. Road map targets, milestones and indicators[1]

Overarching global targets for 2030

Top-line targets for NTDs, in line with the Sustainable Development Goals and WHO's 13th General Programme of Work



© WHO/Yoshi Shimizu

90%[1]

Percentage reduction in people requiring interventions against neglected tropical diseases

75%

Percentage reduction in disability-adjusted life years related to neglected tropical diseases

100

Number of countries having eliminated at least one neglected tropical disease

2

Number of neglected tropical diseases eradicated

Note: In certain cases, reference to "countries" should be understood to signify countries, territories and areas.
The baseline year for the overall percentage reduction is 2020 except for [1] and [2]. [1] Compared with the baseline in 2010.

Cross-cutting targets for 2030

Integrated approaches

75%[2]
Percentage reduction in number of deaths from vector-borne neglected tropical diseases (relative to 2016) – to achieve WHO's global vector control response goal

75%
Integrated treatment coverage index for preventive chemotherapy

40
Number of countries that adopt and implement integrated skin neglected tropical disease strategies

Multisectoral coordination

100%
Access to at least basic water supply, sanitation and hygiene in areas endemic for neglected tropical diseases – to achieve targets 6.1 and 6.2 of Sustainable Development Goal 6

90%
Share of countries with neglected tropical diseases integrated in national health strategies/plans

90%
Share of the population at risk protected against catastrophic out-of-pocket health expenditure due to neglected tropical diseases – to achieve target 3.8 of Sustainable Development Goal 3

Universal health coverage

90%
Share of countries including neglected tropical disease interventions in their package of essential services and budgeting for them

90%
Share of countries with guidelines for management of neglected tropical disease-related disabilities within national health systems

Country ownership

90%
Share of countries reporting on all relevant endemic neglected tropical diseases

90%
Share of countries collecting and reporting data on neglected tropical diseases disaggregated by gender

[2] Compared with the baseline in 2016.

Impact of integrated approaches on disease-specific targets

Targets relevant to individual diseases

Disease	Indicator	2020	2023	2025	2030
Targeted for eradication					
Dracunculiasis	Number of countries certified free of transmission	**187** (96%)	**189** (97%)	**191** (98%)	**194** (100%)
Yaws	Number of countries certified free of transmission	**1** (1%)	**97** (50%)	**136** (70%)	**194** (100%)
Targeted for elimination (interruption of transmission)					
Human African trypanosomiasis (gambiense)	Number of countries verified for interruption of transmission	**0**	**0**	**5** (21%)	**15** (62%)
Leprosy	Number of countries with zero new autochthonous leprosy cases	**50** (26%)	**75** (39%)	**95** (49%)	**120** (62%)
Onchocerciasis	Number of countries verified for interruption of transmission	**4** (12%)	**5** (13%)	**8** (21%)	**12** (31%)
Targeted for elimination as a public health problem					
Chagas disease	Number of countries achieving interruption of transmission through the four transmission routes (vectoral, transfusion, transplantation and congenital), with 75% antiparasitic treatment coverage of the eligible population	**0**	**4** (10%)	**10** (24%)	**15** (37%)
Human African trypanosomiasis (rhodesiense)	Number of countries validated for elimination as a public health problem (defined as <1 case/10 000 people/year, in each health district of the country averaged over the previous five-year period)	**0**	**2** (15%)	**4** (31%)	**8** (61%)
Leishmaniasis (visceral)	Number of countries validated for elimination as a public health problem (defined as <1% case-fatality rate due to primary visceral leishmaniasis)	**0**	**32** (43%)	**56** (75%)	**64** (85%)
Lymphatic filariasis	Number of countries validated for elimination as a public health problem (defined as infection sustained below transmission assessment survey thresholds for at least four years after stopping mass drug administration; availability of essential package of care in all areas of known patients)	**17** (24%)	**23** (32%)	**34** (47%)	**58** (81%)
Rabies	Number of countries having achieved zero human deaths from rabies	**80** (47%)	**89** (53%)	**113** (67%)	**155** (92%)
Schistosomiasis	Number of countries validated for elimination as a public health problem (currently defined as <1% proportion of heavy intensity schistosomiasis infections)	**0**	**49** (63%)	**69** (88%)	**78** (100%)
Soil-transmitted helminthiases	Number of countries validated for elimination as a public health problem (defined as <2% proportion of soil-transmitted helminth infections of moderate and heavy intensity due to *Ascaris lumbricoides, Trichuris trichuria, Necator americanus* and *Ancylostoma duodenale*)	**0**	**60** (60%)	**70** (70%)	**96** (96%)
Trachoma	Number of countries validated for elimination as a public health problem (defined as (i) a prevalence of trachomatous trichiasis "unknown to the health system" of <0.2% in ≥15-year-olds in each formerly endemic district; (ii) a prevalence of trachomatous inflammation—follicular in children aged 1–9 years of <5% in each formerly endemic district; and (iii) written evidence that the health system is able to identify and manage incident cases of trachomatous trichiasis, using defined strategies, with evidence of appropriate financial resources to implement those strategies)	**10** (15%)	**28** (42%)	**43** (65%)	**66** (100%)

Impact of integrated approaches on disease-specific targets (cont'd)

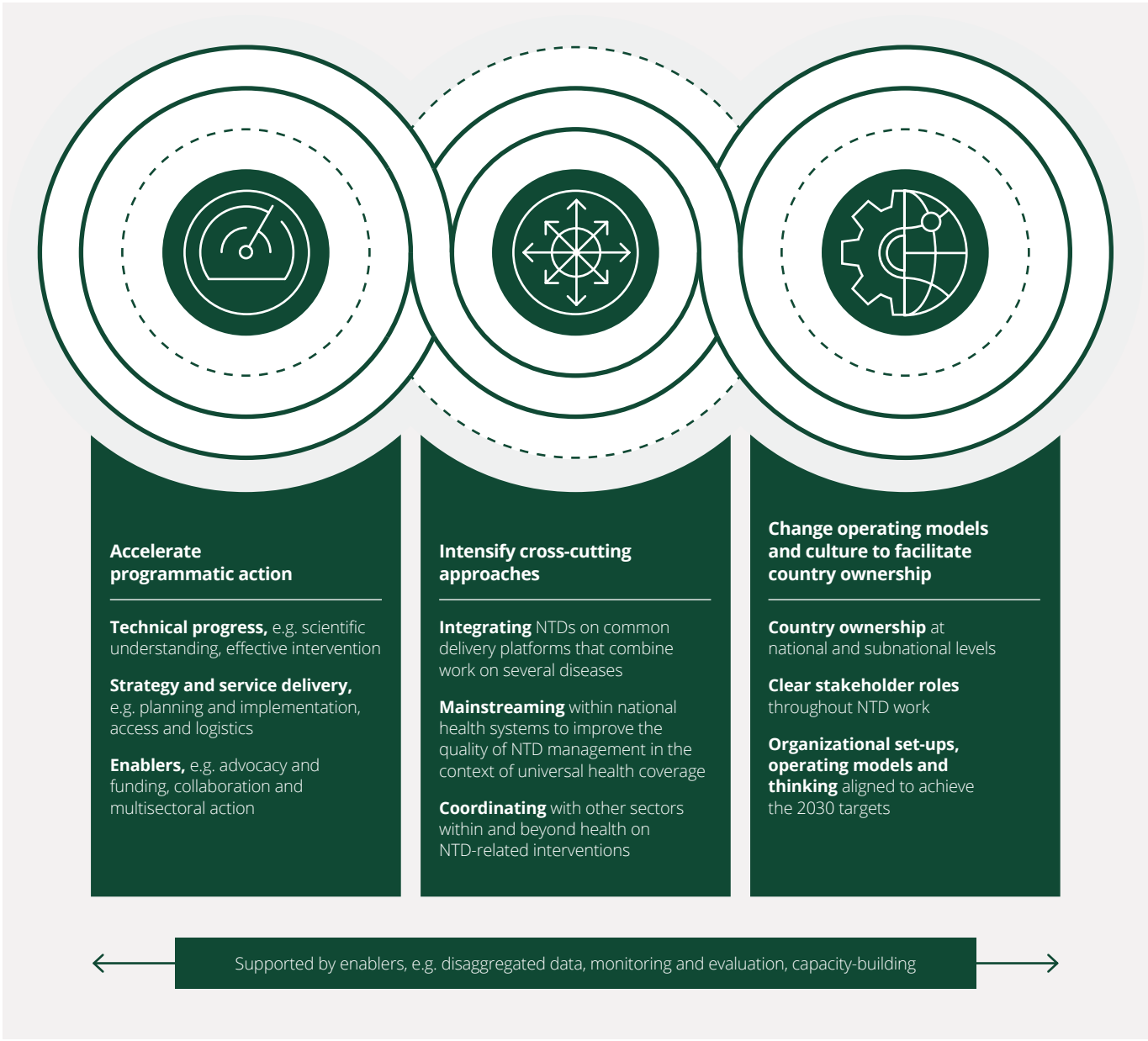
Targets relevant to individual diseases

Disease	Indicator	2020	2023	2025	2030
Targeted for control					
Buruli ulcer	Proportion of cases in category III (late stage) at diagnosis	**30%**	**<22%**	**<18%**	**<10%**
Dengue	Case-fatality rate due to dengue	**0.80%**	**0.50%**	**0.50%**	**0%**
Echinococcosis	Number of countries with intensified control for cystic echinococcosis in hyperendemic areas	**1**	**4**	**9**	**17**
Foodborne trematodiases	Number of countries with intensified control in hyperendemic areas	**N/A**	**3** (3%)	**6** (7%)	**11** (12%)
Leishmaniasis (cutaneous)	Number of countries in which: 85% of all cases are detected and reported, and 95% of reported cases are treated	**N/A**	**44** (51%)	**66** (76%)	**87** (100%)
Mycetoma, chromoblasto-mycosis and other deep mycoses	Number of countries in which mycetoma, chromoblastomycosis, sporotrichosis and/or paracoccidioidomycosis are included in national control programmes and surveillance systems	**1** (3%)	**4** (13%)	**8** (27%)	**15** (50%)
Scabies and other ectoparasitoses	Number of countries having incorporated scabies management in the universal health coverage package of care	**0**	**25** (13%)	**50** (26%)	**194** (100%)
Snakebite envenoming	Number of countries having achieved reduction of mortality by 50%	**N/A**	**39** (30%)	**61** (46%)	**132** (100%)
Taeniasis and cysticercosis	Number of countries with intensified control in hyperendemic areas	**2** (3%)	**4** (6%)	**9** (14%)	**17** (27%)


© WHO/Yoshi Shimizu

Note: In certain cases, reference to "countries" should be understood as signifying countries, territories and areas.

Fig. 5. Areas that require concerted action



Meeting the 2030 NTD targets will require concerted action in three areas **(Fig. 5)**:

1. *Accelerate programmatic action* against NTDs, including interventions to reduce incidence, prevalence, morbidity, disability and death: to do so will require scientific advances, new interventions and tools, and strengthening strategies and service delivery, and enablers.
2. *Intensify cross-cutting approaches* by integrating interventions for several NTDs and mainstreaming them into national health systems, and coordination with related programmes (e.g. WASH, vector control and other programmes).
3. *Change operating models and culture by increasing country ownership,* clarifying the roles of organizations, institutions and other stakeholders, their culture and perceptions and aligning them to meet the 2030 targets.

An integrated approach to NTD activities is expected to result in better health outcomes, greater cost efficiency and effectiveness and better programme management.

Buruli ulcer

Chagas disease

Dengue and chikungunya

Dracunculiasis

Echinococcosis

Foodborne trematodiases

Human African trypanosomiasis

Leishmaniasis

Leprosy

Lymphatic filariasis

Mycetoma, chromoblastomycosis and other deep mycoses

Onchocerciasis

Rabies

Scabies and other ectoparasitoses

Schistosomiasis

Soil-transmitted helminthiases

Snakebite envenoming

Taeniasis and cysticercosis

Trachoma

Yaws


03
Accelerate
programmatic
action
04

Accelerate programmatic action


© WHO/Yoshi Shimizu

The disease-specific targets for each NTD are ambitious and will continue to require considerable work by countries and stakeholders. Each disease and disease group can be assessed with regard to the technical requirements, strategy and service delivery, programme capacity and enablers to determine where action is needed. Each of these dimensions is illustrated in **Fig. 6**.

Technical	**Scientific understanding**
	Diagnostics
	Effective interventions
Strategy and service delivery	**Operational and normative guidance**
	Planning, governance and programme implementation
	Monitoring and evaluation
	Access and logistics
	Health care infrastructure and workforce
Enablers	**Advocacy and funding**
	Collaboration and multisectoral action
	Capacity and awareness building

Fig. 6. Dimensions for assessing disease-specific actions

Dimensions

- Thorough **understanding of disease epidemiology and pathology**
- **No gaps** in research that would hinder progress towards achieving targets
- **Understanding of the non-target effects** of interventions (e.g. ancillary benefits, environmental effects)

- **Availability of effective, standardized, affordable diagnostics** for timely detection, assessment of end-points, surveillance
- Availability of point-of-care diagnostics (where appropriate) usable at community level and in low-resource settings

- **Effective, affordable interventions** for prevention, treatment, case management, rehabilitation and care
- **Continued innovation and adaptation** of interventions

- **Clear definitions of end-points and operational approach** to achieve and sustain them
- **Availability of technical guidelines,** e.g. for validation or verification
- **Equitable access to interventions** (e.g. by disadvantaged, vulnerable and inaccessible populations)

- **Alignment and coordination of work** among relevant stakeholders to achieve overall goals and milestones, based on a strategic plan
- **Appropriate country governance and commitment** for programme management and effective delivery
- **Clear stakeholder responsibilities** and effective, coordinated working processes to implement relevant interventions
- **Effective planning and implementation** at the country level
- **Safe administration of treatment, and diligent monitoring and response to adverse events**

- **NTD monitoring and evaluation framework and mechanisms to monitor and report progress** towards stated goals
- **Standardized mapping and impact assessment** for detailed view of disease epidemiology and progression
- Continuous, systematic, institutionalized collection, analysis and interpretation of **health data disaggregated by age, gender, location,** supported by strong data management systems and tools to assist in data interpretation for informed decision-making at all levels
- **Strengthened and institutionalized surveillance** for the disease, including post-validation and elimination surveillance

- **Adequate supply of affordable, quality-assured medicines, diagnostics and other medical product**s at all levels
- **Efficient supply chain** for effective allocation and distribution of medicines, diagnostics and other medical products where they are needed while minimizing wastage and loss, e.g. with modern online inventory management systems

- Robust health systems and primary health care infrastructure for delivering NTD interventions in models of integrated patient care
- Laboratory capacity and network to support NTD programmes
- **Aptly skilled health care workers, including community volunteers** and community healers, to meet clinical, entomological and community needs

- **Clear identification of funding gaps, and resource mobilization plans to address them**
- **Effective policy dialogue and advocacy** to mobilize support for interventions in national and district health care delivery plans
- **Adequate international and domestic funding** to ensure sustainability of programmes, deployed with adequate lead time and consistency

- **Collaboration among stakeholders** across levels and sectors with clear accountability to ensure an effective, synergetic approach to delivering interventions
- Involvement of communities at risk and affected communities, e.g. in programme design

- **Capacity-building** to ensure high-performing programmes, e.g. **pre-deployment and in-service training,** transfer of skills from vertical NTD programmes to primary health systems, plans to handle health worker attrition and retirement, sharing uptake of best practices
- **Awareness-generation activities** to educate and inform endemic communities, e.g. on behavioural changes, MDA scheduling, treatment and care options

Fig. 7 shows the results of assessments of the gaps for each of these dimensions for each of the 20 diseases or disease groups. Red indicates that critical action is needed to achieve the 2030 target, and green signifies that the dimension will probably not impede meeting the target, although action should be maintained to sustain gains. The colour scale is relative for each disease and category and should not be compared among diseases.

The assessment shows that action is required for several diseases or disease groups in certain dimensions, such as diagnostics, monitoring and evaluation, access and logistics, and advocacy and funding (see paragraph below on strong health and related systems). The greater need for critical action (red in **Fig. 7**) for diseases targeted for control than for those targeted for elimination reflects a poorer appropriate evidence base as well as the fact that programmes for diseases targeted for control are still largely in an early stage, implying that more action is required to address systemic issues, particularly strategy and service delivery.

Strong coordination also promotes clarity, from patients to donors. For patients and communities in which NTDs are endemic, intersectoral coordination results in clearer, more cohesive communication. For example, one message can be delivered about the importance of hand-washing and face-washing in communities where both soil-transmitted helminthiases and trachoma are endemic instead of one from the WASH sector on hand-washing and another from the trachoma programme on face-washing. For donors, clarification of roles and responsibilities among sectors facilitates the identification of the specific activities to be covered by funding for each sector.

Strong health and related systems are essential for eliminating and controlling NTDs.

Strong health systems are essential to achieving the NTD goals. Robust national systems can deliver NTD interventions in the field, supported by global and regional stakeholders for aspects such as technical understanding of the disease. Overall strengthening of health systems is the long-term goal, but capacity-building in areas such as monitoring and evaluation is beneficial for NTDs. As shown in **Fig. 7**, some areas for crucial action (highlighted in red) are common to many NTDs, including diagnostics, monitoring, evaluation, access, logistics, advocacy and funding. Strengthening in these areas over the next 10 years will be particularly important to ensure achievement of the 2030 targets.

Fig. 7. Gap assessment for each NTD[1]

[1] Analysis obtained through technical consultations, WHO 2019.

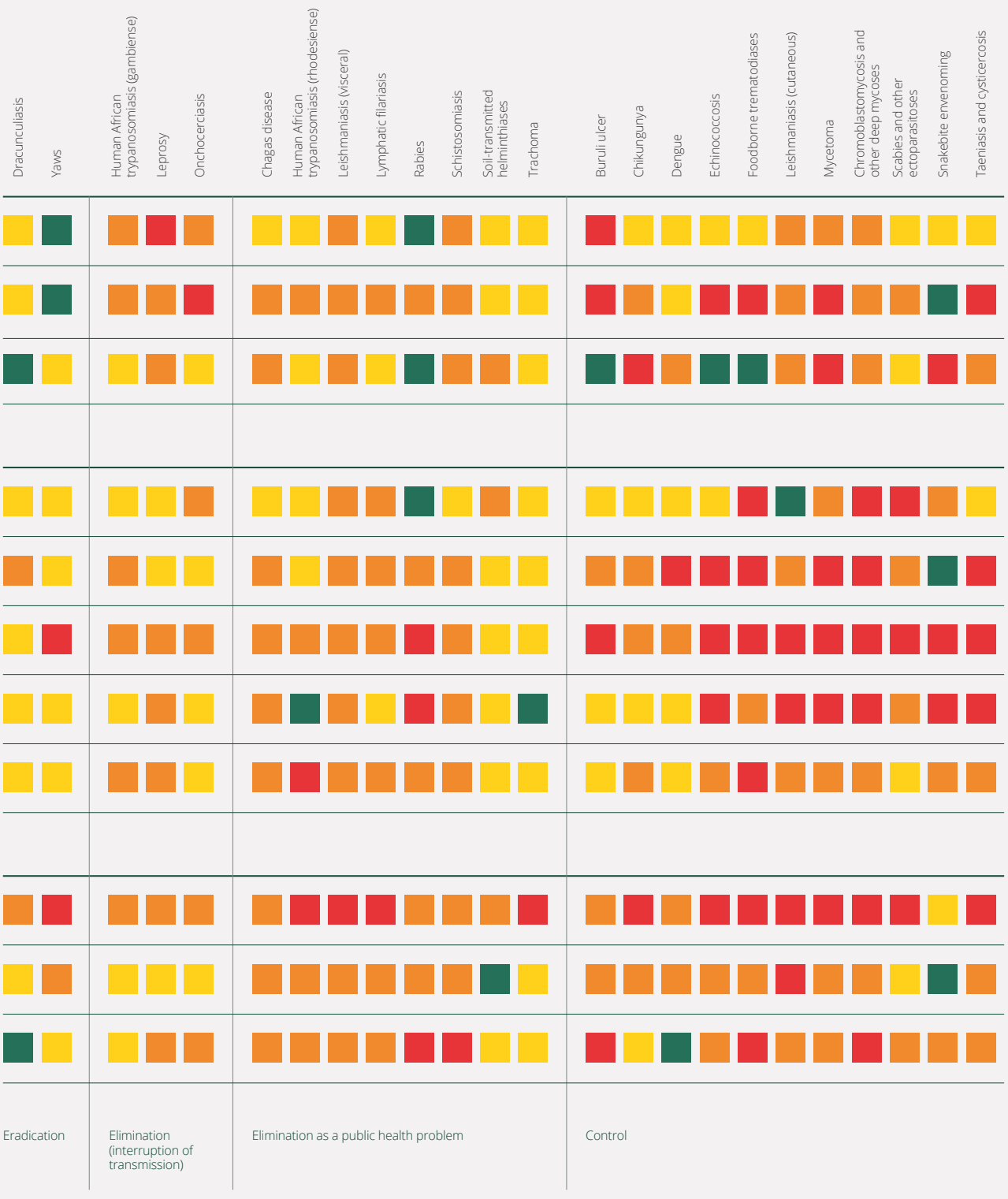

Dracunculiasis
Yaws
Human African trypanosomiasis (gambiense)
Leprosy
Onchocerciasis
Chagas disease
Human African trypanosomiasis (rhodesiense)
Leishmaniasis (visceral)
Lymphatic filariasis
Rabies
Schistosomiasis
Soil-transmitted helminthiases
Trachoma
Buruli ulcer
Chikungunya
Dengue
Echinococcosis
Foodborne trematodiases
Leishmaniasis (cutaneous)
Mycetoma
Chromoblastomycosis and other deep mycoses
Scabies and other ectoparasitoses
Snakebite envenoming
Taeniasis and cysticercosis
Eradication
Elimination (interruption of transmission)
Elimination as a public health problem
Control
No hindrance towards target
Critical action required to reach target

Fig. 8. The role of diagnostics

	Details	Examples (non-exhaustive)
Accelerates elimination	Use data to inform elimination strategies more rapidly	**Human African trypanosomiasis –** specific field diagnostics for screening and high-throughput, cost–effective tools for surveillance **Leprosy –** A molecular test would allow earlier detection and facilitate breaking transmission
Reduces morbidity	Reduce morbidity by identifying cases in order to target treatment (or to not treat in cases of severe adverse effects)	**Visceral leishmaniasis –** A more sensitive rapid diagnostic test would improve treatment in East Africa **Onchocerciasis and loaiasis –** In the absence of diagnostics for *Loa loa*, hypo-endemic areas (millions of people) are not treated because of fear of risk of severe adverse events
Reduces or optimizes cost	Reduce costs to country programmes, pharmaceutical partners and international donors by targeting treatment more effectively or saving years of MDA	**Lymphatic filariasis[1] –** Because of lack of diagnostics, 5–6-year programmes have to be extended by 1–3 years, resulting in 15–50% excessive use of medicines **Schistosomiasis –** A rapid test would allow targeted MDA, for more efficient control

Diagnostics are also critical for monitoring, evaluation and surveillance, e.g. to

- **guide policy decisions** on the necessary intensity, frequency and duration of intervention; and
- **monitor disease trends** and assess the effectiveness of interventions.

[1] A better marker of adult worm viability or fecundity is needed urgently for making decisions when to stop triple therapy (ivermectin, diethylcarbamazine, albendazole).

3.1 Diagnostics and other key innovations

Effective diagnostics are critical to accelerating progress towards elimination, reducing morbidity and reducing programme costs

Effective diagnostics are a prerequisite for reaching the 2030 disease targets, as they are essential for key components of NTD programmes, from confirmation of disease to mapping, screening, surveillance, monitoring and evaluation. Better diagnostics can accelerate progress towards elimination by ensuring the identification and treatment of cases so that they are not potential sources of infection **(Fig. 8)**. Access to diagnostics can also reduce morbidity by ensuring early detection and management to reduce progression and disability, therefore minimizing programme costs. They can also help countries to monitor disease trends and assess the effectiveness of control programmes, and guide policy decisions on interventions and support verification of elimination.

Considerable progress has been made in new point-of-care diagnostics

New diagnostic tools and innovative approaches for NTDs are becoming available, with continued engagement of key partners. For example, the pharmaceutical company Johnson & Johnson has donated resources for research and development of biomarkers for soil-transmitted helminthiases and schistosomiasis; the Novartis Foundation has invested in a molecular diagnostic test for leprosy; the Foundation for Innovative New Diagnostics and the Institute of Tropical Medicine of Antwerp, Belgium, are developing diagnostic platforms, such as rapid diagnostic tests for human African trypanosomiasis (gambiense), and WHO has established a Technical Advisory Group on this topic.


© WHO/Yoshi Shimizu

Gaps remain, however, in the availability and accessibility of such tests

Strengthening diagnostics is a top priority for some NTDs **(Fig. 9)** for which diagnostic tools are either inexistent or inadequate. For example, no test is available to identify cases of early mycetoma (without visible lesions); no validated antigen-based rapid diagnostic test is available for leishmaniasis; and the diagnosis of Buruli ulcer currently requires polymerase chain reaction, which can often be performed only at a distance from endemic communities. Overall, investment in new diagnostics has been limited, representing about 5% of research and development investment for NTDs, whereas about 39% is devoted to medicines and vaccines, about 44% to basic research and about 12% to other areas. Funding for NTDs has been essentially flat for the past decade and in fact at times has gone backwards: funding for NTDs was nearly 10% lower in 2018 than it was in 2009, falling by US$ 34 million (−9.1%) *(13)*.

Even when accurate and effective diagnostic tools are available, they may not be affordable or accessible in a development context in which laboratory infrastructure, equipment and trained personnel are limited. Microscopy is the most widely used method for diagnosing NTDs, yet it requires a laboratory and trained technicians, and the sensitivity of microscopy is often relatively low. Other options such as culturing NTD pathogens or nucleic acid tests are highly specific but are also technically demanding, costly and time-consuming. Effective techniques should therefore not be abandoned until proven, better alternatives become accessible and affordable.

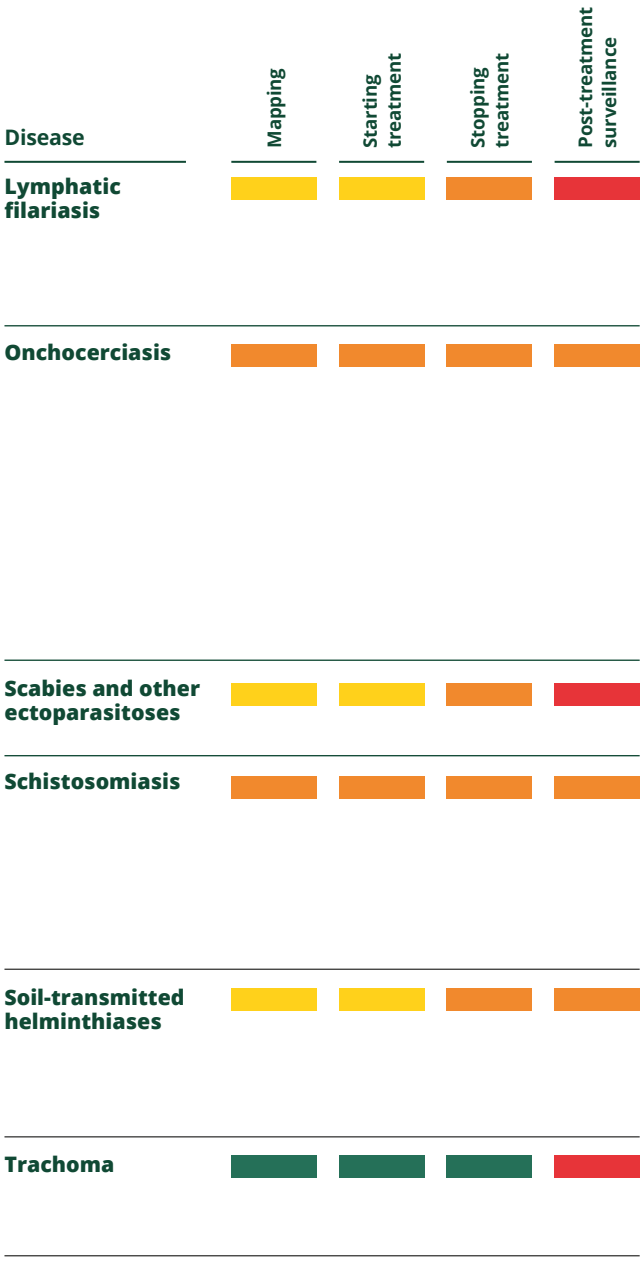
The priorities include more sensitive diagnostics, such as non-invasive diagnostics and field kits, for diseases for which elimination is near, multiplex diagnostic platforms and strengthening of basic systems such as laboratory network capacity

Global resources and expertise in research and development are required to develop new and innovative diagnostic tests that are accessible in low-resource settings (that is, tests that are low-cost, user-friendly, sensitive, highly specific, allow high throughput, are heat stable and require little and/or simple equipment) and quality assured by a quality control mechanism. For diseases that are nearing elimination, with decreased prevalence and intensity of infection, high-sensitivity and high-specificity diagnostics are required to avoid false–negative results, to ensure that all true cases are detected and treated, and to manage the larger number of samples that must be tested to ensure that transmission has been interrupted. Use of multiplex diagnostic platforms could be cost–effective for surveillance of diseases that are endemic in the same geographical area or that target the same population.

Further strengthening will also be required of basic systems such as diagnostic procurement and laboratory network capacity to meet operational needs and ensure access to diagnostics throughout the health system. For example, pooling of investments by donors to increase availability of diagnostics allowed coordinated procurement of more than two million diagnostic tests for lymphatic filariasis for 40 countries in the past five years.

The community of stakeholders can make direct investments and provide in-kind resources to strengthen basic systems, such as pooled procurement and building capacity in laboratory networks and health system workforces. Collective action can overcome technical and operational hurdles to ensure that effective diagnostics are available where they are needed to meet the 2030 goals. Improved diagnostic tools would lead to appropriate interventions or trigger innovation for better treatment.

Fig. 9. Assessment of diagnostic gaps and priorities[1]



[1] The assessment was derived from consultations with experts and expert groups, WHO 2019.

Disease	Screening	Confirm diagnosis	Surveillance	Priorities
Buruli ulcer				• Develop rapid diagnostic tools for use in a public health centre or community for early diagnosis, reducing morbidity and confirming cases • Improve detection of viable *Mycobacterium ulcerans* in wound samples to distinguish between treatment failure and paradoxical reaction with methods such as mycolactone detection and sequencing of the rRNA
Chagas disease				• Validate effectiveness of rapid diagnostic tests and develop affordable ones • Validate effective point-of-care diagnostics for infants and adults • Evaluate biomarkers of success or failure of treatment • Simplify and bring up to date diagnostic algorithms to improve access and shorten time to diagnosis
Dengue				• Improve quality assurance for point-of-care rapid diagnostic tests • Develop polymerase chain reaction test for confirmation of diagnosis
Dracunculiasis				• Develop field test to detect pre-patent infection in humans, dogs and other animals • Develop field pond-side test for detecting *Dracunculus medinensis* DNA in copepods
Echinococcosis				• Bring standardized enzyme-linked immunosorbent assay for dogs to market • Define target product profile, and develop optimal diagnostic for humans
Foodborne trematodiases				• Finish development of more sensitive serological techniques and polymerase chain reaction assays
Human African trypanosomiasis				• Develop field-adapted diagnostic and detection tools (e.g. rapid screening or diagnostic tests) for use in primary health care facilities • Ensure independent, multicentre evaluation of new tools • Include blood microscopy in clinical and laboratory algorithms (for rhodesiense human African trypanosomiasis)
Leishmaniasis (visceral)				• Develop more sensitive rapid diagnostic tests for use in East Africa • Develop less invasive, highly specific tests to measure parasite level • Develop less invasive test of cure of post-kala-azar dermal and visceral leishmaniasis
Leprosy				• Maintain and strengthen capacity for clinical diagnosis • Maintain access to and capacity for slit-skin smear technique • Develop a point-of-care test to confirm diagnosis and detect infection in populations at risk • Develop a vaccine to improve prevention of new leprosy cases
Mycetoma, chromoblasto-mycosis and other deep mycoses				• Develop rapid diagnostic or serological tests to improve early detection in primary health care settings • Evaluate and standardize sporotrichin skin testing for diagnosis of sporotrichosis • Facilitate skin scraping, biopsy and fungal culture and histopathology assessment of deep skin lesions
Rabies				• Develop an ante-mortem diagnostic test for use in primary health care facilities • Validate post-mortem diagnosis of rabies in animals (e.g. non-invasive sample collection combined with rapid diagnostic test) to improve post-bite treatment
Snakebite envenoming				• Standardize and validate current clinically-relevant bedside diagnostic tests to confirm specific clinical syndromes (e.g. 20-minute whole blood clotting test for coagulopathy) • Develop simple low-cost "Yes/No" diagnostic (immunoassay or other method for identifying biting species for disease ecology) to reduce delays in administration of antivenom
Taeniasis and cysticercosis				• Develop and validate specific, sensitive diagnostic tools for porcine cysticercosis • Develop a sensitive, specific point-of-care diagnostic for human taeniasis and neurocysticercosis in resource-limited settings
Yaws				• Develop a sensitive point-of-care molecular test (e.g. polymerase chain reaction) to distinguish yaws from other skin ulcers (e.g. *Haemophilus ducreyi*) and to monitor resistance to azithromycin


© WHO/Budi Chandra

3.2 Monitoring and evaluation

Monitoring and evaluation are essential for tracking progress and decision-making to reach the 2030 goals

Monitoring and evaluation are essential for correcting programmes when necessary. When work against NTDs was formalized 10–15 years ago, monitoring and evaluation were conducted to ensure access to medicines and treatment and therefore focused on process indicators such as population coverage. Now, indicators of impact are used in well-established programmes with cross-cutting approaches to obtain high-quality data for effective decision-making at all levels.

Recently, significant progress has been made in the development of tools and approaches for monitoring and evaluation

In the past few years, WHO and some other stakeholders have improved the quality of surveillance, monitoring and evaluation by standardizing indicators, publishing guidance, developing new tools and approaches, and training programme managers, data managers and surveillance officers in endemic countries. For example, WHO issued the Joint Reporting Form for NTDs that are amenable to preventive chemotherapy, on which countries report annually on the distribution of medicines in a standardized format.

The Secretariat is supporting Member States with integrated data platforms to strengthen data collection and reporting on diseases that must be diagnosed and treated at a health facility, which can be used to make decisions at both national and regional levels. The platforms allow collection of individual and aggregated data both online through a web platform and offline on tablets and smartphones. WHO-recommended NTD indicators are packaged for integration into national health information systems, and training has been provided in data collection and use in peripheral health care centres in endemic countries.

WHO in collaboration with FAO has prepared an atlas of human African trypanosomiasis generated from data for 2018 in the Global Health Observatory[1] for use by health ministries, nongovernmental organizations and research institutions to monitor the impact of control activities, assess epidemiological trends and plan control and research activities. It is a repository of data provided since 2000 by national programmes on the numbers of cases detected and screened in villages, which were used to produce maps that are published regularly on the WHO website. Training has been provided in all endemic countries to map the main epidemiological indicators for inclusion in the atlas; the Democratic Republic of the Congo has used it for the past four years to better target control activities.

The Working Group on Monitoring, Evaluation and Research of WHO's Strategic and Technical Advisory Group for Neglected Tropical Diseases is extending its operating model to ensure that it is commensurate with programmatic needs to meet the goals for 2030 of the road map.

Despite advances, monitoring and evaluation for all NTDs are weak in many countries

Control of all NTDs must be monitored and evaluated and is critical for at least 10 diseases and disease groups in order to reach 2030 goals. For example, for onchocerciasis and schistosomiasis, more cost–effective mapping strategies are necessary for targeting preventive chemotherapy, and for trachoma a system for tracking cases and outcomes is needed. The need for monitoring and evaluation is greater for diseases targeted for control, for which investment has been limited, particularly for mapping and understanding their burden.

[1] See https://www.who.int/data/gho/data/themes/neglected-tropical-diseases

Monitoring and evaluation should be prioritized and strengthened by improving data collection and management, analysis, mapping, impact assessments, surveillance and reporting systems

Strengthening the capacity of NTD programmes to collect and analyse data is central to effective monitoring and evaluation of the impact of intervention programmes and tracking progress towards the 2030 goals. Programmes should recognize the importance of monitoring and evaluation at all levels and be equipped with new data, tools and approaches to decision-making. Core components of monitoring and evaluation that should be strengthened are listed below.

- **Data management platforms.** Data systems should have complete, timely, systematic, accurate, disaggregated data (by age, gender and location), centralized in the health ministry, shared with WHO and stored in a standard format on integrated platforms. Examples include WHO's Preventive Chemotherapy Joint Application Package,[1] the WHO Integrated Data Platform and the WHO Integrated Medical Supplies System,[2] which facilitate online applications for medicines for preventive chemotherapy and patients, although these platforms could be better harmonized and integrated. Centralized data can also be used for cross-cutting analyses and decision-making.
- **Data and analytics tools.** Platforms should also provide tools for data collection, analysis and interpretation to enable informed decision-making, complemented by other information such as that on weather, patterns of land use and socioeconomic profiles. The tools should facilitate reporting, decision-making and policy direction for districts, subdistricts or villages, including digital health platforms for collecting and monitoring data.
- **Mapping and impact assessments.** New approaches and mapping tools are necessary to obtain a granular view of disease epidemiology and progression for targeted interventions. Mapping of different diseases and diseases groups should be combined, when possible, and sampling strategies could be adapted for several diseases. Mapping data should be compatible for sharing among programmes.
- **Surveillance.** New approaches and tools are required within routine systems for post-validation and elimination surveillance, through transmission assessment surveys, monitoring drug efficacy and resistance and pharmacovigilance. Post-validation surveillance will become more important as diseases are eliminated and, in some cases, may be combined with transmission assessment surveys. Monitoring of antimicrobial resistance will become more important as access to interventions increases.
- **Reporting.** National authorities should establish an accessible integrated reporting system, with a framework and mechanisms for monitoring and reporting progress against stated goals. Strong planning with timely reporting and high-quality outputs are needed in order to avoid separate reporting by different stakeholders and donors. A combined reporting system could improve delivery of programmes not only today but in the future, such as for target product profiles.

WHO and the NTD community should monitor progress in achieving the goals of the road map during the coming decade

This road map describes the milestones and 2030 targets and approaches for reaching them. It provides a long-term vision, but progress should be measured over time in a standardized monitoring and evaluation framework. Monitoring will include periodic assessments of substantive progress in achieving both disease-specific and cross-cutting milestones. In addition to annual reporting, formal reviews will be conducted in 2022, 2024, 2026 and 2031 and also in 2029, the year after WHO's Fourteenth General Programme of Work concludes. The results of the earlier reviews might signal the need for revision of targets if new information suggests that they should be more or less ambitious. For example, a breakthrough in research and development might increase the level of ambition for a particular disease, whereas identification of a previously unknown animal reservoir might decrease it.

[1] See https://www.who.int/neglected_diseases/preventive_chemotherapy/reporting/en

[2] See http://mss4ntd.essi.upc.edu/wiki/index.php?title=WHO_Integrated_Medical_Supplies_System_(WIMEDS)

3.3 Access and logistics

Achieving the targets outlined in this road map will require consistent emphasis on the availability, accessibility, acceptability and affordability of NTD medicines and other health products and commodities of assured quality. Access to medicines and health products is a multidimensional challenge, which requires comprehensive strategies, from research and development to supply chain management, quality assurance, registration, pricing and rational use *(14)*.

Effective supply chain management is vital to ensuring access to quality-assured NTD medicines and other products

A strong, responsive supply chain is necessary to ensure access to high-quality, affordable medicines and health products that are accessible to the target populations. At least 1.5 billion treatments are mobilized every year. Forecasting, securing donations of medicines, coordinating delivery, reverse logistics, education and training can be particularly challenging. These processes involve ensuring that medicines manufactured at various locations worldwide are accessible to patients and communities living in some of the places that are most difficult to access. Efficient management will optimize allocation of valuable donated or procured medicines and ensure that they are available at the right place and time, while minimizing wastage. National systems should invest specific resources in the control of NTDs (see **Fig. 7**).

Since the publication of WHO's first road map in 2012, the NTD community has rallied to meet the logistical challenges of getting medicines to those in need, with a focus on the "first mile", namely ensuring that medicines for preventive chemotherapy are sent from their site of manufacture to the central medicine stores in endemic countries. One component was the establishment in 2012 of the NTD Supply Chain Forum, which is a public–private partnership between WHO, pharmaceutical companies, nongovernmental organizations, logisticians, donors and countries where NTDs are endemic.

The Forum has enabled the donation and delivery of billions of treatments for five NTDs,[1] partly through initiatives such as the DHL "control tower" for coordination of NTD shipments, which arranges shipments of medicines through customs clearance to national warehouses, and the NTDeliver tracking tool),[2] which consolidates fragmented country information into a comprehensive database for planning and forecasting.

WHO continues to coordinate and liaise with national programmes on almost all donations of NTD medicines and diagnostics. Its activities range from ensuring timely submission of requests for medicines to provision of technical support and capacity-building to resolving problems along the supply chain until the medicines reach the intended beneficiaries.

The challenges that remain include improving "last-mile" delivery, integrating provision of NTD medicines and products and improving the transparency of the supply chain

Last-mile delivery, at the end of the supply chain, should be a priority, including stock management and reverse logistics at subnational levels **(Fig. 10)** to improve the supply chain, minimize wastage and reduce stock-outs.

The priorities include extending access to quality-assured medicines for all NTDs in an integrated way and strengthening national planning and monitoring of the supply chain

Closing the gap in the availability of medicines by securing access to quality-assured products at affordable prices for all NTDs is fundamental. Integrated supply and logistics can ensure efficient management, for example by reducing duplication and the costs of parallel supply chains and benefiting from pooled or coordinated procurement. An integrated platform might be set up to accelerate access to new NTD medicines.

[1] Lymphatic filariasis, onchocerciasis, schistosomiasis, soil-transmitted helminthiases and trachoma.

[2] See https://www.ntdeliver.com

Fig. 10. Current challenges along the NTD supply chain

Access to quality-assured products is being facilitated by promoting WHO's prequalification of NTD products and collaborative registration with the Secretariat. Guidance on quality assurance in the procurement and donation of NTD products aims to ensure access to safe, efficacious, affordable medicines and other health products.

At country level, integration of the NTD supply chain with national medicine supply networks should be assured, including national medicine procurement and distribution systems and health management information systems. The tools and platforms that could be used include the WHO Supply Chain Management Tool for preventive chemotherapy[1] and the Integrated Medical Supply System[2] for diseases that require complex treatment of individual patients.

A priority for countries is to improve the availability and quality of information on NTD treatments so as to ensure better decisions and more accurate forecasting. This improvement can be facilitated by the use of tools and guidelines such as real-time online reporting on logistics and handling procedures for NTD medicines, thereby minimizing wastage and improving the return of unused medicines. Stronger monitoring is essential for quality assurance, which should be overseen by national regulatory authorities, to improve the accuracy of forecasting and thus ensure more effective allocation of medicines to meet patients' needs beyond elimination targets.

[1] See https://www.ntdeliver.com

[2] See http://mss4ntd.essi.upc.edu/wiki/index.php?title=WHO_Integrated_Medical_Supplies_System_(WIMEDS)

3.4 Advocacy and funding

The message that NTD treatments are a "best buy" in development can be used in advocacy for funding

NTD treatments are considered one of the "best buys" in development, as they are donated, provide a high social return and are cost–effective. The United States Agency for International Development estimated that, for every US$ 1 spent on NTD programmes, US$ 26 in donated medicines are given through partnerships with pharmaceutical companies. In addition, for every US$ 1 invested in preventive chemotherapy for NTDs, the net benefit to individuals could be up to US$ 25 in averted out-of-pocket payment and lost productivity, representing a 30% annualized rate of return. Evidence in favour of including certain NTD interventions in the package of essential interventions for all low-income countries endemic for NTDs is based on a cost per disability-adjusted life year (DALY) averted of 2012 US$ 250 or less *(9)*. The interventions include preventive chemotherapy for at least five NTDs, comprehensive control (including vector control) for visceral leishmaniasis and early detection and treatment of cutaneous leishmaniasis, human African trypanosomiasis and leprosy *(13)*. The cost of delivering preventive chemotherapy, estimated to be US$ 0.4 per person, is low and could be even lower with cross-cutting approaches. As NTDs affect the most disadvantaged people in many countries, continued funding for NTDs is a sound investment with a significant social and long-term financial return.

Considerable progress has been made in advocacy and funding globally and nationally

Advocacy and funding provide countries with the necessary support for delivering NTD interventions. Considerable progress has been made both globally and domestically. For example, Brazil, India and Indonesia contribute significant funding for leprosy and other NTD programmes. In some countries there have been some increases in overall funding available for integrated NTD programmes, as a result of which geographical coverage and the number of people treated has been expanded and treatments targeted at new diseases have been added *(15)*.

The London Declaration on Neglected Tropical Diseases (2012) brought new energy, new partners and additional funding. Pharmaceutical companies donate an average of nearly three billion tablets of safe, quality-assured medicines annually, worth hundreds of millions of United States dollars, to support control and elimination in countries where NTDs are endemic. At WHO's second Global partners meeting on NTDs (Geneva, 19 April 2017), more than US$ 800 million were pledged for 5–7 years, with new donors such as the END Fund, the Reaching the Last Mile Fund established by the Crown Prince of Abu Dhabi, the Government of Belgium and many others.

Continued attention and additional funding are still needed to fill gaps in financing

Nonetheless, more advocacy and funding are required to continue towards the 2030 targets and to sustain progress, especially for diseases that are approaching elimination. A clear indicator of the proportion of domestic financing allocated to NTDs would allow quantification and tracking of such investments. Although in 2016 up to US$ 300 million were donated annually, WHO estimated that NTDs could cost up to US$ 750 million a year by 2020 over and above the costs of vector control and donations of medicines, leaving a considerable gap. In 2016, at the annual meeting of the WHO Alliance for the Global Elimination of Trachoma by 2020 (GET2020) it was estimated that eliminating trachoma by 2020 would cost about US$ 1 billion, whereas only US$ 200–300 million had been pledged at that time *(16)*.

To support this road map an investment case and a sustainability framework will be prepared. Both governments and global stakeholders should help to close the funding gaps necessary to fulfil the 2030 targets set herein.


© WHO/Christopher Black

Domestic financing and mainstreaming into the health system will be critical

Domestic financing will have to be increased to meet the targets, especially in countries that are moving away from bilateral funding. If countries are to carry out their NTD programmes sustainably as part of universal health coverage, NTDs must be accounted for in national strategies and budgets for health, development and poverty alleviation and not only in NTD strategic plans. Inclusion of NTDs in government policies is affordable, as it would require less than 1% of domestic expenditure on health to meet the 2030 targets *(2)*.

Unless NTDs receive adequate resources, they will continue to be neglected. It has been shown that countries procure rabies vaccine only when they have surplus budget, indicating the importance of initial budgeting for this important product. As national programmes for some NTDs are discontinued (including those for lymphatic filariasis), countries should plan funding for some core activities supported by those programmes, such as sustained preventive chemotherapy for soil-transmitted helminthiases. NTD advocates and health ministers could inform finance ministries that NTD treatments are "best buys" in development and that therefore investing in NTDs will not only improve the health and well-being of populations but also benefit the most disadvantaged citizens financially and increase productivity.

Global stakeholders should continue to support and raise the profile of NTDs and ensure coordination and commitment at various levels

The global fight against NTDs involves a diverse group of stakeholders united towards a common goal. One of the strengths of WHO's work on NTDs is collaboration among communities of practice (such as the supply chain forum), academic institutions and various alliances, which support the Secretariat in responding to countries' needs. Such partnerships can be strengthened with the continued support of global stakeholders in funding and in advocating sustained commitment and increased support globally and nationally.

Advocacy and funding are essential for increased and sustained access to effective interventions

Access to effective interventions, often through the generosity of companies, was the basis for progress in achieving the 2020 goals **(Fig. 11)**. More companies are committing funds to areas such as vector control and diagnostics (e.g. General Electric and Abbott). In addition, countries are finding domestic funding and partners. Moving towards the 2030 goals, it will remain crucial to ensure equitable access to effective interventions, for example through renewed commitments to extending the timeframe of donations of medicines. Sustained advocacy and funding from both global and domestic stakeholders will be needed.

Fig. 11. Current status of commitments to donations of medicines

Company	Medicine	Quantity donated	Disease	Commitment	Donation coordinator
Bayer	Nifurtimox	7 750 000 tablets total	Chagas disease	2021–2025	WHO
	Nifurtimox (120 mg)	300 000 tablets annually	Human African trypanosomiasis	2021–2025	WHO
	Nifurtimox (30 mg)	20 000 tablets annually	Human African trypanosomiasis	2021–2025	WHO
	Suramin	10 000 vials annually	Human African trypanosomiasis	2021–2025	WHO
	Niclosamide (400 mg)	2 800 000 tablets total	Taeniasis/cysticercosis	2020–2024	WHO
	Praziquantel (600 mg)	1 339 000 tablets total	Taeniasis/cysticercosis	2020–2024	WHO
Chemo Ibérica S.A.	Benznidazole (12.5 mg)	3000 tablets total	Chagas disease	2020–2022	WHO
(Fundación Mundo Sano)	Benznidazole (100 mg)	105 000 tablets total	Chagas disease	2020–2022	WHO
Eisai	Diethylcarbamazine citrate	2 200 000 000 tablets total	Lymphatic filariasis	Until elimination	WHO
Gilead Sciences	Liposomal amphotericin B	380 000 vials total	Visceral leishmaniasis	2016–2021	WHO
Sanofi	Eflornithine	Unlimited	Human African trypanosomiasis	Until 2025	WHO
	Melarsoprol	Unlimited	Human African trypanosomiasis	Until 2025	WHO
	Pentamidine	Unlimited	Human African trypanosomiasis	Until 2025	WHO
	Fexinidazole	Unlimited	Human African trypanosomiasis	Until 2025	WHO
Novartis	Multidrug therapy[1]	Unlimited	Leprosy	2021–2025	WHO
	Clofazimine	Unlimited	Severe erythema nodosum leprosum reactions	2021–2025	WHO
	Triclabendazole	600 000 tablets total	Fascioliasis	2016–2022	WHO
EMS	Azithromycin	Up to 153 000 000 tablets	Yaws	2021–2025	WHO
Pfizer	Azithromycin	Unlimited	Trachoma	1998–2025	International Trachoma Initiative
Johnson & Johnson	Mebendazole	200 000 000 tablets annually	Soil-transmitted helminthiases (SAC)[2]	Until 2025	WHO
GlaxoSmithKline	Albendazole	600 000 000 tablets annually	Lymphatic filariasis	Until elimination	WHO
		400 000 000 tablets annually	Soil-transmitted helminthiases (SAC)[2]	Until elimination	WHO
Merck & Co.	Praziquantel	250 000 000 tablets annually	Schistosomiasis (SAC)[2]	Unlimited	WHO
MSD	Ivermectin	Unlimited	Onchocerciasis	Until elimination	Mectizan Donation Program
		Unlimited	Lymphatic filariasis in co-endemic countries	Until elimination[3]	Mectizan Donation Program
		100 000 000 treatments annually	Lymphatic filariasis for triple-therapy MDA	Until 2025	Mectizan Donation Program

[1] Rifampicin, clofazimine, dapsone.
[2] For school-aged children (SAC).
[3] In Yemen and African countries where lymphatic filariasis and onchocerciasis are co-endemic.

SOURCE: WHO March 2019 Essential Medicines donated; July 2018 Pfizer Press release; July 2019 Johnson & Johnson press release; Bayer Chagas disease website.


© WHO/Yoshi Shimizu

Research and innovation are fundamental enablers of programmatic progress for all diseases

Research, development and innovation are crucial to finding appropriate solutions against all diseases throughout the course of the programmes. Basic, operational and implementation research are required to answer various questions and for establishing a baseline for the prevalence of an NTD and determining when to stop mass drug administration (MDA). The research and development of new interventions, diagnostics, tools and treatment approaches must therefore be supported, in collaboration with other stakeholders, by means that include product development partnerships (e.g. the Drugs for Neglected Diseases *initiative* and the Foundation for Innovative New Diagnostics). Research is needed into the behavioural and social aspects of communities' needs and perceptions in enhancing treatment compliance and healthy behaviours in the context of NTDs. WHO's Global Observatory on Health Research and Development, the UNICEF/UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases and the Coalition for Operational Research on Neglected Tropical Diseases provide leadership and direction on research priorities and support. Innovation may also include potential use of molecular epidemiology, mathematical modelling and new technologies such as "big data", artificial intelligence, digital health, satellite imagery and drones. For quick assimilation of new findings, technologies and products in local contexts, research and development must be supported in countries where NTDs are endemic, thereby strengthening local research capacity and stimulating further investment.

Risks of political instability, migration, climate change and antimicrobial resistance are associated with many diseases

Common risks that have been identified for several NTDs include political instability, migration, urbanization, climate change and antimicrobial resistance. Political instability and conflict can be barriers to progress in NTD programmes, such as those for dracunculiasis, human African trypanosomiasis and cutaneous leishmaniasis. Political instability can also result in gaps in governance, diversion of NTD funding to other causes and difficulties for implementation, such as disruption of infrastructure, restricted access to local populations and risks for health care personnel. Migration and other population movement can result in the introduction or reintroduction of diseases, particularly when displaced populations live in temporary accommodation with inadequate sanitation, poor water storage practices and limited access to health care. Local epidemics or pandemics may significantly limit the implementation of interventions against NTDs during outbreaks. Climate change alters the epidemiology of vector-borne diseases and the spread of NTDs such as dengue and chikungunya. Antimicrobial and insecticide resistance are emerging threats for certain NTDs, especially in view of the expansion of preventive chemotherapy and the widespread use of insecticides for vector control.

These challenges highlight the importance of new and innovative approaches to NTDs, such as development of new antimicrobial agents and systems to monitor antimicrobial resistance. Contingency planning would be essential to mitigate the effects of the unforeseen events. Collaboration with governmental actors such as environmental policy makers and migration authorities will be essential to mitigate risks to achieving the 2030 targets.

Each disease will require a unique set of actions to meet the milestones and targets

Even though certain themes are relevant to many diseases, a unique set of critical actions will be required for each disease and disease group, as outlined in **Fig. 12**.

Fig. 12. Critical actions for each disease and disease group to reach the 2030 targets

Targeted for eradication

Disease	Critical action 1	Critical action 2	Critical action 3
Dracunculiasis	Develop a scientific and operational protocol for elimination of infections in animals.	Investigate why dracunculiasis infection occurred in Angola to better understand the current challenges and take appropriate measures to stop transmission.	Initiate certification in Democratic Republic of the Congo and Sudan to avoid missing targets.
Yaws	Strengthen active and passive surveillance, including in countries of unknown status.	Ensure effective, efficient integration and/or co-implementation with other programmes and sectors (e.g. integrated management of skin NTDs).	Increase funding and advocacy for yaws eradication, including securing longer-term commitments and increasing the priority of yaws as suitable for preventive chemotherapy and a skin NTD.

Targeted for elimination (interruption of transmission)

Disease	Critical action 1	Critical action 2	Critical action 3
Human African trypanosomiasis (gambiense)	Integrate control and surveillance activities in the peripheral health system; identify and prepare sentinel sites for surveillance post-elimination.	Develop a long-term funding plan, including campaigns for resource mobilization to meet needs.	Reinforce ownership of elimination and targets by endemic countries by advocacy to health authorities and heads of states in the context of decreasing numbers of cases.
Leprosy	Update country guidelines to include use of single-dose rifampicin for post-exposure prophylaxis for contacts; advance research on new preventive approaches.	Continue investment into research for diagnostics for disease and infection; develop surveillance strategies, systems and guidelines for case-finding and treatment; ensure resources for validation.	Ensure medicines supply, including access to multi-drug therapy, prophylactic drugs, second-line treatments and medicines to treat reactions; monitor adverse events (pharmacovigilance) and resistance.
Onchocerciasis	Start MDA in all endemic areas after mapping, improve delivery of current MDA programmes, and implement alternative strategies where appropriate.	Develop improved diagnostics to facilitate mapping and decisions to eliminate transmission; develop improved diagnostic strategy for loaiasis; increase programme capacity to perform entomological and laboratory diagnostics.	Develop a macrofilaricide and diagnostic or other elimination strategies to accelerate interruption of transmission; design a case management strategy; develop and implement elimination strategies for areas where loaiasis is endemic but onchocerciasis is hypoendemic.

Targeted for elimination as a public health problem

Disease	Critical action 1	Critical action 2	Critical action 3
Chagas disease	Advocate with national or federal health ministries to recognize Chagas disease as a public health problem, and establish effective prevention, control, care and surveillance in all affected territories.	Improve medical care for Chagas disease, from training health care workers in-service to integrating training at all levels of health services.	Ensure that countries in which domiciliary vector transmission is still registered in certain territories comply with prevention, control and surveillance.
Human African trypanosomiasis (rhodesiense)	Develop new field-adapted tools to detect the disease (e.g. rapid diagnostic test) for use in primary health care facilities, and safe and effective treatment.	Integrate control and surveillance into national health systems, and strengthen capabilities through national plans for health care staff for training, awareness and motivation.	Coordinate vector control and animal trypanosomiasis management among countries, stakeholders and other sectors (e.g. tourism and wildlife) through multisectoral national bodies to maximize synergies.
Leishmaniasis (visceral)	Enable early detection to ensure prompt treatment, through, for example, active case detection.	Ensure supply of medicines to ensure prompt access to treatment, especially during outbreaks, and especially for children and young adults, who make up 50–70% of the affected population.	Develop more effective and user-friendly treatment and diagnostics, especially for East Africa.
Lymphatic filariasis	Start MDA in all endemic districts and strengthen it in all settings; implement improved interventions where appropriate (e.g. three-medicine treatment in settings that qualify; strategies for hotspots).	Improve capacity for morbidity management and disability prevention; prioritize in primary health care and as part of universal health coverage.	Improve diagnostics, strengthen criteria for stopping MDA, establish post-MDA and post-validation surveillance standards; update guidelines with new tools and strategies as appropriate.
Rabies	Improve forecasting of demand for rabies vaccine and immunoglobulin to ensure adequate supply in facilities, and develop innovative approaches for delivery to ensure timely access to post-exposure prophylaxis and dog vaccination.	Build national capacity of health workers (e.g. rabies exposure assessment, diagnosis, administration of post-exposure prophylaxis) and for dog management (e.g. mass dog vaccination).	Strengthen and institutionalize surveillance for rabies; improve country compliance with reporting to ensure data availability.
Schistosomiasis	Define indicator for measuring morbidity.	Implement effective interventions, including extending preventive chemotherapy to all populations in need and ensuring access to the necessary medicines; implement targeted snail control with updated guidelines; continue micro-mapping and targeting.	Develop diagnostic tests, including standardized point-of-care diagnostic, and develop new interventions, including alternatives to praziquantel and methods of snail control.
Soil-transmitted helminthiases	Increase political commitment to ensure sustainable domestic financing.	Develop more effective medicines and medicine to improve patient outcomes and in case of drug resistance.	Develop comprehensive surveillance and mapping systems to target treatment and monitor drug resistance.
Trachoma	Improve access to high-quality surgery, tracking of outcomes and management of post-surgery trachomatous trichiasis; initiate management of people with trachomatous trichiasis as soon as possible (about 2.5 million in 2019).	Increase knowledge through research, and extend partnerships to increase work, specifically on facial cleanliness and environmental improvement to reduce transmission.	Develop an efficient, cost–effective way to detect and monitor recrudescence of infection. which could be important for post-validation.

Additional critical actions can be found in the disease summaries in the **Annex**.

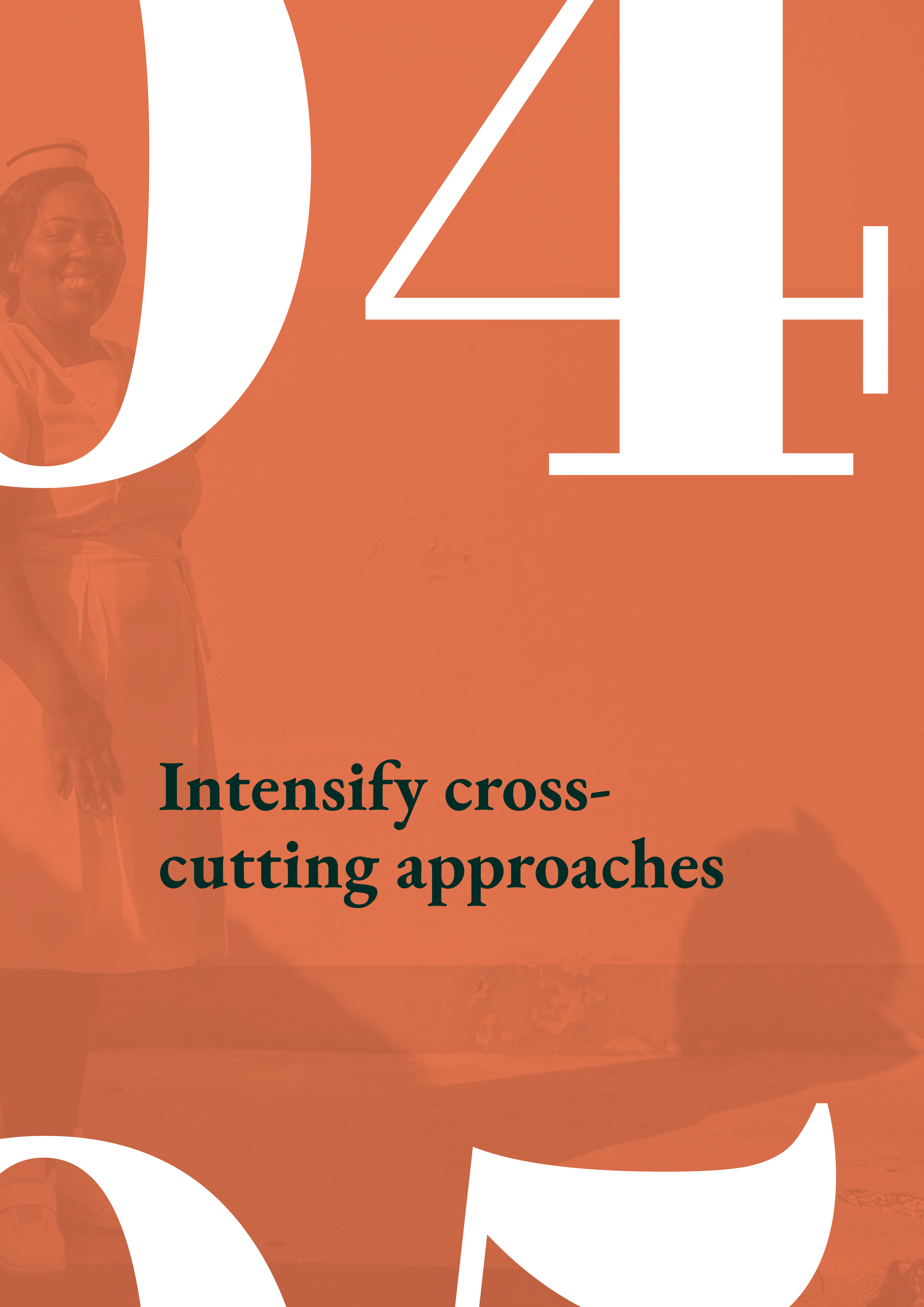
Fig. 12. Critical actions for each disease and disease group to reach the 2030 targets (cont'd)

Targeted for control

Disease	Critical action 1	Critical action 2	Critical action 3
Buruli ulcer	Build capacity of health workers to clinically diagnose and treat the disease and community health workers to detect and refer cases for early treatment, furthering integration among skin NTDs.	Develop rapid diagnostic tools for use in public health and community centres to ensure early diagnosis, reduce morbidity and confirm cases.	Create comprehensive surveillance systems in all endemic countries, including micro-mapping, to improve targeting and integrating interventions with those for other NTDs in co-endemic areas to improve case detection.
Dengue and chikungunya	Continue developing preventive vaccines for all at-risk populations.	Further develop the evidence base on effectiveness of vector control strategies.	Continue collaborating with environmental sector and engineers to reduce mosquito habitats.
Echinococcosis	Map disease prevalence to establish baseline data, and strengthen integrated national surveillance.	Develop guidelines for effective prevention and control strategies, and implement them in the field.	Strengthen implementation of ultrasound diagnosis and effective interventions, and ensure access to albendazole.
Foodborne trematodiases	Develop accurate surveillance and mapping tools and methods, with information on environmental factors involved in infection.	Estimate number of tablets required for control and secure donations of praziquantel.	Promote application and awareness of preventive chemotherapy, WASH and One Health interventions. Evaluate impact, and use the results in training health care staff.
Leishmaniasis (cutaneous)	Develop and scale up easy-to-administer oral or topical treatment that could be used in health centres.	Improve the affordability and sensitivity of rapid diagnostic test for detection of cases, and the availability of treatment.	Estimate the burden of the disease by improving surveillance, and establish a patient database to ensure effective monitoring of the impact of control interventions.
Mycetoma, chromo-blastomycosis and other deep mycoses	Develop differential rapid diagnostic test and effective treatment, and establish surveillance for case detection and reporting.	Develop a standardized field manual for diagnosis and treatment, and ensure proper training of health care workers.	Provide access to affordable diagnosis and treatment.
Scabies and other ectoparasitoses	Develop guidance and tools for mapping in endemic countries to estimate the burden of disease.	Develop guidance for implementation of preventive chemotherapy.	Create an advocacy and funding plan; secure financing for ivermectin and topical treatments; advocate for inclusion in universal health coverage.
Snakebite envenoming	Improve training of physicians in managing snakebite, and build awareness in communities on best practices in prevention and seeking treatment for snakebite envenoming.	Improve the quality of anti-venoms, and invest in research and development of new products.	Enhance overall production capacity for quality-assured products, and ensure their availability and accessibility in rural areas.
Taeniasis and cysticercosis	Develop a high-throughput test for evaluating control programmes in resource-limited settings, and map endemic areas.	Conduct targeted interventions in areas of high endemicity.	Increase advocacy from WHO, FAO and OIE to raise the priority of controlling the diseases.

Research and innovation are fundamental enablers of programmatic progress for all NTDs.

Buruli ulcer
Chagas disease
Dengue and chikungunya
Dracunculiasis
Echinococcosis
Foodborne trematodiases
Human African trypanosomiasis
Leishmaniasis
Leprosy
Lymphatic filariasis
Mycetoma, chromoblastomycosis and other deep mycoses
Onchocerciasis
Rabies
Scabies and other ectoparasitoses
Schistosomiasis
Soil-transmitted helminthiases
Snakebite envenoming
Taeniasis and cysticercosis
Trachoma
Yaws



04

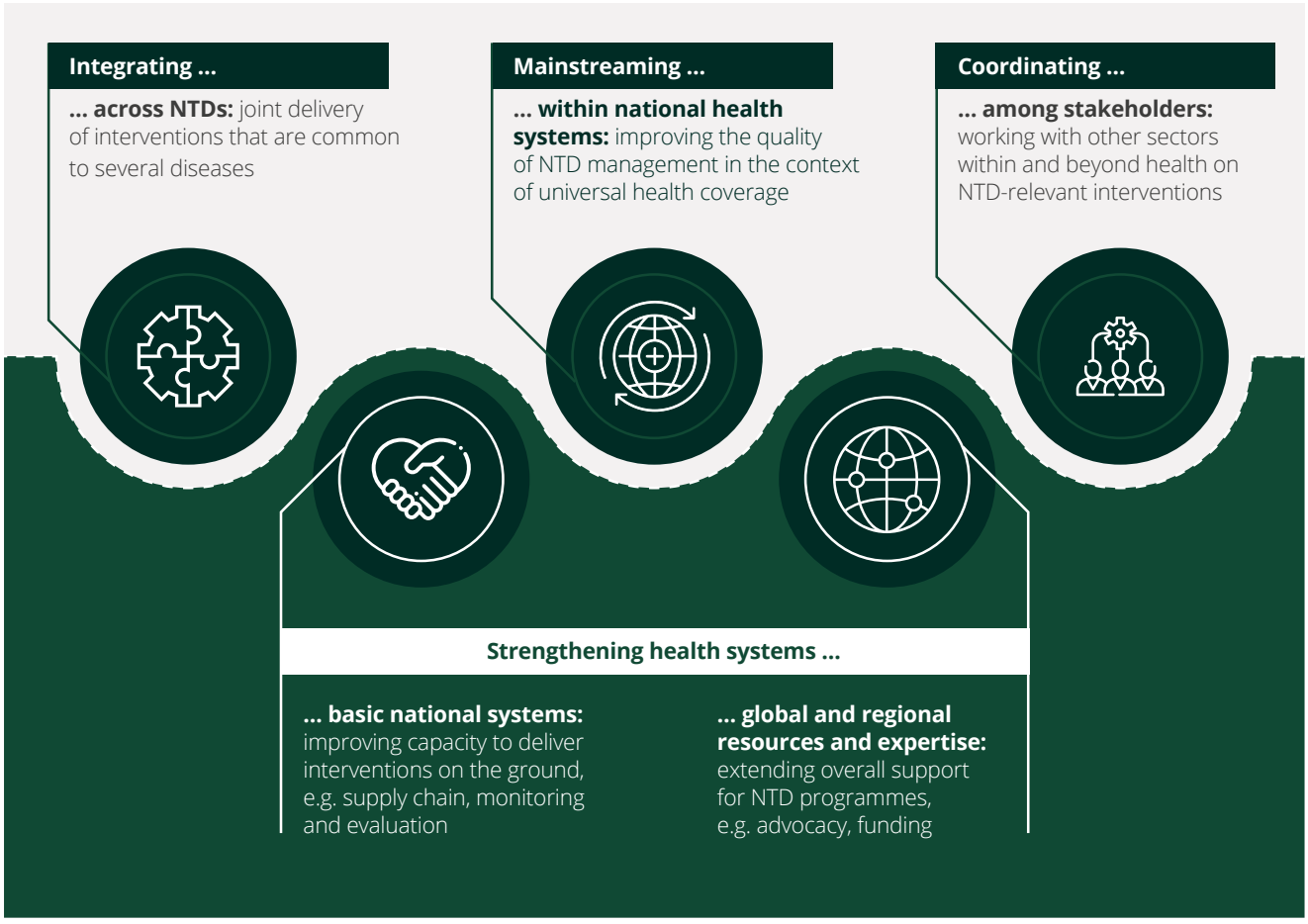
Intensify cross-cutting approaches

Intensify cross-cutting approaches

Given the breadth and diversity of the NTD portfolio, a focus on each disease in its own silo to achieve the 2030 targets will be neither cost–effective nor sustainable. These diseases and disease groups and the necessary response must involve not only health systems but also broader public and private sectors. The psychosocial and neurological effects of certain NTDs cannot be managed without well-functioning mental health and social support structures. NTD programmes should incorporate interventions aimed at reducing stigmatization and breaking down barriers to timely access to care and treatment for individuals, families, communities and marginalized groups, such as migrants. Strong data, monitoring systems and supply chains are essential for all NTD programmes. Strengthening links of NTD programmes with national health information systems and among specialized programmes, such as those for polio and vector control for malaria, will be essential for surveillance. Cross-cutting approaches are also cost–effective: mass administration of medicines for treatment of three diseases simultaneously is cheaper and more convenient for communities than in three separate visits. Cross-cutting approaches are also consistent with the vision of universal health coverage and with health systems strengthening in which patients are at the centre of the objectives and operating model.

The road map includes four categories of cross-cutting themes, as shown in **Fig. 13**: integration among NTDs; *mainstreaming* into national health systems; *coordination* with relevant programmes such as vector control and programmes for other diseases; and delivery through *strong country health systems* with robust regional and global support. Although these cross-cutting concepts have been stated in various other NTD plans, such as WHO's Global plan to combat Neglected Tropical Diseases 2008–2015 and the actions advocated by the World Health Assembly in resolution WHA66.12 (2013) on neglected tropical diseases, programmes have so far remained largely disease-specific. One aim of the road map is to encourage a shift to cross-cutting work, by providing a clear framework (**Fig. 12** and **Fig. 13**) and proposing concrete strategies and courses of action. Most of the recommended cross-cutting actions are based on best practices in countries. Not all will be applicable in every country, but, together, they represent a comprehensive guide for action.

Fig. 13. Four categories of cross-cutting themes



4.1 Integrate approaches across diseases

A common platform requires combining activities for NTDs with similar delivery strategies and interventions

In some countries, the NTD platform might be a formal programme or directorate within the health ministry, while in others it might be represented by less formal structures such as a task force or national coordinating body. An integrated approach will bring the programmes for NTDs that are endemic in a country onto a single NTD platform, which will allow links among programmes, when practical. A single platform will also centralize planning, implementation and evaluation of interventions for several NTDs, such as for the so-called skin NTDs **(Fig. 14)** and delivery of NTD interventions in schools. Integration will change the focus from technical interventions in vertical disease silos to an approach based on the needs of patients and communities. An integrated platform will encourage a broader, more holistic approach to include not only prevention but also treatment, care, rehabilitation and health education. An integrated NTD platform can provide support for even the most neglected of the NTDs, ensuring that they are addressed systematically and that the action is commensurate with the need.

There are concrete opportunities for joint interventions among NTDs

Fig. 15 exemplifies ways in which activities for several NTDs can be integrated to ensure more effective, efficient programming. Integration of planning and programme management allows coordinated monitoring and integration of implementation for NTDs with similar delivery strategies and interventions. Several diseases can be grouped or "packaged", depending on the burden of each in a country, for joint delivery of interventions such as preventive chemotherapy and use of multiplex diagnostics, shown by dark boxes. Monitoring, evaluation and reporting should be integrated for all relevant endemic NTDs.

Fig. 14. Integrated approaches to the management of skin NTDs

About skin NTDs

Skin conditions are the 18th leading cause of ill health globally and one of top 10 causes of non-fatal disability (Global Burden of Disease, 2016; https://www.who.int/healthinfo/global_burden_disease/en/).

Skin NTDs affect the skin and subcutaneous tissues and can result in disability, disfigurement, stigmatization and other socioeconomic problems (https://www.who.int/neglected_diseases/news/WHO-publishes-pictorial-training-guide-on-neglected-skin-disease/en/).


Buruli ulcer


Leishmaniasis


Leprosy


Lymphatic filariasis


Mycetoma, chromoblastomycosis and other deep mycoses


Onchocerciasis


Scabies and other ectoparasitoses


Yaws

Objectives and priorities

The goal of an integrated approach is to **reduce morbidity, disability and the psychosocial impacts of debilitating skin NTDs.** Progress will be measured primarily by the number of countries that adopt and implement an integrated approach to control skin NTDs. The target and milestones are:

Indicator	2020	2023	2025	2030
Number of countries that adopt and implement integrated skin NTD strategies based on local endemicity	4	15	20	40

Priorities in operational research and programme areas to achieve the 2030 targets for skin NTDs are:

Operational research priorities:

- Research on the epidemiology of causes, transmission modes and risk factors for infection
- Studies on socioeconomic impact
- Development and assessment of better medicines for integrated case management
- Development of diagnostic platforms for multiple or integrated screening in the community and in clinics
- Design of integrated information systems to ensure reliable reporting and responses, including mapping to identify overlaps
- Evaluation of training and training materials to improve integrated case detection on the front line of health care

Programme priorities:

- Identification of pharmaceutical companies willing to consider donations or reduced medicine prices
- Development of guidance on an integrated framework, surveillance tools, case detection and management, control and prevention at global, regional and/or national levels
- Development of training materials for health workers with emphasis on integrated pathways for:
  - clinical care: diagnosis, treatment and morbidity management
  - mental health, reduction of stigmatization and discrimination and psychosocial support
  - community interventions: prevention of disability, case management and rehabilitation

Integrated approaches in practice

Areas in which integrated approaches to skin NTDs are applicable.
Some examples of addressing several locally endemic skin NTDs other than by several disease-specific programmes:

Epidemiological surveillance, including active and passive case-finding, detection and disease mapping	Training and capacity-building for health workers and community volunteers on screening and treating skin NTDs	Promotion of implementation research and innovations to improve the efficiency of an integrated approach to skin NTDs
Social mobilization and community health education to build awareness about skin NTDs and encourage early reporting and treatment-seeking	Management and care of skin NTDs, e.g. through referrals (e.g. for mental health), training in self-care, provision of rehabilitation services (e.g. physical therapy, counselling), reducing stigmatization	Integrated planning, monitoring and evaluation of skin NTD programmes

Integrated approaches to skin NTDs can have a number of benefits, such as:

- Greater ownership by national programmes and long-term sustainability
- Cost–effectiveness and efficient use of resources
- Extended coverage and earlier case detection
- Greater capacity of health workers to properly manage cases

Fig. 15. Disease groupings for which joint interventions may be applicable (1/2)

		Examples of approaches to integration
Planning and programme management		· **Strategy and action planning:** Developing a national strategy and annual plans covering all NTDs, including cross-cutting and disease-specific targets (see section 4) · **Data management:** Hosting a data management tool (e.g. a cross-disease dashboard within the broader national health management information system) to collect, store and display disaggregated data for several NTDs for decision-making and reporting · **Mapping:** Mapping several NTDs in a specified area or a defined population to enhance understanding of disease incidence and prevalence · **Supply chain management:** Forecasting, procuring, transporting, clearing customs, storing, distributing and tracking medicines and other products within existing national medicine supply networks · **Quality assurance of health products:** Developing harmonized quality assurance guidelines to facilitate access to safe, efficacious, affordable NTD medicines, e.g. through prequalification
Implementation	**Social mobilization**	· **Joint awareness-building and community education** on all NTDs, e.g. behavioural change, MDA scheduling, availability of care, anti-stigmatization and discrimination
	Preventive chemotherapy	· **Community distribution and administration of multi-drug packages** for specific NTDs that are endemic in a given area by trained, supervised frontline health workers · **Distribution and administration of drugs for specific childhood NTDs** that are endemic in a given area in primary schools
	Active case-finding	· **Combined search for and contact with suspected cases of NTDs** in a defined population for whom early diagnosis is essential to reduce morbidity and mortality or to prevent further transmission
	Targeted prevention	· **Administration of preventive interventions to selected groups** considered at high-risk for contracting a specific NTD, e.g. vaccines, treatment for contacts of leprosy cases
	Vector control	· **Prevention and control of human–vector interaction,** supplementing control of targeted vectors
	One Health approaches	· **Integrated approaches** to building understanding of human–animal transmission of NTDs with an animal interface and delivering interventions such as vaccinations, population management and tethering for dogs
	Point-of-care diagnosis	· **Using a point-of-care multiplex diagnostics platform** to test populations for multiple endemic NTDs simultaneously
	Support networks	· **Developing and referring patients to community support network services** to help with stigmatization and discrimination common to diseases associated with long-term disability or disfigurement
	Self-care	· **Provision of and support for self-care packages** (e.g. bandaging, foot hygiene, eye care), and training for patients whose disease involves a component of self-care for morbidity management
	Counselling and psychological support	· **Provision of and support for counseling and support** for NTD patients who require support for mental and emotional health
	Health care worker training	· **Building the capacity of health care workers** to diagnose, treat and care for patients with NTDs

Relevant NTDs

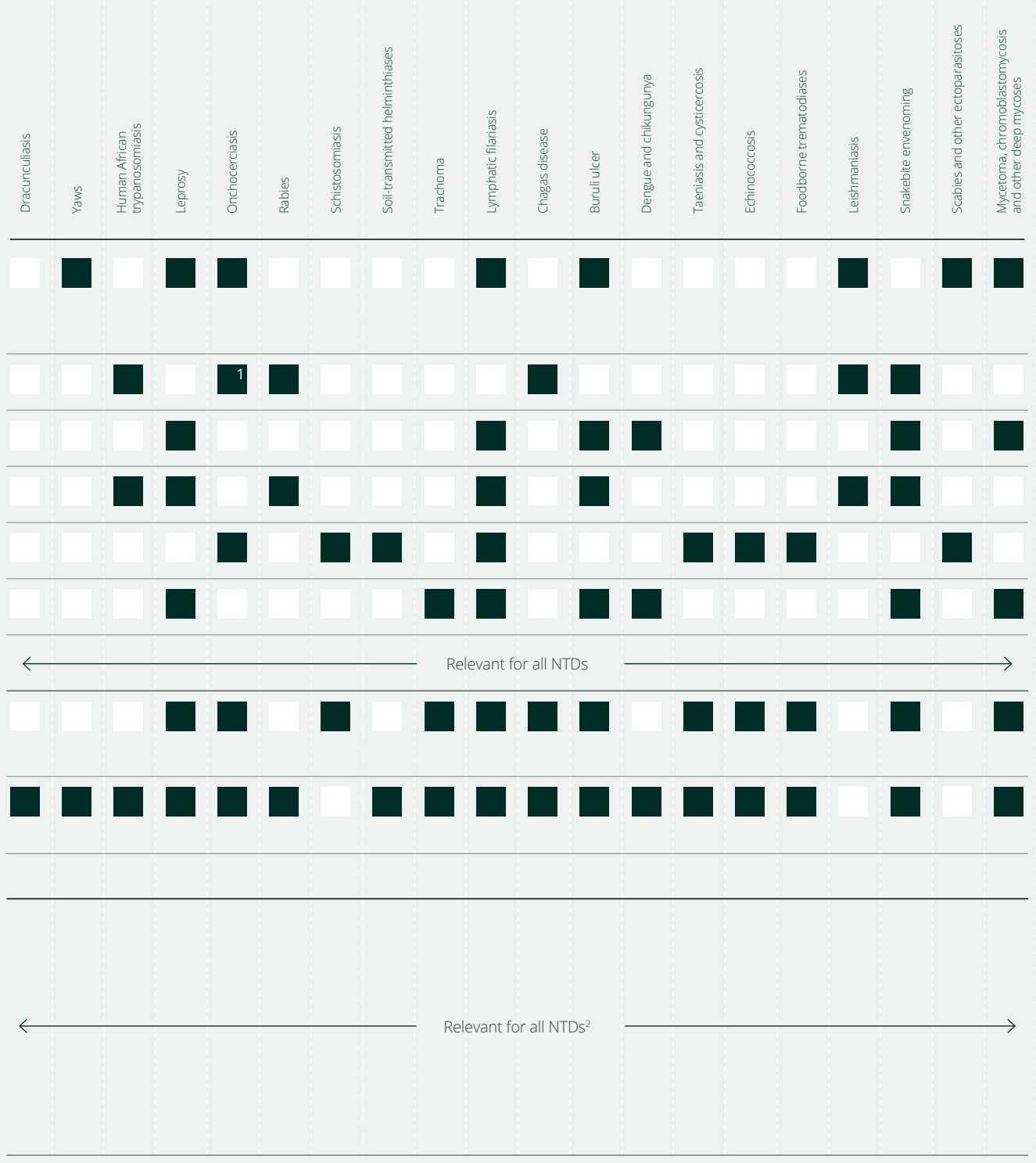
Fig. 15. Disease groupings for which joint interventions may be applicable (2/2)

	Examples of approaches to integration	
Implementation	**Screening and treatment of skin NTDs**	· **Capacity-building** to enable health care workers **to screen for skin NTDs** by visual examination and/or referral for subsequent clinical examination **and relevant treatment** · **Provision of care and rehabilitative services,** e.g. lymphoedema management (Buruli ulcer, yaws, lymphatic filariasis, mycetoma)
	Rapid response systems	· **Development and use of emergency response systems** for rapid access to medical treatment for diseases that require immediate attention
	Physical therapy	· **Provision of physical therapy** services and advice (e.g. exercises) or referral to relevant services to restore the full range of motion and functional ability of patients
	Wound care	· **Capacity-building for health care workers** to wash, dress and care for various types of severe or extensive wounds at a health facility and to teach affected people about self-care
	Anthelminthic treatment	· **Capacity-building to diagnose and treat patients with certain parasitic infections** e.g. intestinal helminths
	Provision of assistive devices	· **Provision of assistive devices** required for disability due to several diseases (e.g. walking devices, orthopaedic footwear), and training of health care workers to select relevant devices
	Laboratory diagnosis	· **Integrated use of laboratory capacity** and technical training for laboratory staff to test for the NTDs that are endemic in a given region
	Management of complications and surgery	· Capacity-planning to ensure affordable access to surgery and management of complications · Training in NTD surgery and complications that require medical management, e.g. nerve damage due to leprosy, acute attacks in lymphatic filariasis (including managing referrals when relevant)
	Management and tracking of referrals	· **Integrated referral management and tracking system** to recognize when secondary or other forms of care are required and to direct the patient to those resources
Monitoring and evaluation		· **Surveillance:** Integration of NTDs into national health information systems for routine data collection and analysis, which might include joint administration of surveys for several NTDs (e.g. coordination of transmission assessment surveys, surveillance for outbreaks and mortality) · **Monitoring and evaluation:** Integrated activities for several NTDs, such as for progress, impact assessment, monitoring for drug efficacy, antimicrobial resistance, quality control · **Pharmacovigilance:** Monitoring and recording of adverse events; providing reliable, balanced information for effective assessment of the risk–benefit profile of medicines and communicating the findings to national regulatory departments · **Reporting:** Consolidated reporting on NTDs, providing input into planning, e.g. to determine development priorities such as target product profiles

· **Other interventions unique to individual NTDs remain relevant, e.g. individual treatment and case management, including first-line treatment and care**

· **All services for NTDs should be based on gender equity and human rights**

Relevant NTDs



[1] Required in *Loa loa* co-endemic areas
[2] Quality assurance of health products and pharmacovigilance is not relevant for dracunculiasis because there is no medicine to treat this disease


© WHO/Yoshi Shimizu

4.2 Mainstream delivery platforms within national health systems

NTDs are designated as "neglected" partly because they are frequently overlooked by health systems. Actions against NTDs both contribute to and benefit from strengthened health systems and especially primary and community health care. NTDs must be well positioned to benefit from and contribute to better monitoring and evaluation. Within national governance structures, the NTD platform should build on common and synergistic work for different diseases. Mainstreaming NTD activities into the health system and building capacity to deliver interventions through its infrastructure will contribute to sustainable, efficient NTD prevention and control and enable NTD patients to access all aspects of treatment, care and support. A common indicator and accountability mechanism should be defined to track progress in mainstreaming. These activities will contribute to overall health system strengthening, greater country ownership and poverty alleviation.

Integrated approaches to NTDs can and should be mainstreamed within various components of national health systems; for example, planning should be incorporated into overall national health planning and budgeting, data management should be included in health management information systems at all levels, and delivery of medicines should be coordinated through national medicines supply and logistics systems. Diligent monitoring for safe administration of treatment for NTDs and reporting and responding to adverse events align with the objectives of national pharmacovigilance programmes and demonstrates a core element of universal health coverage and high-quality people-centred care. Integrated NTD interventions, from prevention to diagnosis, treatment, care and rehabilitation, can and should be delivered through community or primary- or secondary-care facilities in the national health system **(Fig. 16)**.

Existing structures should be used; for example, NTD capacity-building could be part of a standard health ministry training module or part of staff induction. Even when interventions against NTDs, such as preventive chemotherapy, are required in settings with weak formal health systems, they should be integrated into informal and community health structures. **Fig. 16** proposes ways in which NTD programme components can be mainstreamed into health systems, although the details will differ by country.

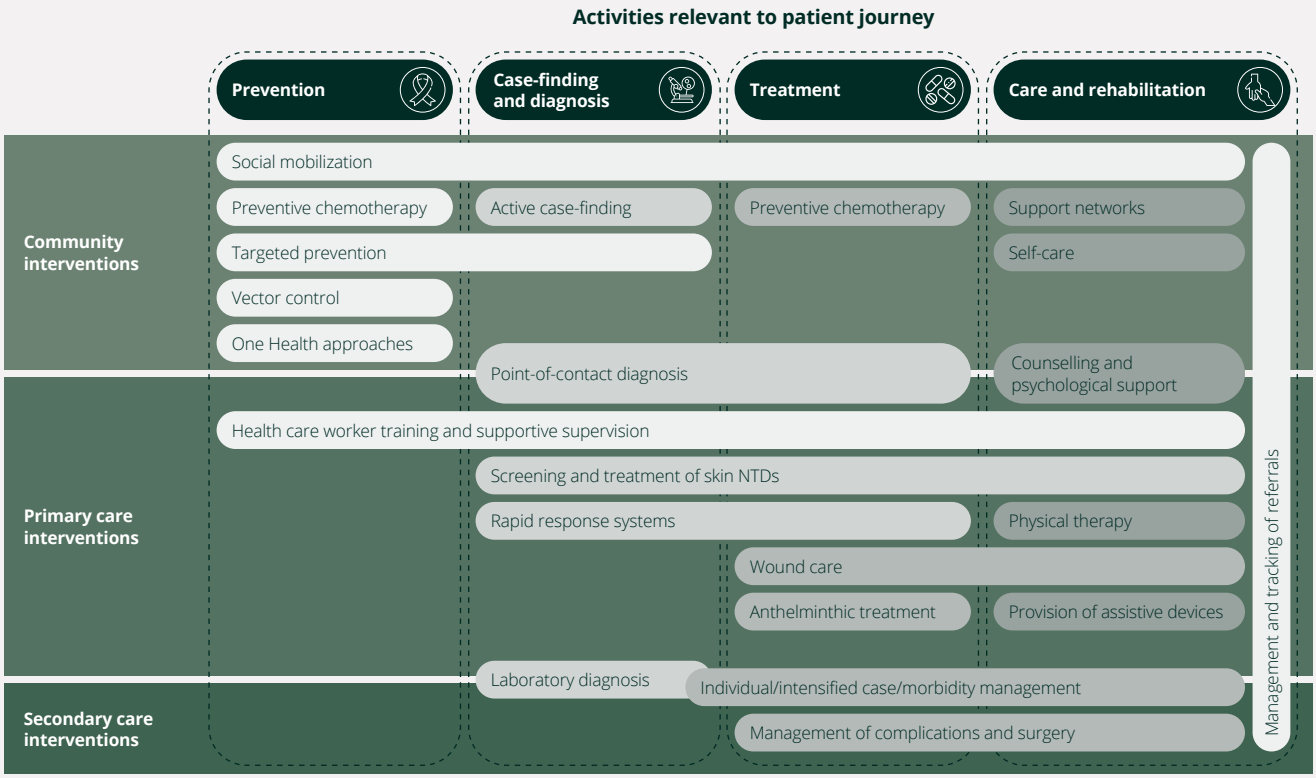
Benefits of integration and mainstreaming

An integrated approach to NTD activities is expected to result in better health outcomes, greater cost efficiency and effectiveness and better programme management (see **Fig. 16**). A gradual shift has been occurring towards integrated management of NTDs since 2006, when approaches for combined delivery of preventive chemotherapy were introduced. Additional work is now required to realize the full benefits of integration and mainstreaming. Diseases such as scabies and yaws should be included in existing integrated preventive chemotherapy programmes, which are usually limited to a group of five diseases.[1] Furthermore, more work is required to integrate operations against diseases with similar treatment measures, epidemiology and geographical distribution. NTDs can be integrated more effectively through existing systems and structures, such as vaccination programmes, cold chain, delivery, education and health worker training.

Some disease-specific focus will still be required, despite an overall transition to integration. **Fig. 17** indicates considerations for achieving a balance between disease-specific and integrated approaches.

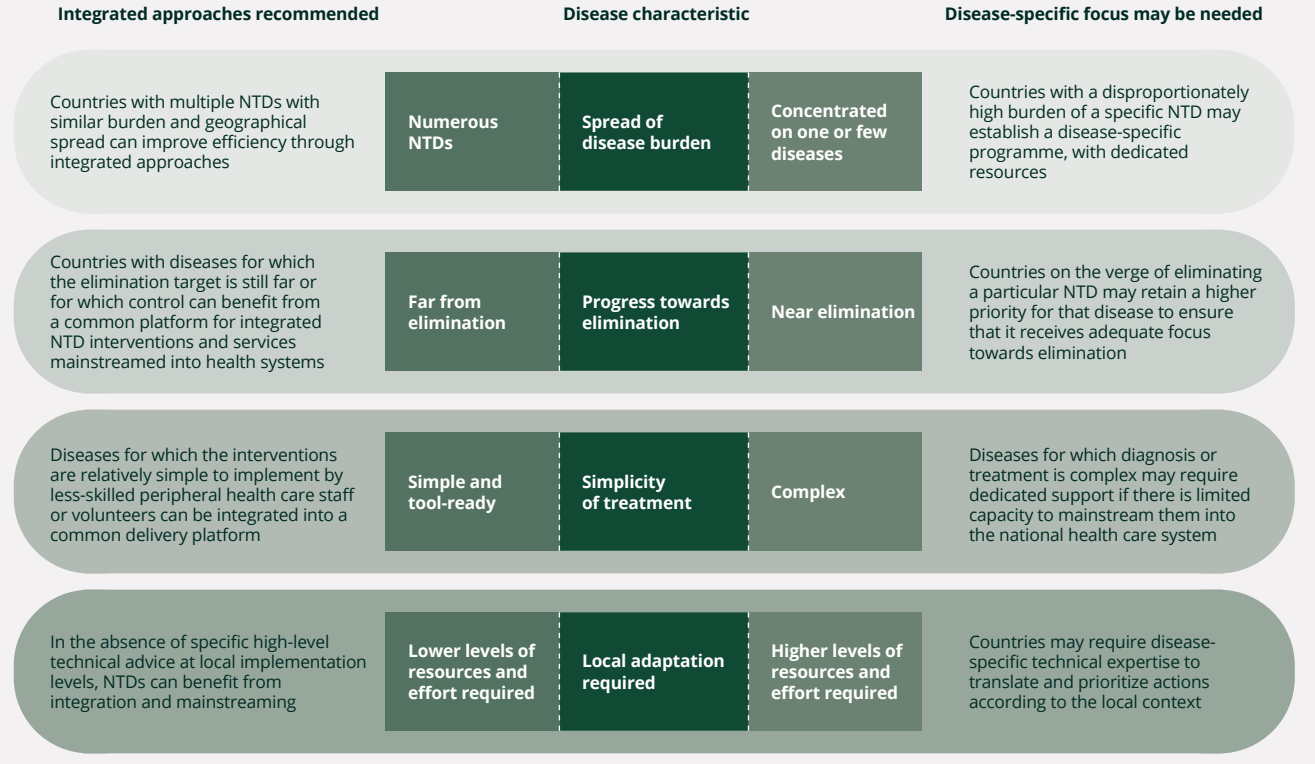
[1] Lymphatic filariasis, onchocerciasis, schistosomiasis, soil-transmitted helminthiases and trachoma.

Fig. 16. Mainstreaming NTDs into national health systems



- Interventions unique to certain NTDs remain relevant. e.g. individual treatment and case management including first-line treatment and care
- All services for NTDs should be based on gender equity and human rights

Fig. 17. Considerations for balancing disease-specific and integrated approaches



© WHO/Arko Datto

4.3 Coordinate efforts across sectors

Meeting the 2030 targets will require coordination, collaboration and cooperation among many sectors

The SDGs show that there is no single development target. Meeting the 2030 targets for NTDs will require coordination among adjacent sectors and programmes, both within and beyond health, in the broader NTD network. Sectors such as vector control and WASH make critical contributions to progress on NTDs, and working together more effectively can accelerate and sustain progress towards disease elimination and control. Coordination is also necessary with the wide array of relevant NTD partners, including donors, academic institutions, pharmaceutical companies, disease experts, multilateral organizations and implementing partners, to ensure effective service delivery.

Coordination is particularly important for the 12 NTDs targeted for elimination and eradication. Experience has shown that NTD interventions alone may be insufficient to eliminate a disease. For example, deworming to prevent schistosomiasis in the Mekong sub-region alone did not prevent reinfection but required parallel activities, including WASH, health education and the One Health approach to deal with animal reservoirs. Furthermore, the burden of Chagas disease in Latin America was reduced by vector control, particularly information, education and communication, indoor residual spraying and house improvements, in combination with screening of blood donors to stop transmission via transfusion.

Other sectors play critical roles in the prevention, treatment and care of patients with NTDs

The activities of other sectors can significantly contribute to the prevention, treatment and care of many NTDs. **Fig. 18** shows activities that can be undertaken by various health departments and non-health sectors, and **Fig. 19** shows the NTDs for which the activities are pertinent. Certain sectors may be particularly appropriate; for example, schools may be the channel for health education on all NTDs.

Effective intersectoral coordination facilitates concerted action towards attaining the SDGs

A well-coordinated NTD network, with defined roles for stakeholders and clear mechanisms of interaction and exchange, has several benefits. Through collaboration, NTDs can benefit from the resources and activities of other sectors. For example, sharing of micro-mapping data on the endemicity of WASH-related NTDs with WASH programmes can direct WASH activities to NTD hotspots. Collaboration may also improve the quality and cost–effectiveness of interventions by ensuring that they are delivered through the most suitable channel. For example, veterinary services would be better suited than an NTD programme to implement an intervention for animal health, such as vaccinating pigs. Effective coordination can also minimize duplication of work. For example, harmonized vector control for both malaria and lymphatic filariasis can reduce overlapping initiatives in countries that are endemic for both diseases.

Fig. 18. Coordination with health ministries and other ministries and authorities

Health ministry		
Activities of health ministry departments that are relevant for NTDs		
Global vector control response (may be under the ministry of environment in some countries)		• **Use of repellents and traps,** e.g. insecticide-treated bed nets, screens, insecticides or molluscicides, fogging • **Environmental management** to minimize mosquito habitats, including: - **housing improvements** (in collaboration with ministry of infrastructure), e.g. plans to build vector-free housing, including safe storage of water, sanitation, window screens, and ensuring air flow to prevent vector entry and to help to keep houses cool - **container management,** e.g. covering, emptying, cleaning and disposing of containers (e.g. old tyres) - **draining or treating stagnant water** (in collaboration with ministry of water and WASH) • **Behavioural change,** e.g. wearing long clothing • **Use of other innovative approaches,** e.g. release of modified, transgenic or sterile vectors, spatial repellents to stop vector entry into households
Mental health		• **Psychological support and counselling** services for NTD patients • **Routine assessment of mental health** for patients with specific NTDs, particularly those with chronic conditions
Disability and inclusion		• **Treatment of disability and morbidity management,** e.g. physical therapy • **Provision of support services** and devices, e.g. walking devices and prosthetics • **Training for self-management of disability** and self-care
Women's and child health		• **Awareness-building about diseases** for which women and children are disproportionately at risk or for which there are particular manifestations in women (e.g. female genital schistosomiasis) • **Use of pre- and post-natal contacts, e.g. in maternal health clinics, to deliver interventions,** e.g. deworming tablets, and supplements (e.g. iron) for pregnant women and children to prevent anaemia
Eye health		• **Promotion of eye care,** e.g. face-washing, protecting eyes and eye examinations • **Provision of treatment** for eye conditions related to NTDs, including surgery when required
Nutrition		• **Access to better nutrition** to strengthen immune systems and reduce susceptibility to infection, e.g. for visceral leishmaniasis for which malnutrition is a risk factor • **Provision of food and supplements** (e.g. iron and vitamin A) to combat common side-effects of NTDs, such as anaemia and nutritional impairment
Other disease programmes		• **Immunization programmes:** joint delivery of preventive chemotherapy to preschool-aged children • **Tuberculosis:** joint detection of paragonimiasis (foodborne trematodiases), leprosy and other mycobacterial diseases, e.g. Buruli ulcer • **Malaria:** joint diagnosis with human African trypanosomiasis, vector control against *Anopheles* mosquitoes • **HIV/AIDS:** education about risks, e.g. of coinfection with certain NTDs

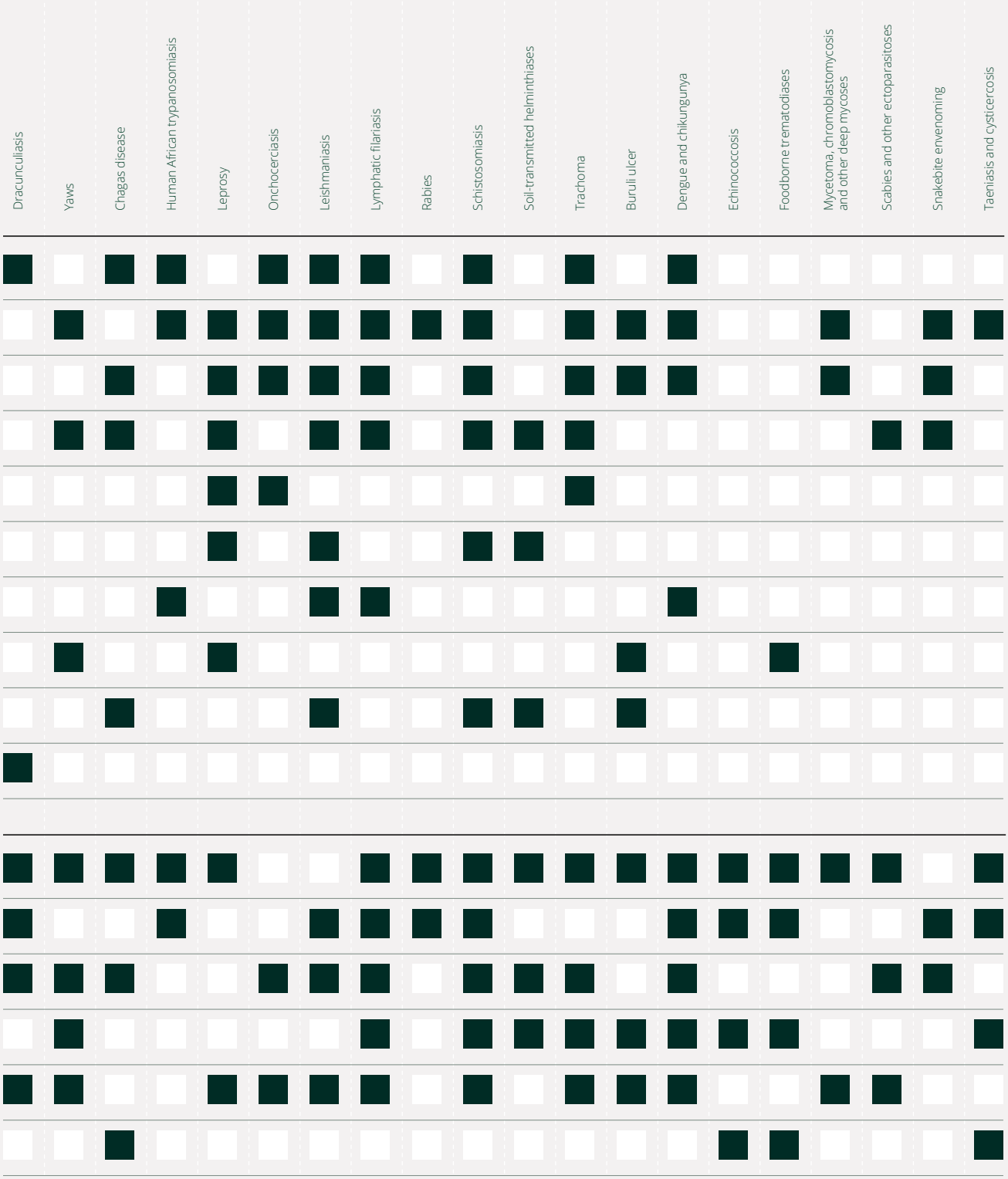
Generic ministry names are shown, which may differ by country.

© WHO/Yoshi Shimizu

Fig. 19. Relevance of coordination for each NTD

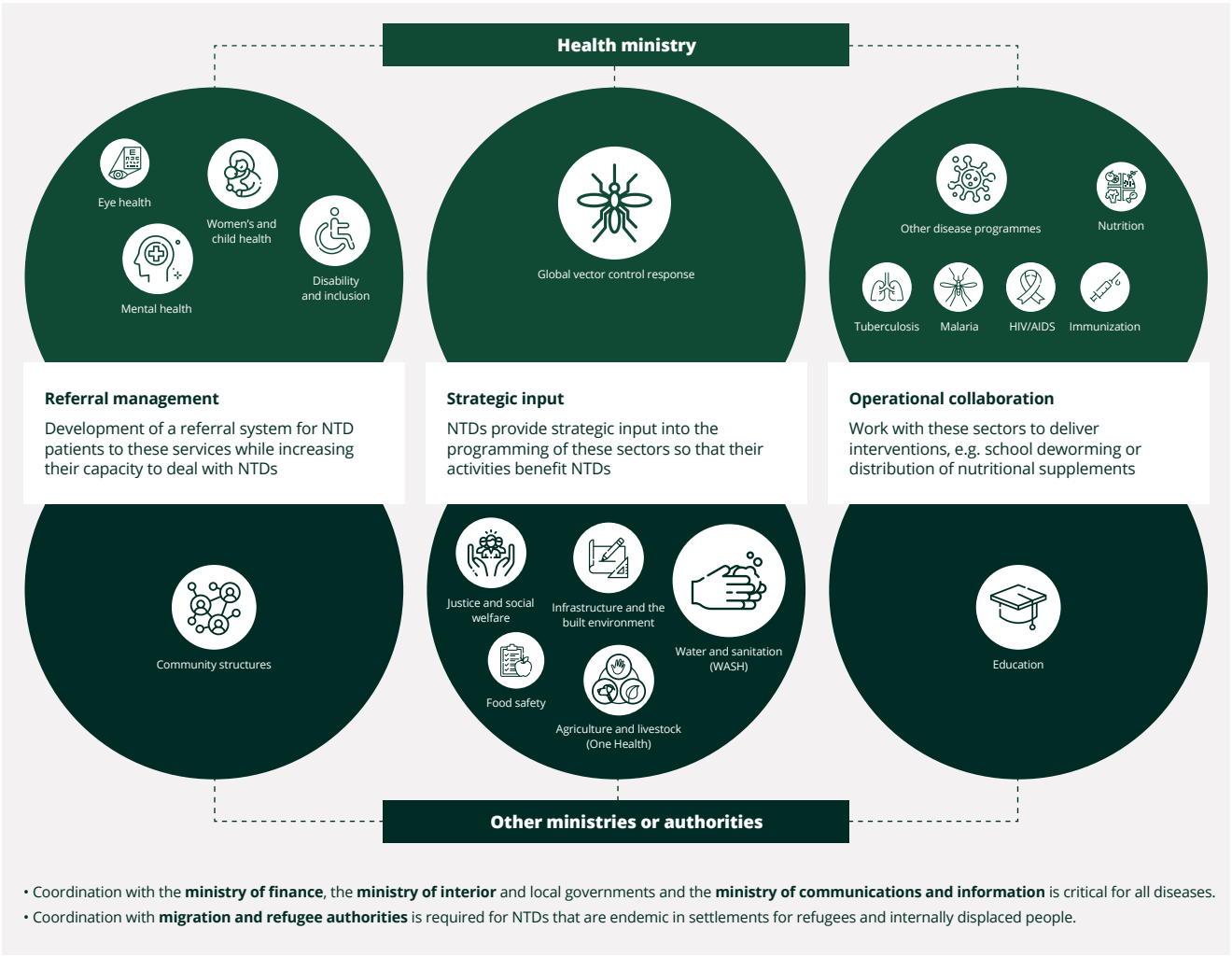
Health ministry	Global vector control response
	Mental health
	Disability and inclusion
	Women's and child health
	Eye health
	Nutrition
	Malaria
	Tuberculosis
	HIV/AIDS
	Immunization programmes
Other ministries or authorities	Water and sanitation (WASH)
	Agriculture, livestock, wildlife, environment (One Health)
	Infrastructure and the built environment
	Education (school delivery of interventions, e.g. MDA)
	Justice and social welfare
	Food safety

Primary linkages with NTDs shown only



- Coordination with the ministries responsible for **finance**, the **interior and local governments**, and **communications and information** is critical for all diseases.
- Coordination with migration and refugee authorities is required for NTDs that are endemic in settlements for refugees and internally displaced people.

Fig. 20. Examples of coordination with other disciplines and sectors



The form of coordination depends on the sector and may range from action in NTD-endemic areas to use of the platforms of other sectors to deliver NTD interventions

The purpose and scope of activities and the mechanisms used for coordination depend on the sector and national structures. There is no standard approach to multisectoral collaboration, **Fig. 20** outlines three broad categories of coordination at a high level. First, referral management comprises coordination primarily among health sectors for a smooth system in which NTD patients are referred to relevant services. Strategic input will ensure that other programmes benefit NTD programmes, with relatively little change in programming; for example, vector control for malaria is also beneficial against lymphatic filariasis and leishmaniasis.

Operational collaboration ensures delivery of NTD interventions through other platforms (such as deworming in schools) or joint implementation (such as detection of paragonimiasis in examinations for tuberculosis). The activities that could be coordinated and the potential mechanisms for interaction with NTDs are shown for WASH in **Fig. 21**, for the global vector control response in **Fig. 22** and for the One Health approach in **Fig. 23**.

Fig. 20. Examples of coordination with other disciplines and sectors (cont'd)

Other ministries or authorities	
Activities conducted by other ministries or authorities that are relevant for NTDs	
Water and sanitation (WASH) 	• **Providing access to improved water sources** (protected from external contamination) • **Hygienic conditions for case management,** e.g. wound-washing (rabies), self-care and morbidity management (e.g. personal hygiene and wound care for lymphatic filariasis, leprosy and yaws), surgical procedures (e.g. surgery for hydrocele and trichiasis) • **Sanitation – access to facilities and safe management of fecal waste** to prevent transmission (e.g. of soil-transmitted helminthiases, taeniasis and foodborne trematodiases) • **Promoting hygienic practices** (e.g. hand- and face-washing, prevention of open defecation, food hygiene, filtering water from open water bodies before drinking) • **Proper storage and disposal/drainage of water** to reduce vector habitats
Agriculture, environment, livestock, wildlife (One Health approach) 	• **Understanding animal reservoirs and zoonotic transmission** • **Treating animals to prevent transmission** • **Vaccination,** e.g. mass dog vaccination (rabies), and pig and sheep vaccination (taeniasis, cystic echinococcosis) • **Medical treatments,** e.g. deworming for pigs (taeniasis), dogs (cystic echinococcosis) and foxes (alveolar echinococcosis) • **Animal husbandry and management,** e.g. dog tethering (dracunculiasis), keeping domestic animals and livestock away from human dwellings (mycetoma) and preventing pig contact with human faeces (taeniasis)
Education 	• **MDA in schools**[1] against childhood diseases like soil-transmitted helminthiases, schistosomiasis, yaws • **Awareness of practices to prevent NTDs** embedded in national curricula, e.g. hygienic practices and preventing mosquito breeding sites
Justice and social welfare 	• **Preventing structural discrimination** associated with high levels of stigmatization associated with NTDs (leprosy, cutaneous leishmaniasis, lymphatic filariasis and neurocysticercosis), e.g. abolishing discriminatory laws • **Promoting inclusive access** to resources and facilities, health and social services, education and employment opportunities • **Conducting anti-stigmatization interventions** (e.g. community dialogue and engaging local leaders to share anti-stigmatization messages)
Infrastructure and the built environment 	• **Housing improvements** to minimize mosquito habitats, including safe storage of water, sanitation, window screens, constructing drains that do not provide breeding sites for mosquitoes and ensuring air flow to prevent vector entry and help keep houses cool
Food safety 	• **Food safety practices and regulations,** including: - for households and food handlers (e.g. properly washing and cooking food before consumption and ensuring food quality) - for farmers and livestock keepers (e.g. safe disposal of offal during slaughtering (echinococcosis))

- Coordination with the ministries responsible for **finance**, the **interior and local governments**, and **communications and information** is critical for all diseases
- Coordination with migration and refugee authorities is required for NTDs that are endemic in settlements for refugees and internally displaced people

[1] School is one venue for delivering MDA to school-aged children, but efforts should be made to ensure that school-aged children not in school also receive MDA.

Fig. 21. WASH and NTDs: activities and mechanisms for coordination

Purpose of coordination

Improve the targeting of WASH investment and activities to better support the prevention, treatment and care of NTDs

Examples of activities that should be coordinated

Planning

Programme planning

NTD programme to share micro-mapping data on endemicity of WASH-related NTDs with the ministry of water and sanitation.

WASH programmes to direct investment and interventions towards NTD hotspots, where interventions are most needed.

Advocacy

Joint building of evidence and awareness on the mutual benefits of collaboration between WASH and NTDs, e.g.:

- **return on investment:** e.g. the return on every US$ invested in WASH in NTD-endemic areas as compared with the average return of about US$ 5 for WASH interventions overall;
- **health outcomes:** e.g. WASH is essential to limit or break the transmission cycle for 16 of the 20 NTDs or conditions.

Implementation

Social mobilization

Joint awareness-raising and behavioural-change promotion, e.g. promoting WASH practices during MDA campaigns, including NTD-specific messages in WASH activities in households or schools.

Delivering interventions

NTD programme to manage components of WASH-related diseases, such as case management, surveillance and surgical care.

WASH services to deliver interventions (e.g. build sanitation facilities, provide access to improved water sources) and strengthen the environment for sustainable WASH service delivery.

Evaluation

Evaluation and reporting

Sharing data and tracking progress towards common targets, including:

- **Indicators** and goals that are relevant for both sectors and aligned with global cross-cutting targets on WASH and NTDs, e.g.:

Impact indicator	Target year
0% of population practising open defecation	2025
100% of population using at least basic sanitation	2030
100% of population using at least basic water supply	2025
100 % of population with hand-washing facilities, including soap and water	2030

- **Jointly tracking progress and impact** with harmonized monitoring and evaluation and frameworks to inform decision-making and joint planning, gauge effectiveness of interventions, and document benefits for use in advocacy.
- **Share data and best practices,** e.g. by joint use of datasets and documenting experiences and lessons learned.

Potential coordination mechanism	Dedicated committee or task team at national and/or local level (within cross-sector coordination platforms), with clear assignment of roles in coordinating activities among stakeholder groups.
Case studies	**Cambodia and Lao People's Democratic Republic CL-SWASH initiative:** community-led initiative to eliminate schistosomiasis by combining deworming with WASH interventions (CL-SWASH): the two countries set up national task forces with representatives from NTD, WASH, nutrition and education sectors to develop community-led initiatives to eliminate schistosomiasis by combining deworming, nutrition and WASH interventions. **Ethiopia:** Ethiopia has a national technical working group, a dedicated coordinator of WASH and NTDs at the Federal Ministry of Health, regional WASH and NTD coordinators and a national WASH and NTD framework that defines the process and responsibilities for joint planning, delivery and supervision.

See WASH/NTD strategy for further details: https://www.who.int/water_sanitation_health/publications/wash-and-ntd-strategy/en/

Fig. 22. Global vector control response: activities and mechanisms for coordination

Purpose of coordination

Promote integrated vector management for all vector-borne diseases, and improve the efficacy, cost–effectiveness and sustainability of vector control

Examples of activities that should be coordinated

Planning	**Developing interventions strategies**	• **Develop interventions for human health,** e.g. prevention, treatment, control and care of patients with vector-borne diseases	• **Develop vector control strategies** for vector-borne NTDs, e.g. plan of action based on the Global Vector Control Response 2017–2030.
	Programme planning	• Coordinate a **national assessment of vector control requirements** based on disease endemicity. • **Strengthen inter- and intra-sectoral action and collaboration** (multi-sectoral approach). • Prepare a **costed work plan** in which actions are prioritized according to available resources.	
	Capacity-building	• **Conduct cross-sectoral training;** e.g. staff of health ministry and other relevant ministries trained in public health entomology and vector control.	
	Advocacy	• **Advocate about the importance of vector control** in disease elimination. • **Jointly develop evidence and awareness** about the mutual benefits of coordination, e.g. the cost–effectiveness of vector control for preventing NTDs, such as: - for each US$ 1 invested in community activities, one person is protected against dengue for one year. - US$ 1.3 spent on insecticide-treated nets can protect one person for 1 year. • **Promote reporting of all suspected cases** for timely action.	
Implementation	**Social mobilization**	• **Joint community engagement:** working with local residents to improve vector control and build resilience against disease outbreaks, e.g.: - **communication for behavioural impact** with targeted messages to reduce breeding sites (e.g.: cover stagnant water) and exposure to mosquitoes (e.g. use of window screens and personal protection). - **information** (e.g. use of media and other channels) and education (e.g. promotion of vector control by community health workers or schools).	
	Delivering interventions	• **NTD programmes to manage human health related to vector-borne NTDs.**	• **Vector control programmes to scale up interventions** such as insecticide spraying, environmental improvements, and larval control.
Monitoring and evaluation	**Surveillance**	• **Coordination of clinical case-finding, laboratory confirmation and vector surveillance,** e.g.: - prevent and control outbreaks by early reporting and directing vector control activities to areas where dengue is suspected or detected. - alert clinicians to prepare for cases after notification of a significant increase in the mosquito population. - sustain vector surveillance, and integrate data into the health information system.	
	Evaluation and reporting	• **Monitor impact and track progress** in indicators of the impact of the Global Vector Control Response 2017–2030. • **Assess impact** of coordinated interventions on the vector and human health. • **Estimate burden**. • **Assess environmental effects** of vector control, and monitor insecticide resistance.	
	Data management	• **Share databases** e.g. on vector dynamics and insecticide use to assess the impact of vector control interventions.	

Potential coordination mechanism	• **A vector control working group or task force** under a national interministerial task force on vector control that oversees, coordinates and strengthens vector control in line with the Global Vector Control Response strategy; membership could include high-level officers from relevant ministries, local authorities and communities and stakeholders such as development partners. • Enabling factors include dedicated funding for task force activities and high-level leadership, e.g. the president convenes the task force when an outbreak is suspected.
Case studies	• **Inter-ministerial task force in Singapore** between Ministry of Health and Ministry of the Environment and Water Resources; it convenes within 24 h of a report of a suspected case of dengue. Adequate national funding is allocated to relevant ministries to cover vector control activities. • **Integrated vector management task force in Sudan,** which implements a national action plan developed with stakeholder consultation, led to a significant increase incapacity at all levels.

See the Global Vector Control Response 2017–2030 for further details: https://www.who.int/vector-control/publications/global-control-response/en/

Fig. 23. One Health approach and NTDs: activities and mechanisms for coordination

Purpose of coordination	Ensure a coordinated approach to disease hosts and environmental factors related to NTDs, with clear assignment of roles and responsibilities

Examples of activities that should be coordinated

Planning

Developing a One Health strategy for NTDs	• **Develop a One Health strategy for NTDs,** including case definition, common targets, strategies and mechanisms for collaboration among agriculture, livestock, wildlife, environment, food safety, health and other ministries. • **Integrate NTD into existing One Health platform**s and ensure that they are considered and included in local strategies and plans. • **Create national operational plans to deliver interventions for NTDs with a human–animal–environment interface, with clear attribution of roles and responsibilities,** e.g. a coordinated plan outlining stakeholder accountability for humans-, animal-, food- and ecosystem-related actions.	
Developing scientific understanding	• **Use a One Health approach to improve understanding of human–animal transmission** of NTDs, including social and economic implications.	• **Identify key hosts** for NTDs and **tailored control work**. • **Develop diagnostics and interventions for animals** that are lacking, e.g. for cysticercosis, cystic echinococcosis. • **Investigate parasite evolution,** e.g. how movements of infected animals and people transfer parasites to new host species; e.g. evolution of zoonoses as more land is used for livestock production.
Programme planning	• **Share data on occurrence of NTDs** in various human and animal hosts among sectors to guide activities, e.g. surveillance in animals as a proxy for humans. • **Develop plans for coordinated disease control,** e.g. simultaneous interventions for both humans and animals in a geographical area.	
Advocacy	• **Jointly develop evidence and awareness** about the importance of a One Health approach for elimination and for maintaining the social and commercial value of animals for populations affected by NTDs.	

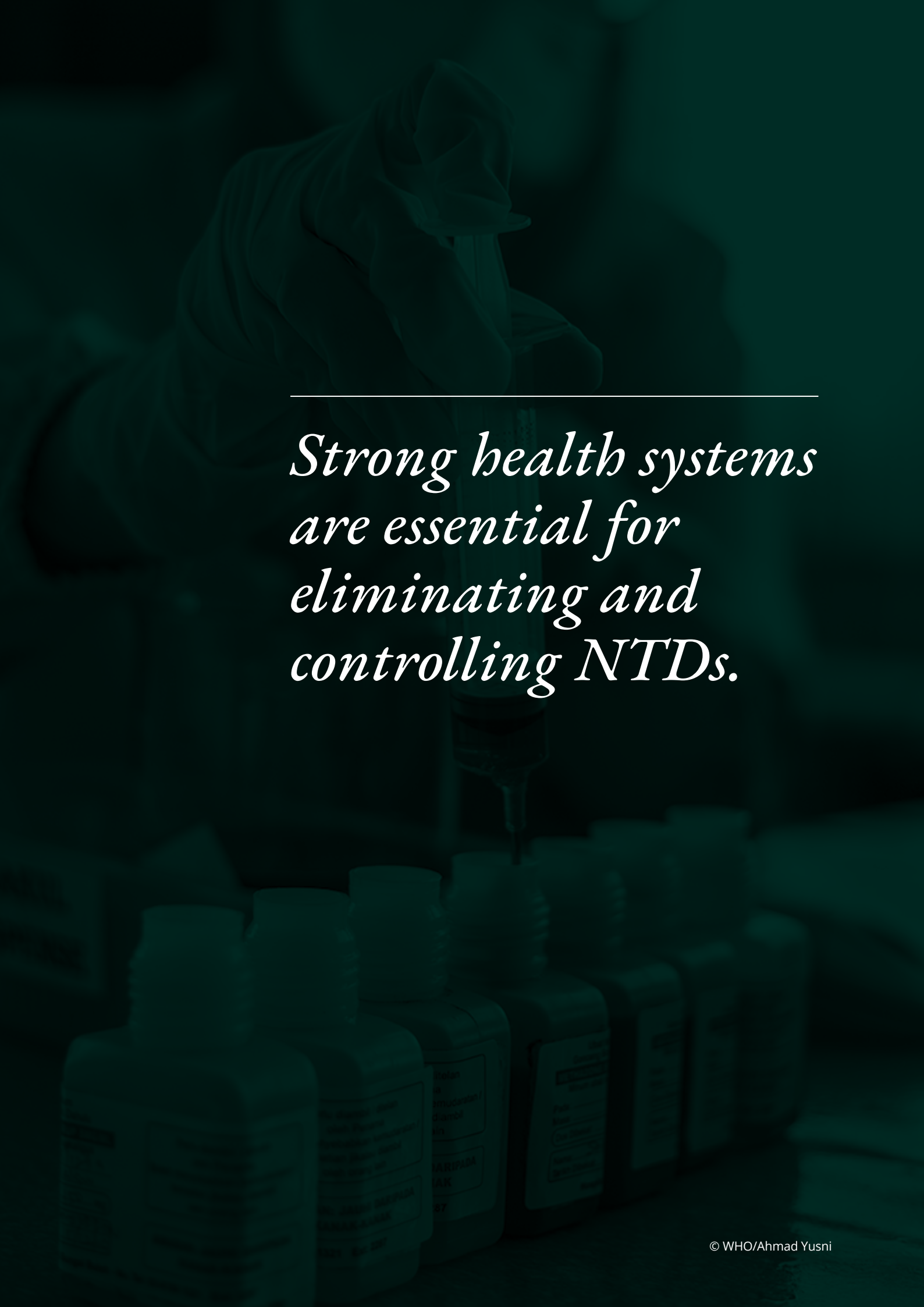
Implementation

Social mobilization	• **Conduct joint awareness-raising and behavioural-change promotion** with specific messages for targeted groups such as livestock keepers. • **Provide education on animal husbandry and management,** e.g. tethering dogs, safe disposal of offal containing cystic stages.	
Delivering interventions	• **NTD programme to:** - **manage human health** for NTDs with an animal interface, e.g. prevention, case management, palliative care and surveillance. - **deliver animal interventions outside One Health activities,** e.g. dog tethering is unique to NTDs.	• **One Health stakeholders to use existing platforms to deliver interventions involving animals,** e.g. use other disease or livestock programmes to deliver animal interventions, such as deworming and pig vaccination (cysticercosis). • **Explore opportunities for corporate social responsibility of pharmaceutical companies** to support animal aspects of programmes. • **Explore opportunities to increase availability and use of human and animal health products for disease management and control,** e.g. regional stockpiles of medicines or vaccines.

Evaluation

Evaluation and reporting	• **Coordinate surveillance programmes among sectors,** e.g. surveillance in animals as a proxy for humans, monitoring antimicrobial resistance in humans and animals. • **Share data and track progress** towards common targets, including: - using harmonized indicators and monitoring and evaluation frameworks to inform decision-making and joint planning, gauge effectiveness of interventions and to document benefits for use in advocacy. • **Share data and best practices,** e.g. by joint use of data sets, documenting experiences and lessons learned.

Potential coordination mechanism	Include NTDs in national, regional and global One Health working groups through partnerships with FAO and OIE.
Case studies	WHO, OIE, FAO and the Global Alliance for Rabies Control use a comprehensive strategic plan to reach the target of ending human deaths from dog-mediated rabies by 2030.



Strong health systems are essential for eliminating and controlling NTDs.

Buruli ulcer

Chagas disease

Dengue and chikungunya

Dracunculiasis

Echinococcosis

Foodborne trematodiases

Human African trypanosomiasis

Leishmaniasis

Leprosy

Lymphatic filariasis

Mycetoma, chromoblastomycosis and other deep mycoses

Onchocerciasis

Rabies

Scabies and other ectoparasitoses

Schistosomiasis

Soil-transmitted helminthiases

Snakebite envenoming

Taeniasis and cysticercosis

Trachoma

Yaws

Change operating models and culture to facilitate country ownership

Change operating models and culture to facilitate country ownership


© WHO/Diego Rodriguez

Roles and responsibilities must be clear at each level and sector of the global NTD community to define the appropriate operating model. Meeting the targets set in this road map will also require shifts in organizational structures, ways of working and thinking. The Secretariat remains committed to supporting countries in implementing their national NTD programmes for better overall global health outcomes and for monitoring and evaluation.

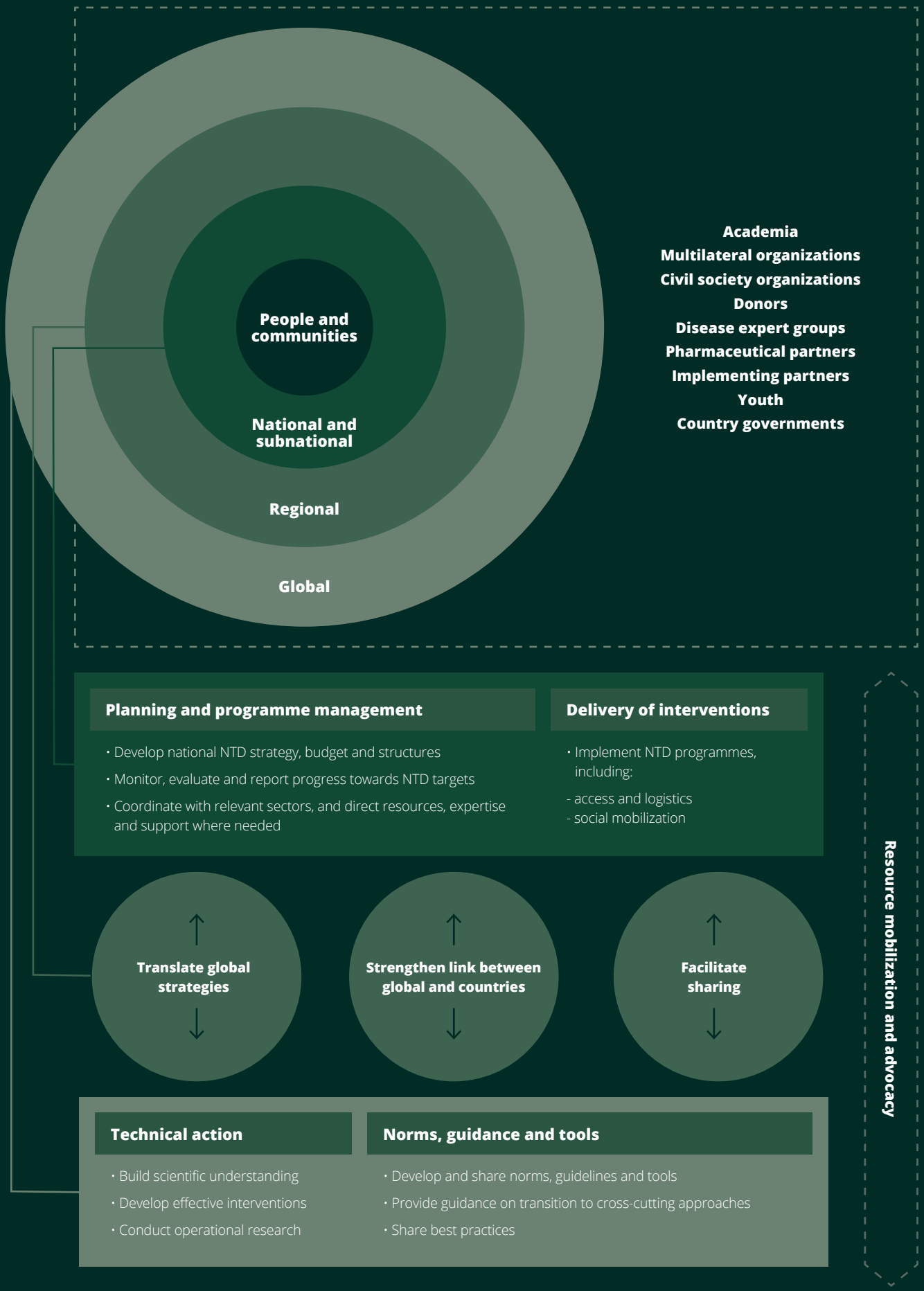
Country ownership is essential for meeting the 2030 NTD targets with the support of regional and global stakeholders.

Countries are both the drivers and the beneficiaries of progress towards the road map targets for 2030. Eliminating at least one NTD in 100 countries and reducing the population that needs interventions against NTDs by 90% as compared with 2010 will require concerted action by national and local governments in countries endemic for NTDs, and those countries should increasingly assume the leadership in designing, delivering and evaluating their NTD programmes. Local governments (at municipality and district levels) are also essential for successful implementation of interventions and coordination of multisectoral action. As national and local governments increasingly assume leadership, the role of regional and global stakeholders will primarily be one of support.

Global development of norms, guidance and tools and technical advances will remain vital. WHO's collaborating centres for NTDs constitute a global network of expertise in activities such as target product profiles for new NTD products and diagnostics. Regional stakeholders occupy an important position as the interface between global and local levels, providing guidance to countries in translating global targets and in sharing best practices. While the specific activities conducted globally, regionally and nationally will vary and will evolve as the leadership of countries increases, the roles of the three tiers are broadly consistent **(Fig. 24)**.

Partners play a pivotal role at all levels but particularly in countries. As countries define their goals in relation to the road map targets, partners can help to fill gaps identified by countries as areas where they need additional support. Clear delineation of responsibilities among partners will ensure geographical coverage, avoid duplication and ensure that no community is overlooked. The coordination of this extensive, diverse network will be supported by WHO, which will work with all stakeholder groups.

Fig. 24. Roles of stakeholders at all levels and in all sectors



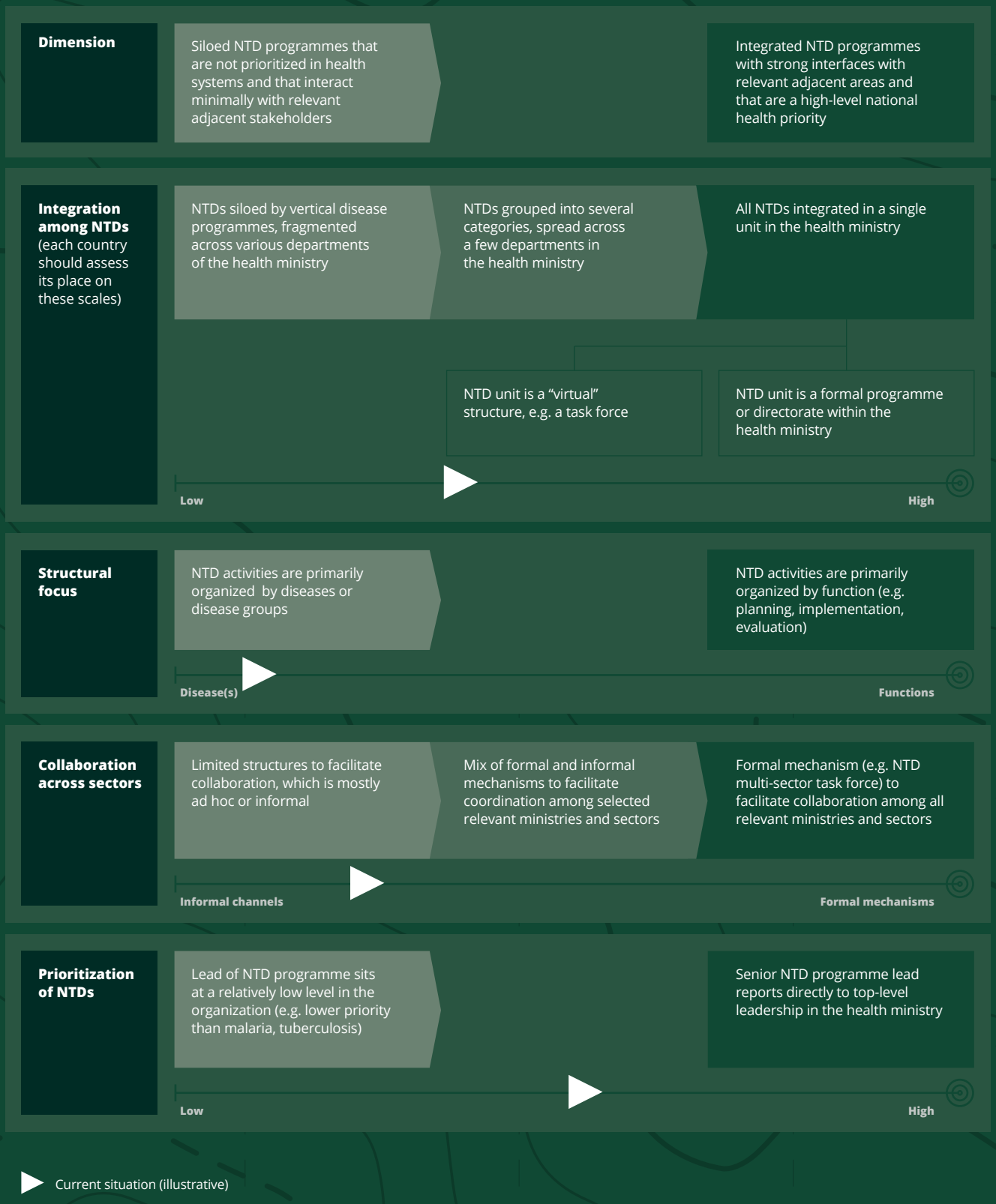
Organizational structures are necessary to support strategies and approaches.

Meeting the targets set for 2030 and benefiting from cross-cutting approaches will require effective alignment of organizational structures at all levels. As countries set their NTD targets, which may include several disease-specific and cross-cutting goals, they should consider whether their programme structure can support the strategies and their execution. Transition to cross-cutting approaches can be facilitated by moving along the four dimensions outlined in **Fig. 25**. This may include setting up a formal NTD unit or a virtual structure as a task force or steering committee for all relevant NTDs and establishing formal mechanisms for multisectoral collaboration. The place at which countries position themselves on the scale in **Fig. 25** depends on factors including country size, ministerial structures and disease endemicity. The aim is to shift programmes towards the right-hand side of the scale, thereby marking greater prioritization of NTDs and cross-cutting orientation.

Changes in the ways that WHO and global and regional stakeholders work will facilitate the transition of countries towards cross-cutting activities. As countries integrate activities for several NTDs, global stakeholders might consider doing the same. Intersectoral collaboration beyond the health sector, notably for environmental and veterinary health, should be a priority.

© WHO/Yoshi Shimizu

Fig. 25. Shifts in organizational structures in countries



Thinking and culture should also be aligned with the 2030 targets.

National leadership in achieving the 2030 targets set in the road map will require a sense of ownership, commitment and accountability. It is envisaged that national and local governments will take a proactive approach in defining and carrying out an NTD agenda, financed in part or fully from domestic funds. Countries should actively integrate and prioritize endemic NTDs in national and local government health plans, with a dedicated line in the national and local health budgets, ensuring that the amount is commensurate with the burden (for instance, in terms of US$ spent per DALY). Countries should also proactively foster multisectoral action and build the political will necessary to support NTD elimination and control. **Fig. 26** exemplifies the activities a country may undertake to design a national NTD plan and to attract the necessary support.

Country ownership of NTDs is not confined to one national entity, as it is relevant at all levels of government. Health systems in many countries are becoming decentralized; therefore, the commitment and funding required to sustain progress towards 2030 should extend to local governments and authorities and also include civil and community leaders at all levels of society, given their core role in raising awareness about endemic diseases, behavioural change and building local support for NTD interventions. For example, in trachoma-endemic communities, women who have undergone eye surgery are among the most effective groups for encouraging others with the disease to seek treatment.

Additionally, involvement of patient groups and people living with NTDs in designing NTD programmes can empower them and ensure that interventions adequately cater to patient needs. Mainstreaming the participation of young people across all NTD activities will be important for the attainment of the goals of this road map. Youth engagement builds the capacity of youth to influence positive change, harnessing their energy, values-based motivation and social connectedness in order to spread information, generate innovative solutions and change communal behaviours and norms in favour of national NTD programmes.

Changes in thinking in global and regional organizations can aid the transition towards the cross-cutting approaches proposed in this road map. These changes include moving away from a siloed disease-specific approach to consideration of areas of mutual benefit and collaboration with other organizations to progress towards elimination and control. As countries move towards stronger coordination and collaboration with other sectors vital for NTD control – such as WASH, the veterinary and agricultural sectors and vector control – stakeholders can initiate such links at global and regional levels, for instance interactions between the NTD and WASH programmes within WHO. Connections will thus be formed at all levels to strengthen overall multisectoral exchange. Donors could make their funding more flexible to cover cross-cutting initiatives, for example by funding integrated programmes (such as capacity-building for skin NTDs, morbidity management and integrated preventive chemotherapy campaigns). They could also accept general reports on NTDs from countries rather than requiring separate reports for each funded programme; that change would reduce the workload of countries and empower them to manage their NTD programmes.

Country ownership is essential for meeting the 2030 NTD targets with the support of regional and global stakeholders.

Fig. 26. Examples of steps in designing a national NTD plan

Concerted action among all stakeholders is required to sustain and build on the progress of the past decade.

Buruli ulcer

Chagas disease

Dengue and chikungunya

Dracunculiasis

Echinococcosis

Foodborne trematodiases

Human African trypanosomiasis

Leishmaniasis

Leprosy

Lymphatic filariasis

Mycetoma, chromoblastomycosis and other deep mycoses

Onchocerciasis

Rabies

Scabies and other ectoparasitoses

Schistosomiasis

Soil-transmitted helminthiases

Snakebite envenoming

Taeniasis and cysticercosis

Trachoma

Yaws

06

Conclusions

Conclusions


© WHO/Stephenie Hollyman

Despite the significant progress that has been made, the burden of NTDs remains heavy for the populations who carry it, who are some of the most vulnerable and marginalized people in the world. In view of the growing commitment of the global community to attaining the SDGs and universal health coverage, particularly in the decade of action for the SDGs, this road map builds on the experiences and lessons learned and the momentum of the past decade. All parties are encouraged to evaluate their approaches to improve the efficiency and effectiveness of their contributions.

The road map will be revised in accordance with evolving disease epidemiology and emerging opportunities for concerted action. Formal global reporting on progress is planned in 2022, 2024, 2026 and 2029, so that adjustments can be made as required. The overall impact of the actions set out in the road map will be evaluated in a final report in 2031. The dynamism and openness of the iterative and consultative process are expected to foster greater collaboration within and beyond the NTD community in order to lessen the global burden.

This road map is a call to action for Member States, donors, implementing partners, disease experts and all other stakeholders to align their strategies and plans towards the prevention of infections and alleviation of the suffering of people affected by NTDs.

References

1. Accelerating work to overcome the global impact of neglected tropical diseases: a roadmap for implementation. Geneva: World Health Organization; 2012 (https://apps.who.int/iris/handle/10665/70809).

2. Economic costs of selected neglected tropical diseases (Table 3.2.1.1). In: Working to overcome the global impact of neglected tropical diseases: first WHO report on neglected tropical diseases. Geneva: World Health Organization; 2012:16 (https://apps.who.int/iris/handle/10665/44440).

3. Lutumba P, Makieya E, Shaw A, Meheus F, Boelaert M. Human African trypanosomiasis in a rural community, Democratic Republic of Congo. Emerg Infect Dis. 2007;13:248–54.

4. Anoopa SD, Bern C, Varghese B, Chowdhury R, Haque R, Ali M, et al. The economic impact of visceral leishmaniasis on households in Bangladesh. Trop Med Int Health. 2006;11:757–64.

5. Ozaki M, Islam S, Rahman KM, Rahman A, Luby SP, Bern C. Economic consequences of post-kala-azar dermal leishmaniasis in a rural Bangladeshi community. Am J Trop Med Hyg. 2011;85:528–34.

6. Sundar S. Household cost-of-illness of visceral leishmaniasis in Bihar, India. Trop Med Int Health. 2010;15(Suppl 2):50–4.

7. Uranw S, Meheus F, Baltussen R, Rijal Su, Boelaert M. The household costs of visceral leishmaniasis care in south-eastern Nepal. PLoS Negl Trop Dis. 2013;7:e2062.

8. Meheus F, Abuzaid AA, Baltussen R, Younis BM, Balasegaram M, Khalil EA, et al. The economic burden of visceral leishmaniasis in Sudan: an assessment of provider and household costs. Am J Trop Med Hyg. 2013;89:1146–53.

9. Fitzpatrick C, Nwankwo U, Lenk E, de Vlas SJ, Bundy DA. An investment case for ending neglected tropical diseases (Chapter 17). In: Holmes KK, Bertozzi S, Bloom BR, Jha P, editors. Major infectious diseases, 3rd edition. Vol. 6. Disease control priorities. Washington, DC: International Bank for Reconstruction and Development; World Bank; 2017:411–431 (http://dcp-3.org/sites/default/files/chapters/DCP3%20Major%20Infectious%20Diseases_Ch17.pdf).

10. Bangert M, Molyneux DH, Lindsay SW, Fitzpatrick C, Engels D. The cross-cutting contribution of the end of neglected tropical diseases to the sustainable development goals. Infect Dis Poverty. 2017;6:e73.

11. Universal health coverage. WHO fact sheet. Geneva: World Health Organization; 2019 (https://www.who.int/news-room/fact-sheets/detail/universal-health-coverage-(uhc)).

12. Fitzpatrick C, Engels D. Leaving no one behind: a neglected tropical disease indicator and tracers for the Sustainable Development Goals. Int Health. 2016;8(Suppl1):i15–8.

13. Chapman N, Doubell A, Oversteegen L, Barnsley P, Chowdhary V, Rugarabamu G, et al. Neglected disease research and development: uneven progress (G-Finder report 2019). Sydney (NSW): Policy Cures Research Ltd; 2019 (https://s3-ap-southeast-2.amazonaws.com/policy-cures-website-assets/app/uploads/2020/01/30100951/G-Finder-2019-report.pdf).

14. Roadmap for access to medicines, vaccines and other health products, 2019–2023. Geneva: World Health Organization; 2019 (https://www.who.int/medicines/access_use/road-map-medicines-vaccines/en/).

15. Investing to overcome the global impact of neglected tropical diseases: third WHO report on neglected tropical diseases. Geneva: World Health Organization; 2015 (https://apps.who.int/iris/bitstream/handle/10665/152781/9789241564861_eng.pdf).

16. WHO Alliance for the Global Elimination of Trachoma by 2020. Eliminating trachoma: accelerating towards 2020. London: International Coalition for Trachoma Control; 2016 (http://www.trachomacoalition.org/2016-roadmap/).

Buruli ulcer

Chagas disease

Dengue and chikungunya

Dracunculiasis

Echinococcosis

Foodborne trematodiases

Human African trypanosomiasis

Leishmaniasis

Leprosy

Lymphatic filariasis

Mycetoma, chromoblastomycosis and other deep mycoses

Onchocerciasis

Rabies

Scabies and other ectoparasitoses

Schistosomiasis

Soil-transmitted helminthiases

Snakebite envenoming

Taeniasis and cysticercosis

Trachoma

Yaws

Disease summaries

The annex summarizes for each disease and disease group the current epidemiological status and burden of disease, core strategic interventions and progress towards the 2020 targets.

The targets, sub-targets and milestones for 2030, and the critical actions required to achieve them, were used as the basis for the road map document which was endorsed by the Seventy-third World Health Assembly.

Buruli ulcer

Buruli ulcer is caused by infection with *Mycobacterium ulcerans*, a bacteria belonging to the family that causes multiple diseases including tuberculosis and leprosy.

Disease and epidemiology

- Buruli ulcer is caused by infection with *Mycobacterium ulcerans*, a bacteria belonging to the family that causes multiple diseases including tuberculosis and leprosy.
- The disease manifests as ulcers (mostly on the limbs) that affect the skin and sometimes bone, and cause permanent disfigurement and long-term disability.
- The mode of transmission is not known and there is no known prevention against the disease; BCG vaccination may provide limited protection.
- The bacteria produces a unique toxin (mycolactone) that causes tissue damage and inhibits the local immune response, suppressing pain.

Progress against WHO 2020 targets

Impact indicator	2020 target	Current status
Completed clinical trial to evaluate oral treatment and results incorporated into control and treatment	Completed	Completed
% of cases detected and cured at an early stage (category I and II)	70%	66%

Core strategic interventions

Preventive chemotherapy	N/A
WASH	N/A
Vector control	N/A
Veterinary public health	N/A
Case management	• Recommended treatment (combination oral antibiotic therapy): - rifampicin and clarithromycin; or - rifampicin and moxifloxacin may also be used • Hygienic wound care
Other	• Early diagnosis is essential for morbidity management • Morbidity management includes surgery, wound and lymphoedema management, physiotherapy and long-term rehabilitation

Risks that require mitigation

- Outbreaks may overwhelm the capacity of existing health infrastructure/workforce
- Single manufacturers of medicines that are difficult to produce at the required quantity and quality
- Limited availability of treatments for concomitant diseases (e.g. anaemia, malnutrition, coinfections) may increase case-fatality rate

WHO 2030 target, sub-targets and milestones

Indicator	2020 (baseline)	2023	2025	2030
Proportion of cases in category III (late stage) at diagnosis	30%	<22%	<18%	<10%
Proportion of laboratory-confirmed[1] cases	65%	>85%	>95%	>95%
Proportion of confirmed cases who have completed a full course of antibiotic treatment	90%	>95%	>98%	>98%

[1] Currently PCR confirmation, but other laboratory tests may be recommended for confirmation by WHO before 2030.
SOURCE: All data sourced from WHO unless otherwise indicated

Burden of disease

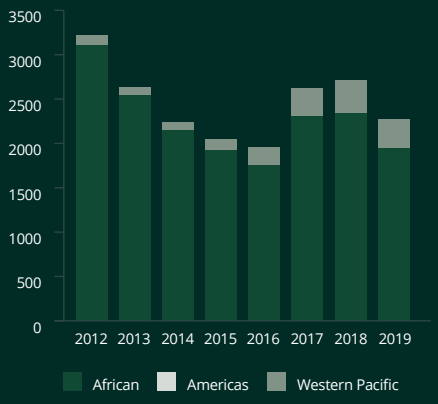
2260
new cases reported in 2019

39%
of patients with category III lesions in 2019

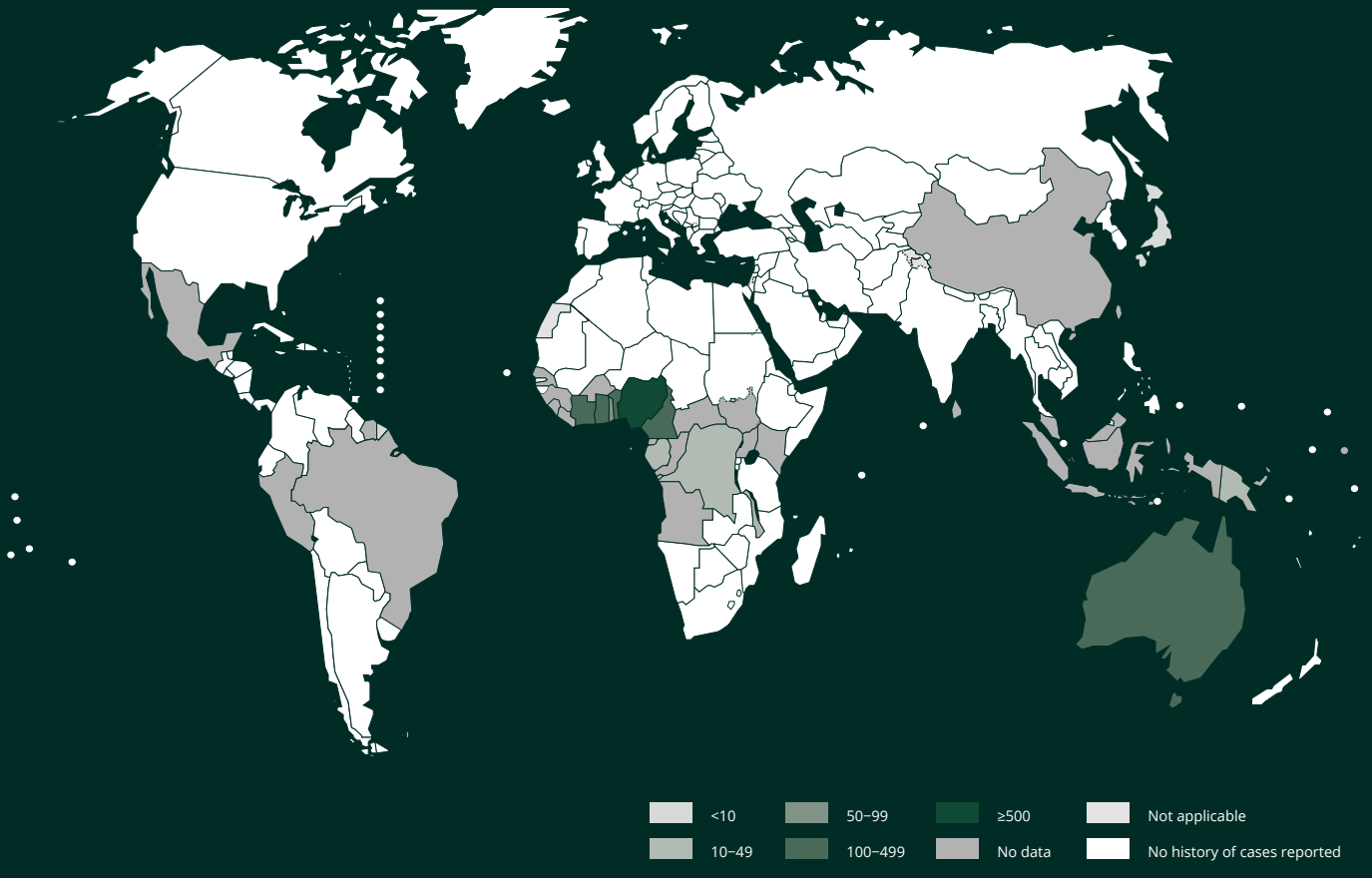
34%
of people with disability at diagnosis in 2019

In 2019, Buruli ulcer was endemic in 33 countries in Africa, Latin America and the Western Pacific.

Number of Buruli ulcer cases reported to WHO by region, 2012–2019



Number of Buruli ulcer cases reported to WHO, 2019



Buruli ulcer: assessment of actions required to meet 2030 sub-targets

Summary of critical actions to achieve targets

- Build capacity of health workers to clinically diagnose and treat the disease and community health workers to detect and refer cases for early treatment, furthering integration among skin NTDs.
- Develop rapid diagnostic tools for use in public health and community centres to ensure early diagnosis, reduce morbidity and confirm cases.
- Create comprehensive surveillance systems in all endemic countries, including micro-mapping, to improve targeting and integrating interventions with those for other NTDs in co-endemic areas to improve case detection.

Category and current assessment	Current status	Actions required
Technical progress		
Scientific understanding	• Mode of transmission is unknown • Effectiveness of vector control and protective wear is being assessed in Australia	• Improve epidemiological understanding including modes and drivers of transmission as well as seasonality • Understand environmental reservoirs to help inform design of preventive public health interventions • Relate environmental studies to distribution of human disease by studying the whole genome sequences of *M. ulcerans*
Diagnostics	• Diagnosis is done clinically or using laboratory techniques (direct microscopy, histopathology, culture, PCR, f-TLC) • Early detection is essential in reducing morbidity • *M. ulcerans* RDT LAMP test and RPA test are being pilot tested in selected countries	• Develop rapid diagnostic tools for use at public health centre and community levels to enable early diagnosis, reduce morbidity and confirm cases • Improve detection of viable *M. ulcerans* in wound samples to distinguish treatment failures and paradoxical reactions through methods such as mycolactone detection and 16S rRNA
Effective intervention	• No known prevention against the disease • Combination of rifampicin and clarithromycin is recommended for 8 weeks; in Australia, combination rifampicin and moxifloxacin is used • Surgery particularly skin grafting can be used to accelerate healing in extensive lesions	• Evaluate new promising medicines to provide new treatment options including reduction in duration of treatment • Evaluate new approaches to wound care (e.g. dressings that can be changed less frequently) • Develop innovative strategies to improve adherence to treatment (e.g. community health worker check-ups, SMS reminders)

For more details, please visit:
www.who.int/buruli/en/

No hindrance towards target

Critical action required to reach target

Category and current assessment	Current status	Actions required
Strategy and service delivery		
Operational and normative guidance	• Buruli ulcer global strategy and national plans are in place • WHO guidelines on diagnosis and treatment exist	• Update treatment guidelines based on results of clinical trial assessing various oral treatment regimens
Planning, governance and programme implementation	• WHO Technical Advisory Group on Buruli ulcer exists • Most national Buruli ulcer control programmes are in place • National NTD coordination bodies exist but are weak (in some countries only on paper or only coordinating preventive chemotherapy)	• Strengthen national NTD coordination bodies to carry out their remits effectively across the full range of NTDs and consistently include Buruli ulcer in NTD packages of care
Monitoring and evaluation	• 11 out of 33 known endemic countries reported data in 2019 • Standard reporting forms BU 01 and BU 02 are used in all countries	• Encourage reporting of data on Buruli ulcer in all endemic countries • Enhance surveillance of Buruli ulcer in countries that are not reporting cases through integrated skin NTD reporting system • Initiate micro-mapping of Buruli ulcer to identify overlaps with other NTDs and integrate approaches • Monitor resistance to antibiotics phenotypically and through genetic markers
Access and logistics	• WHO procures medicines and provides them to countries at no cost • Governments and partners provide dressings and other supplies	• Ensure access to quality-assured medicines or secure donations • Ensure adequate access to affordable improved dressings
Health care infrastructure and workforce	• Decentralization of care within primary health care to move care closer to the patient is in progress • Sufficient national laboratory capacities to confirm cases	• Strengthen the health care system at all levels through capacity building to increase access to early detection, care and surgery, ensure access to oral treatment at sub-district level and enable management of other chronic skin conditions • Strengthen efforts to reduce stigmatization and provide access to rehabilitation services
Enablers		
Advocacy and funding	• Political commitment through Yamoussoukro declaration (1998) and Cotonou declaration (2009) • Donors and partners support implementation at country level • Research community provides visibility and advocacy through mobilizing research resources	• Enhance political commitment among endemic countries and partners to mobilize funds and human resources • Build community engagement and mobilization to support programme implementation • Sustain research funding for knowledge generation
Collaboration and multisectoral action	• Collaboration with other skin NTDs to reach populations affected by these diseases • Linkages with education and social services for case detection and awareness • The Global Buruli ulcer initiative brings together some of those fighting the disease	• Continue expansion of integrated approach across skin NTDs to increase coverage of case detection and treatment and improve monitoring and reporting • Collaborate with tuberculosis and leprosy programmes in supply chain, case detection, treatment, follow-up and laboratory networks • Collaborate with academic and health care institutions in endemic countries to enhance knowledge of skin NTDs
Capacity and awareness building	• Integration of training across skin NTDs is in progress • Ongoing trainings for laboratory diagnosis, skin grafting and wound care • Essential community education on reducing stigmatization is insufficient	• Develop capacity of health workers at community, health centre and district levels to detect, treat and provide surgery for integrated skin NTDs • Devise online training packages that can be easily adapted by countries

Chagas disease

Chagas disease is a potentially life-threatening illness caused by infection with the protozoan parasite *Trypanosoma cruzi*. The disease is mainly a chronic condition and co-infections and co-morbidities are common.

Disease and epidemiology

- Chagas disease is a potentially life-threatening illness caused by infection with the protozoan parasite *Trypanosoma cruzi*.
- Transmission of infection is (i) vector-borne (through the faeces and urine of triatomine bugs) in the Americas and (ii) oral/foodborne, (ii) congenital, (iv) transfusional (through blood products), (v) organ transplantation and (vi) laboratory accidents everywhere.
- During the acute and chronic phases, most patients have no (or nonspecific) symptoms; without treatment, up to 30% develop cardiac alterations and up to 10% digestive, neurological or mixed alterations. Afterwards, the destruction of the muscle and nervous system can lead to cardiac arrhythmias and/or heart failure and sudden death.
- The disease is mainly a chronic condition and co-infections and co-morbidities are common.

Progress against WHO 2020 targets

Impact indicator	2020 target	Current status
Interruption of transfusional transmission by 2015	Americas, European and Western Pacific regions	66% of countries are at an advanced stage
Interruption of domiciliary vectoral transmission by 2020	Region of the Americas	33% of countries have succeeded

Core strategic interventions

Preventive chemotherapy	N/A
WASH	• Good hygiene practices in food preparation, transportation, storage and consumption
Vector control	• Spraying with residual insecticides to remove triatomine bugs from dwellings • Home cleanliness and housing improvements (e.g. crack-free walls, bednets)
Veterinary public health	N/A
Case management	• Two antiparasitic medicines (benznidazole and nifurtimox) can cure infection during the acute or early chronic phase, or can prevent or curb progression of the disease • Life-long medication or surgery may be necessary for specific heart and/or digestive alterations
Other	• Blood screening is vital to prevent transmission through blood transfusions and organ transplantation • Treatment of girls or women of childbearing age can prevent congenital transmission

WHO 2030 target, sub-targets and milestones

Indicator	2020 (baseline)	2023	2025	2030
Number of countries achieving interruption of transmission through the four transmission routes (vectoral, transfusion, transplantation and congenital), with 75% antiparasitic treatment coverage of the eligible population	0/41 (0%)	4/41 (10%)	10/41 (24%)	15/41 (37%)
Number of countries achieving verification of interruption of domiciliary vectoral transmission	7/21 (33%)	9/21 (43%)	14/21 (66%)	18/21 (86%)
Number of countries achieving verification of interruption of transfusional transmission	0/41 (0%)	5/41 (12%)	20/41 (49%)	41/41 (100%)
Number of countries achieving verification of interruption of transplantation transmission	0/41 (0%)	5/41 (12%)	20/41 (49%)	41/41 (100%)
Number of countries achieving verification of interruption of congenital transmission	0/41 (0%)	4/41 (10%)	10/41 (24%)	15/41 (37%)

SOURCE: All data sourced from WHO unless otherwise indicated

Burden of disease

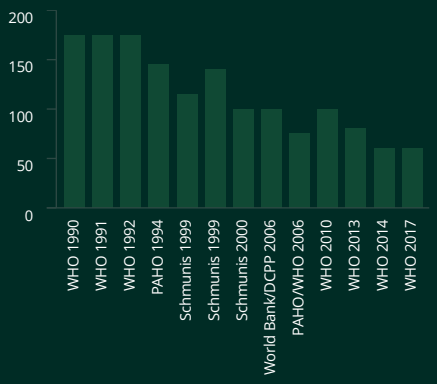
6–7 million
people infected with *T. cruzi* in 2019

About 10 000
deaths in 2017

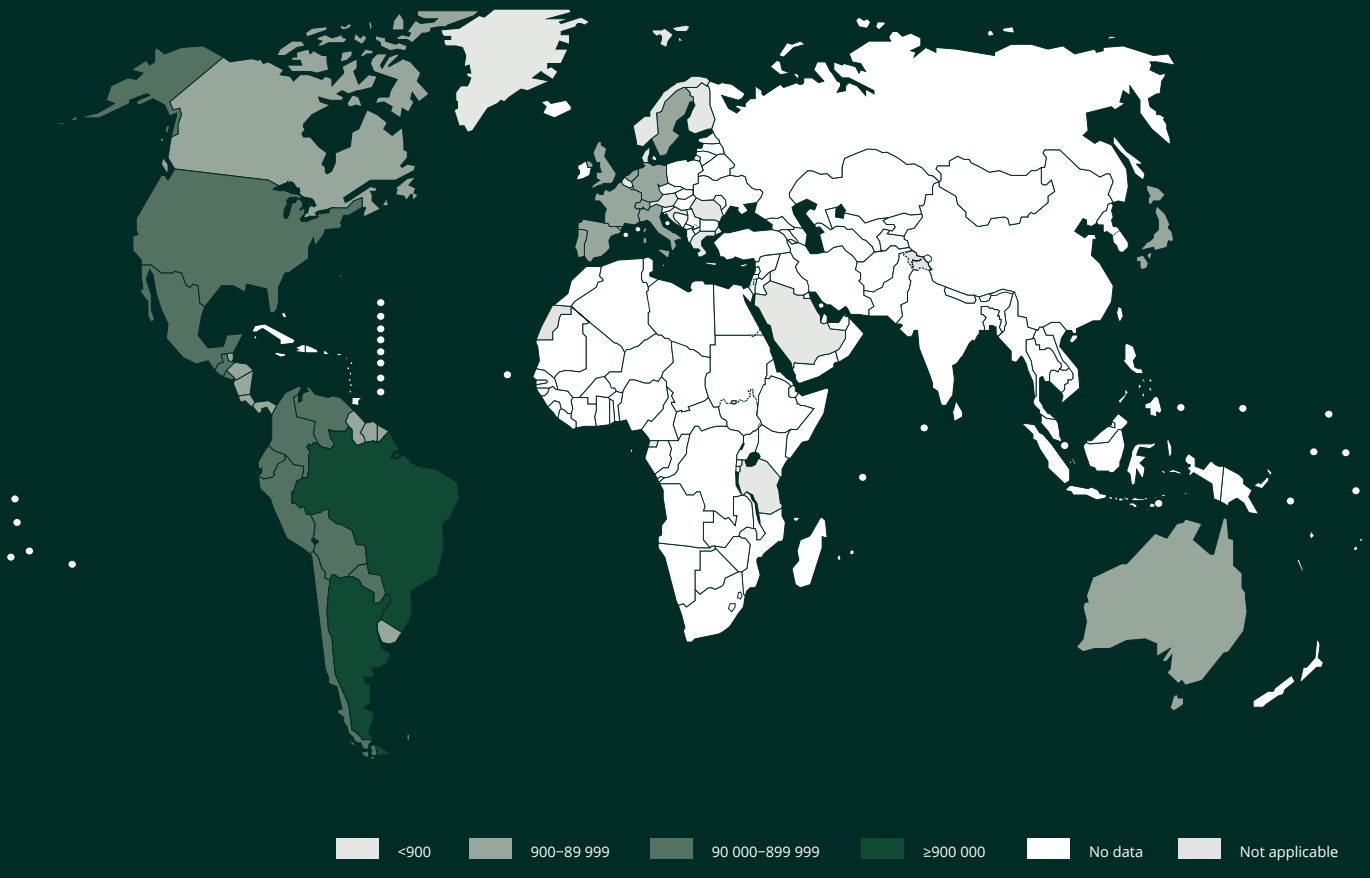
About 75 million
people at risk of infection

Chagas disease occurs principally in 21 continental Latin American countries.[1] During the past decades, however, population mobility has led to increased detection of the disease in the USA, Canada, many European and some Western Pacific countries.

Estimated number of *T. cruzi* infected people worldwide according to 1990–2017 publications, millions



Global distribution of Chagas disease, 2006–2019



[1] Argentina, Belize, Bolivia (Plurinational State of), Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, French Guiana, Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, Uruguay and Venezuela (Bolivarian Republic of)

Chagas disease: assessment of actions required to meet 2030 sub-targets


© WHO/A. Loke

Summary of critical actions to achieve targets

- Advocate with national or federal health ministries to recognize Chagas disease as a public health problem, and establish effective prevention, control, care and surveillance in all affected territories.
- Improve medical care for Chagas disease, from training health care workers in-service to integrating training at all levels of health services.
- Ensure that countries in which domiciliary vector transmission is still registered in certain territories comply with prevention, control and surveillance actions.
- Coordinate vector control management among countries, stakeholders and other sectors (e.g. tourism) through multisectoral national bodies to maximize synergies.

Category and current assessment	Current status	Actions required
Technical progress		
Scientific understanding	• The diversity of *T. cruzi* has been progressively described including parasite life cycles in different geographical areas and through six transmission routes • Databases on triatomine bugs and their geographical distribution have been built • Host–parasite interaction (immunology) is of paramount importance for the evolution of infection • About one-third of patients develop cardiac alterations • Chagas disease is mainly a chronic condition and co-infection and co-morbidity are relatively frequent	• Improve characterization of *T. cruzi* diversity, global distribution and description of parasite life cycles and transmission capacity with different triatomine bugs, mammals and environments (e.g. altitudes) • Improve understanding of transmission routes and their importance by geographical area • Improve characterization of triatomine bugs, their resistance to insecticides and geographical distribution • Improve knowledge of host–parasite interaction and antiparasitic treatment response/immunological modulation including parasite dormancy and immunotherapy • Improve understanding of cardiac factors through pooling of long-term cohorts and others • Improve knowledge on co-infection, co-morbidity and survival curves
Diagnostics	• Parasitological diagnosis with digital microscopy for haemoparasites is not available • Two diagnostic tests detecting antibodies are needed to confirm the diagnosis • Commercial serological rapid diagnostic tests (RDTs) have been evaluated, but not always validated in the field • Detection of markers of current infection is essential for clinical trials • Detection of *Trypanosoma* spp. (discrete typing units) is done through molecular biology (PCR) • Current algorithms of case diagnosis are based on two (or three) serological diagnostic tests but the new RDT and automatized tests (chemiluminescence) need to be incorporated accordantly to their assessment results	• Develop digital microscopy systems with artificial intelligence to diagnose haemoparasites, including trypanosomes • Develop platforms for two RDTs (one with high sensitivity and another with high specificity) • Validate commercialized RDTs through multicentric field studies • Develop tests to detect current infection and assess therapeutic response to treatment • Develop tests with capacity to identify *Trypanosoma* spp. and distinguish between infection of mothers and their newborns • Adapt chemiluminescence developed for blood banks screening to diagnose cases and validate of new algorithms using commercialized RDTs and automatic diagnosis
Effective intervention	• Different interventions are used to tackle different routes of transmission, including vector control, screening of blood in blood banks and in organ transplantation, screening of girls, childbearing-age women and newborns to prevent congenital disease and antiparasitic treatment	• Research new dosages and duration of benznidazole and nifurtimox treatment, combination with other medicines and new medications

For more details, please visit:
www.who.int/chagas/en/

No hindrance towards target

Critical action required to reach target

Category and current assessment	Current status	Actions required
Strategy and service delivery		
Operational and normative guidance	• A strategy for elimination of transmission of congenital Chagas disease was launched in 2018	• Update the WHO Technical Report Series and national normative documents/protocols for prevention and control • Promote the implementation of policies to prevent transfusional and organ transplantation transmissions (including laboratory quality control) • Update and implement protocols to eliminate congenital transmission
Planning, governance and programme implementation	• Important advances in control of vectoral and transfusional transmission have been achieved in the past decades (or two decades) • Equity challenges as out-of-pocket expenses related to treatment of chronic cardiac/digestive/ mixed manifestations are often unaffordable for disadvantaged populations	• Increase diagnosis of Chagas disease at primary health care level • Ensure accessibility for management of chronic clinical manifestations without incurring out-of-pocket payments • Improve vector surveillance and transmission control • Increase screening coverage of donors and recipients, and referrals of people at risk • Increase rates of detection, confirmation of diagnosis, access to health care and notification of infected people
Monitoring and evaluation	• Four transmission routes of Chagas disease can be eliminated	• Implement updated protocols on surveillance and verification of transmission interruption • Target active screening of high-risk population groups • Strengthen compulsory reporting of acute and chronic cases
Access and logistics	• Nifurtimox is donated by Bayer and benznidazole for paediatric age is donated by Chemo Ibérica S.A. • Universal health coverage of antiparasitic treatment can be achieved	• Expand access to antiparasitic medicines for acute and chronic cases of the eligible population
Health care infrastructure and workforce	• Chagas disease is a silent and silenced (neglected) disease that has been urbanized and exported to other continents	• Increase workforce awareness and training to diagnose and treat cases and monitor advances • Increase diagnosis of Chagas disease at primary health care level
Enablers		
Advocacy and funding	• Activities have had limited support	• Increase funding for implementation
Collaboration and multisectoral action	• Diagnosis and treatment at paediatric age are essential	• Increase collaboration with the education sector
Capacity and awareness building	• It has been demonstrated that Chagas disease is neglected in the education of health sciences	• Build capacity to increase awareness and capacity to diagnose and treat

Dengue and chikungunya (dengue)

Dengue is a viral disease caused by infection with four distinct serotypes of the Flaviviridae family. The disease is closely related to urban environments to which *Aedes* mosquitoes have adapted.

Disease and epidemiology

- Dengue is a viral disease caused by infection with four distinct serotypes of the Flaviviridae family.
- Symptoms of dengue include fever, muscle and joint pain, severe headache, pain behind the eyes, nausea, rash and vomiting; severe dengue causes severe abdominal pain, persistent vomiting, respiratory distress, organ impairment and death.
- Transmitted to people through bites of female *Aedes aegypti* and *Aedes albopictus* mosquitoes.
- The disease is closely related to urban environments to which *Aedes* mosquitoes have adapted.

Progress against WHO 2020 targets

Impact indicator	2020 target	Current status
By 2015, sustainable dengue vector control interventions established in endemic priority countries[1]	10	10
Dengue control and surveillance systems established in all regions (2020)	6	5
Reduction in number of cases and case-fatality rate (2020; 2009–2010 as base line)	25%/ 50%	50%/20% reduction in Region of the Americas following Zika epidemic (2016)[2]

Core strategic interventions

Preventive chemotherapy	N/A
WASH	• Safe water storage practices (e.g. covering all water storage containers and overhead tanks) and safe disposal of household water
Vector control	• Reducing available habitats for mosquitoes (e.g. environmental modification, use of lids, house construction) • Restricting access of mosquitoes to homes through wire mesh and other covers • Management of solid waste, especially plastic products • Use of insecticides and indoor fogging – use of personal protection measures such as repellents is encouraged
Veterinary public health	N/A
Case management	• Medical care by physicians and nurses for severe dengue (prevention of plasma leakage and organ failure) • Maintenance of volume of body fluid and platelet counts
Other	• Vaccine for people with previous dengue infection as confirmed by laboratory testing

Risks that require mitigation

- Rising resistance to insecticides among vectors
- The incidence of the disease may increase with changing climate and continued rapid urbanization

WHO 2030 target, sub-targets and milestones

Indicator	2020 (baseline)	2023	2025	2030
Case-fatality rate due to dengue	0.80%	0.50%	0.50%	0%
Number of countries able to detect and respond to dengue outbreaks	10/128 (8%)	26/128 (20%)	64/128 (50%)	96/128 (75%)
To reduce the burden of the disease and its incidence by 25% (2010–2020 as baseline)	3 100 900	3 million	2.75 million	2.35 million

[1] Bangladesh, Brazil, India, Malaysia, Mexico, Pakistan, Sri Lanka, Singapore, Thailand and Vietnam
[2] Limited decrease in other regions
SOURCE: All data sourced from WHO unless otherwise indicated

Burden of disease

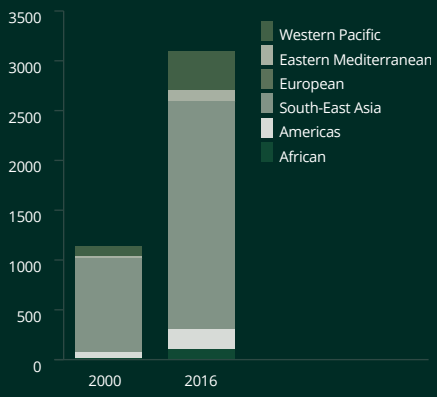
About 104 million
estimated infections from dengue in 2017[1]

About 40 000
reported deaths in 2016

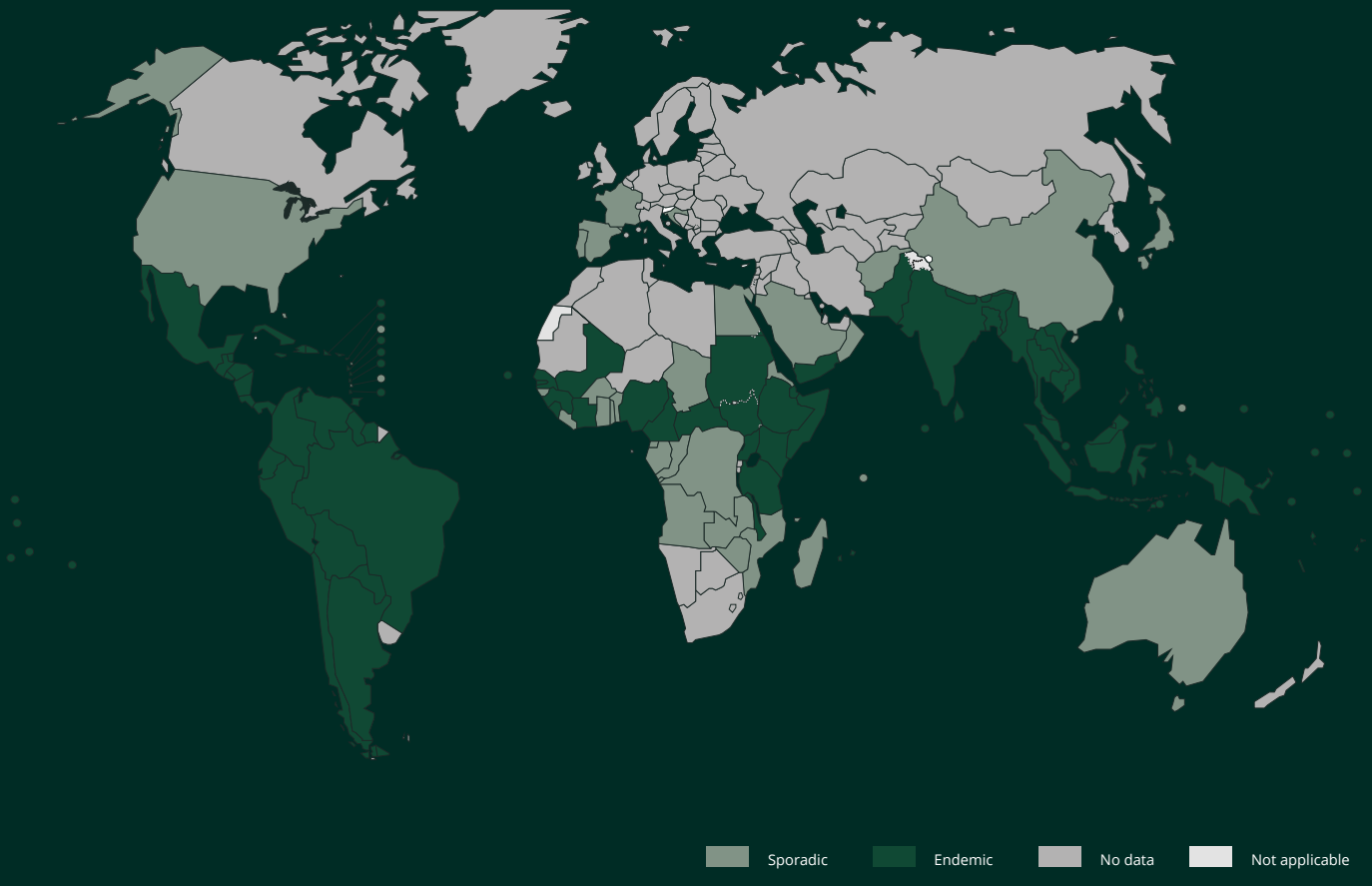
About 3 million
people with disability at diagnosis in 2018

The incidence of dengue has increased drastically (by more than 300% since 2009).[1] Today, 3.9 billion people are at risk in 128 countries of which more than 100 are endemic for dengue; the majority of those affected live in Africa, Asia and Latin America.[2] The economic burden of the disease was estimated at nearly US$ 9 billion in 2013.[3]

DALYs per region, thousands



Endemicity of dengue, 2018



[1] Global burden of disease. Seattle (WA): Institute for Health Metrics and Evaluation (http://www.healthdata.org/gbd)

[2] Messina JP, Brady OJ, Golding N, Kraemer MUG, Wint GRW, Ray SE, et al. The current and future global distribution and population at risk of dengue. Nat Microbiol. 2019; 4:1508–15. doi:10.1038/s41564-019-0476-8

[3] Shepard DS, Undurraga EA, Halasa YA, Stanaway JD. The global economic burden of dengue: a systematic analysis. Lancet Infect Dis. 2016;16:935–41. doi:10.1016/S1473-3099(16)00146-8

Dengue: assessment of actions required to meet 2030 sub-targets

Summary of critical actions to achieve targets

Dengue constitutes a rapidly emerging threat in an increasingly urbanized world. To control this threat, the following critical actions are necessary:

- Continue developing preventive vaccines for all at-risk populations.
- Further develop the evidence base on effectiveness of vector control strategies.
- Continue collaborating with environmental sector and engineers to reduce mosquito habitats.
- Increase and sustain financial commitment to dengue control.

Category and current assessment	Current status	Actions required
Technical progress		
Scientific understanding	• 80% of cases are asymptomatic • Secondary infections can be severe • Dengue virus is maintained in a sylvatic or enzootic cycle of transmission between canopy-dwelling non-human primates and *Aedes* mosquitoes in Borneo, Africa, etc.	• Estimate burden of dengue in countries
Diagnostics	• Dengue diagnostics are now included in WHO Essential Diagnostics List • Rapid diagnostic tests (RDTs) exist for point-of-care diagnosis, but their quality is not assured	• Improve quality assurance for point-of-care RDTs • Develop PCR test for confirmation of diagnosis
Effective intervention	• Improved case management has resulted in declining case-fatality rates in all regions • Sustained vector control includes measures targeting the eggs and larval and adult stages, but evidence of effectiveness is inconclusive • Community-based source reduction measures and contact tracing approach with indoor residual spraying of residences and places of work and in schools demonstrate good evidence for control of the disease	• Further develop the evidence base on effectiveness of vector control strategies • Continue developing preventive vaccines for all at-risk populations • Continue collaborating with environmental sector and engineers to reduce mosquito habitats • Assess current usage of insecticides and ensure they are not used indiscriminately in order to avoid environmental contamination and development of insecticide cross-resistance • Further develop evidence base on effectiveness of vector control strategies

For more details, please visit:
www.who.int/denguecontrol/en/

No hindrance towards target

Critical action required to reach target

Category and current assessment	Current status	Actions required
Strategy and service delivery		
Operational and normative guidance	• Guidelines for diagnosis, treatment, prevention and control (2009) are being updated; a new edition is expected in 2021	• Ensure compliance of private health care providers with national dengue protocol • Develop global operational guidance for managing dengue outbreaks for use at country level • Recognize dengue as an endemic disease
Planning, governance and programme implementation	• Varied strength and organization of national dengue programmes	• Develop sustained strategic approaches in endemic countries • Develop concrete vector management, control and surveillance programmes and strategies and integrate new vector control tools with ongoing vector control (e.g. control of larvae and removal of breeding sites) • Implement community-based container management and use of safe insecticides in non-drinking water containers • Identify indicators related to disease incidence • Develop resilience plans for cities to "engineer out" mosquito habitats • Consider dengue as an environmental threat
Monitoring and evaluation	• Current M&E system is weak resulting in common underreporting • Insecticide resistance is emerging	• Develop surveillance and rapid response systems • Ensure monitoring and reporting systems are established in all endemic countries • Regularly monitor the presence and activity of mosquitoes at sentinel sites using traps • Monitor insecticide resistance
Access and logistics	• Regional stockpiles of spray equipment, RDTs (not quality assured) and insecticides in the WHO Western Pacific Region	• Initiate programme for independent quality assurance of diagnostics • Ensure availability of RDTs
Health care infrastructure and workforce	• Dengue is treated at all levels of health system • Severe dengue is managed in hospitals	• Establish regional network of medical staff for case management training and knowledge sharing • Streamline national referral systems • Make housing improvements to build out breeding habitats (as an ideal prevention)
Enablers		
Advocacy and funding	• Current levels of R&D funding have decreased	• Increase the commitment of resources from international donors, countries and nongovernmental organizations
Collaboration and multisectoral action	• The Global Dengue & *Aedes*-transmitted Diseases Consortium coordinates collaboration • Successful cross-border, cross-state and district-level exchange of information	• Establish Intersectoral Task Force to coordinate and co-implement resources nationally • Collaborate with environmental sectors and engineers to reduce mosquito habitats • Collaborate with education sector on incorporating dengue educational messages into school curricula • Coordinate with WASH stakeholders to manage dengue outbreaks environmentally and prevent disease transmission
Capacity and awareness building	• WHO-supported international courses on dengue are organized (one per year) in Cuba and Singapore • Support provided to countries for local trainings	• Target communities with tailored educational messages for various groups (e.g. schools, women's groups, religious leaders) • Build the WASH capacity of health care professionals and caregivers for hygienic treatment and care at health care facilities and households

Dengue and chikungunya (chikungunya)

Chikungunya is a viral disease caused by infection with an alphavirus of the family Togaviridae. Symptoms include sudden onset of fever and joint pain, muscle pain, headache, rash and lymphopenia; joint pain may persist for months or years.

Disease and epidemiology

- Chikungunya is a viral disease caused by infection with an alphavirus of the family Togaviridae.
- Symptoms include sudden onset of fever and joint pain, muscle pain, headache, rash and lymphopenia; joint pain may persist for months or years.
- Human infection is transmitted through bites of female *Aedes aegypti*, *Aedes albopictus* and other species of *Aedes* mosquitoes.
- Explosive outbreaks cause attack rates of up to 68% and place a sudden, heavy burden on health services.
- Chikungunya has increased and spread drastically since 2004.

Progress against WHO 2020 targets

Impact indicator	2020 target	Current status
N/A	N/A	N/A

Core strategic interventions

Preventive chemotherapy	N/A
WASH	• Safe water storage practices (e.g. covering all water storage containers and overhead tanks) and safe disposal of household water
Vector control	• Reducing available habitats for mosquitoes (e.g. environmental modification, use of lids, house construction) • Spraying of safe insecticides including indoor fogging for emergency control • Restricting access of mosquitoes to homes through use of screening or other covers • Solid waste management, especially plastic products • Use of insecticides and indoor fogging
Veterinary public health	N/A
Case management	• Relieving symptoms, particularly joint pain and chronic joint pain
Other	N/A

Risks that require mitigation

- Outbreaks may overwhelm the capacity of existing health infrastructure/workforce
- Single manufacturers of medicines that are difficult to produce at the required quantity and quality
- Limited availability of treatments for concomitant diseases (e.g. anaemia, malnutrition, coinfections) may increase case-fatality rate

WHO 2030 target, sub-targets and milestones

Indicator	2020 (baseline)	2023	2025	2030
Vaccine development for one or more vaccine candidates	Phase I		Phase III	Licensed vaccine
Number of endemic countries identified and mapped for chikungunya	10%	50%	100%	
Develop optimized and prioritized integrated strategies for case management and estimate the potential public health benefits by 2025	5	20	40	

SOURCE: All data sourced from WHO unless otherwise indicated

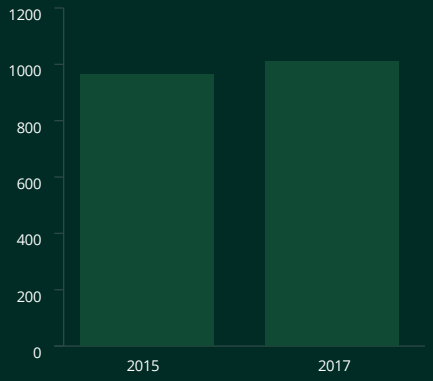
Burden of disease

About 8 million

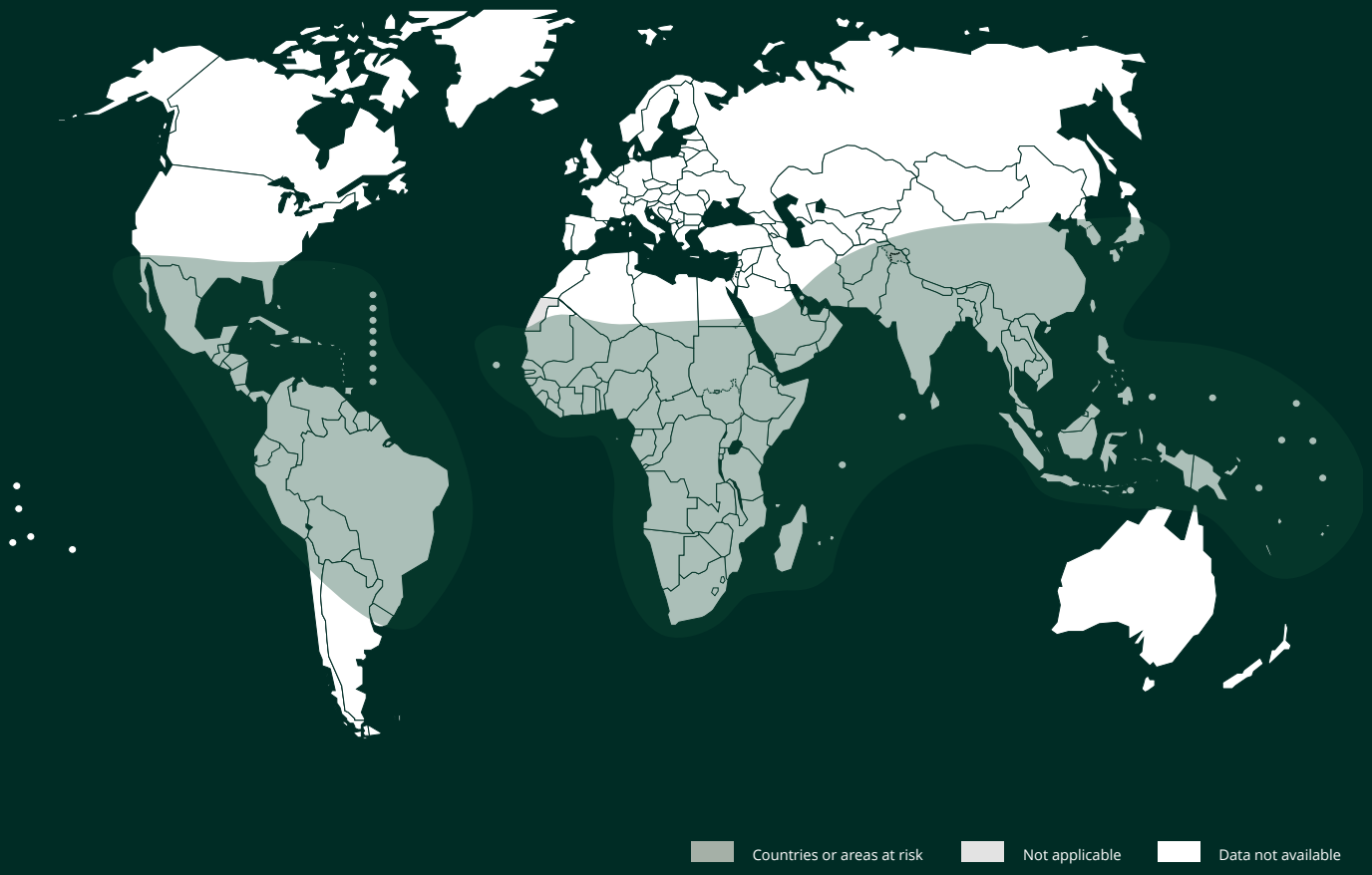
reported chikungunya infections during 2004–2017; the burden is poorly understood and the number of cases is likely largely underreported (expert estimates suggest up to 100 million infections).

Outbreaks of chikungunya have been reported in more than 60 countries; the heaviest burden is in South-East Asia, Africa and Latin America.

Number of chikungunya cases in the Americas, thousands[1]



Countries or areas at risk, 2015



[1] Data for other regions are not available

Chikungunya: assessment of actions required to meet 2030 sub-targets


© WHO/Yoshi Shimizu

Summary of critical actions to achieve targets

- Incentivize public–private partnerships for vaccine development.
- Advocate for funding to facilitate comprehensive mapping of the disease burden and development of national strategic approaches.
- Further develop the evidence base on effectiveness of vector control strategies.
- Develop quality-assured rapid diagnostic tests.

Category and current assessment	Current status	Actions required
Technical progress		
Scientific understanding	• Outbreaks have been reported in more than 60 countries • Majority of research carried out is for dengue and not specifically for chikungunya	• Understand health and economic burden of chikungunya • Study mutation of virus and its association with vectors to determine differences in transmission of chikungunya from other *Aedes*-borne viral infections • Understand the role of zoonotic transmission cycles
Diagnostics	• Clinical challenge in differentiating chikungunya from dengue • Serological tests including ELISA can confirm presence of antibodies • RT-PCR methods are available to determine virus in blood but vary in sensitivity	• Develop more sensitive and specific diagnostic tests (e.g. dipstick) • Refine criteria for differential diagnosis of chikungunya and dengue • Compare available PCR kits systematically to ensure quality
Effective intervention	• No specific antiviral medicine or commercial vaccines available; some vaccines are in testing • Sustained vector control includes measures targeting the eggs, larval and adult stages; however, evidence of effectiveness is not conclusive • Community-based source reduction measures and contact training approaches with indoor residual spraying of residences and places of work and in schools demonstrate good evidence for control of the disease	• Incentivize public–private partnerships to accelerate vaccine R&D • Further develop evidence base on effectiveness for vector control strategies (e.g. windows and doors screening, larval control) • Assess current usage of insecticides and ensure they are not used indiscriminately in order to avoid environmental contamination and development of insecticide resistance

For more details, please visit:
www.who.int/news-room/fact-sheets/detail/chikungunya

No hindrance towards target

Critical action required to reach target

Category and current assessment	Current status	Actions required
Strategy and service delivery		
Operational and normative guidance	• The Pan American Health Organization (PAHO) and the United States Centers for Disease Control and Prevention have published preparedness and response guidance for chikungunya in the Region of the Americas	• Develop guidance on surveillance systems to increase standardization of reported data • Update PAHO guidance and use it as a basis for developing guidance in other regions • Develop global operational approach on case management including chronic cases and vector control
Planning, governance and programme implementation	• Currently benefiting from dengue planning efforts due to similarities in disease profile • Indicators of impact on vector populations have been defined	• Recognize chikungunya as an endemic disease and develop national strategic approaches • Identify indicators related to disease incidence • Ensure compliance of private health care providers as per national protocols for diagnosis and treatment • Implement community-based management of containers and use of safe insecticides in non-drinking water containers • Establish vector management, control and surveillance programmes and strategies and integrate new vector control tools with ongoing vector control (e.g. control of larvae and removal of breeding sites) • Develop resilience plans for cities to "engineer out" mosquito habitats • Consider dengue as an environmental threat
Monitoring and evaluation	• Outbreaks have been reported in a PAHO region formerly free of chikungunya • State of surveillance and M&E systems varies by country	• Develop surveillance and M&E systems in high-risk countries • Monitor resistance of vectors against insecticides • Monitor presence and activity of mosquitoes in areas of potential risk
Access and logistics	• Regional stockpiles of spray equipment and insecticides in the Western Pacific Region	• Consider developing regional stockpiles of spray equipment and insecticides in other endemic regions • Ensure availability of high-quality PCR diagnostic tests
Health care infrastructure and workforce	• Health care workforce instructed to treat suspected chikungunya cases as dengue until dengue ruled out[1]	• Establish a regional network of medical staff for case management and chronic pain • Streamline national referral systems • Make housing improvements to build out breeding habitats (as an ideal intervention)
Enablers		
Advocacy and funding	• Lack of data on economic costs of infection results in under-recognition of disease impact[2]	• Increase commitment of resources from international donors, countries and nongovernmental organizations for sustained interventions and patient care • Develop and share resources among all stakeholders • Create agreements with stakeholders that are developing vaccines to ensure maintenance of original timelines
Collaboration and multisectoral action	• Academic institutions and biotech companies jointly researching chikungunya vaccines • The Global Dengue & *Aedes*-Transmitted Diseases Consortium brings together some of those fighting chikungunya	• Coordinate programme delivery on *Aedes* infections • Incentivize multisectoral collaboration for surveillance, prevention and treatment • Share surveillance data on epidemiology with stakeholders interested in developing a vaccine to allow for phase III trials and share facilities in which these can be conducted • Collaborate with environmental sectors and engineers to reduce mosquito habitats • Coordinate all arbovirus activities with emergency programmes • Coordinate with WASH stakeholders to manage dengue outbreaks environmentally and prevent transmission of the disease
Capacity and awareness building	• Currently integrated with dengue training	• Train health care professionals on differentiating chikungunya from dengue • Create awareness to induce behavioural change in endemic areas (e.g. promote covering of the entire body when outdoors) • Build the capacity of health care professionals and caregivers in WASH to provide hygienic treatment and care at health care facilities and households

[1] Chikungunya virus: information for health care providers. Washington (DC); United States Centers for Disease Control and Prevention, 2018 (https://www.cdc.gov/chikungunya/hc/index.html)

[2] Factsheet chikungunya. In: Chikungunya [website]. Washington (DC): Pan American Health Organization (https://www.paho.org/hq/index.php?option=com_content&view=article&id=8303:2013-hoja-informativa-chikungunya&Itemid=40023&lang=en)

Dracunculiasis

Dracunculiasis is a parasitic disease caused by infection with *Dracunculus medinensis* (the guinea worm). The disease causes people to become non-functional for weeks when the adult female worm emerges from the body through a painful burning blister.

Disease and epidemiology

- Dracunculiasis is a parasitic disease caused by infection with *Dracunculus medinensis* (the guinea worm).
- The disease causes people to become non-functional for weeks when the adult female worm emerges from the body through a painful burning blister; the worm develops in the body for about a year.
- Human infection is usually transmitted through drinking stagnant water containing parasite-infected water fleas; patients often immerse the limb in water to relieve burning when the worm is emerging; once in the water, the worm releases larvae, completing the transmission cycle.
- Infection also occurs in animals, particularly in dogs.[1]

Progress against WHO 2020 targets

Impact indicator	2020 target	Current status
Number of countries certified free of transmission	187	187

Core strategic interventions

Preventive chemotherapy	N/A
WASH	• Ensuring access to safe drinking-water sources • Filtering water from open water bodies before drinking • Preventing contamination of drinking-water by advising patients to avoid wading into water
Vector control	• Temephos to control water fleas, the intermediate host (also called cyclops)
Veterinary public health	• Proactive tethering of dogs (including infected dogs) to prevent contamination of the environment and management of infection
Case management	• Containment of human cases • Wound care including wound cleaning, infection prevention, pain and inflammation reduction
Other	• Surveillance to ensure early detection and containment of transmission • Increasing awareness of cash reward scheme for voluntary reporting, promoting behavioural change and improving case detection • Conduct COMBI (Communication for Behavioural Impact) for community compliance with eradication strategies

Risks that require mitigation

- Animal infections with *D. medinensis*
- Population displacement, insecurity and political instability in key endemic countries

WHO 2030 target, sub-targets and milestones

Indicator	2020 (provisional estimate)	2023	2025	2030
Number of countries certified free of transmission	187/194 (96%)	189/194 (97%)	191/194 (98%)	194/194 (100%)

[1] Currently in Angola, Chad, Ethiopia and Mali

SOURCE: All data sourced from WHO unless otherwise indicated

Burden of disease

54
cases reported in 2019

About 29%
economic rate of return on investment once the disease is eradicated[1]

1–1.9 million
DALYs averted in 1990–2016[2]

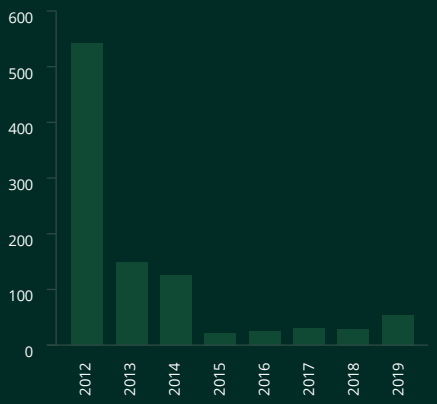
Dracunculiasis is on the verge of eradication, with 54 human cases reported in four countries in 2019 including Cameroon which reported an imported case; seven countries remain to be certified free of transmission:

– Angola, Chad, Ethiopia, Mali and South Sudan have indigenous transmission;

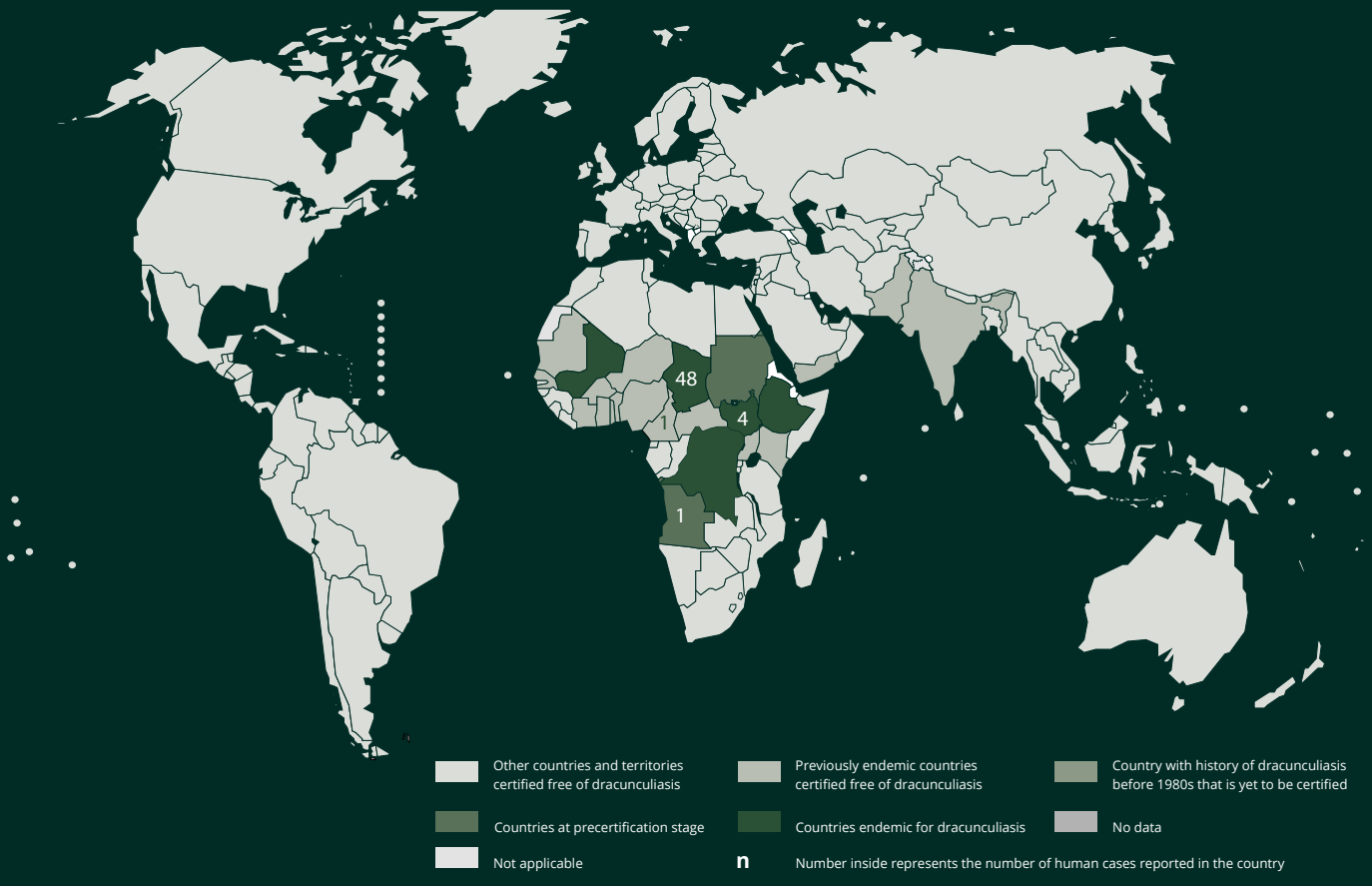
– Sudan is in the precertification phase;

– Democratic Republic of Congo has had no history of dracunculiasis since 1980 but assessment is required for certification purposes.

Number of dracunculiasis cases reported worldwide, 2012–2019



Certification status 2020 and cases reported, 2019



[1] Greenaway C. Dracunculiasis (guinea worm disease). CMAJ. 2004; 170(4): 495-500. PMID: 14970098; PMCID: PMC332717

[2] Cromwell EA, Roy S, Sankara DP, Weiss A, Stanaway J, Goldberg E, et al. Slaying little dragons: the impact of the Guinea Worm Eradication Program on dracunculiasis disability averted from 1990 to 2016 . Gates Open Res. 2018; 2:30. doi:10.12688/gatesopenres.12827.1

Dracunculiasis: assessment of actions required to meet 2030 sub-targets


© WHO/Diego Rodriguez

Summary of critical actions to achieve targets

- Develop scientific and operational protocols for elimination of infections in animals.
- Investigate why dracunculiasis infection occurred in Angola to better understand the current challenges and take appropriate measures to stop transmission.
- Initiate certification in Democratic Republic of the Congo and Sudan to avoid missing targets.
- Stop transmission in humans and/or animals in Angola, Chad, Ethiopia, Mali and South Sudan.
- Sustain the commitment of countries, donors and partners.

Category and current assessment	Current status	Actions required
Technical progress		
Scientific understanding	• Good understanding of transmission pathways to humans	• Develop scientific and operational protocols for elimination of infections in animals • Investigate why dracunculiasis infection occurred in Angola to better understand the current situation and take appropriate measures to stop transmission • Develop understanding of copepod biology
Diagnostics	• Macroscopy and laboratory PCR currently used	• Develop serological field diagnostic test for humans and animals • Develop field pond-side test for detecting *D. medinensis* DNA in copepods
Effective intervention	• There is currently no medicine to treat or vaccine to prevent dracunculiasis; research is ongoing • Current strategies as described under strategic interventions are effective	• Explore the use of new technologies including drones or satellite imaging to identify and treat hidden water sources in endemic localities • Research alternative products to control copepods • Explore providing cash reward for identifying new stagnant water sources in hard-to-reach areas

For more details, please visit:
www.who.int/dracunculiasis/en/

No hindrance towards target

Critical action required to reach target

Category and current assessment	Current status	Actions required
Strategy and service delivery		
Operational and normative guidance	• The criteria for certification are being updated by a group convened by the International Commission for the Certification of Dracunculiasis Eradication (ICCDE) and supported by WHO in order to develop a protocol to certify remaining countries in the context of *D. medinensis* infection in animals (dogs)	• Finalize the review of criteria for certification
Planning, governance and programme implementation	• Seven WHA resolutions supporting eradication • Annual ministerial meeting of affected countries on the margin of the World Health Assembly. Annual meetings of ICCDE and programme managers • Implementation of interventions needs improvement in the few remaining foci	• Initiate certification in Democratic Republic of the Congo and Sudan to avoid missing targets • Intensify and extend the scope and quality of interventions in the remaining few foci including improved transmission containment and effective use of temephos
Monitoring and evaluation	• Improvement of programme coverage in areas that are not known to be endemic but are at risk is needed • National programmes monitor operational indicators but better ways of measuring effectiveness of vector control intervention are needed • Need for improved indicators for monitoring temephos application	• Ensure that monitoring systems are functional in non-endemic and formerly endemic areas that have not reported cases for a long time (e.g. particularly sensitive are the Central African Republic, Cameroon and other at-risk countries bordering endemic countries) • Improve indicators for monitoring application of temephos • Monitor the quality of temephos application and resistance of cyclops to temephos regularly
Access and logistics	• Adequate supply of temephos in endemic areas must be sustained • Sufficient supply of ID cards (photos) and cash reward material must be maintained	• Ensure that stock of temephos can be mobilized immediately to non-endemic and formerly endemic countries that reported cases or infection
Health care infrastructure and workforce	• High turnover of trained staff • Low coverage of health facilities • Insufficient number of trained people for vector control	• Governments to strengthen overall health systems in the context of universal health coverage • Integrate training on dracunculiasis in the curricula of health staff • Train and equip sufficient number of teams (e.g. vector control)
Enablers		
Advocacy and funding	• Insufficient funds for programme requirements • Delays in releasing funding at all levels	• Ensure and sustain commitment for adequate funding from donors until eradication • Increase advocacy in affected countries to sustain momentum, commitment and funding nationally until eradication is achieved • Eliminate delays in releasing funding at all levels • Develop a return on investments for WASH in endemic areas
Collaboration and multisectoral action	• Strong collaboration globally; WHO and The Carter Center facilitate cooperation within the ecosystem • Integration of eradication activities with other programmes and sectors such as WASH and education is not formalized in all countries	• Integrate eradication activities with other programmes and sectors (e.g. polio, integrated surveillance, veterinary services, other NTDs) • Collaborate with national WASH sectors to ensure access to safe water for affected and at-risk communities towards hygiene and wound management • Urge health ministries to collaborate with other relevant ministries to achieve the goal of eradication including of animal cases
Capacity and awareness building	• Suboptimal capacity of health staff in non-endemic areas to respond to any emergence of the disease should it occur	• Train health staff, ensure availability of standard operating procedures, include surveillance and response in the curriculum for health workers in affected countries • Increase awareness of prevention and the cash reward scheme for voluntary reporting and promote behavioural change

Echinococcosis (alveolar and cystic)

Cystic echinococcosis and alveolar echinococcosis result from infection with tapeworms of the genus *Echinococcus*. Both are complex diseases requiring well-equipped health care systems, well-trained health care staff and sufficient resources.

Disease and epidemiology

- CE and AE result from infection with tapeworms of the genus *Echinococcus*.
- During an asymptomatic period that may last several years:
  - CE causes cysts in various parts of the body (mostly the liver or lungs) and results in abdominal pain, nausea, vomiting, chronic cough, chest pain and other symptoms depending on the organs affected;
  - AE causes infiltrative vesicles and results in growing, metastasizing malignant tumor-like lesions, involving first the liver and later resulting in weight loss, general malaise, abdominal pain and liver failure; it can be fatal if left untreated.
- Infection is transmitted through the faecal-oral route from the faeces of canid animals (mainly dogs for CE, foxes and other canids for AE) to intermediate hosts (livestock, mainly sheep for CE, small rodents for AE); humans are accidental intermediate hosts and do not transmit the infection further.
- CE and AE are complex diseases requiring well-equipped health care systems, well-trained health care staff and sufficient resources; consequently, universal health coverage is essential for both echinococcal diseases.

Progress against WHO 2020 targets

Impact indicator	2020 target	Current status
Conducted pilot projects to validate effective control strategies, especially for low-resource settings (CE)	Complete by 2015	Pilot projects conducted in five countries[1]
Validated control strategy adopted by selected countries	N/A	Control programmes conducted in two countries[2]

Core strategic interventions

	Cystic echinococcosis	Alveolar echinococcosis
Preventive chemotherapy	N/A	N/A
WASH	• Hand-to-mouth transmission reduced through handwashing • Avoidance of dog faeces and contaminated food	• Hand-to-mouth transmission reduced through handwashing
Vector control	N/A	N/A
Veterinary public health	• Periodic deworming of dogs with praziquantel • Safe disposal of offal during slaughtering • Vaccination of sheep • Culling of aged sheep	• Periodic deworming with praziquantel of dogs and, where feasible, anthelminthic baiting of foxes
Case management	• Triaging of appropriate case management through cyst staging including: - "Watch and wait" strategy - Anthelminthic treatment with albendazole or mebendazole - Percutaneous methods + albendazole prophylaxis (e.g. PAIR treatment: puncture, aspiration, injection, re-aspiration) - Surgery (cyst removal) + albendazole prophylaxis	• Anthelminthic treatment with albendazole or mebendazole
Other	• Early diagnosis (ultrasonography imaging) is key for better patient outcomes • Education campaigns for hygiene measures and dog deworming to avoid infections	• Curative surgery (i.e. complete lesion removal; in extreme cases, liver transplantation)

Risks that require mitigation

- Long-term sustainability of interventions
- Transmission within sylvatic cycle may pose challenges to elimination of the disease (AE)

WHO 2030 target, sub-targets and milestones

Indicator	2020 (provisional estimate)	2023	2025	2030
Number of countries with intensified control[3] of cystic echinococcosis in hyperendemic areas[4]	1	4	9	17

[1] Argentina, Chile, Kyrgyzstan, Morocco, Peru
[2] China, Uruguay
[3] Periodic deworming of dogs, >80% vaccination coverage of sheep and access to ultrasound diagnosis available in the area
[4] Provisionally defined as an estimated 5 cases/100 000 people
SOURCE: All data sourced from WHO unless otherwise indicated

Burden of disease

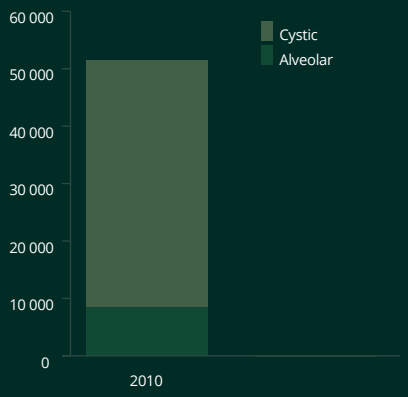
At least 1 million
people infected worldwide at any point in 2011[1]

About 19 000
deaths annually in 2016[2]

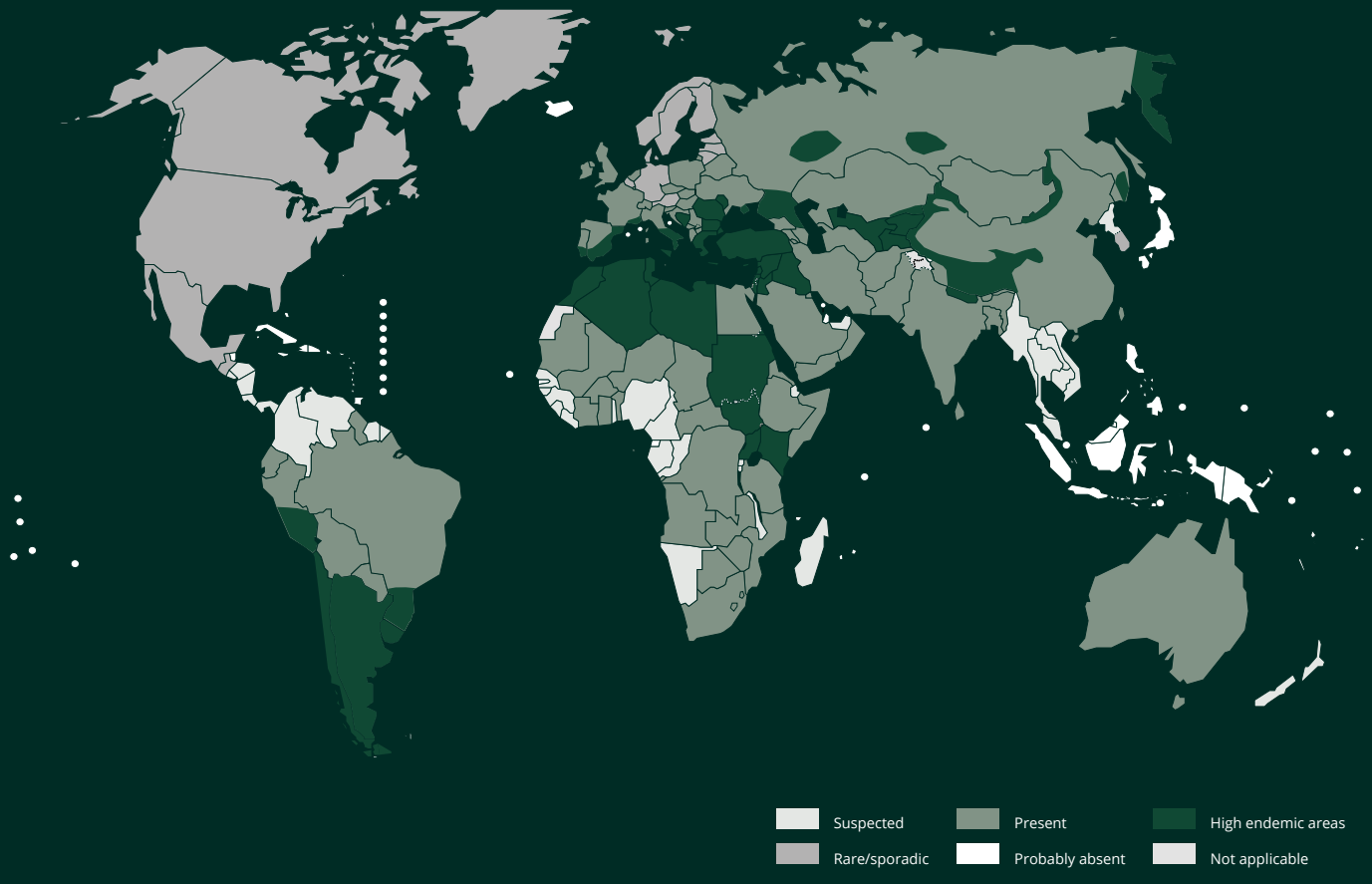
About 870 000
DALYs in 2015[2]

Cystic and alveolar echinococcosis are endemic in at least 111 countries; cystic echinococcosis is spread across all continents except Antarctica while alveolar echinococcosis is endemic in Asia, continental Europe and north America.

Number of cases by disease type, 2010



Endemicity of *Echinococcus granulosus* and cystic echinococcosis, 2015



[1] Report of the WHO Informal Working Group on cystic and alveolar echinococcosis surveillance, prevention and control. Geneva: World Health Organization; 2011 (https://www.who.int/echinococcosis/resources/9789241502924/en/)
[2] WHO Global health estimates, 2016 (https://www.who.int/healthinfo/global_burden_disease/en/)

Echinococcosis: assessment of actions required to meet 2030 sub-targets

Summary of critical actions to achieve targets

- Map disease prevalence to establish baseline data, and strengthen integrated national surveillance.
- Develop guidelines for effective prevention and control strategies, and implement them in the field.
- Strengthen implementation of ultrasound diagnosis and effective interventions, and ensure access to albendazole.

Category and current assessment	Current status	Actions required
Technical progress		
Scientific understanding	• Parasite life cycles and genetics understood • Immunology of infection in intermediate hosts described • Gaps in understanding factors influencing likelihood of infection • Highly localized within countries where transmission cycle can be maintained	• Map health and economic burden (currently likely underestimated) • Estimate prevalence in sheep and other relevant livestock (CE) • Develop research to quantify resources needed to control the diseases • Delineate epidemiological impact of short-, mid- and long-term intervention approaches and identify their respective resource implications • Develop understanding of processes regulating parasite acquisition
Diagnostics	• Imaging is currently the main diagnostic used in humans • Serological tests used for confirmation in humans, but are not standardized • Coproantigen tests for dogs not adequately validated (CE) • No serological test available for livestock (CE)	• Bring standardized coproantigen diagnostic for dogs to market (CE) • Define target product profile and develop optimal diagnostic for humans
Effective intervention	• Periodic dog deworming with praziquantel (CE) • Effective anthelminthic available for definitive hosts • Effective vaccine available for sheep (CE)	• Conduct pilot trials involving livestock vaccination (CE) in different settings • Conduct efficacy trials in humans to understand optimal treatment courses of albendazole • Develop long-acting/pulse release praziquantel for dogs • Evaluate efficacy of currently available vaccine in other livestock species and in different genotype/species (CE)

For more details, please visit:
www.who.int/echinococcosis/en/

No hindrance towards target

Critical action required to reach target

Category and current assessment	Current status	Actions required
Strategy and service delivery		
Operational and normative guidance	• Guidance will be in place by 2020 for early detection and management	• Develop guidelines for implementation of optimized prevention and control methods (including periodic deworming of dogs and foxes)
Planning, governance and programme implementation	• The disease is currently reportable only in some countries • There is large variability in the maturity of national CE programmes • Concerted efforts to reduce CE burden are effective in China and in areas of South America and have successfully eliminated CE in New Zealand and other islands	• Implement effective interventions in endemic areas using support as needed • Implement systematic use of population ultrasound screening (e.g. in school-aged children) for early diagnosis • Mandate segregated reporting of CE and AE in all endemic countries
Monitoring and evaluation	• Surveillance in humans and animals is weak in most countries	• Develop a high-throughput tool to collect baseline data, fully understand the scope of the challenge and evaluate control programmes in resource-limited settings • Set up surveillance systems for humans and animals in highly endemic countries including meat inspections for CE
Access and logistics	• Low availability of livestock vaccine (CE) • There is currently no donation of praziquantel and access to albendazole is limited due to out-of-pocket expenses	• Register EG95 vaccine for sheep in endemic countries (CE) and increase awareness of the intervention • Set up a reliable supply chain for medicines and vaccines to ensure access
Health care infrastructure and workforce	• Access to diagnosis and treatment facilities in rural areas is challenging	• Ensure access to ultrasound for diagnosis • Ensure access to percutaneous methods (CE) and surgery in rural areas • Improve abattoir infrastructure to decrease transmission
Enablers		
Advocacy and funding	• Lack of commitment for control efforts from governments in endemic countries	• Increase funding and support for animal health and strengthen the One Health approach • Increase advocacy for implementation of active control measures (CE)
Collaboration and multisectoral action	• Strong cooperation with FAO and OIE • WHO Informal Working Group on Echinococcosis brings together some of those fighting AE and CE	• Develop widespread cooperation with the surgical community for incorporating CE and AE into health systems • Set up a collaboration with rabies for educational programmes on deworming when dog rabies vaccinations take place (CE)
Capacity and awareness building	• Limited awareness of the disease in rural communities where slaughtering takes place in community environments and dogs are fed with organs of slaughtered animals (CE) • Surgery is at times conducted inappropriately	• Develop training courses for medical personnel on diagnosis and clinical management of CE and AE in rural areas of affected countries • Provide community education based on the local values (local people, local language and culture) to improve effectiveness of interventions for both infections and improve safe practices in slaughtering (CE) • Build capacity for disease triaging and ultrasound operations • Build systemic and personnel surveillance capacity including for testing in animals

Foodborne trematodiases

Foodborne trematodiases are caused by trematode worms ("flukes"): *Clonorchis sinensis, Opisthorchis viverrini, Opisthorchis felineus* (referred to collectively as small liver flukes), *Fasciola hepatica, Fasciola gigantica* and *Paragonimus* spp.

Disease and epidemiology

- Foodborne trematodiases are caused by trematode worms ("flukes"): *Clonorchis sinensis, Opisthorchis viverrini, Opisthorchis felineus* (referred to collectively as small liver flukes), *Fasciola hepatica, Fasciola gigantica* and *Paragonimus* spp.
- The disease causes:
  - severe pain in abdominal region, general malaise, inflammation and fibrosis of the liver (clonorchiasis, opisthorchiasis, and fascioliasis);
  - fatal bile duct cancer (clonorchiasis and opisthorchiasis), blockage, colic pain and jaundice (fascioliasis); and
  - chronic blood-stained cough, chest pain, and dyspnea.
- Infection is transmitted through raw or undercooked food (freshwater fish, aquatic vegetables, crabs and crayfish) infected with larvae.
- Transmission is maintained through the zoonotic life cycle, especially cats and dogs.

Progress against WHO 2020 targets

Impact indicator	2020 target	Current status
Trematode infections included in mainstream preventive chemotherapy strategy	N/A	Pilot projects conducted in 10 countries[1]
Population at risk reached by preventive chemotherapy	75%	N/A
Morbidity due to foodborne trematode infections controlled in all endemic countries	100%	N/A

Core strategic interventions

Preventive chemotherapy	• Mass drug administration with triclabendazole (*Fasciola* spp.) and praziquantel (small liver flukes and *Paragonimus* spp.)
WASH	• Safe disposal of faecal waste • Access to safe water
Vector control	N/A
Veterinary public health	• Treatment of livestock and other domestic animals
Case management	• Anthelminthic medicines (praziquantel, triclabendazole) • PAIR methods, surgery (including partial hepatectomy)
Other	• Safe food practices (preparation and storage, dietary change) • Multisectoral community health education on WASH (e.g. sanitation) and One Health interventions (e.g. treatment of pets, cooking of fish offal prior to feeding them to animals) • Good management practices in fish farming (safe sourcing, keeping animals away from fish ponds)

WHO 2030 target, sub-targets and milestones

Indicator	2020 (baseline)	2023	2025	2030
Number of countries with intensified control[2] in hyperendemic areas[3]	N/A	3/92 (3%)	6/92 (7%)	11/92 (12%)

[1] Opisthorchiasis (Cambodia, Lao People's Democratic Republic, Thailand, Vietnam); clonorchiasis (China, Republic of Korea); fascioliasis (Bolivia (Plurinational State of), Peru; paragonimiasis (Philippines, Vietnam)

[2] Mass drug administration administered according to recommended schedule to both humans and animals, safe faecal waste management, regular community education

[3] To be defined in global guidance on control of foodborne trematodiases

SOURCE: All data sourced from WHO unless otherwise indicated

Burden of disease[1]

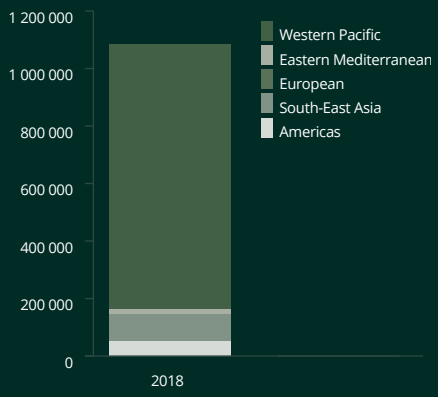
200 000
new cases annually

About 7000
deaths annually

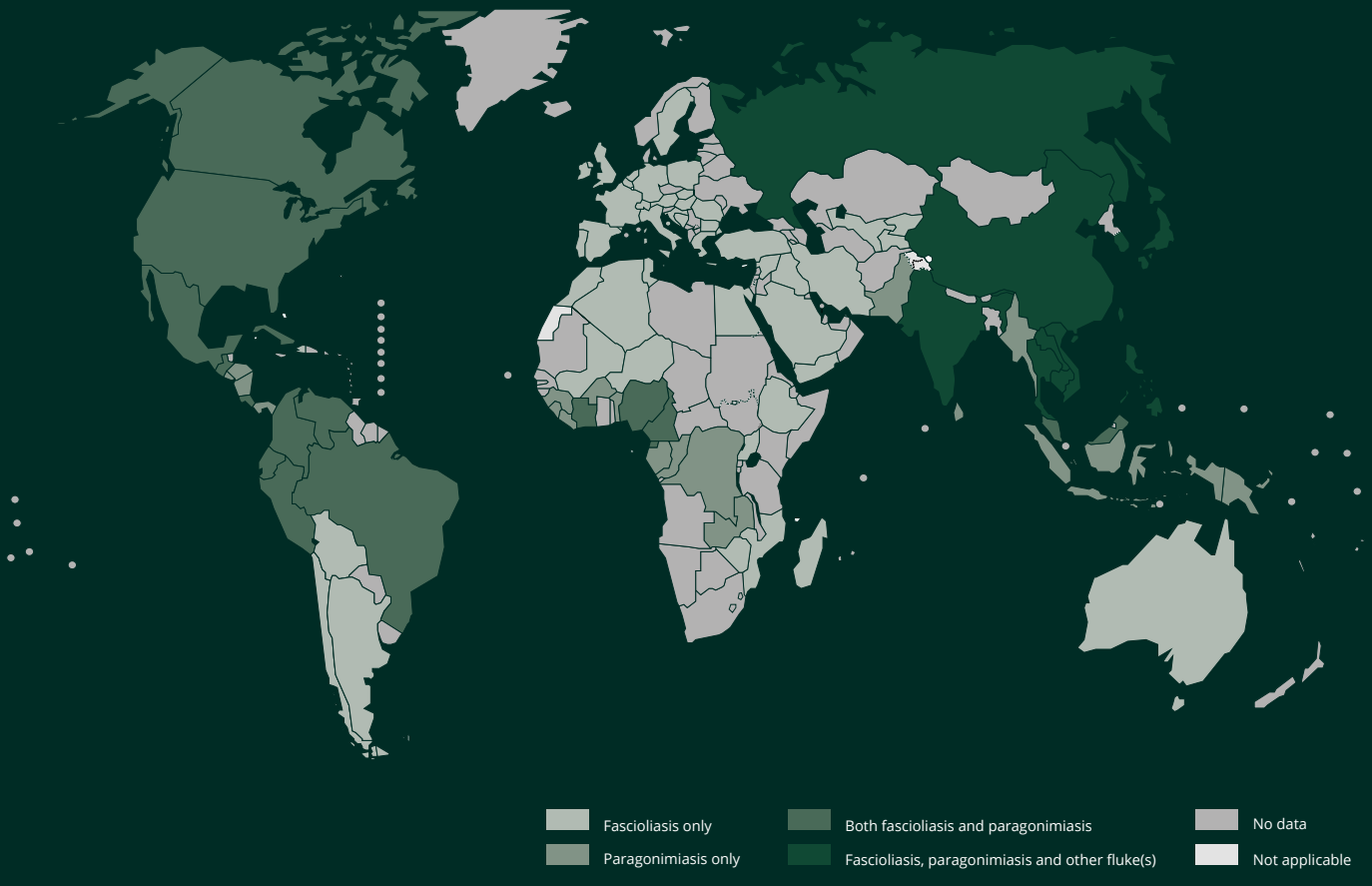
About 1.1 million
DALYs in 2016

Accurate data on incidence and prevalence are not available. The diseases are endemic in 92 countries across all continents except Antarctica.

DALYs per region[2] **in 2016**



Distribution of foodborne trematodiases globally[3]



[1] Occurrence is highly localized
[2] Data in the African Region unavailable; in other regions, likely underestimated due to lack of reliable data
[3] All data sourced from WHO unless otherwise indicated

Foodborne trematodiases: assessment of actions required to meet 2030 sub-targets

Summary of critical actions to achieve targets

- Develop accurate surveillance and mapping tools and methods, with information on environmental factors involved in infection.
- Estimate number of tablets required for control and secure donations of praziquantel.
- Promote application and awareness of preventive chemotherapy, WASH and One Health interventions; evaluate impact and use the results in training health care staff.

Category and current assessment	Current status	Actions required
Technical progress		
Scientific understanding	• Some understanding of the parasites' life cycle; however, involvement of different species in transmission is insufficient • The disease is highly localized within countries	• Conduct eco-epidemiological studies • Understand the susceptibility and involvement of different animal species (including fish species) • Understand the mode of transmission and the process/pathway involved in the cause of disease • Understand associations with other diseases (coinfections and protective effects (e.g. leptospirosis, noncommunicable diseases) to inform control strategies
Diagnostics	• Clinical diagnosis, parasitological techniques (e.g. detection of eggs in stool) or urine test are used • Imaging used to diagnose morbidity • More sensitive serological techniques and molecular techniques (PCR) are at an experimental stage	• Finish development of and evaluate more sensitive serological techniques and PCR, especially for *Fasciola* • Develop point-of-care differential diagnostic for intestinal and liver flukes
Effective intervention	• Effective preventive measures (preventive chemotherapy, education, sanitation and safe food practices) are known but rarely applied	• No hindrance towards the target

For more details, please visit:
www.who.int/foodborne_trematode_infections/en/

No hindrance towards target

Critical action required to reach target

Category and current assessment	Current status	Actions required
Strategy and service delivery		
Operational and normative guidance	• No manuals on public health approach to control globally • Some guidance in a few countries exists	• Prepare global guidance on control • Develop manual for public health interventions in high-risk areas • Set national goals, develop national strategy and adapt global guidance to country-specific context
Planning, governance and programme implementation	• Limited engagement from countries results in underutilization of effective interventions	• Promote the implementation of effective measures, evaluate their impact and disseminate results for training health care staff • Implement newly developed diagnostics in endemic regions when evaluated
Monitoring and evaluation	• Disease burden not well understood in humans and animals • Evaluation of the number of individuals at risk in each endemic country is not available	• Estimate the number of individuals at risk by country • Develop accurate surveillance and mapping methods, particularly layered with information on the environmental factors involved in infection • Report changes in incidence of liver cancers associated with control of these diseases • Establish link between cancer register and hyper-endemic areas
Access and logistics	• Triclabendazole donation by Novartis secured until 2022 (600 000 tablets/year) • Countries can apply for donated triclabendazole tablets through WHO	• Ensure access to praziquantel (number of tablets needed for control should be estimated)
Health care infrastructure and workforce	• Imaging techniques are essential • Remote and marginalized communities are difficult to reach	• Increase access to imaging diagnostics for use in resource-limited settings • Increase interconnectedness between preventive and curative services • Integrate case management into health care system (e.g. CASCAP screening programme)
Enablers		
Advocacy and funding	• No strong advocacy group able to voice a global vision on these diseases • Limited due to lack of funding	• Create and sustain advocacy group for foodborne trematodiases • Secure funding to tackle critical actions required to reach 2030 sub-targets
Collaboration and multisectoral action	• WHO promotes the inclusion of flukes among the targets of preventive chemotherapy interventions • WHO, FAO and OIE collaborate in order to promote the One Health approach	• Rally action and mobilize across foodborne trematodiases • Prompt countries to develop their actions based on examples of multisectoral control of *O. virerrini* in Thailand • Coordinate control with tuberculosis and other diseases (e.g. case-finding in highly endemic areas for paragonimiasis) • Develop multisectoral collaboration at country level to implement One Health approaches
Capacity and awareness building	• Limited knowledge of the disease among at-risk populations and health staff	• Training for health staff and veterinary staff on diagnosis and treatment • Raise awareness of and increase education on WASH and One Health topics to enable behavioural change

Human African trypanosomiasis

(gambiense)

Gambiense human African trypanosomiasis is caused by infection with *Trypanosoma brucei gambiense*. It affects mainly humans but the parasite can also be found in animals.

Disease and epidemiology

- Gambiense human African trypanosomiasis (gHAT) is caused by infection with *Trypanosoma brucei gambiense* and accounts for 98% of all HAT cases.
- gHAT affects mainly humans but the parasite can also be found in animals.
- gHAT causes chronic infection (in two stages): bouts of fever, headaches, joint pains and frequently enlarged lymph nodes (haemolymphatic stage) and sleep disturbances, behavioural changes, confusion, sensory and motor disturbances (neurological stage) when the parasite crosses the blood–brain barrier.
- HAT is mainly transmitted through the bite of an infected tsetse fly of the genus *Glossina*; other modes of transmission include mother-to-child.

Progress against WHO 2020 targets

Impact indicator	2020 target	Current status
Number of HAT cases declared (global elimination of HAT as a public health problem)	<2000	<1000

Core strategic interventions

Preventive chemotherapy	N/A
WASH	• Safe water supply to reduce contact with tsetse flies
Vector control	• Baits and traps including impregnated screens
Veterinary public health	• Treatment of animals (cattle, pigs), restricted application of insecticides
Case management	• Medicines used for treatment of gHAT: pentamidine (haemo-lymphatic stage), eflornithine and nifurtimox (neurological stage), fexinidazole (haemo-lymphatic and not severe neurological stage)
Other	• Cases are detected through active (mobile units visiting villages in endemic areas and screening the whole population) and passive screening (clinical suspects attending to health facilities)

Risks that require mitigation

- Inability to screen and treat due to conflict and political instability in the most affected country
- Lack of integration of activities into a weak health system
- Asymptomatic infections and animal reservoirs as elimination is approached could lead to resurgence
- Reduction in surveillance once zero cases are reported locally, or cessation of activities in low prevalence settings

WHO 2030 target, sub-targets and milestones

Indicator	2020 (provisional estimate)	2023	2025	2030
Number of countries verified for interruption of transmission	0	0	5 (21%)	15 (62%)
Number of gHAT cases reported	<1000	500	200	0

SOURCE: All data sourced from WHO unless otherwise indicated

Burden of disease

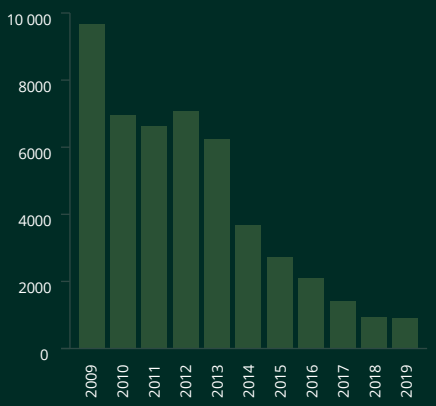
Fewer than 1000
reported cases in 2019

53 million
people at risk[1]

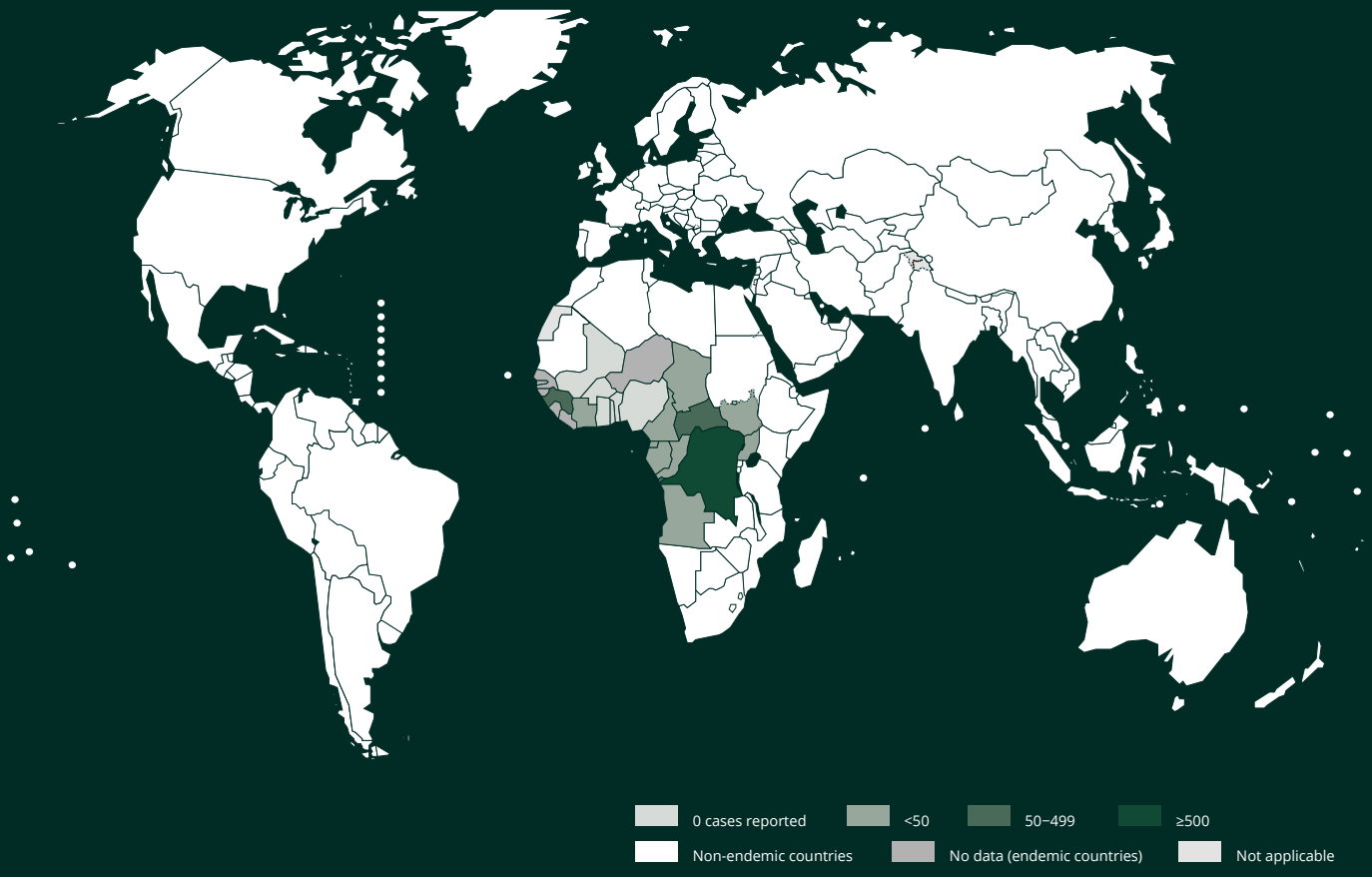
24
endemic countries

HAT is endemic in sub-Saharan Africa.

Number of gHAT cases, 2009–2019



Distribution of human African trypanosomiasis (gambiense), 2019



[1] Franco JR, Cecchi G, Priotto G, Paone M, Diarra A, Grout L, et al. Monitoring the elimination of human African trypanosomiasis: update to 2016. PLoS Negl Trop Dis. 2018; 12(12):e0006890

HAT (gambiense): assessment of actions required to meet 2030 sub-targets


© WHO/Andy Craggs

Summary of critical actions to achieve targets

- Integrate control and surveillance activities in the peripheral health system; identify and prepare sentinel sites for surveillance post-elimination.
- Develop a long-term funding plan, including campaigns for resource mobilization to meet needs.
- Reinforce ownership of elimination and targets by endemic countries by advocacy to health authorities and heads of states in the context of decreasing numbers of cases.
- Support development of effective treatments and specific, cost–effective diagnostics (for diagnosis and surveillance), and adapt treatment and vector control to low prevalence settings.

Category and current assessment	Current status	Actions required
Technical progress		
Scientific understanding	• Key gaps in the knowledge about transmission of the disease (e.g. latent infections in humans, role of animal reservoirs) • Epidemiological situation is not well known in some geographical areas	• Evaluate role of epidemiological elements (e.g. latent infections in humans, the role of the skin as a reservoir, the role of animal reservoirs), fill gaps in epidemiology understanding and monitor environmental change • Understand prevalence of infection in regions with low or limited surveillance • Monitor impact of environmental and climate changes
Diagnostics	• Screening with serological tests; parasite confirmation (in blood, lymph nodes or cerebrospinal fluid) • Determining stage of progression by examining cerebrospinal fluid from lumbar puncture • Screening tools available but imperfect. Current confirmation tools cumbersome • Limited availability of tools to assess absence of the disease • Different initiatives (DiTECT, FIND, IRD, ITM) are developing and evaluating new tools and protocols for screening and diagnosis • Case-finding (active and passive) is the main activity for control and surveillance	• Develop field-adapted diagnostic/detection tools (e.g. a simplified diagnostic that does not require confirmatory testing by microscopy) • Ensure independent, multicentre evaluation of new tools
Effective intervention	• Current interventions are effective but need to be adapted to the evolving epidemiological situation • Tools for vector control have demonstrated utility in reducing disease transmission when strategically deployed and coordinated with medical intervention • Trials for new simpler medicines are ongoing	• Adapt interventions to a new epidemiological scenario of low and very low prevalence and integration in health system to ensure sustainability • Develop safe and efficient single oral dose for both stages (e.g. acoziborole) to help integration of treatment into primary health system. • Develop a paediatric formulation of oral treatment for children under 6

For more details, please visit:
www.who.int/trypanosomiasis_african/en/

No hindrance towards target

Critical action required to reach target

Category and current assessment	Current status	Actions required
Strategy and service delivery		
Operational and normative guidance	• There is a global strategy defined to achieve elimination • Operational guidelines are defined for different settings • The verification of HAT elimination is not developed and tools are limited	• Develop and adopt guidance for assessing elimination as interruption of transmission (how to measure HAT as truly eliminated) • Create guidance for targeting vector control activities • Consider diagnostic algorithms with a lower specificity if safer treatments become available
Planning, governance and programme implementation	• HAT control and surveillance is led by National Sleeping Sickness Control Programmes (NSSCPs) with the support of WHO network for HAT elimination which coordinates stakeholders on HAT control and surveillance	• Participate in efforts advocating for universal health coverage • Efforts from countries are needed to integrate control and surveillance into strengthened national health systems
Monitoring and evaluation	• HAT Atlas is a helpful tool for planning and monitoring control and elimination activities • Global indicators and methods for validation of HAT elimination as a public health problem are available	• Use distribution data and case mapping tools to improve targeting of case-finding activities • Better understand the coverage of the population screened to help focus on the population at risk (e.g. develop assessment methodology, transfer the process to country surveillance programmes) • Secure financial and technical support for validation and verification • Develop high-throughput test to assess elimination and post-elimination surveillance on samples in a reference laboratory • Reinforce surveillance through setting up sentinel surveillance sites with trained staff and equipment
Access and logistics	• Access to treatment is 100% ensured by donation of manufacturers and distribution is ensured by WHO until 2020 • Access to screening and diagnosis is not ensured and distribution of diagnostic tools is not systematic	• Ensure availability and access of HAT diagnostic tools through involvement of manufacturers
Health care infrastructure and workforce	• Decrease of HAT-skilled staff and decrease in prevalence makes it difficult to gain experience • Challenging integration of control and surveillance activities in a weak health system	• Integrate control and surveillance activities in the peripheral health system; identify and prepare sentinel sites for surveillance post-elimination • Develop national plans for staff training, awareness and motivation within the national health systems
Enablers		
Advocacy and funding	• Important funding (Belgian Government, Sanofi, Bayer and the Bill & Melinda Gates Foundation) is guaranteed for next 2–5 years but extension for long-term support is required • Ownership of the elimination process and targets by endemic countries is weak	• Develop a long-term funding plan, including a campaign to mobilize resources to meet needs • Maintain current support to ensure the sustainability of the current gains (e.g. lobbying to avoid donor fatigue) • Reinforce ownership of the elimination process and targets by endemic countries through advocacy to health authorities and heads of states (e.g. PATTEC) in a context of decreasing numbers of cases
Collaboration and multisectoral action	• The WHO network for HAT elimination provides a framework in which activities conducted by its members are coordinated, facilitating HAT control and surveillance • Interface with animal trypanosomiasis (One Health approach) through the FAO and PAAT initiative. • Collaboration with some other NTD programmes (e.g. Buruli ulcer, dracunculiasis and leprosy, for case-finding)	• Enhance cross-border collaboration for elimination of transboundary foci • WHO coordination of countries and other stakeholders must be ensured to maximize synergies. • Establish collaboration with malaria programme on diagnosis and vector control • Integrate interventions between zoonotic and anthropomorphic trypanosomiasis (One Health approach)
Capacity and awareness building	• International Course on African Trypanosomiasis (ICAT) covers key aspects to underpin the capacity of the programmes • Efforts of multiple partners (IRD, ITM, FIND, DND*i*, Makerere University) in coordination with NSSCPs	• Capacity-building (e.g. cascade training/retraining) for treatment services • Develop training to transition HAT expertise from specialized HAT programmes into national health systems

Human African trypanosomiasis

(rhodesiense)

Rhodesiense human African trypanosomiasis is caused by infection with *Trypanosoma brucei rhodesiense*. It is a zoonosis (of wild and domestic animals) that occasionally affects humans.

Disease and epidemiology

- Rhodesiense human African trypanosomiasis (rHAT) is caused by infection with *Trypanosoma brucei rhodesiense* and accounts for 2% of all HAT cases.
- rHAT is a zoonosis (of wild and domestic animals) that occasionally affects humans.
- rHAT causes acute infection which rapidly develops initially with bouts of fever, chancre in the site of infection, headaches, joint pains and frequently cardiac and renal symptoms (haemo-lymphatic stage) and sleep disturbances, behavioural changes, confusion, sensory and motor disturbances (neurological stage) when the parasite crosses the blood–brain barrier and invades the central nervous system.
- HAT is mainly transmitted through the bite of an infected tsetse fly of the genus *Glossina*; other modes of transmission include mother-to-child.

Progress against WHO 2020 targets

Impact indicator	2020 target	Current status
Number of HAT cases declared (global elimination of HAT as a public health problem)	<2000	<1000

Core strategic interventions

Preventive chemotherapy	N/A
WASH	• Safe water supply to reduce contact with tsetse flies
Vector control	• Insecticide spraying of livestock • Baits and traps including impregnated screens • Sterile insects release
Veterinary public health	• Treatment of animals (cattle, pigs), restricted application of insecticides
Case management	• Medicines used for treatment of rHAT: suramin (haemo-lymphatic stage) and melarsoprol (neurological stage)
Other	• Cases are detected mainly through passive screening (clinical suspects attending to health facilities)

Risks that require mitigation

- Challenged with integration of activities in a weak health system
- Cessation of activities in low prevalence settings

WHO 2030 target, sub-targets and milestones

Indicator	2020 (provisional estimate)	2023	2025	2030
Number of countries validated for elimination as a public health problem (defined as <1 case/10 000 people per year, in each health district of the country averaged over the previous 5-year period)	0	2 (15%)	4 (31%)	8 (61%)
Area with ≥1 HAT case per 10 000 people per year (average of 5 years)	10 000 km^2	5000 km^2	2000 km^2	0

SOURCE: All data sourced from WHO unless otherwise indicated

Burden of disease

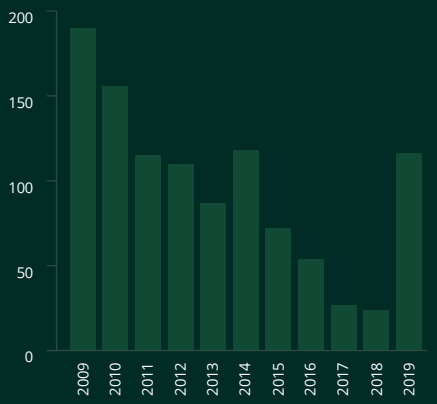
116
cases in 2019

4 million
people at risk[1]

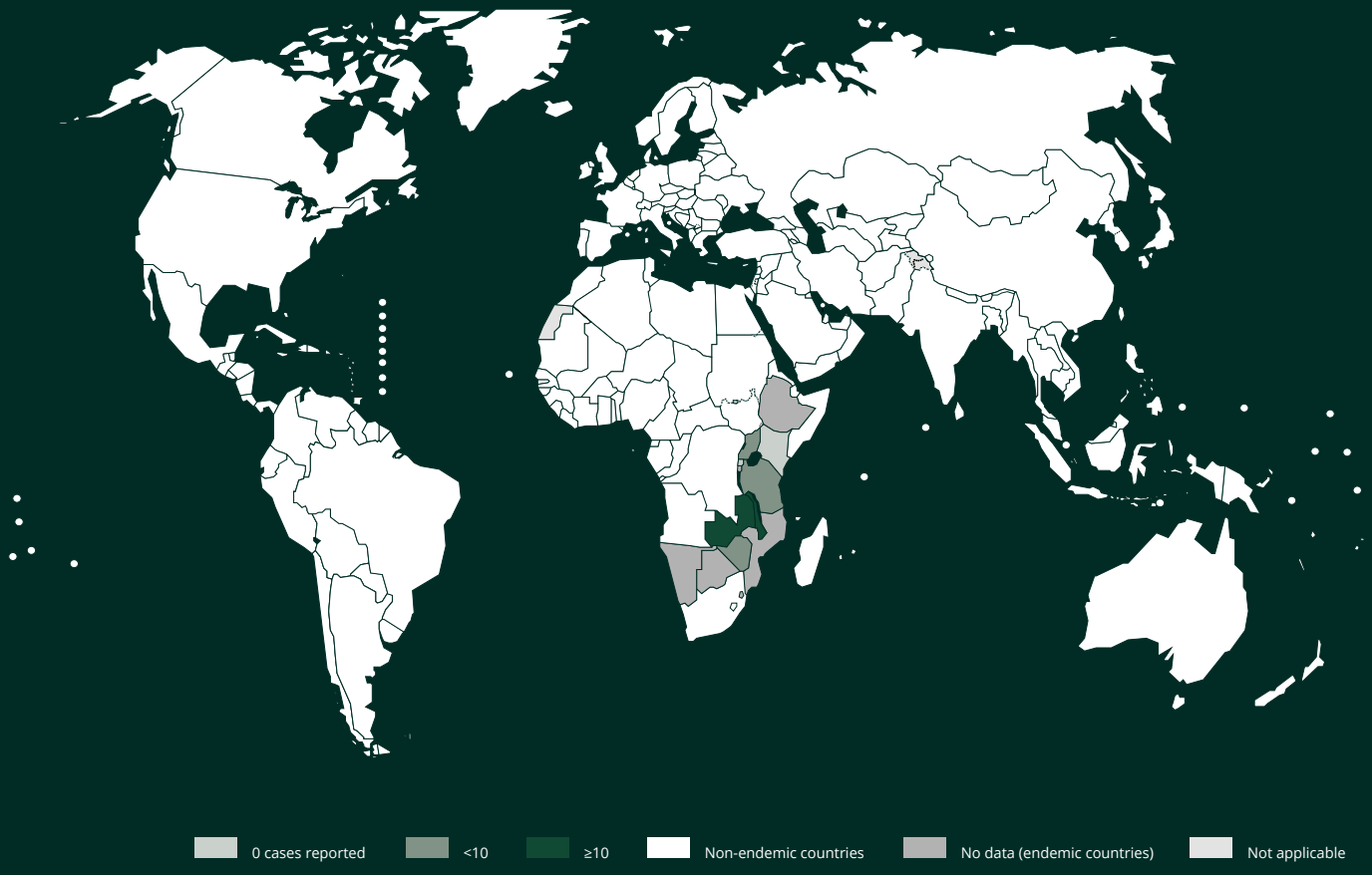
13
endemic countries

HAT is endemic in sub-Saharan Africa.

Number of rHAT cases, 2009–2019



Distribution of human African trypanosomiasis (rhodesiense), 2019



[1] Franco JR, Cecchi G, Priotto G, Paone M, Diarra A, Grout L, et al. Monitoring the elimination of human African trypanosomiasis: update to 2016. PLoS Negl Trop Dis. 2018; 12(12):e0006890

HAT (rhodesiense): assessment of actions required to meet 2030 sub-targets

Summary of critical actions to achieve targets

- Develop new field-adapted tools to detect rHAT (e.g. rapid diagnostic test (RDT)) for use in primary health care facilities, and safe and effective treatment.
- Integrate control and surveillance into national health systems, and strengthen capabilities through national plans for health care staff for training, awareness and motivation.
- Coordinate vector control and animal trypanosomiasis management among countries, stakeholders and other sectors (e.g. tourism and wildlife) through multisectoral national bodies to maximize synergies.

Category and current assessment	Current status	Actions required
Technical progress		
Scientific understanding	• A zoonotic disease for which wild and domestic animals are the main reservoirs and play a central role in transmission to humans • There are geographical areas in which the epidemiological situation is not well known • Risk factors for epidemic outbreaks are not well understood	• Understand prevalence of infection in regions with low or limited surveillance • Understand risk factors for epidemic outbreaks
Diagnostics	• No serological tests available and no ongoing research • Diagnosis through parasite confirmation (in blood, lymph nodes or cerebrospinal fluid) • Determination of stage of progression by examining cerebrospinal fluid from lumbar puncture • Expanded use of RDT for malaria has decreased the use of blood smear diagnostic technique required	• Develop new field-adapted tools to detect rHAT (e.g. RDT) to use in primary health care facilities (screening or diagnostic) • Include blood microscopy in clinical and laboratory algorithms
Effective intervention	• The main intervention is control of vector and animal reservoirs (e.g. treatment of animals, insecticide application in cattle) • Early case detection and treatment reduces disease impact in humans • Available treatment is toxic; trials for new simpler medicines (e.g. fexinidazole) are ongoing	• Develop safe, efficient treatments (e.g. fexinidazole, acoziborole) to replace toxic, arsenic-based treatments (melarsoprol)

For more details, please visit:
www.who.int/trypanosomiasis_african/en/

No hindrance towards target

Critical action required to reach target

Category and current assessment	Current status	Actions required
Strategy and service delivery		
Operational and normative guidance	• A global control strategy is in place • The HAT Atlas is a helpful tool for planning and monitoring control and elimination activities	• Prepare guidelines to maximize use of vector control tools tailored to different environments as needed • Foster a multisectoral approach • Develop strategies for the One Health approach to reduce transmission from animals (livestock and wild animals) to humans
Planning, governance and programme implementation	• HAT control and surveillance is led by National Sleeping Sickness Control Programmes (NSSCPs) with the support of WHO network for HAT elimination which coordinates stakeholders on HAT control and surveillance • Ownership of the process of elimination as a public health problem by endemic countries is weak	• Reinforce ownership of the elimination process and targets by endemic countries • Integrate HAT control (including treatment) and surveillance activities into health systems
Monitoring and evaluation	• Global indicators and methods for validation of HAT elimination as a public health problem are available • Under-detection remains a concern	• Use distribution data and case mapping tools to improve targeted case-finding • Reinforce human case detection activities • Secure technical support for validation process • Reinforce surveillance through setting up sentinel surveillance sites with trained staff and equipment
Access and logistics	• Access to treatment is 100% ensured through donated medicines that are distributed by WHO	• If new diagnostics tools become available, their logistics and supply should be ensured
Health care infrastructure and workforce	• Decreasing number of HAT-skilled staff and prevalence makes it difficult to gain experience • Challenging integration of control and surveillance activities in a weak health system • Widespread use of malaria RDTs reduces possibilities of microscopy for rHAT	• Develop national plans for staff training, awareness and motivation within the national health systems • Strengthen peripheral health systems (country leadership is needed)
Enablers		
Advocacy and funding	• Due to low prevalence there is a significant funding gap for control and research activities	• Secure financial support for validation process • Develop a long-term funding plan, including a campaign to mobilize resources to meet needs • Advocate for external donors and national appropriation • Contribute to efforts advocating for universal health coverage • Strengthen coordination bodies at continental level for integrated action against human disease and animal trypanosomiasis
Collaboration and multisectoral action	• The WHO network for HAT elimination provides a framework in which activities conducted by its members are coordinated, facilitating HAT control and surveillance • One Health interventions against animal trypanosomiasis and human disease are being implemented in some countries in coordination with FAO within the PAAT initiative	• Build intersectoral bodies to address trypanosomiasis nationally • Enhance cross-border collaboration for elimination of transboundary foci • Coordinate vector control and animal trypanosomiasis management across countries, stakeholders and other sectors (e.g. tourism, wildlife) through multisectoral national bodies to maximize synergies • Coordinate with Global Malaria Programme to use microscopy in some cases • Strengthen coordination bodies at continental level for integrated action against human disease and animal trypanosomiasis
Capacity and awareness building	• International Course on African Trypanosomiasis (ICAT) covers key aspects to underpin the capacity of the programmes. • Efforts to maintain diagnostic and treatment capacities supported by WHO, NSSCPs and other partners (IRD, ITM, FIND, DND*i*, Makerere University and others)	• Reinforce capacity-building including training to transition HAT expertise from specialized HAT programmes to national health systems • Develop guidance materials and manuals to improve patient management in endemic areas

Leishmaniasis (cutaneous)

Cutaneous leishmaniasis is caused by infection with the protozoan *Leishmania* parasite, which is transmitted by the bite of female phlebotomine sandflies. It is associated with population displacement, poor housing, lack of financial resources, malnutrition and a weak immune system.

Disease and epidemiology

- Cutaneous leishmaniasis (CL) is caused by infection with the protozoan *Leishmania* parasite, which is transmitted by the bite of female phlebotomine sandflies; only 10–25% of those infected by the *Leishmania* parasite will develop the disease.
- CL causes skin lesions (mostly ulcers), leaving permanent scars and serious disability, stigmatization and mental health problems (especially for young girls); mucocutaneous leishmaniasis can cause severe mutilations, especially on the face.
- CL is associated with population displacement, poor housing, lack of financial resources, malnutrition and a weak immune system.

Progress against WHO 2020 targets

Impact indicator	2020 target	Current status
Percentage of cases detected in the Eastern Mediterranean Region	70%	Estimated ~20%
Proportion of all detected cases treated/managed according to guidelines	≥90%	Unknown

Core strategic interventions

Preventive chemotherapy	N/A
WASH	N/A
Vector control	• Insecticide spraying, insecticide-treated nets and environmental management
Veterinary public health	• Rodent control
Case management	• Treatment of leishmaniasis depends on several factors including type of disease, concomitant pathologies, parasite species and geographical location. Local treatment includes pentavalent antimonials, paromomycin, cryotherapy and thermotherapy. Systemic medicines include liposomal amphotericin B, pentavalent antimonials and miltefosine.
Other	• Early diagnosis (rapid diagnostic tests combined with clinical signs) and prompt treatment

Risks that require mitigation

- In the absence of a topical, painless treatment it is very challenging to get patients with minor lesions to be diagnosed and treated
- Getting medical supplies and devices to treat some 150 000 new cases annually will cost about US$ 7–8 million. Until now, no domestic funding or external donors has committed that level of financial support

WHO 2030 target, sub-targets and milestones

Indicator	2020 (baseline)	2023	2025	2030
Number of countries in which: 85% of all cases are detected[1] and reported and 95% of reported cases are treated	N/A	44/87 (51%)	66/87 (76%)	87/87 (100%)

[1] Detected through active case search and/or strengthened passive surveillance
SOURCE: All data sourced from WHO unless otherwise indicated

Burden of disease

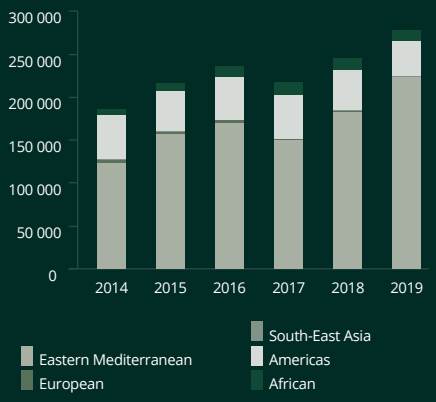
277 224
new cases reported in 2019[1]

About 260 000
DALYs in 2017[2]

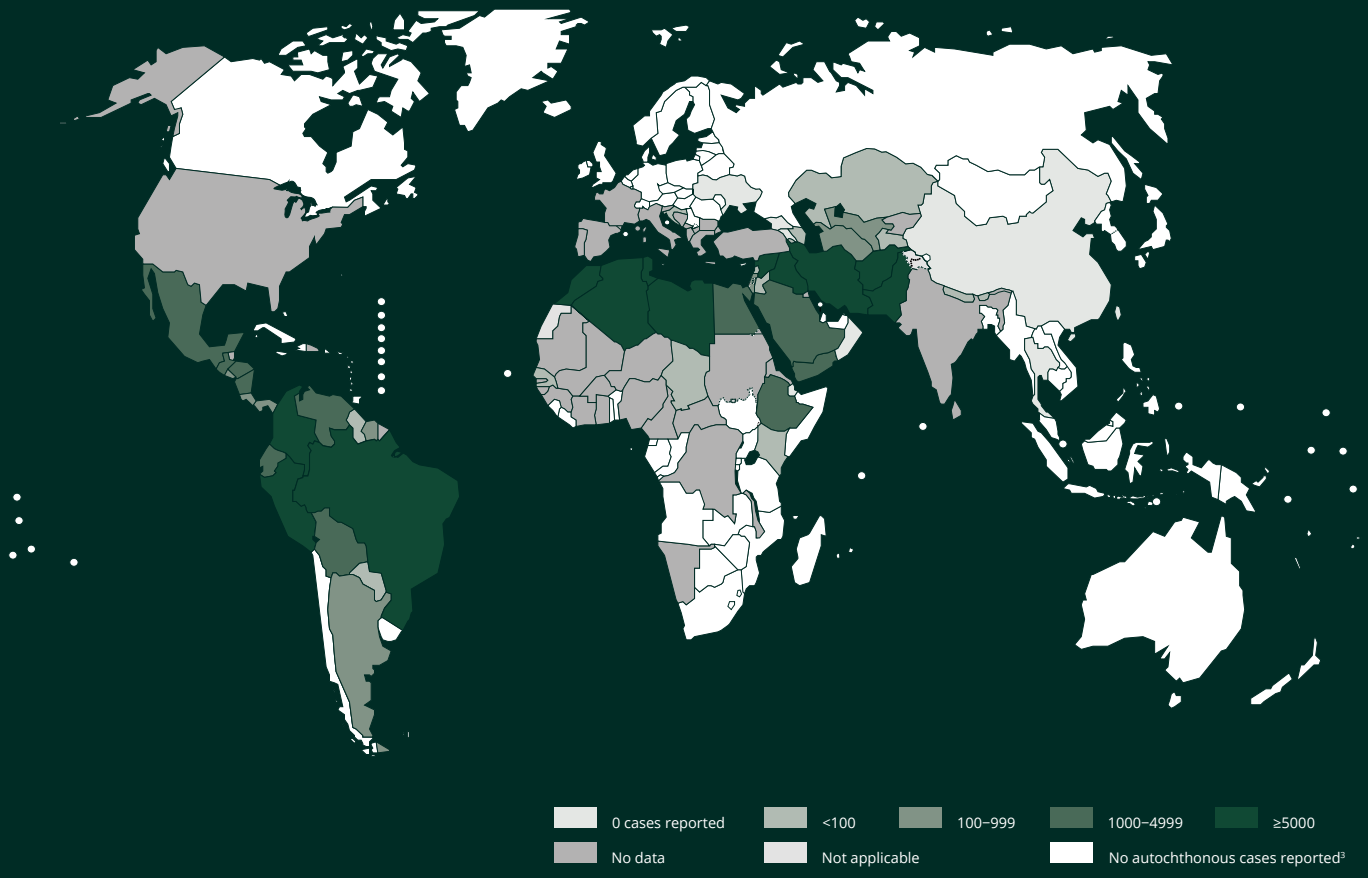
Some 87 countries are endemic for CL (2016).

In 2016, about 80% of new reported CL cases occurred in nine countries (Afghanistan, Algeria, Brazil, Colombia, Iran (Islamic Republic of), Iraq, Pakistan, Syrian Arab Republic and Yemen).

Number of new CL cases reported by WHO region, 2014–2019



Number of new cases reported, 2019



[1] This is likely underreporting the actual number
[2] Global burden of disease. Seattle (WA): Institute for Health Metrics and Evaluation (http://www.healthdata.org/gbd)
[3] Also referred to as non-endemic country

Leishmaniasis (cutaneous): assessment of actions required to meet 2030 sub-targets


© WHO/Christopher Black

Summary of critical actions to achieve targets

- Develop and scale up easy-to-administer oral or topical treatment that could be used in health centres.
- Improve the affordability and sensitivity of rapid diagnostic test for detection of cases, and the availability of treatment.
- Estimate the burden of the disease by improving surveillance, and establish a patient database to ensure effective monitoring of the impact of control interventions.

Category and current assessment	Current status	Actions required
Technical progress		
Scientific understanding	• Incomplete understanding of barriers and factors linked to low diagnosis, treatment and reporting rates • Animals are an important reservoir of the disease	• Identify challenges to improving diagnosis, treatment and/or reporting rates through research • Improve understanding of the vector life cycle for more effective vector control • Conduct incidence surveys in endemic countries to better understand epidemiology • Adapt interventions for prevention, control, and monitoring to the biological characteristics of each parasitic species and its ecoepidemiology
Diagnostics	• Current diagnosis based on parasitological tests and/or clinical features lacks adequate sensitivity in several endemic areas and laboratory diagnosis is not always available. PCR available in reference laboratories	• Develop affordable, more sensitive rapid diagnostic tests at species level that can be used at health centre and community levels (especially important in foci where several *Leishmania* species coexist)
Effective intervention	• CL is mainly treated with pentavalent antimonials, which are difficult to obtain and to administer and include painful injections for patients • Better therapies such as cryotherapy or thermotherapy are rarely implemented in highly endemic areas due to their high price	• Develop oral/topical treatment that can be used at the health centre and community level is needed • Include care for all skin NTDs in an integrated approach regardless of the specific causative agent • Develop a preventive vaccine • Develop evidence base for vector control / animal reservoir tools/ strategy and develop protocols for control tailored to sandflies

For more details, please visit:
www.who.int/leishmaniasis/cutaneous_leishmaniasis/en/

No hindrance towards target

Critical action required to reach target

Category and current assessment	Current status	Actions required
Strategy and service delivery		
Operational and normative guidance	• Guidelines for case management are in place • Guidelines for disease surveillance and vector control are due for publication in 2021	• Adopt and implement disease surveillance and national guidelines on vector control
Planning, governance and programme implementation	• National guidelines for case management are in place	• Ensure national guidelines are implemented locally to ensure implementation • Reduce time between onset of symptoms and treatment by implementing activities aimed at early diagnosis and prompt treatment
Monitoring and evaluation	• Most countries use aggregate data that does not allow for in-depth analysis or they struggle to report accurately • Most countries lack comprehensive databases including disease and vector surveillance and control interventions data	• Develop or integrate electronic national databases with patient data for analysis, including data on vector surveillance and control interventions • Ensure CL is made a notifiable disease and decouple roles dedicated to managing cases and reporting • Develop active surveillance systems and decision tools to allow for adaptive interventions • Collect data on mental health impact especially on women and children
Access and logistics	• Several high-burden countries lack the necessary medicines or physical treatment options for case management	• Ensure availability of medicines and/or physical treatment for case management (procured or donated) in all countries through sufficient production and access; undertake registration in endemic countries where this has not been addressed • Improve access to diagnosis and treatment for rural populations
Health care infrastructure and workforce	• There is a shortage of properly trained health personnel in several highly endemic areas • High turnover of health personnel poses a challenge to consistently having trained personnel	• Maintain awareness within health systems and communities to ensure detection and treatment of cases • Adopt innovative mechanisms/approaches to identify and treat patients at the periphery (e.g. through the deployment of mobile teams/use of new technologies)
Enablers		
Advocacy and funding	• Key interventions such as provision of medical supplies or M&E are fully dependent on external donors in several countries	• Increase domestic funding and improve other mechanisms to procure quality-assured medicines • Train community and policy advocates to address lack of awareness/knowledge/investment on the part of all stakeholders
Collaboration and multisectoral action	• Regular coordination meetings take place in-country and regionally but the minutes of meetings could be better disseminated to all stakeholders • Cross-border meetings are not held • Intersectoral coordination is insufficient	• Develop regular coordination mechanism in-country, regional and cross-border and dissemination of minutes to all stakeholders • Integrate CL with other skin NTDs and other sectors
Capacity and awareness building	• Although capacity building is done regularly, the high turnover causes some gaps and some personnel are assigned to tasks for which they are not specifically trained	• Train community health workers and national health personnel for timely and adequate diagnosis and treatment • Raise awareness in communities; reduce stigmatization

Leishmaniasis (visceral)

Visceral leishmaniasis is caused by infection with protozoan *Leishmania* parasites that are transmitted by the bite of female phlebotomine sandflies. It is associated with malnutrition, population displacement, poor housing, a weak immune system and lack of financial resources.

Disease and epidemiology

- Visceral leishmaniasis (VL) is caused by infection with protozoan *Leishmania* parasites that are transmitted by the bite of female phlebotomine sandflies; only 10–25% of those infected develop the disease.
- VL causes irregular bouts of fever, weight loss, enlargement of the spleen and liver and anaemia; if left untreated, VL is fatal in more than 95% of cases. Cases of HIV–*Leishmania* coinfection are more difficult to treat and have poorer prognosis.
- PKDL (post-kala-azar dermal leishmaniasis), a sequel of VL, occurs in 5–15% of patients, who develop a rash up to 2-3 years after treatment for VL; people with PKDL are considered a potential source of VL infection.
- VL is associated with malnutrition, population displacement, poor housing, a weak immune system and lack of financial resources.

Progress against WHO 2020 targets

Impact indicator	2020 target	Current status
Percentage of districts/sub-districts on Indian subcontinent (Nepal, Bangladesh and India) reported as having reached elimination as a public health problem threshold (<1 case/10 000 population)	100%	Bangladesh 100%, India 92%, Nepal 100%[1]
Number of countries validated as having eliminated VL (as a public health problem)	Bangladesh, India and Nepal	0 (validation is required)

Core strategic interventions

Preventive chemotherapy	N/A
WASH	N/A
Vector control	• Insecticide spraying, insecticide-treated nets and environmental management
Veterinary public health	• Strategies such as vaccines are being evaluated in dogs
Case management	Treatment of leishmaniasis depends on several factors including type of disease, concomitant pathologies, parasite species and geographical location. For treatment of *L. infantum* infection, medicines are mainly pentavalent antimonials (PA) and liposomal amphotericin B (LAMB). For *L. donovani* infection PA, LAMB, paromomycin and miltefosine are used for treatment.
Other	• Early diagnosis (rapid diagnostic tests combined with clinical signs) and prompt treatment

Risks that require mitigation

- Outbreaks may overwhelm the capacity of existing health infrastructure/workforce
- Single manufacturers of medicines that are difficult to produce at the required quantity and quality
- Limited availability of treatments for concomitant diseases (e.g. anaemia, malnutrition, coinfections) may increase case-fatality rate

WHO 2030 target, sub-targets and milestones

Indicator	2020 (baseline)	2023	2025	2030
Number of countries validated for elimination as a public health problem (defined as <1% case-fatality rate due to primary visceral leishmaniasis)[2]	0/75 (0%)	32/75 (43%)	56/75 (75%)	64/75 (85%)
Number of countries in SEAR validated for elimination as a public health problem (defined as <1 case (new and relapses) per 10 000 population at district level in Nepal and at sub-district level in Bangladesh and India)	0/3 (0%)	3/3 (100%)	3/3 (100%)	3/3 (100%)
In SEAR, PKDL cases detected (VL post-treatment follow-up 3 years) and treated	Unknown	90%	95%	100%

[1] Assessment of endemicity in some districts in Nepal and sub-districts in Bangladesh has to be carried out; relapses and patients coinfected with HIV and *Leishmania* are not regularly included in the denominator in India, which deflates the prevalence in India compared with other countries

[2] Defined as an immunocompetent patient with no other concomitant condition that does not result from VL (e.g. transplantation, HIV, cancer, immunosuppressive medicines, diabetes, renal failure)

SOURCE: All data sourced from WHO unless otherwise indicated

Burden of disease

13 814
new cases reported in 2019

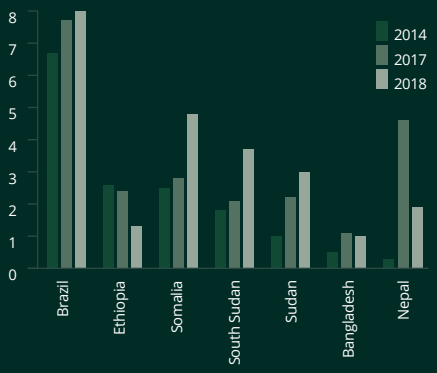
491
deaths reported among patients in seven countries[1] in 2018

About 510 000
DALYs in 2017[2]

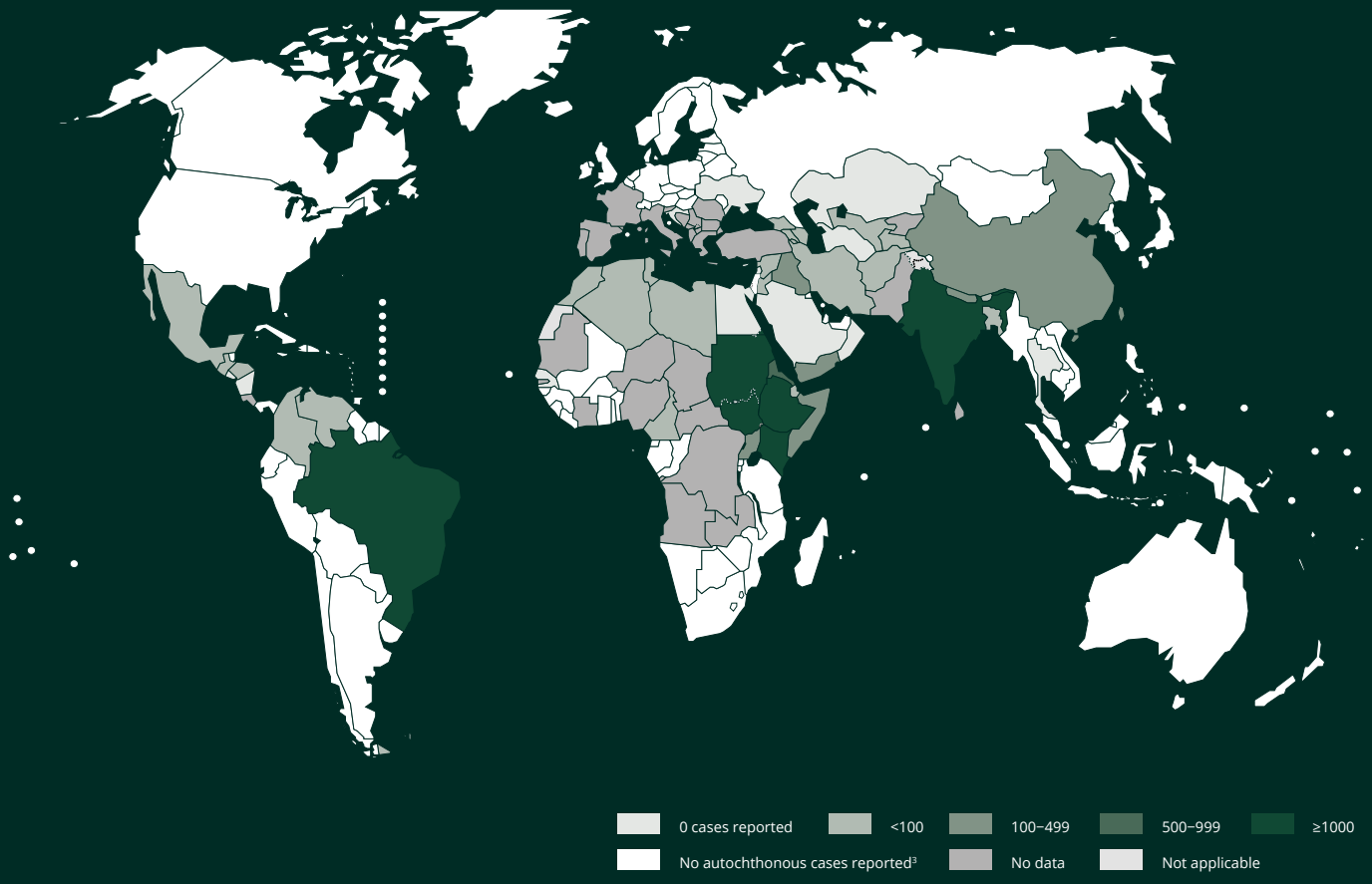
75 countries are endemic for VL (2016).

In 2017, there were about 95% new reported VL cases in seven countries (Brazil, Ethiopia, India, Kenya, Somalia, South Sudan and Sudan); 50–70% of cases are in children.

Case-fatality rate, percentage



Number of VL cases reported, 2019



[1] Bangladesh, Brazil, Ethiopia, Nepal, Somalia, South Sudan and Sudan
[2] Global burden of disease. Seattle (WA): Institute for Health Metrics and Evaluation (http://www.healthdata.org/gbd)
[3] Also referred to as non-endemic country

Leishmaniasis (visceral): assessment of actions required to meet 2030 sub-targets


© WHO/A. Loke

Summary of critical actions to achieve targets

- Enable early detection to ensure prompt treatment, through, for example, active case detection.
- Ensure supply of medicines to ensure prompt access to treatment, especially during outbreaks, and especially for children and young adults, who make up 50–70% of the affected population.
- Develop more effective and user-friendly treatment and diagnostics, especially for East Africa.

Category and current assessment	Current status	Actions required
Technical progress		
Scientific understanding	• Poor understanding of pathogenesis and sources of transmission of VL/PKDL • Few risk maps available • Factors linked to a fatal prognosis have been described in some settings • Complex disease which manifests differently in various geographies and thus the response may need to be adapted to local context	• Improve understanding of parasitic and patient factors linked to a fatal prognosis • Deepen understanding of the vector life cycle for more effective vector control • Map risk by of infection by environmental and human factors • Develop an improved leishmanin skin test • Study the immune response in PKDL versus non-PKDL cases
Diagnostics	• A second-line serological test (DAT) available in case rapid tests showed a negative result in a patient with suspected VL in East Africa • Sensitivity of diagnostic rapid tests may not be adequate for certain regions. PCR available in reference laboratories • No deployable test of cure for VL and PKDL • Lack of VL patient post-treatment follow-up in certain countries	• Develop more effective and user-friendly treatment and diagnostics, especially for East Africa • Devise less invasive and highly specific tests to measure parasite level • Develop less invasive test of cure for PKDL and VL • Design and apply strategies and tools for patient tracking
Effective intervention	• Effective treatment is available and first-line treatment has reduced its duration from 28 days to 1 days in South-East Asia; treatments are costly, access is challenging and requires specific skills to be administered; short-course first-line treatment is not available in East Africa • In addition to the antileishmanials, most patients require antibiotics, therapy against severe malnutrition and in some also blood transfusion • Treatment for immunosuppressed patients (e.g. HIV, cancer) is complex • No vaccine is currently available but candidates are under development • Time between onset of symptoms and treatment is too long (in most cases 1–3 months, and even more so for PKDL) • Lack of evidence that IRS as currently implemented is effective against VL	• Enable early detection to ensure prompt treatment, through, for example, active case detection • Ensure supply of medicines to ensure prompt access to treatment, especially during outbreaks, and especially for children and young adults, who make up 50–70% of the affected population • Develop a preventive vaccine • Develop new, safe, cheaper oral medicines, not requiring cold chain • Assess shorter regimen for first-line treatment in East Africa • Pursue further research on combination therapies to increase the number of treatment options and mitigate the threat of resistance; monitor resistance • Improve management of VL patients with complex co-morbidities • Develop evidence base for vector and zoonotic control tools/ strategy • Reduce time between onset of symptoms and treatment by ensuring prompt diagnosis and early treatment (e.g. through integrated active case-finding with other diseases)

For more details, please visit:
www.who.int/leishmaniasis/visceral_leishmaniasis/en/

No hindrance towards target

Critical action required to reach target

Category and current assessment	Current status	Actions required
Strategy and service delivery		
Operational and normative guidance	• National guidelines for case management are in place • WHO guidelines for disease surveillance and vector control are due to be published in 2021 • Lack of strategy and guidelines for the post-elimination phase	• Ensure new guidelines on surveillance and on vector control are adopted nationally • Develop strategy and guidelines for the post-validation phase of elimination • Update case management guidelines to include co-morbidities
Planning, governance and programme implementation	• National guidelines for VL control are in place but not always implemented. Regional Technical Advisory Groups provide guidance and technical support to countries although meetings are not conducted regularly • Case management guidelines are not systematically implemented • The South-East Asia Region elimination programme is run vertically	• Improve implementation of the case management guidelines • Develop and implement strategies for patient tracking and active case detection • Improve communication between different levels of government and between public and private sectors; include horizontal integration in the health system • Increase frequency of Regional Technical Advisory Group meetings
Monitoring and evaluation	• Lack of a standardized, integrated national and regional information system for all components to be used for patient follow-up, pharmacovigilance and to direct vector control • Entomological surveillance needs additional attention in operationalization and implementation	• Create a standardized integrated national, regional and global information system for all components (disease, pharmacovigilance, vector and animal reservoir) • Conduct periodic independent external reviews; incentives in place to improve implementation and monitoring • Implement independent M&E of indoor residual spraying to ensure quality and measure impact
Access and logistics	• Poor forecasting of supplies and stock management (inventory) of insecticides, diagnostic kits and/or medicines • Procurement policies may affect quality of products purchased • Some medicines are not available and/or affordable • Medicines are available for selected countries through in-kind or cash donations from Gilead Sciences (AmBisome until 2021), Sanofi (cash until 2020) and DFID (cash until 2022 to NGO consortium)	• Develop monthly reporting system to anticipate and avoid stock-outs at health facility level • Ensure accessibility of WHO quality-assured medical supplies through improved country procurement policies and capacity • Improve access to affordable, quality-assured medicines through Innovative funding mechanisms, additional manufacturers and pricing agreements
Health care infrastructure and workforce	• Shortage of properly trained health personnel in several highly endemic areas despite health system reforms (particularly vector biologists/entomologists/ insectaries) • High turnover of health staff as endemic areas are isolated and not preferred by doctors • Current vertical approach is successful but sustainability is required	• Improve deployment of trained health personnel at community level and maintain awareness within health systems and community to ensure detection and treatment of cases • Incentivize sustainable staffing in endemic areas • Ensure sufficient capacity and quality of health facilities
Enablers		
Advocacy and funding	• Key interventions such as provision of medical supplies or M&E are fully dependent on external donors in several countries	• Increase domestic funding to procure quality-assured medical supplies for diagnosis and treatment • Advocate for sustained funding and political commitment for research innovation
Collaboration and multisectoral action	• Regular coordination meetings take place in-country and regionally but the minutes of meetings could be better disseminated to all stakeholders • Cross-border meetings are not held • Intersectoral coordination is insufficient	• Establish regular coordination mechanisms in-country, regional and cross-border and dissemination of minutes to all stakeholders • Include horizontal integration in the health system • Integrate with other diseases control programmes where possible
Capacity and awareness building	• Although capacity building is done regularly, the high turnover causes some gaps and some personnel are assigned to tasks for which they are not specifically trained	• Train community health workers and national health personnel for timely and adequate diagnosis and treatment, reporting and data analysis/interpretation • Train newly deployed health personnel upon arrival to an endemic area on diagnosis and treatment of VL; train health professionals on implementing diagnostic and treatment algorithms in the field • Train entomologists and vector biologists, and fund insectaries with closed, pathogen-free *Phlebotomus argentipes* colonies

Leprosy (Hansen's disease)

Leprosy (Hansen's disease) is a communicable disease caused by the bacillus *Mycobacterium leprae*; the incubation period is long (average of 5 or more years). Untreated leprosy can lead to impairment, disabilities and exclusion.

Disease and epidemiology

- Leprosy (Hansen's disease) is a communicable disease caused by the bacillus *Mycobacterium leprae*; the incubation period is long (average of 5 or more years).
- The disease affects the skin and peripheral nerves and can cause permanent damage to the skin, nerves, face, hands and feet; untreated leprosy can lead to impairment, disabilities and exclusion.
- Infection is likely transmitted by droplets from the nose and mouth during prolonged close contact with untreated leprosy patients.[1]
- Diagnosis of leprosy is mainly clinical.
- Stigma and discrimination play a major role in leprosy; overcoming them is important to reach zero leprosy.
- As with other NTDs, the occurrence of leprosy is often related to poor socioeconomic conditions.

Progress against WHO 2020 targets

Impact indicator	2020 target	Current status (2019)
Rate of grade 2 disabilities in newly detected cases/million	Below 1/million	1.5/million
Rate of new grade 2 disabilities in new paediatric cases	Zero	350[3]
Number of laws allowing discrimination on the basis of leprosy	Zero countries with discriminatory laws	39 discriminatory laws in 17 countries

Core strategic interventions

Preventive chemotherapy	• Post-exposure prophylaxis administered to all contacts of detected and consenting cases (single-dose rifampicin reduces the risk of leprosy among contacts by 60%[2])
WASH	• Access to clean water for wound care and routine self-care including daily soaking of hands and feet to prevent secondary disabilities; ensure hygiene, water and sanitation in health care facilities
Vector control	N/A
Veterinary public health	N/A
Case management	• Early detection of cases is important to contain the spread of infection and prevent disabilities • Multidrug therapy (MDT) lasting 6 to 12 months combines dapsone, rifampicin and clofazimine • Periodic monitoring, detection and treatment of immunological reactions (Type 1 and 2) and nerve damage • Management of adverse drug reactions • Counselling and psychological first aid • Prevention of disability, wound care and management of disability including self-care • Rehabilitation to optimize functioning of the individual in the community
Other	• Early detection by active cases search (including contact screening), and prompt treatment with MDT or post-exposure prophylaxis, is important to contain the spread of infection and prevent disabilities • Interventions addressing stigmatization and discrimination help to reduce their unfavourable consequences and promote inclusion of people affected or impacted into society • Counselling and health education are essential to help leprosy patients, their families and communities to complete treatment and cope with physical and mental consequences

WHO 2030 target, sub-targets and milestones

Indicator	2020 (provisional estimate)	2023	2025	2030
Number of countries with zero new autochthonous leprosy cases	50 (26%)	75 (39%)	95 (49%)	120 (62%)
Annual number of new leprosy cases detected	184 000	148 000	123 500	62 500
Rate (per million population) of new cases with grade 2 disability	1.3	0.92	0.68	0.12
Rate (per million children) of new paediatric cases with leprosy	7.81	5.66	4.24	0.77

[1] Up to 95% of the world's population has some immunity
[2] Single-dose rifampicin as a blanket approach can be used in areas characterized by small populations and hyper transmission
[3] Figure based on incomplete data; estimate including all countries is 400–500 cases
SOURCE: All data sourced from WHO unless otherwise indicated

Burden of disease

202 226
new leprosy patients diagnosed globally in 2019

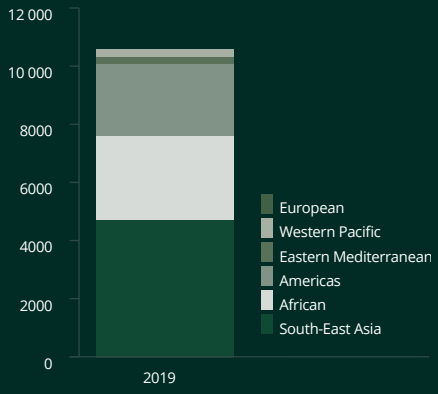
14 981
new paediatric cases diagnosed with leprosy in 2019

10 813
new leprosy patients with grade 2 disability in 2019

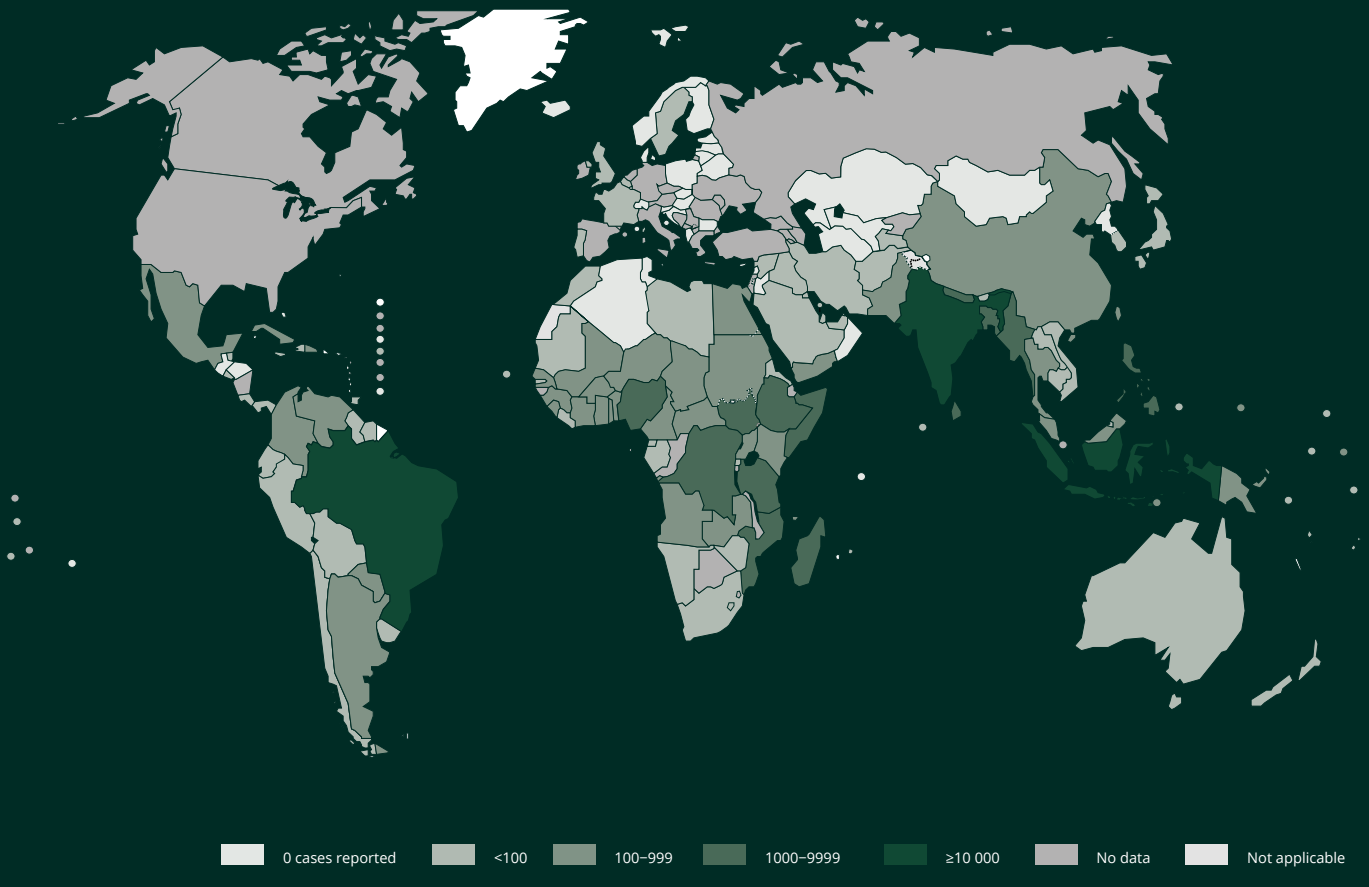
In 2019, leprosy was reported from 119 countries (including imported cases); 80% of the burden is in India, Brazil and Indonesia; 82 countries reported new cases with grade 2 disabilities.

About 30 million: estimated population at risk that needs to be treated with chemoprophylaxis to reach a 70% reduction in incidence by 2030.

Number of new leprosy patients with grade 2 disability (visible deformities) by WHO region, 2019



Number of new cases reported, 2019



Leprosy (Hansen's disease): assessment of actions required to meet 2030 sub-targets


© WHO/Jonathan Perugia

Summary of critical actions to achieve targets

- Update country guidelines to include use of single-dose rifampicin for post-exposure prophylaxis for contacts; advance research on new preventive approaches.
- Continue investment into research for diagnostics for disease and infection; develop surveillance strategies, systems and guidelines for case-finding and treatment; ensure resources for validation.
- Ensure medicines supply, including access to MDT, prophylactic drugs, second-line treatments and medicines to treat reactions; monitor adverse events (pharmacovigilance) and resistance.
- Ensure capacity for case-finding (screening, diagnosis), treatment and surveillance; integrate with primary care, skin and other NTDs, TB and/or other programmes where appropriate.
- Combat stigmatization and discrimination to ensure access to services and inclusion in society; ensure human rights of leprosy-affected persons are respected.

Category and current assessment	Current status	Actions required
Technical progress		
Scientific understanding	• Limited understanding of host, agent, and environmental factors • Mechanism of leprosy reactions not fully understood	• Improve understanding of transmission including transmission from animals to humans • Improve understanding of reaction development
Diagnostics	• Mainly clinical diagnosis • Slit-skin smear available for some cases (limited access) • PCR is useful for diagnosis and surveillance of drug resistance • Serology allows detection of infection but its utility to predict disease progression is limited • Inadequate diagnosis of relapses	• Maintain and strengthen capacity for clinical diagnosis • Maintain access to and capacity for slit-skin smear • Develop a point-of-care test to confirm diagnosis and detect infection in the population at risk • Improve diagnosis of relapses
Effective intervention	• MDT (a combination of rifampicin, dapsone and clofazimine) used as first-line treatment • Single-dose rifampicin to contacts of new patients provides ~60% protection but is not yet globally implemented • Limited information on antimicrobial resistance in leprosy; resistance of first-line medicines appears low • Tools exist to diagnose and manage nerve function impairment	• Explore more effective medicines or combinations of medicines to treat leprosy and leprosy reactions • Conduct research on other preventive approaches (e.g. improved chemotherapy and vaccines) • Swiftly implement new post-exposure chemoprophylaxis (rifampicin) • Expand active case detection in targeted populations • Include diagnosis and treatment of nerve function impairment as routine programme components • Encourage access to WASH

For more details, please visit:
www.who.int/lep/en

No hindrance towards target

Critical action required to reach target

Category and current assessment	Current status	Actions required
Strategy and service delivery		
Operational and normative guidance	• Guidelines for the diagnosis, treatment and prevention of leprosy published (2018) • Guide for surveillance of antimicrobial resistance in leprosy updated (2017) • Global leprosy strategy (2016), operational manual (2016), monitoring and evaluation guide (2017) with strategies identified based on burden of disease • Technical guidance on management of reactions and prevention of disabilities issued (2020)	• Create surveillance strategies and guidelines for varied endemicity settings • Develop validation/verification guidelines • Update country guidelines where appropriate; integrate with WASH, skin NTDs and other programmes
Planning, governance and programme implementation	• Global Partnership for Zero Leprosy (2018) formed as a coalition committed to ending leprosy • Countries are integrating leprosy with skin NTD programmes and into universal health coverage • Ongoing efforts to reduce discrimination including abolition of discriminatory laws • Countries have varying approaches to integration of leprosy	• Development of global leprosy elimination plan • While integration is occurring, ensure leprosy services continue regardless of the platform or approach used • Reduce stigma to improve case-finding and treatment outcomes • Enhance coverage of medical and social rehabilitation • Support countries as they transition to low-burden stages
Monitoring and evaluation	• Roll-out digitalized case-based data management system is ongoing Mapping of cases is being introduced • Integrated programme reviews are occurring, with focus on reviewing progress in reaching the leprosy programme targets • Periodic monitoring for reactions is weak	• Utilize mapping tools and strong surveillance system to ensure detection of sporadic and hidden cases and to monitor progress; improve notification systems • Develop mechanisms to monitor adverse events • Expand monitoring of antimicrobial resistance
Access and logistics	• Novartis donates MDT medicines and clofazimine for reactions; current commitment is until 2020 • Limited availability of second-line medicines • Limited availability of medicines to manage reactions • Assistive devices to improve quality of life of persons affected by disabilities due to leprosy are mostly available but often with poor access	• Bring drug supply chain systems in line with annual leprosy data • Ensure supply of MDT, prophylactic medicines, second-line drugs and drugs to treat leprosy reactions • Ensure availability of wound dressing materials • Ensure access to assistive devices including tailor-made footwear • Ensure unrestricted access to leprosy services for women and girls
Health care infrastructure and workforce	• Weak capacity of health care staff for diagnosis and management of leprosy, reactions, and morbidity and disability prevention • Inadequate capacity of laboratories for diagnostic services • Limited corrective surgery, wound care and disability care for persons with disabilities due to leprosy • Limited access to mental health care services, counselling and psychological support	• Increase capacity for diagnosis, treatment and management • Increase laboratory capacity to support clinical diagnosis and resistance monitoring • Increase capacity to conduct active case-finding and post-exposure prophylaxis • Ensure access to wound care, reconstructive surgery and rehabilitation • Offer counselling and mental health care services
Enablers		
Advocacy and funding	• Despite increased domestic funding in several countries, many countries still depend on external sources of funding • High-level advocacy to sustain interest in elimination of leprosy • Ongoing promotion of interest and investment in research: clinical, basic and operational research	• Advocate with central and local governments to sustain and increase domestic funding even in the post-elimination era • Continue periodic evaluation and high-level advocacy to inform ministries on progress and gaps and to increase engagement • Advocate for policy based on evidence from research • Ensure the human rights of leprosy-affected persons are respected
Collaboration and multisectoral action	• Global Partnership for Zero Leprosy (2018) coordinates and advocates for the leprosy community • Variable collaboration with other ministries (e.g. social welfare, justice, education) • Involvement of organizations of affected persons in many countries • Collaboration with donors and partners in implementing programme • Collaboration with communities to address stigmatization and discrimination • Integration of leprosy programme with other health programmes is ongoing in specific countries	• Closely integrate with universal health coverage/primary health care and community health worker efforts; coordinate with other relevant programmes for case detection, management and surveillance • Optimize collaboration with other relevant sectors to increase reach of services and promote anti-discrimination measures • Optimize involvement of organizations of leprosy affected persons • Engage specialists including dermatologists and reconstructive surgeons • Engage with private sector and traditional healers • Engage with communities to combat stigmatization and discrimination
Capacity and awareness building	• Clinical expertise among frontline health workers is often insufficient • Limited managerial capacity in the context of transition to low burden or decentralization	• Ensure capacity of front-line and referral-level staff in screening, case-finding and treatment • Strengthen the capacity of persons affected by leprosy • Improve capacity to promote social inclusion and access to services • Develop and disseminate e-learning modules • Engage media in awareness raising

Lymphatic filariasis

Lymphatic filariasis is caused by infection with the filarial parasites *Wuchereria bancrofti, Brugia malayi* and *B. timori*. People who are physically impaired by the disease may live for years with disability, stigmatization and mental health co-morbidity.

Disease and epidemiology

- Lymphatic filariasis (LF) is caused by infection with the filarial parasites *Wuchereria bancrofti, Brugia malayi* and *B. timori.*
- Infection is transmitted by mosquito species from the genera *Culex, Anopheles, Mansonia* and *Aedes*.
- Morbidity results from damage to the lymphatic vessels by adult parasite nests and microfilaria released in the blood.
- Impaired lymphatic function leads to chronic, overt manifestations of lymphoedema and hydrocele as well as acute episodes of adenolymphangitis.
- People who are physically impaired by LF may live for years with disability, stigmatization and mental health co-morbidity.

Progress against WHO 2020 targets

Impact indicator	2020 target	Current status
Global elimination as a public health problem (% endemic countries)	100%	24%

Core strategic interventions

Preventive chemotherapy	• Mass drug administration (MDA) stops the spread of infection through WHO-recommended regimens of albendazole, diethylcarbamazine and ivermectin (in different combinations depending on co-endemicity with loaiasis and onchocerciasis and status of MDA programme[1])
WASH	• Hygiene of affected limbs is essential for morbidity management • Sanitation improvements can reduce vector breeding habitats
Vector control	• Vector control to reduce transmission; type of vector control varies based on parasite–vector species and local ecology (e.g. use insecticide-treated nets in areas where *Anopheles* is the primary vector)
Veterinary public health	N/A
Case management	• Essential package of care: - skin care and hygiene, exercises and elevation to prevent severity and progression of lymphoedema - treatment for episodes of adenolymphangitis - surgery to cure hydrocele - antifilarial medicines for treatment of infection - communities to complete treatment and cope with physical and mental consequences
Other	N/A

Risks that require mitigation

- Risk of countries discontinuing their programmes when validated by WHO and potential for resurgence of infection and disease without robust post-validation activities in place
- Systematic non-adherence could impact effective coverage and success of MDA programmes

WHO 2030 target, sub-targets and milestones

Indicator	2020 (provisional estimate)	2023	2025	2030
Number of countries validated for elimination as a public health problem (defined as: - infection sustained below transmission assessment survey thresholds for at least 4 years after stopping MDA; - availability of essential package of care in all areas of known patients)	17/72 (24%)	23/72 (32%)	34/72 (47%)	58/72 (81%)
Number of countries implementing post-MDA or post-validation surveillance	26 (36%)	37 (51%)	40 (56%)	72 (100%)
Population requiring MDA	TBC	330 million	180 million	0

[1] See WHO guideline for specific recommendations for use of IA, IDA and albendazole and frequency
SOURCE: All data sourced from WHO unless otherwise indicated

Burden of disease

About 51.4 million
people infected in 2018[1]

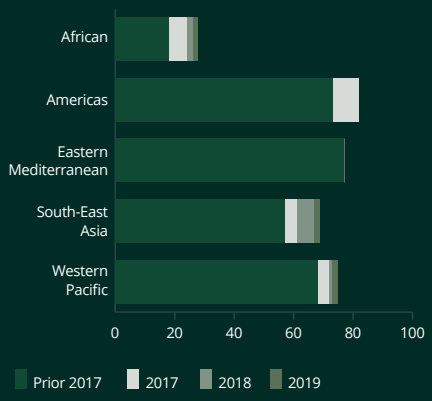
859 million
people living in endemic areas requiring MDA in 2019

About 1.6 million
DALYs in 2019

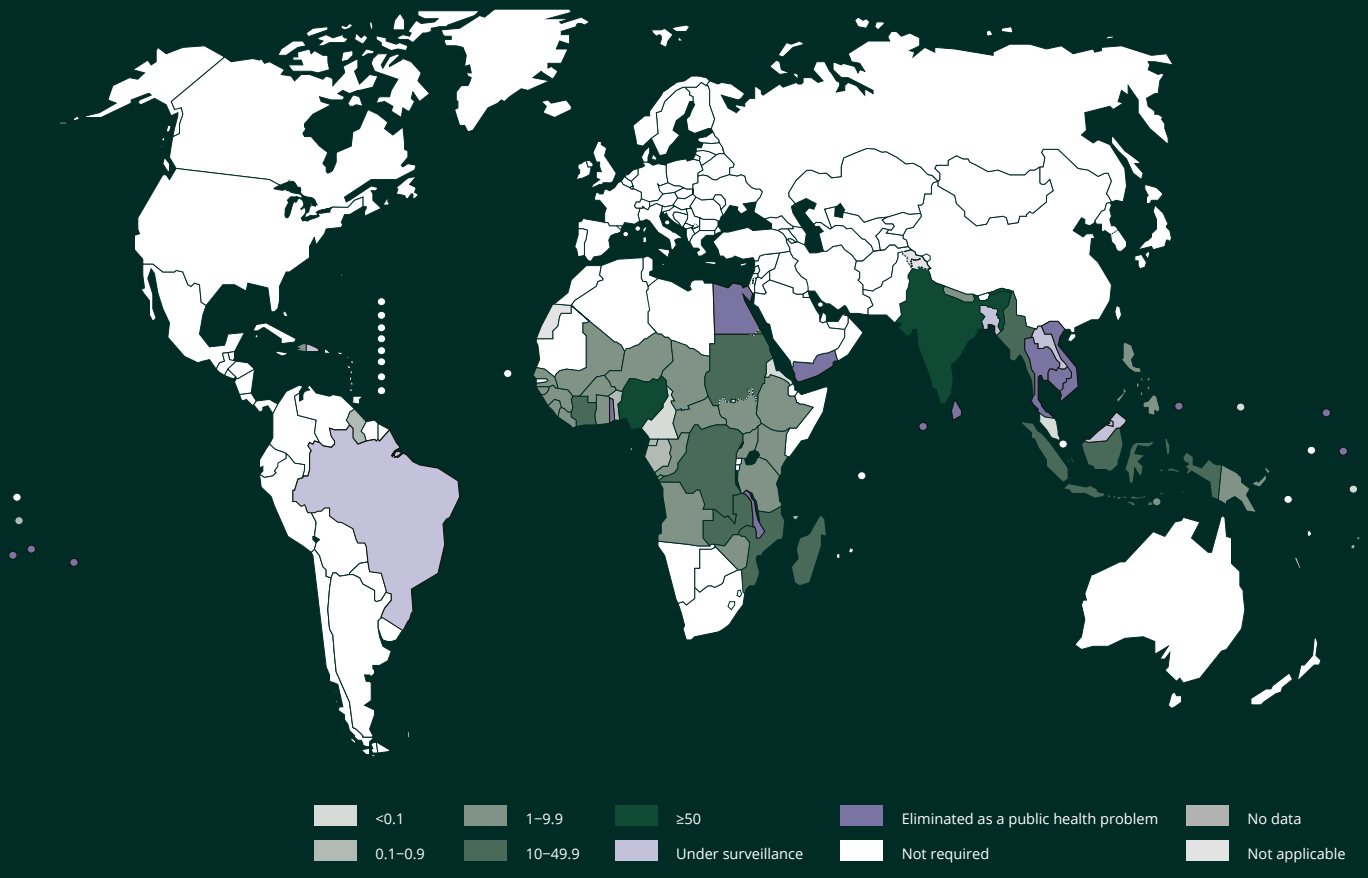
LF is endemic in 72 countries across WHO's African, Americas, Eastern Mediterranean, South-East Asia and Western Pacific regions.

63%, the highest ever global coverage, was achieved in both 2018 and 2019.

Progress in scaling down
Proportion of known endemic implementation units that have completed transmission assessment surveys and no longer require MDA, by WHO region



Number of people requiring preventive chemotherapy (millions), 2019



[1] Local Burden of Disease 2019 Neglected Tropical Disease Collaborators. The global distribution of lymphatic filariasis, 2000–18: a geospatial analysis. Lancet. 2020;8:e1186–94.

Lymphatic filariasis: assessment of actions required to meet 2030 sub-targets

Summary of critical actions to achieve targets

- Start MDA in all endemic districts and strengthen it in all settings; implement improved interventions where appropriate (e.g. three-medicine treatment in settings that qualify; strategies for hotspots).
- Improve capacity for morbidity management and disability prevention (MMDP); prioritize in primary health care and as part of universal health coverage.
- Improve diagnostics, strengthen criteria for stopping MDA and establish surveillance before and after it and in post-validation standards; update guidelines with new tools and strategies as appropriate.

Category and current assessment	Current status	Actions required
Technical progress		
Scientific understanding	• Good understanding of transmission and parasite life cycle • Uncertainty of the impact of zoonotic *B. malayi* on efforts to interrupt transmission	• Continued research around correlation of biological markers of infection and exposure with transmission interruption • Understanding and defining high transmission areas/hotspots
Diagnostics	• Diagnostic tests are available for recommended M&E • *Loa loa* infection can create a false–positive result of the recommended LF antigen test	• Develop and improve diagnostic tests to make stop-IDA decisions, to not cross-react with *L. loa*, that are more field-reliable and for surveillance • Ensure reporting of issues with diagnostic tests for quality monitoring
Effective intervention	• Multiple rounds of annual MDA are effective at reducing infection prevalence below target thresholds with high coverage • The new, triple-therapy (IDA) regimen (ivermectin, diethylcarbamazine and albendazole) is more effective at clearing microfilariae for longer periods of time than two-drug regimens, allowing for fewer rounds of MDA • Bednets can also decrease transmission in some settings • Surgery cures hydrocele • Management of lymphoedema reduces acute attacks	• Interventions are effective; delivery is the challenge *(see next section):* - ensure directly observed therapy and sustain high coverage; - implement IDA and other alternative MDA regimens where warranted - develop strategies to mitigate hotspots of persistent infection and reach missed populations; develop new approaches for urban settings - ensure accessible and inclusive care for patients to reduce stigma and improve mental well-being are part of universal health coverage essential packages

For more details, please visit:
www.who.int/lymphatic_filariasis/disease/en/

No hindrance towards target

Critical action required to reach target

Category and current assessment	Current status	Actions required
Strategy and service delivery		
Operational and normative guidance	• Guidelines are available for MDA, M&E and morbidity management and disability prevention (MMDP) • Specific guidance for post-validation surveillance is needed • Criteria for elimination of transmission are not defined	• Update aide mémoire for morbidity management with new targets; link to universal health coverage • Specify the minimum standards for post-validation surveillance and how to set up and maintain activities • Define criteria to achieve verification of interruption of LF transmission
Planning, governance and programme implementation	• WHO launched the Global Programme to Eliminate Lymphatic Filariasis (GPELF) in 2000, which represents the aggregate effort of all individual stakeholders towards LF elimination • While interventions and guidance exist there is lack of prioritization and high-quality implementation in some countries • When programmes fail to achieve effective coverage, additional rounds of MDA become necessary	• Enhance support to countries to develop/update national NTD strategic plans with alternative MDA strategies and focus on universal health coverage • Encourage cross-country learning to facilitate adoption of best practices • Strengthen political commitment, social mobilization, microplanning, supervision, and adverse event management to ensure quality of MDA • Include patients in planning, policy development and mobilization • Emphasize the importance of post-validation surveillance and patient care
Monitoring and evaluation	• Lack of resources for M&E implementation • Identification of focal, residual infection can be challenging • Limited areas where endemicity was not determined when programmes started • Risk of perverse incentives for health workers and/or programme managers at different levels to report inflated coverage figures or lower prevalence	• Map areas with uncertain occurrence of infection to determine need for MDA • Identify epidemiological settings where current thresholds for stopping MDA may not be sufficient, define new thresholds and develop survey method • Develop alternative M&E strategy for new MDA regimens (i.e. IDA) • Develop new guidance on the standard of surveillance and interventions to be sustained post-MDA and post-validation • Integrate surveillance with NTDs, malaria or others where feasible
Access and logistics	• MSD, GSK and Eisai donate ivermectin, albendazole and diethylcarbamazine; global supply has been adequate to date; IDA will increase global demand of ivermectin; MSD has expanded the Mectizan donation of up to 100 million treatments annually for IDA until 2025 • Challenge to reach remote rural communities, islands, and conflict areas	• Improve planning, request sufficient medicines and diagnostic tests well in advance of programme activities • Make contingency plans for failed impact assessments or emergencies • Make materials for lymphoedema management, hydrocele surgery and medicines to treat acute attacks available through the health system
Health care infrastructure and workforce	• Limited capacity within primary health care to deliver the essential package of care for MMDP • Limited capacity to implement recommended epidemiological surveys	• Include LF morbidity management modules in health workforce training curriculums; Include training on identification of cases and referral • Include LF interventions in essential universal health coverage packages • Ensure availability of functional facilities for MMDP
Enablers		
Advocacy and funding	• The Global Alliance to Eliminate LF supports advocacy/resource mobilization with international and local donors • Limited prioritization and resourcing for LF MDA in some countries • About US$ 15 million in funding is dedicated to R&D for fighting LF[1]	• Advocate the success and cost–effectiveness of interventions to facilitate govt support; Increase domestic funding and prioritization at all levels of government • Encourage sustained commitment post-validation to avoid recrudescence • Resources for improved diagnostics
Collaboration and multisectoral action	• Limited collaboration and coordination with: - environmental sector and vector control - primary health care system - STH/deworming and onchocerciasis elimination programmes - WASH • GPELF partners are active in supporting innovation through basic and operational research	• Integrate vector management and surveillance (where feasible) through the Global Vector Control Response to supplement MDA • Strengthen integrated management of skin NTDs • Create link with Global Surgery Initiatives to ensure availability of surgery in IUs with known hydrocele burden, and with social services, rehabilitation and mental health to build capacity for assessment and referral for psychosocial support • Coordinate with STH and onchocerciasis programmes for evidence-based planning when IUs implement TAS and stop MDA • Expand local partnerships to sustain MMDP and surveillance post-validation
Capacity and awareness building	• Lack of technical and operational capacity in some countries for MDA programme implementation, pre-TAS and TAS implementation and for MMDP • Capacity and delivery of MMDP through primary health care is urgently needed	• Build capacity for high-quality pre-TAS and TAS implementation • Increase awareness and reduce stigma associated with LF in the community • Disseminate MMDP toolkit tools (situation analysis, patient estimation methods, facility inspection, MMDP modules); increase training for providers and patients

[1] Neglected disease research and development: reaching new heights. G-finder report 2018. Surry Hills (NSW): Policy Cures Research; 2018 (https://s3-ap-southeast-2.amazonaws.com/policy-cures-website-assets/app/uploads/2020/01/09162040/2018-G-FINDER-report.pdf)

Mycetoma, chromoblastomycosis and other deep mycoses (mycetoma)

Mycetoma results from infection with several microorganisms of bacterial or fungal origin; based on its causative agent the disease is classified as actinomycetoma (bacterial mycetoma) or eumycetoma (fungal mycetoma).

Disease and epidemiology

- Mycetoma results from infection with several microorganisms of bacterial or fungal origin; based on its causative agent the disease is classified as actinomycetoma (bacterial mycetoma) or eumycetoma (fungal mycetoma).
- The disease causes chronic infection of skin, connective tissue, muscle and bone, eventually leading to deformities and disabilities; it is associated with severe morbidity and increased mortality.
- The mode of transmission is not well understood; the disease affects people of all ages and is more common in men than in women; it affects mainly poor people who work in agriculture (farming and livestock breeding).

Progress against WHO 2020 targets

Not applicable: mycetoma was categorized as a WHO neglected tropical disease only in 2017

Core strategic interventions

Preventive chemotherapy	N/A
WASH	• Personal hygiene and self-care of the affected limbs to avoid secondary infections
Vector control	N/A
Veterinary public health	N/A
Case management	• Treatment depends on the causative organisms: - bacterial: long-term antibiotic combinations - fungal: combined antifungals (mainly itraconazole) and surgery (from local excision to debridement to amputation) • Wound care (cleaning, dressing, disinfecting)
Other	• Wearing protective clothes (long sleeves and trousers) and close-toed shoes

Risks that require mitigation

- In the absence of a topical, painless treatment it is very challenging to get patients with minor lesions to be diagnosed and treated
- Getting medical supplies and devices to treat some 150 000 new cases annually will cost about US$ 7–8 million. Until now, no domestic funding or external donors has committed that level of financial support

WHO 2030 target, sub-targets and milestones

Indicator	2020 (baseline)	2023	2025	2030
Number of countries in which mycetoma, chromoblastomycosis, sporotrichosis and/or paracoccidioidomycosis are included in national control programmes and surveillance systems	1/30 (3%)	4/30 (13%)	8/30 (27%)	15/30 (50%)

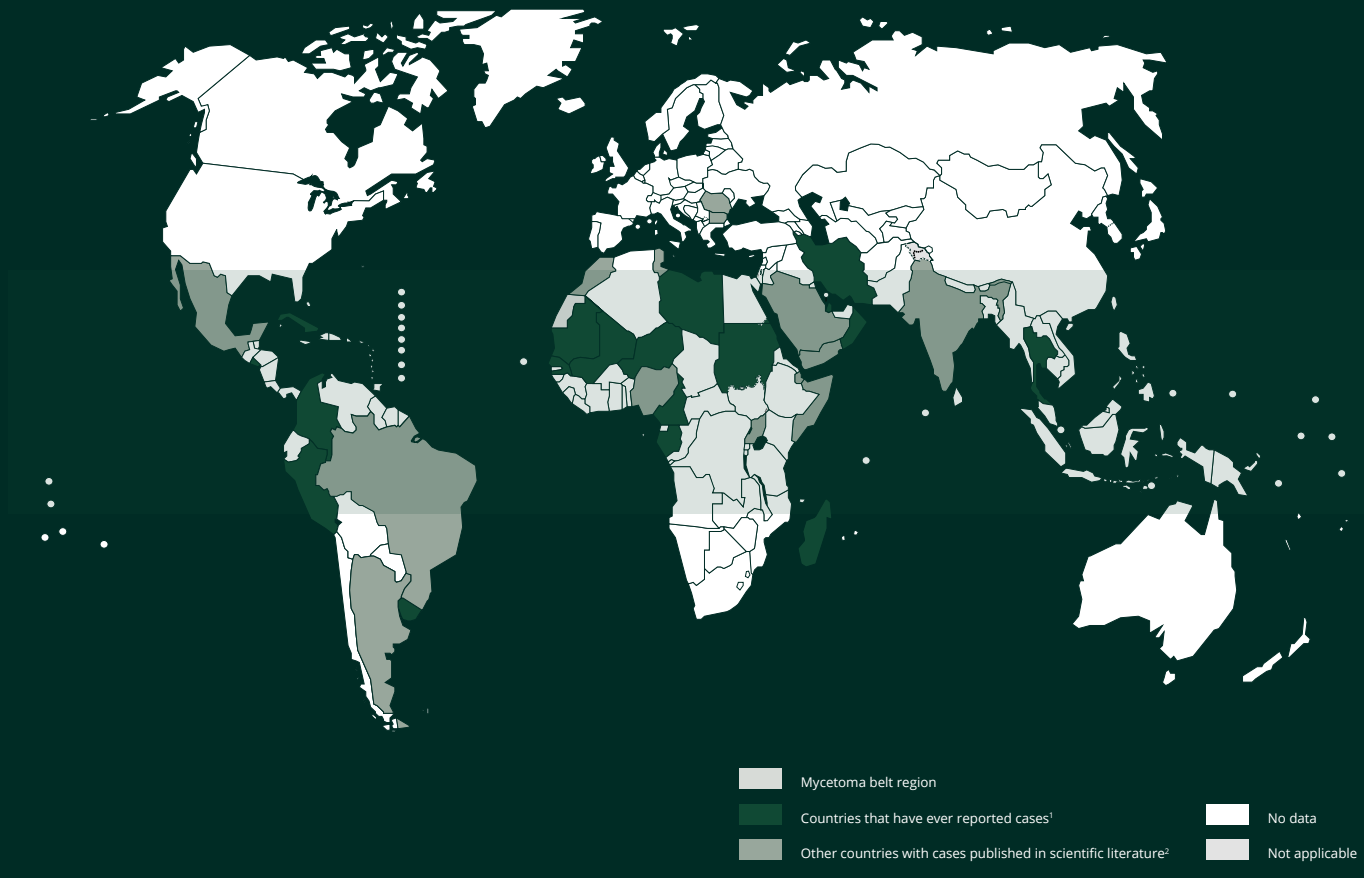
SOURCE: All data sourced from WHO unless otherwise indicated

Burden of disease

Burden of disease is unknown

The causative organisms are distributed worldwide but are endemic in tropical and subtropical areas in Africa, Latin America and Asia, especially where dry climates are prevalent. The most affected countries lie in the "mycetoma belt", between latitudes 30°N and 15°S.

Distribution of mycetoma (reported or published cases)



[1] Results of the 2017 global WHO survey on mycetoma. Wkly Epidemiol Rec. 2018;93(33):417–28.

[2] van de Sande WWJ. Global burden of human mycetoma: a systematic review and meta-analysis. PLoS Negl Trop Dis. 2013;7(11):e2550 and van de Sande W, Fahal A, Ahmed SA, Serrano JA, Bonifaz A, Zijlstra E. Closing the mycetoma knowledge gap. Med Micol. 2018;56(S1):153–64.

Mycetoma: assessment actions of required to meet 2030 sub-targets

Summary of critical actions to achieve targets

- Develop differential rapid diagnostic test and effective treatment, and establish surveillance for case detection and reporting.
- Develop a standardized field manual for diagnosis and treatment, and ensure proper training of health care workers.
- Provide access to affordable diagnosis and treatment.

Category and current assessment	Current status	Actions required
Technical progress		
Scientific understanding	• The mechanism of transmission of mycetoma is not yet fully understood, which has limited the development of a sound preventive strategy • Keeping livestock far from human dwellings may reduce the risk of mycetoma	• Understand transmission pathways and risk factors • Understand pathology to find better cures
Diagnostics	• The diagnosis is based largely on clinical presentation • Causative organisms are identified through microscopy or culture of the grains, or through PCR of biopsies • Imaging techniques can be used to assess the extent of lesions	• Develop differential rapid diagnostic or serological tests to improve early detection at primary health care level • Develop point of care test of cure
Effective intervention	• Health promotion to increase use of protective clothes and wearing of shoes is ongoing • For actinomycetoma, cure rate with antibiotics is 60-90%; for eumycetoma, cure rate with antifungals is about 30% • A clinical trial is investigating safety and efficacy of fosravuconazole for treatment of eumycetoma	• Better document impact of separation of livestock from human dwellings • Develop guidance on how to recognize early stages of disease to ensure early detection • Develop better regimens (shorter duration and higher efficacy)

For more details, please visit:
www.who.int/buruli/mycetoma/en/

No hindrance towards target

Critical action required to reach target

Category and current assessment	Current status	Actions required
Strategy and service delivery		
Operational and normative guidance	• No standardized global guidance on case management, surveillance, prevention and control • Only Jordan has a national guideline on mycetoma management	• Develop global and national guidance on surveillance with standard indicators for M&E, prevention, case management and control • Develop mycetoma grading system to assess clinical stage, for all endemic regions
Planning, governance and programme implementation	• Only Sudan has a national control plan dedicated to mycetoma	• Include mycetoma in strategic plans against NTDs or develop specific plans in endemic countries, within the framework of universal health coverage • Implement active case-finding strategies
Monitoring and evaluation	• No surveillance protocol or system, no standard indicators for M&E	• Integrate data collection with national health information system • Assess burden of mycetoma through integrated surveillance of skin NTDs
Access and logistics	• No medicine donations by manufacturers are currently in place • Countries procure and manage their supply system; availability and affordability of antifungal medicines remain low	• Ensure access to medicines including prequalification, procurement and affordability • Ensure access to medicines also in remote areas
Health care infrastructure and workforce	• Health systems have currently inadequate capacity to provide control services or run control programmes	• Strengthen the health system in the context of universal health coverage to ensure detection, referral and provision of care for mycetoma • Ensure access to health facilities, especially for wound care • Ensure sufficient laboratory capacity for appropriate and timely diagnosis
Enablers		
Advocacy and funding	• Partners and various mycetoma research institutions are exerting maximum efforts to bring attention to mycetoma • Some partners and governments have shown engagement, however, increase is needed	• Ensure and sustain political commitment from endemic countries to mobilize funds and support human resources • Increase partners' commitment to improve access to medicines • Increase country involvement in the informal mycetoma working group • Engage and mobilize community to support programme implementation • Coordinate with WASH stakeholders to ensure that improved water supplies are made available for hygiene in households and health care facilities, and that improvements in hygiene behaviour are sustained
Collaboration and multisectoral action	• Communication and collaboration among stakeholders has been initiated but is still limited • An informal "Global mycetoma working group" has been established to address various aspects of the disease	• Strengthen collaboration among research institutions and drug/diagnostics developers, manufacturers and donors • Develop integrated approach to detection and diagnosis with other skin NTDs
Capacity and awareness building	• Continuing integration across skin NTDs • In many areas, capacity to recognize early stages of disease by peripheral health workers is still limited • In many endemic countries the majority of health workers lack the required knowledge and skill to manage cases	• Train health staff and community health workers across skin NTDs to improve early detection • Improve the diagnostic and managing capacities of health care workers to ensure early detection, improve cure rate and avoid unnecessary amputations

Mycetoma, chromoblastomycosis and other deep mycoses

(chromoblastomycosis and other deep mycoses)

Chromoblastomycosis and other deep mycoses are chronic fungal infections of the skin and subcutaneous tissue caused by a group of fungi. They are transmitted by traumatic inoculation of relevant microorganisms through broken skin.

Disease and epidemiology

- Chromoblastomycosis (CBM) is a chronic fungal infection of the skin and subcutaneous tissue caused by a group of fungi; the three most common species are *Fonsecaea pedrosoi, Cladophialophora carrionii* and *Phialophora verrucose*; other deep skin mycoses affecting vulnerable populations in tropical countries, are paracoccidioidomycosis (PCM, caused by *Paracoccidioides* spp.) and sporotrichosis (ST, caused by *Sporothrix* spp.).
- CBM causes lesions that are clinically polymorphic, the most frequent being nodular, verrucous and tumoral; ST causes skin lesions that are commonly single nodules or ulcers or chains of nodules; PCM is a respiratory infection, although lymph nodes, skin and mucous membrane lesions are the commonest site for dissemination in the bloodstream, which can occur in otherwise healthy people.
- CBM, PCM and ST are transmitted by traumatic inoculation of relevant microorganisms through broken skin.

Progress against WHO 2020 targets

Not applicable: chromoblastomycosis and other deep skin mycoses were categorized as a WHO neglected tropical disease only in 2017

Core strategic interventions

Preventive chemotherapy	N/A
WASH	• Personal hygiene
Vector control	N/A
Veterinary public health	• Pet control for ST to prevent transmission to humans
Case management	• No "gold standard" treatment for CBM exists; treatment options include antifungals (itraconazole), physical therapies, immune adjuvants and surgery for minor lesions • Itraconazole is the treatment of choice for PCM and ST
Other	• Wearing protective clothes and shoes • Minimizing contact with feral cats (ST)

Risks that require mitigation

- In the absence of a topical, painless treatment it is very challenging to get patients with minor lesions to be diagnosed and treated
- Getting medical supplies and devices to treat some 150 000 new cases annually will cost about US$ 7–8 million. Until now, no domestic funding or external donors has committed that level of financial support

SOURCE: All data sourced from WHO unless otherwise indicated

Burden of disease

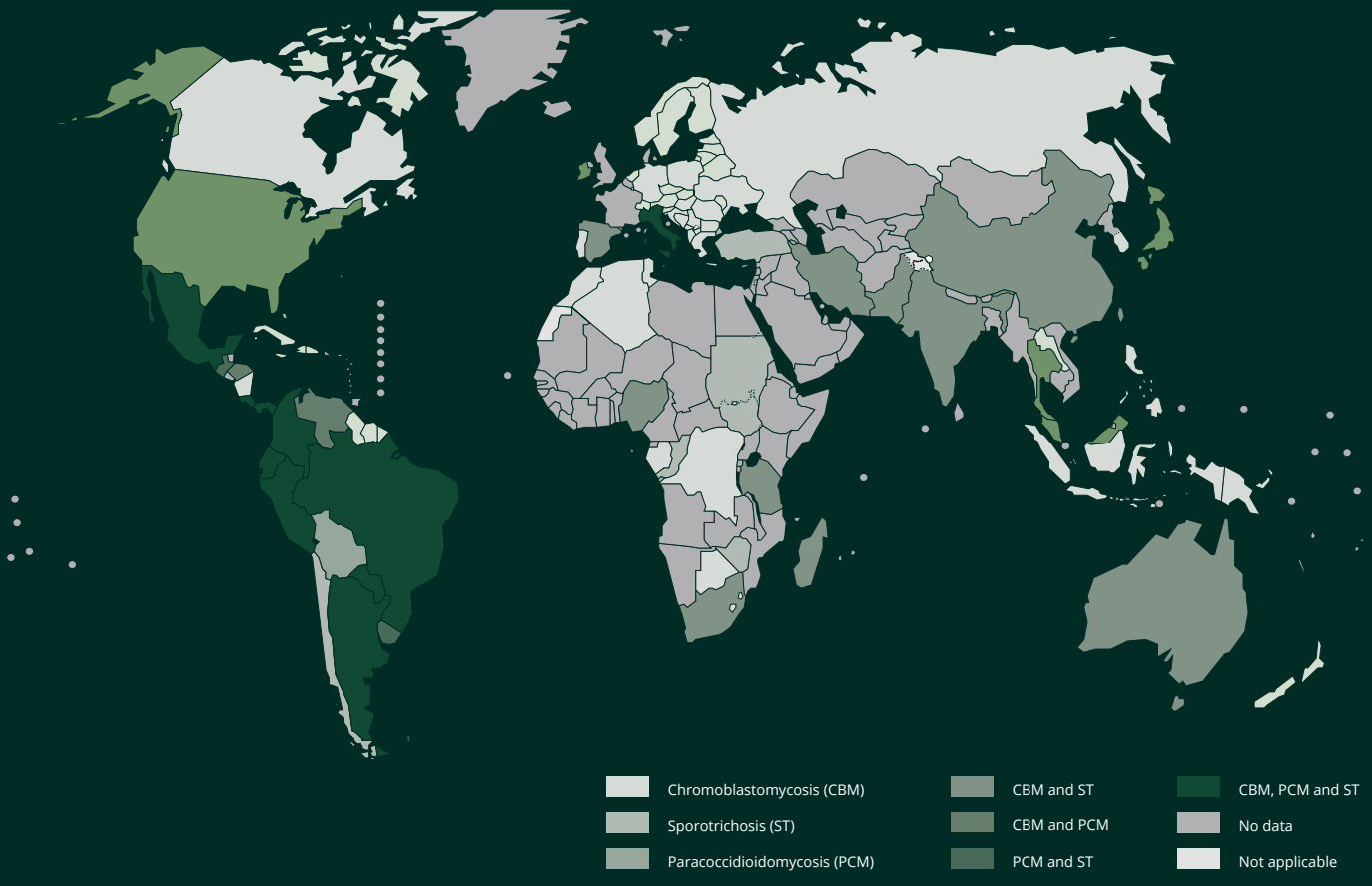
At least 10 000

cases of CBM, PCM and ST recorded globally since the 1940s; the exact burden is unknown and thought to be higher

CBM and ST are distributed globally, while PCM is transmitted only in the Region of the Americas. Overall, the highest burden is found in tropical and subtropical regions of Africa, Asia and Latin America.

Madagascar and Brazil have the highest recorded number of CBM cases.

Distribution of deep mycoses



Chromoblastomycosis: assessment of actions required to meet 2030 sub-targets

Summary of critical actions to achieve targets

- Develop differential rapid diagnostic test and effective treatment, and establish surveillance for case detection and reporting.
- Develop a standardized field manual for diagnosis and treatment, and ensure proper training of health care workers.
- Provide access to affordable diagnosis and treatment.

Category and current assessment	Current status	Actions required
Technical progress		
Scientific understanding	• Transmission pathways of the disease are well understood	• Determine the exact magnitude, trend and distribution of the diseases and associated causative agents
Diagnostics	• Diagnosis based on clinical manifestation, epidemiological link and demonstration of etiological agents from skin scrapings or biopsies • No rapid diagnostic test or any serological test available for CBM and ST • Early detection improves outcomes	• Develop rapid diagnostic or serological tests to improve early detection at primary health care level • Evaluate and standardize sporotrichin skin testing for diagnosis of ST • Facilitate skin scarping and biopsy, and fungal culture and histopathology assessment of deep skin lesions
Effective intervention	• Case management with antifungals and local treatment has low cure rate and requires several months of treatment • Optimal therapy not defined for chromoblastomycosis • Early, presumptive management of suspect cases can prevent progression of disease to advanced stages • Protective shoes, gloves or garments help prevention	• Evaluate effectiveness of itraconazole and other antifungals through prospective studies • Improve therapeutic regimens (shorter duration and increased efficacy) to increase responsiveness to treatment) • Develop innovative preventive tools based on local understanding of the transmission

For more details, please visit:
www.who.int/neglected_diseases/diseases/mycetoma-chromoblastomycosis-deep-mycoses/en/index1.html

No hindrance towards target

Critical action required to reach target

Category and current assessment	Current status	Actions required
Strategy and service delivery		
Operational and normative guidance	• No global guidance on case management, surveillance, prevention and control	• Develop CBM-grading system to assess clinical stage, valid for all endemic regions • Develop field manual on prevention, case management, and surveillance
Planning, governance and programme implementation	• There is no information on any country having a national control plan	• Include CBM, PCM and ST in control programmes against NTDs or communicable diseases in endemic countries
Monitoring and evaluation	• No surveillance protocols, surveillance systems or standard indicators • No M&E system • A reporting system for sporotrichosis in cats exists in Brazil	• Develop a surveillance guide with standard indicators • Establish surveillance system for active case detection • Establish M&E system or integrate with national health information system
Access and logistics	• No donation of medicines • Countries procure and manage their supply system; availability and affordability of antifungal medicines remain low	• Ensure access to affordable and quality-assured itraconazole • Provide affordable skin biopsy and sample processing for diagnosis
Health care infrastructure and workforce	• Health systems have currently inadequate capacity to provide control services or run control programmes	• Strengthen the health system to provide care within context of universal health coverage • Ensure sufficient laboratory capacity for appropriate and timely diagnosis
Enablers		
Advocacy and funding	• Some organization and groups including the Global Action Fund for Fungal Infections (GAFFI), the International League of Dermatological Societies (ILDS) and the International Society for Human and Animal Mycology (ISHAM) are making advocacy, awareness-raising and capacity-building efforts	• Ensure political commitment from endemic countries and partners to mobilize funds and human resources • Engage community and mobilize support for programme implementation
Collaboration and multisectoral action	• Collaboration with various professional societies, nongovernmental organizations, research and academic institutes initiated • GAFFI, ILDS, ISHAM and others are making significant efforts in advocacy, capacity-building, policy and strategies for control of skin diseases	• Initiate collaboration with various research institutes, medicines and diagnostics developers, manufacturers and donors to improve access to diagnosis and treatment in all endemic countries • Coordinate with WASH stakeholders to ensure improved water supplies and soap availability in households and health care facilities
Capacity and awareness building	• Most health workers in endemic areas may not be able to recognize most of the deep mycoses at early stage and lack the required knowledge and skills to manage cases • Online course exists for microscopy and histopathology • No standard and structured training programmes for health professionals	• Train health professionals and community health workers across priority skin NTDs to improve early detection based on local epidemiological contexts • Improve the diagnostic (e.g. skin biopsy and histopathology) and managing capacities of health care system in the endemic regions of the countries

Onchocerciasis

Onchocerciasis (river blindness) is a parasitic disease caused by infection with the worm *Onchocerca volvulus*. The disease causes severe itching, disfiguring skin conditions and visual impairment and can result in permanent blindness.

Disease and epidemiology

- Onchocerciasis (river blindness) is a parasitic disease caused by infection with the worm *Onchocerca volvulus*.
- The disease causes severe itching, disfiguring skin conditions and visual impairment and can result in permanent blindness.
- Human infection is transmitted through repeated bites of infective *Simulium* blackflies, which breed mostly along fast-flowing water.
- By 2019, 1.8 million people no longer required treatment (post-treatment surveillance completed) and WHO had verified four countries for elimination of transmission.

Progress against WHO 2020 targets

Impact indicator	2020 target	Current status
Number of countries eliminating transmission – Region of the Americas	6 countries by 2022	4
Elimination of transmission in Yemen	Achieved by 2015	Not achieved
Elimination of transmission in Africa where possible	Undefined	0

Core strategic interventions

Preventive chemotherapy	• Once to twice yearly community-based mass drug administration (MDA) of ivermectin with adequate coverage for 10 or more years; may further increase frequency in selected circumstances
WASH	N/A
Vector control	• Environmentally safe spraying of insecticides at black fly habitats and larval breeding sites, new strategy of removal of trailing vegetation in rivers under development
Veterinary public health	N/A
Case management	• Ivermectin treatment to manage symptoms; doxycycline for cure in appropriate circumstances; management of visual impairments
Other	• Where loaiasis is co-endemic, systems to manage serious adverse events must be in place; new strategies against loaiasis are being developed

Risks that require mitigation

- Goal may not be feasible with current tools in hyper- and holoendemic areas
- Cost of mapping and strategies against loaiasis may be prohibitive
- Risk resurgence if MDA is stopped prematurely

WHO 2030 target, sub-targets and milestones

Indicator	2020 (baseline)	2023	2025	2030
Number of countries verified for interruption of transmission	4 (12%)	5 (13%)	8 (21%)	12 (31%)
Number of countries that stopped MDA for ≥1 focus	9	22	24	34
Number of countries that stopped MDA for ≥50% of population	6	10	25	>16
Number of countries that stopped MDA for 100% of population	4	6	10	>12

SOURCE: All data sourced from WHO unless otherwise indicated

Burden of disease

About 21 million
existing cases estimated in 2017[1]

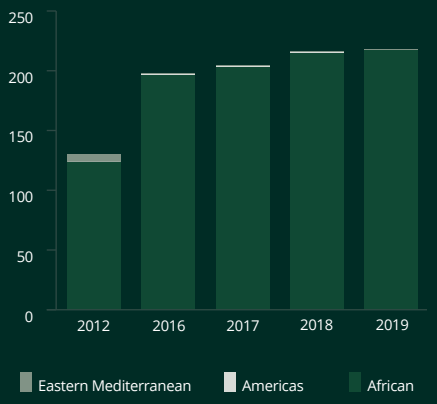
218 million
population at risk in 2019

About 1.3 million
DALYs lost in 2017[2]

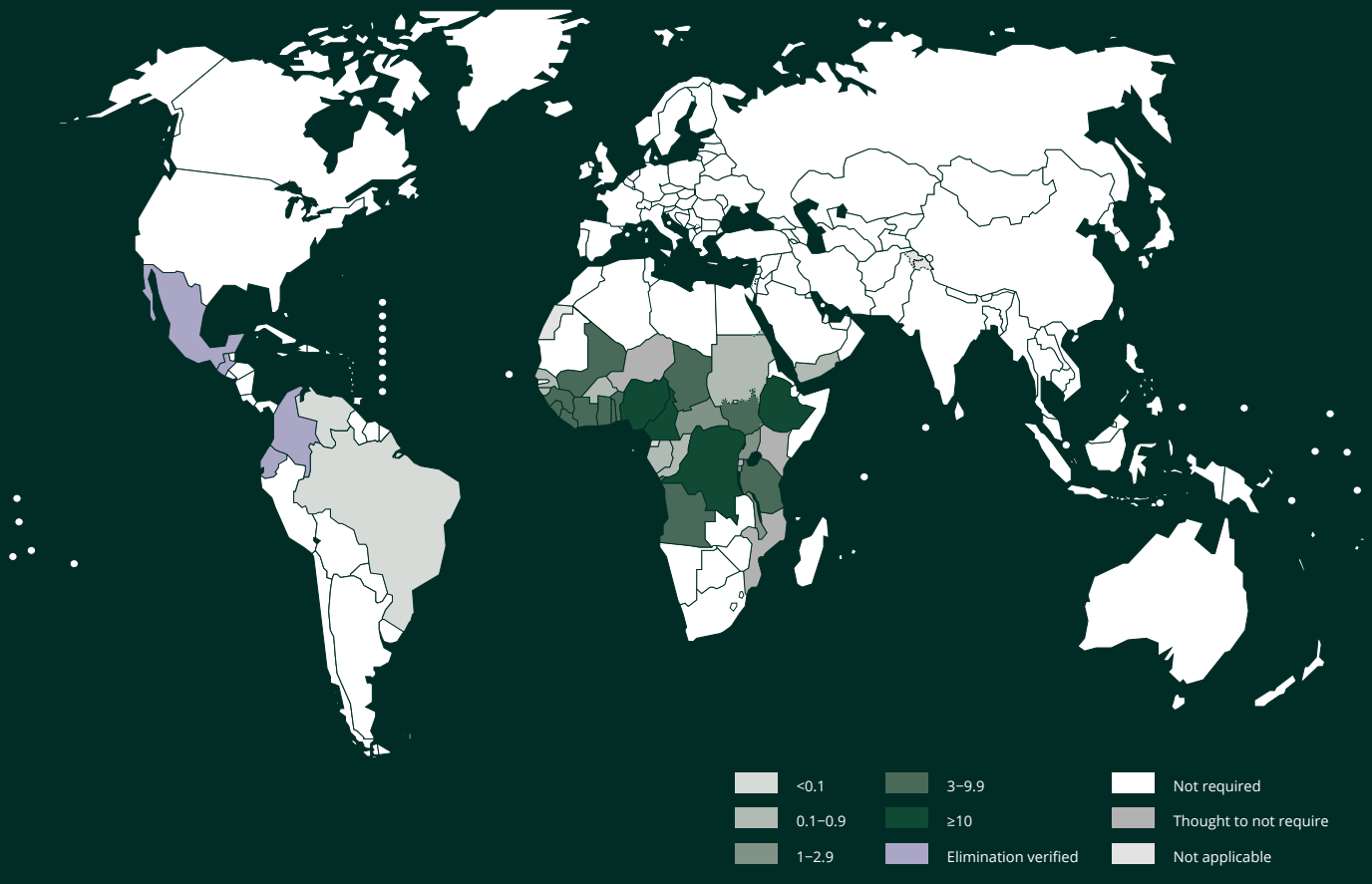
Significant progress has been made to date. In 2019, almost 154 million people living in areas at risk of onchocerciasis received treatment as compared with 46 million in 2005; more than 27 million people are no longer infected.

The increase in the population at risk from 2012 to 2019 is due mainly to additional disease mapping.[3]

Population requiring preventive chemotherapy by WHO region, million



Number of people requiring preventive chemotherapy (millions), 2019



[1] Global burden of disease. Seattle (WA): Institute for Health Metrics and Evaluation (http://www.healthdata.org/gbd)
[2] GBD 2017 DALYs and HALE Collaborators. Global, regional, and national disability-adjusted life-adjusted life-years (DALYs). Lancet. 2018;392:1859–922
[3] In 2013, South Sudan (5.7 million cases) was transferred from the WHO Eastern Mediterranean Region to the WHO African Region

Onchocerciasis: assessment of actions required to meet 2030 sub-targets


© WHO/Olivier Asselin

Summary of critical actions to achieve targets

- Start MDA in all endemic areas after mapping, improve delivery of current MDA programmes, and implement alternative strategies where appropriate.
- Develop improved diagnostics to facilitate mapping and decisions to eliminate transmission; develop improved diagnostic strategy for loaiasis; increase programme capacity to perform entomological and laboratory diagnostics.
- Develop a macrofilaricide and diagnostic or other elimination strategies to accelerate interruption of transmission; design a case management strategy; develop and implement elimination strategies for areas where loaiasis is co-endemic but onchocerciasis is hypoendemic.

Category and current assessment	Current status	Actions required
Technical progress		
Scientific understanding	• Good understanding of the transmission and parasite life cycle, but limited on serological indicator of interruption of transmission	• Develop understanding of transmission and transmission thresholds in hypoendemic areas to inform guidelines • Monitor and research how environmental changes may affect transmission
Diagnostics	• Serological and molecular tests are available but could be improved	• Continue to evaluate performance of diagnostics in development • Develop target product profiles for new diagnostics designed for programmes' needs • Devise a confirmatory diagnostic(s) for use in low-prevalence settings that could assist with mapping, MDA stopping decisions and surveillance • Prepare a diagnostic strategy for identification of *Loa loa* infection intensity • Relate prevalence with serology to vector transmission indices
Effective intervention	• Once-to-twice-yearly ivermectin MDA is effective at breaking transmission but takes 10–15 years or more • Ivermectin cannot be used safely in MDA settings in which loaiasis is hypoendemic and onchocerciasis is co-endemic, thereby limiting elimination progress • Vector control when twice annual MDA is insufficient	• Develop a macrofilaricide or other treatment strategies to accelerate interruption of transmission; new treatment strategies are particularly needed for loaiasis co-endemic areas (e.g. macrofilaricide or screening for *Loa loa*) • Develop better understanding of when to use quarterly MDA • Improve recommendations about when to use vector control • Demonstrate effectiveness and safety of moxidectin in children and in programmatic setting (moxidectin could replace the need for semiannual ivermectin MDA)

For more details, please visit:
www.who.int/onchocerciasis/en/

No hindrance towards target

Critical action required to reach target

Category and current assessment	Current status	Actions required
Strategy and service delivery		
Operational and normative guidance	• Guidelines for stopping MDA and post-treatment surveillance are available • Better guidance for steps required to achieve interruption of transmission is needed • Serological threshold for stopping MDA may be too low	• Provide clear guidance on strategies in areas in which onchocerciasis is hypoendemic and loaiasis is co-endemic • Update entomological guidance for verification and continued surveillance • Update guidelines and manuals for programme managers with strategies (including frequency and vector control) for elimination and elimination verification process • Implement research to validate higher threshold
Planning, governance and programme implementation	• Good coordination among stakeholders through NTD NDGO network, Expanded Special Project for Elimination of NTDs (ESPEN) and the Onchocerciasis Elimination Program for the Americas (OEPA) • National onchocerciasis elimination committees and national laboratories are needed • Reported coverage has increased	• Include onchocerciasis in country packages of universal health coverage • Scale up national onchocerciasis committees or similar mechanisms in countries where these are currently not present • Improve the quality of MDA delivery to increase coverage and increase MDA frequency to shorten timelines • Make use of currently available coverage tools that help determine changes to interventions (e.g. social mobilization) • Establish national laboratories able to meet quality assurance standards and to supply national committees with valid and timely results for decisions making
Monitoring and evaluation	• Mapping of hypoendemic areas in Africa is incomplete • M&E strategies are being updated for current tools • Strategy for post-elimination surveillance needs to be developed	• Design operationally feasible elimination mapping; complete onchocerciasis elimination mapping • Develop and disseminate protocols for standardization of mapping and stopping evaluations to ensure consistency of data • Improve mapping and sampling in *Loa loa* co-endemic areas to allow for granular treatment approaches • Close data gaps in hypoendemic areas through development of more easy-to-use tools • Update M&E guidance as new tools are developed and threshold revised
Access and logistics	• Strong supply for medications donated by Merck through the Mectizan Donation Program • Ensuring supply of diagnostics in-country is challenging	• Develop a plan to facilitate the addition of new medications to the supply chain as they become available • Improve diagnostics planning and logistics to obtain needed diagnostics available now and in the future
Health care infrastructure and workforce	• Not all countries have in-country capacity to perform laboratory testing in quality assured manner	• Continue to build in-country capacity for the performance of quality assured diagnostics
Enablers		
Advocacy and funding	• Most programmes are dependent on external donor support • Country ownership of and investment in their programmes is variable	• Develop advocacy plan and continue advocacy to ensure donor support and increase domestic financing to ensure sustainability • Develop an onchocerciasis partner forum to accelerate advocacy and funding • Ensure interventions are cost–effective and secure funding as needed
Collaboration and multisectoral action	• Coordination platforms include Onchocerciasis Control Programme (closed), African Programme for Onchocerciasis Control (closed), ESPEN, OEPA and onchocerciasis NGDO Coordination Group • Multiple NGOs, academics and donors support innovation with OEPA and ESPEN	• Strengthen integrated management of skin NTDs and use common indicators • Increase collaboration with ecology and vector management
Capacity and awareness building	• Many countries need assay specific training, quality assurance and logistical support to perform needed laboratory-based tests • Shortage of entomological capacity	• Continue efforts to develop sustainable entomological and laboratory capacity • Improve training programmes on how to implement in hard to reach areas

Rabies

Rabies is caused by infection with the rabies virus and other lyssaviruses. Infection causes progressive and fatal inflammation of the brain and spinal cord. About 40% of rabies victims are children aged under 15 years.

Disease and epidemiology

- Rabies is caused by infection with the rabies virus and other lyssaviruses
- Infection causes progressive and fatal inflammation of the brain and spinal cord; there are two clinical presentations of rabies:
  - furious rabies (80% of cases) in which hyperactivity and excitable behaviour are exhibited and death occurs within a few days; and
  - paralytic rabies (20% of cases, often misdiagnosed) in which the muscles gradually become paralysed and eventual coma and death result.
- The rabies virus is transmitted to humans mainly through the bites of domestic dogs (up to 99%) but also by various other mammals (such as bats).
- About 40% of rabies victims are children aged under 15 years.

Progress against WHO 2020 targets

Impact indicator	2020 target	Current status
Regional elimination[1]	Latin America (2015)	Postponed
	South-East Asia (2020)	To be shifted to 2030
	Western Pacific (2020)	To be shifted to 2030

Core strategic interventions

Preventive chemotherapy	N/A
WASH	• Access to water for wound washing (e.g. with soap and water) post-exposure can significantly decrease the viral load in the wound
Vector control	N/A
Veterinary public health	• Mass vaccination of dogs (vaccinating 70% of dog populations in high-risk areas) is a cost–effective and recognized measure to break the rabies transmission cycle • Dog population management
Case management	• Post-exposure prophylaxis (PEP) with the rabies vaccine as well as rabies immunoglobulin for category III exposures is needed immediately after exposure to a potentially rabid animal • Thorough wound washing is essential
Other	• Timely diagnosis and accurate risk assessment of wound and bite circumstances are important • Education is crucial, especially for children, to prevent deaths from rabies, e.g. how to avoid being bitten and what to do in the event of a bite • Pre-exposure vaccination is recommended for people at high risk of exposure to the rabies virus, e.g. laboratory staff working with the rabies virus, veterinarians and animal handlers

WHO 2030 target, sub-targets and milestones

Indicator	2020 (provisional estimate)	2023	2025	2030
Number of countries having achieved zero human deaths from rabies	80/169 (47%)	89/169 (53%)	113/169 (67%)	155/169 (92%)
Number of countries having reduced mortality due to dog-transmitted human rabies by 50%	100/169 (59%)	134/169 (79%)	160/169 (95%)	169/169 (100%)
Number of countries having reached 70% vaccination coverage of dogs in high-risk areas	63/169 (37%)	96/169 (57%)	116/169 (67%)	154/169 (91%)

[1] No targets for 2020 were set for the African, Eastern Mediterranean and Western Pacific regions
SOURCE: All data sourced from WHO (e.g. Global Health Estimates) unless otherwise indicated

Burden of disease

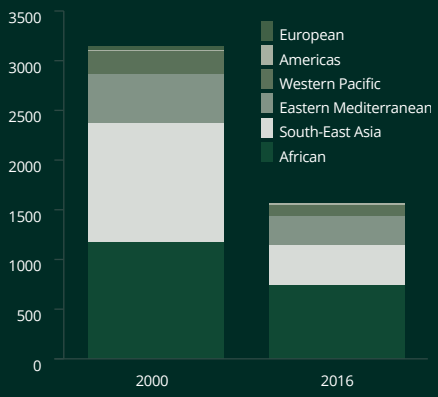
About 29 million
people receiving post-exposure prophylaxis in 2015[1]

About 59 000
deaths in 2015

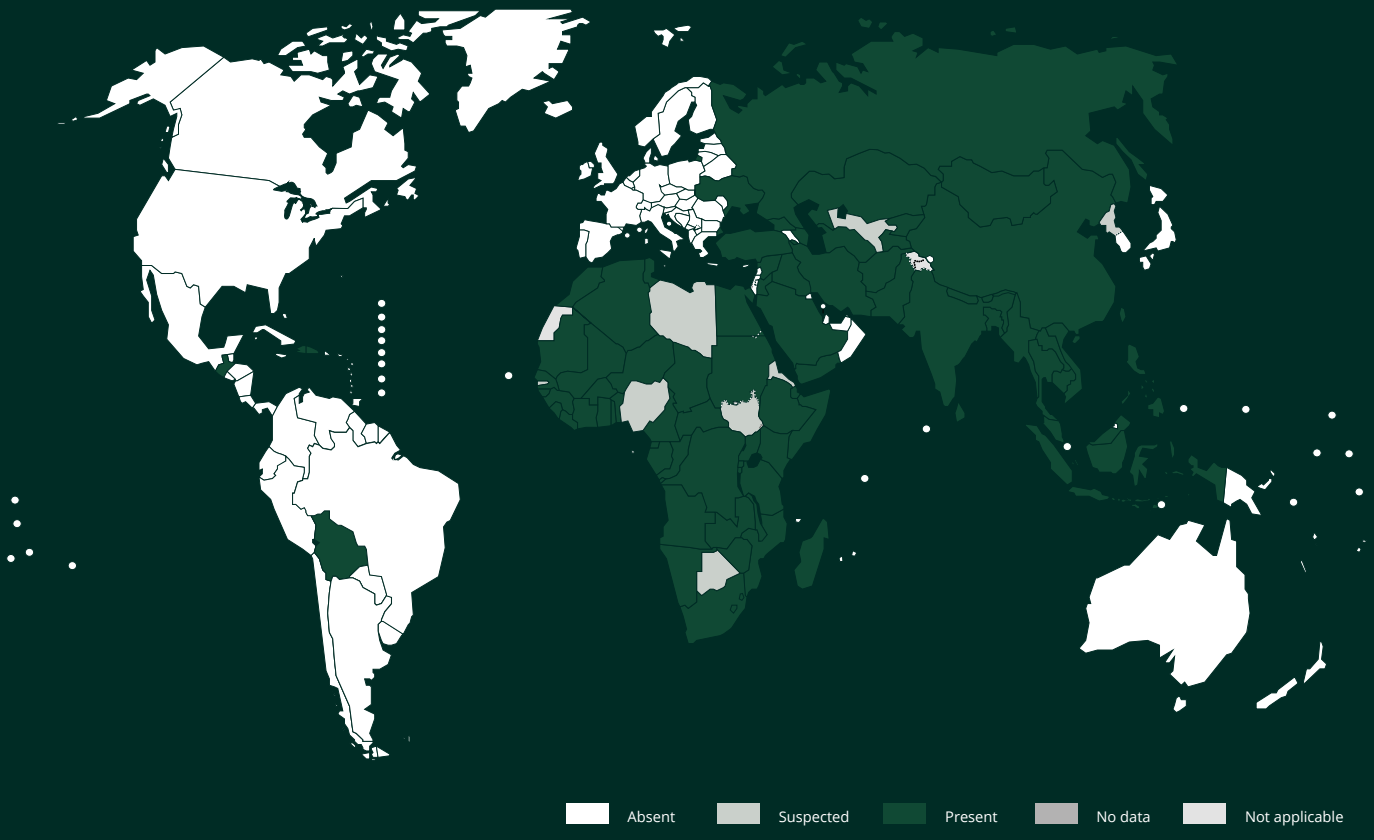
About 1.6 million
DALYs in 2016[2]

Dog-transmitted human rabies is present or suspected in 89 countries, mostly in Africa and Asia.

DALYs per region, thousands[3]



Endemicity of dog-transmitted human rabies, 2019



[1] Data from Hampson et al., 2015 (Estimating the global burden of endemic canine rabies)
[2] Estimated DALYs for rabies from WHO Global Burden of Disease (2016) is likely underestimated: another estimate of the annual DALYs caused by canine rabies is 3.7 million (see: Hampson K, Coudeville L, Lembo T, Sambo M, Kieffer A, Attlan M, et al. Estimating the global burden of endemic canine rabies. PLOS Negl Trop Dis. 2015;9(5):e0003786. doi:10.1371/journal.pntd.0003786
[3] Change in estimated DALYs could result from the different methods used to estimate DALYs between 2000 and 2016 and to underreporting

Rabies: assessment of actions required to meet 2030 sub-targets


© WHO/Budi Chandra

Summary of critical actions to achieve targets

- Improve forecasting of demand for rabies vaccine and immunoglobulin to ensure adequate supply in facilities, and develop innovative approaches for delivery to ensure timely access to post-exposure prophylaxis and dog vaccination.
- Build national capacity of health workers (e.g. rabies exposure assessment, diagnosis, administration of post-exposure prophylaxis) and for dog management (e.g. mass dog vaccination).
- Strengthen and institutionalize surveillance for rabies; improve country compliance with reporting to ensure data availability.

Category and current assessment	Current status	Actions required
Technical progress		
Scientific understanding	• Good understanding of disease epidemiology and pathology • Gavi learning agenda is driving research progress	• No hindrance towards target
Diagnostics	• Well-established diagnostic protocols are available • Comparative assessments of various diagnostics are ongoing	• Develop a field-deployable antemortem diagnostic test for use in primary health care facilities • Validate the postmortem diagnosis of rabies in animals (e.g. non-invasive sample collection combined with rapid diagnostic test) to improve post-bite treatment
Effective intervention	• Effective preventive and post-exposure vaccines are available	• Develop a monoclonal antibody product as an alternative to RIG • Adapt mass dog vaccination methods to the setting, e.g. develop and license an oral vaccine for dogs

For more details, please visit:
www.who.int/rabies/en/

No hindrance towards target

Critical action required to reach target

Category and current assessment	Current status	Actions required
Strategy and service delivery		
Operational and normative guidance	• Several guidelines are in place, including: - WHO TRS No. 1012 guidance on rabies prevention, vaccines, laboratory diagnostics and case management - OIE standards on animal rabies prevention/control including e.g. mass dog vaccination • In 2018, the United Against Rabies collaboration published a global strategic plan for rabies: "Zero by 30"	• Continue dissemination of guidance in-country • Continue building implementation research on how to improve access operationally to human PEP and scale up dog vaccination campaigns
Planning, governance and programme implementation	• The United Against Rabies "Zero by 30" global strategy outlines an operational plan on how to achieve zero deaths by 2030	• Improve national coordination of relevant activities, including clearly defining the funding source behind each activity • Strengthen the rabies control framework by the WHO resolution taking into account the One Health approach
Monitoring and evaluation	• WIDP module on rabies has been finalized • OIE World Animal Health Information System (WAHIS) for animal rabies reporting is in place	• Improve data availability and quality nationally and subnationally to ensure compliance with reporting • Strengthen surveillance e.g. introduce indicator of suspicious death after bite, develop process for collecting samples
Access and logistics	• There is adequate global production capacity for rabies vaccines • Demand forecasting and management of vaccines is weak, leading to stock-outs • The OIE rabies Vaccine Bank is operational, though with limited capacity	• Ensure availability of quality-assured human and animal vaccines, e.g. collect data on vaccine/RIG use to forecast demand and inform the vaccine procurement system • Strengthen anti-rabies services with EPI vaccines (same cold chain, stock management) • Develop innovative approaches to improve delivery systems and ensure timely access to PEP and dog vaccinations • Improve supply of biologicals
Health care infrastructure and workforce	• Health care infrastructure and facilities are typically weak in places where rabies tends to occur (e.g. rural villages)	• Ensure health facility equipment for wound washing and vaccine storage • Ensure capacity and capability for rapid and accurate rabies diagnosis through accessible, equipped laboratories and trained personnel • Develop anti-rabies services with trained staff for intradermal vaccine administration and wound infiltration with RIG
Enablers		
Advocacy and funding	• United Against Rabies donor landscaping is ongoing • Strong investment by Gavi in rabies vaccines • World Rabies Day helps raise awareness	• Secure complementary funding for mass dog vaccinations to support the Gavi initiative • Strengthen country-level commitment and political will to rabies; ensure demand from communities for rabies services is recognized
Collaboration and multisectoral action	• A One Health approach exists (involving WHO, OIE, FAO and GARC) through the Uniting Against Rabies collaboration • The OIE Rabies Vaccine Bank supports the implementation of dog vaccination campaigns • United Against Rabies (WHO, FAO, OIE, GARC) provides the umbrella for a wide coalition including countries, nongovernmental organizations, private sector and other international organizations	• Support countries in developing multisectoral plans for rabies and further inter-ministerial collaboration • Strengthen the One Health approach e.g. build a platform for data exchange between WHO and OIE on rabies • Combine rabies interventions with those of other diseases (e.g. leishmaniasis, echinococcosis, dracunculiasis) for synergies (e.g. cost) • Increase collaboration with civil society and private sector (e.g. to enhance services or support advocacy)
Capacity and awareness building	• Effective interventions are available but capacity-building is required in-country for health workers and particularly for managing dogs	• Train health workers on rabies exposure assessment and diagnosis, administration of PEP, prevention of unnecessary use of PEP • Expand the capacity of veterinary training and services for dog populations (not just livestock), especially for mass dog vaccination • Enhance information, education and communication to prevent bites by dogs, improve care-seeking and manage stray dog populations

Scabies and other ectoparasitoses

Scabies and other ectoparasitoses are caused by infection with a microscopic mite *Sarcoptes scabiei var hominis*. The female mite burrows into the skin and lays eggs, triggering an immune response that causes intense itching and rash.

Disease and epidemiology

- Scabies and other ectoparasitoses are caused by infection with a microscopic mite *Sarcoptes scabiei var hominis*.
- Human infection is transmitted through close contact with the skin, which the female mite burrows into and lays eggs, triggering an immune response that causes intense itching and rash.
- Bacterial infections can complicate the disease, leading to serious consequences such as severe soft tissue infections, septicaemia, kidney disease and, possibly, rheumatic heart disease.

Progress against WHO 2020 targets

Not applicable: scabies and other ectoparasitoses were categorized as a WHO neglected tropical disease only in 2017

Core strategic interventions

Preventive chemotherapy	• Mass drug administration (MDA) using oral ivermectin and topical scabicides
WASH	• Hygiene measures may be helpful as part of the response to institutional outbreaks • Hygiene measures reduce the risk of secondary infection in infested individuals
Vector control	N/A
Veterinary public health	N/A
Case management	• Topical scabicides such as permethrin, benzyl benzoate, malathion and sulfur ointment • Oral ivermectin • Treatment of all household contacts • Specialist case management of crusted scabies cases
Other	• Not applicable

Risks that require mitigation

- As programmes that use ivermectin are discontinued (e.g. lymphatic filariasis and onchocerciasis in certain areas) in some countries, there is risk of scabies outbreaks or resurgence
- As MDA becomes more commonly used, monitoring for resistance will become important

WHO 2030 target, sub-targets and milestones

Indicator	2020 (baseline)	2023	2025	2030
Number of countries having incorporated scabies management in the universal health coverage package of care	0	25 (13%)	50 (26%)	194 (100%)
Number of countries using MDA intervention in all endemic districts	0	3	6	25

SOURCE: All data sourced from WHO unless otherwise indicated

Burden of disease

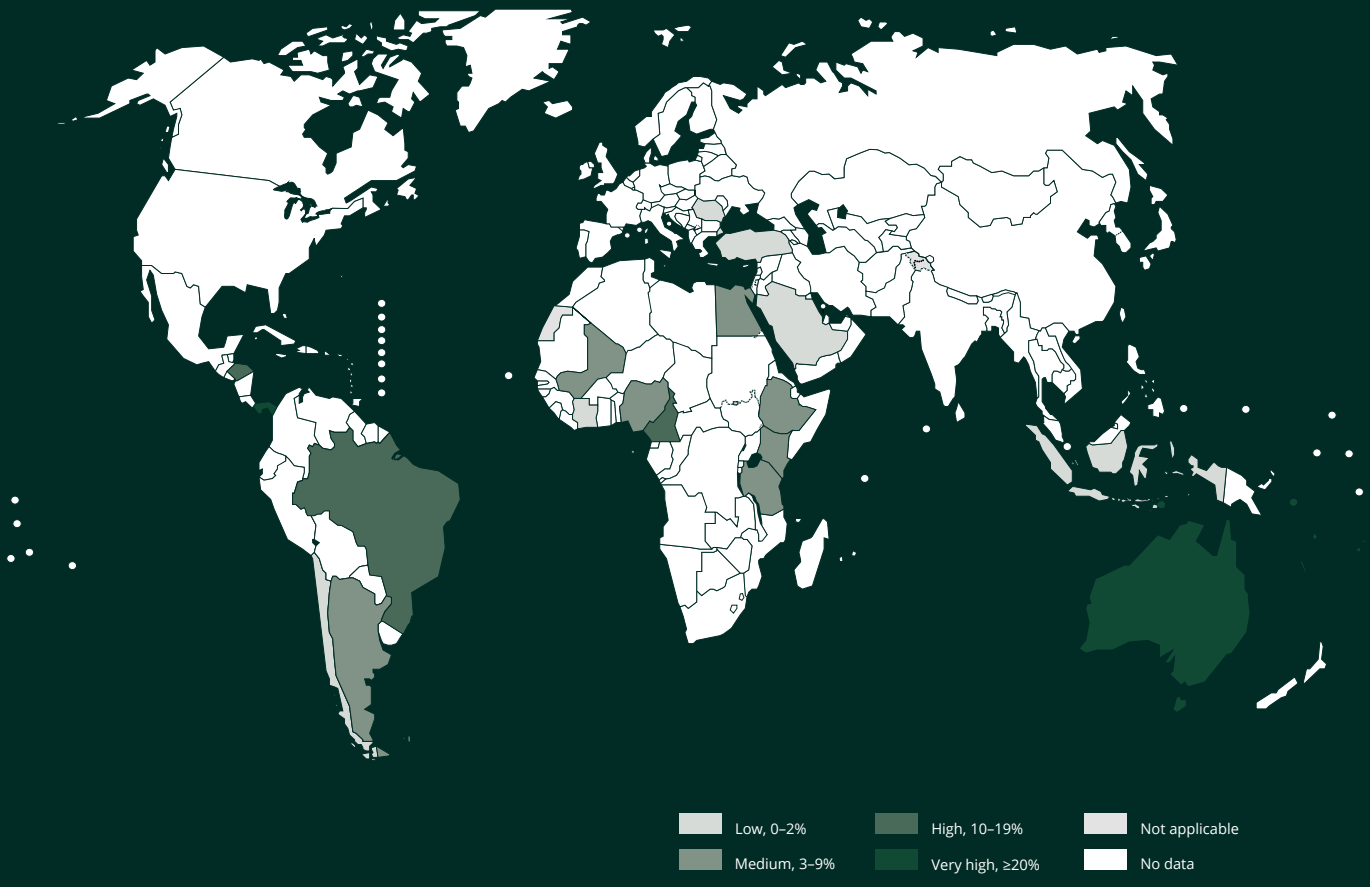
About 200 million
people affected by scabies at any time

About 4.5 million
DALYs (all-age) in 2017

Accurate data on incidence and prevalence are not available.

The disease is endemic across all continents; the highest burden is in Asia (number of cases, DALYs).

Prevalence of scabies, latest year available



Source: Engelman D, Cantey PT, Marks M, Solomon AW, Chang AY, Chosidow O, et al. The public health control of scabies: priorities for research and action. Lancet. 2019; 394: 81–82. doi:10.1016/S0140-6736(19)31136-5

Scabies: assessment of actions required to meet 2030 sub-targets


© WHO/Rada Akbar

Summary of critical actions to achieve targets

- Develop guidance and tools for mapping in endemic countries to estimate the burden of disease.
- Develop guidance for implementation of preventive chemotherapy.
- Create an advocacy and funding plan; secure financing for ivermectin and topical treatments; advocate for inclusion in universal health coverage.

Category and current assessment	Current status	Actions required
Technical progress		
Scientific understanding	• Significant research has been performed to define the impact of MDA strategies on transmission of scabies • Initial research on burden of scabies has begun in certain regions	• Evaluate epidemiological burden globally • Improve understanding of recrudescence of transmission in settings where MDA with ivermectin for other NTDs has stopped • Understand the life cycle and the impact of treatments on individuals and associated morbidity (e.g. impetigo and rheumatic fever)
Diagnostics	• Methods exist for screening and individual diagnosis, but lack of point-of-care confirmatory diagnostics • New international consensus criteria 2019 will facilitate programmatic screening	• Validate clinical diagnostic algorithms for programmatic use • Develop population-level diagnostics to facilitate integration with other NTD programme activities and evaluate programme end-points
Effective intervention	• Strong evidence for effectiveness of ivermectin MDA in combination with topical scabicides for those who cannot take ivermectin; ivermectin cannot be safely used in areas in which loaiasis is co-endemic	• Determine if ivermectin-based single-dose MDA (instead of two doses 7 days apart) is effective for programmatic use • Identify alternative strategies for MDA including in areas where loaiasis is co-endemic • Understand if moxidectin could serve as a treatment

For more details, please visit:
www.who.int/neglected_diseases/diseases/scabies/en/

No hindrance towards target

Critical action required to reach target

Category and current assessment	Current status	Actions required
Strategy and service delivery		
Operational and normative guidance	• Provisional framework in development	• Develop guidance and tools for mapping in endemic countries to estimate the burden of disease • Develop guidance for implementation of preventive chemotherapy
Planning, governance and programme implementation	• Informal bodies exist to support coordination • Country-level organization and planning are often lacking • MDA with ivermectin for lymphatic filariasis or onchocerciasis has had some impact on transmission, although these strategies miss some children at risk for infection	• Include scabies and impetigo in national universal health coverage and integrated management of childhood illness guidelines • Incorporate scabies into national NTD programme planning in known highly endemic countries
Monitoring and evaluation	• Burden of the disease and its prevalence are poorly understood	• Design operationally feasible mapping strategies • Develop and disseminate protocols for standardization of mapping to ensure consistency of data • Develop system for tracking scabies outbreaks; monitor particularly where lymphatic filariasis or onchocerciasis elimination programmes are closing • Consider integrating M&E strategies with other skin diseases
Access and logistics	• Ivermectin added to WHO Model List of Essential Medicines for ectoparasites (2019)	• Secure supply of low-cost ivermectin and topical scabicides; identify potential generic manufacturers of ivermectin that could obtain WHO prequalification • Ensure availability of topical scabicides and treatment of secondary infection
Health care infrastructure and workforce	• WHO manual on skin NTDs provides some guidance on diagnosis and management in the primary health care setting (2018)	• Develop national plans for staff training in diagnosis and management of scabies including secondary infection • Ensure good-quality prescribing practices in skin NTDs
Enablers		
Advocacy and funding	• Currently minimal donor support and limited domestic prioritization in many countries	• Create an advocacy and funding plan; secure financing for ivermectin and topical treatments; advocate for inclusion in universal health coverage
Collaboration and multisectoral action	• Collaboration beginning to increase as a framework is developed • The International Alliance for the Control of Scabies and the International League of Dermatological Societies helps coordinate action against scabies	• Strengthen integrated management of skin NTDs • Coordinate with other programmes that use ivermectin (e.g. lymphatic filariasis) • Strengthen collaboration with WASH in institutional settings
Capacity and awareness building	• Needs have not been assessed but are expected to be high	• Capacity-building should be considered across skin NTDs for treatment and prevention of secondary infection

Schistosomiasis

Schistosomiasis is a parasitic disease caused by infection with *Schistosoma* trematodes. The disease affects poor rural communities but has spread to urban areas and to tourists visiting endemic areas.

Disease and epidemiology

- Schistosomiasis is a parasitic disease caused by infection with *Schistosoma* trematodes including *S. mansoni*, *S. japonicum*, *s. mekongi*, *S. guineensis and related S. intercalatum* and *S. haematobium*.
- There are two main types of the disease:
  - intestinal schistosomiasis, which results in abdominal pain, diarrhoea, blood in the stool, Katayama fever (mostly with *S. japonicum* only) and, in advanced stages, enlargement of the liver and spleen, fibrosis, portal hypertension and accumulation of fluid in the peritoneal cavity; and
  - urogenital schistosomiasis (*S. haematobium* only), which results in bloody urine, fibrosis of the bladder and damage to the ureter and kidneys; genital forms manifest as pain of the testicle and blood in the sperm in men, abdominal and pelvic pain in women, pain during intercourse, ectopic pregnancies and infertility; association with HIV transmission has been demonstrated in co-endemic areas.
- Human transmission occurs through contact with water (e.g. bathing, swimming, washing clothes) infested with larval forms (cercariae) that develop in freshwater snails, the intermediate host; inadequate sanitation increases risk of transmission.
- The disease affects poor rural communities but has spread to urban areas and to tourists visiting endemic areas.

Progress against WHO 2020 targets

Impact indicator	2020 target	Current status
Regional Elimination	2015 – multiple regions[1] 2020 – multiple regions[2]	0
Percentage of school-aged children covered with preventive chemotherapy	75%	67%

Core strategic interventions

Preventive chemotherapy	• Regular treatment through mass drug administration (MDA) with praziquantel of at-risk groups (school-aged children, preschool-aged children, communities in highly endemic areas, adults in occupations involving contact with infested water)
WASH	• Access to safe water • Improved sanitation and management of excreta across communities (including animal waste) • Individual hygiene education (e.g. use of toilets, personal hygiene)
Vector control	• Snail control with molluscicides, physical removal, and environmental modification
Veterinary public health	• Keeping animals away from transmission sites (for zoonotic transmission) especially in areas endemic for *S. japonicum*
Case management	• Treatment of animals with praziquantel • Treatment with praziquantel on case-by-case basis and individualized disease management (e.g. surgery and self-care) where appropriate
Other	• Behavioural change, self-care and environmental management interventions

Risks that require mitigation

Zoonotic reservoirs could continue transmission; reintroduction of the disease by migration raises the risk of recrudescence; the disease could resurge if regular treatment through MDA is stopped without sustainability interventions in place (e.g. WASH and surveillance)

WHO 2030 target, sub-targets and milestones

Indicator	2020 (provisional estimate)	2023	2025	2030
Number of countries validated for elimination as a public health problem (currently defined as <1% proportion of heavy intensity schistosomiasis infections)	0	49/78 (63%)	69/78 (88%)	78/78 (100%)
Number of countries where absence of infection in humans has been achieved	1/78 (1%)	10/78 (13%)	19/78 (24%)	25/78 (32%)

[1] Eastern Mediterranean Region, Caribbean, Indonesia and the Mekong River basin
[2] Region of the Americas, Western Pacific Region and selected countries in the African Region
SOURCE: All data sourced from WHO unless otherwise indicated

Burden of disease

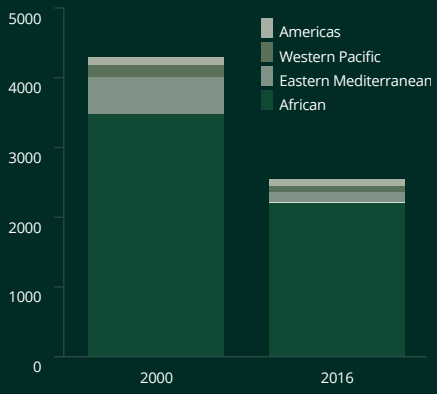
About 236 million
people required MDA in 2019

About 24 000
deaths in 2016

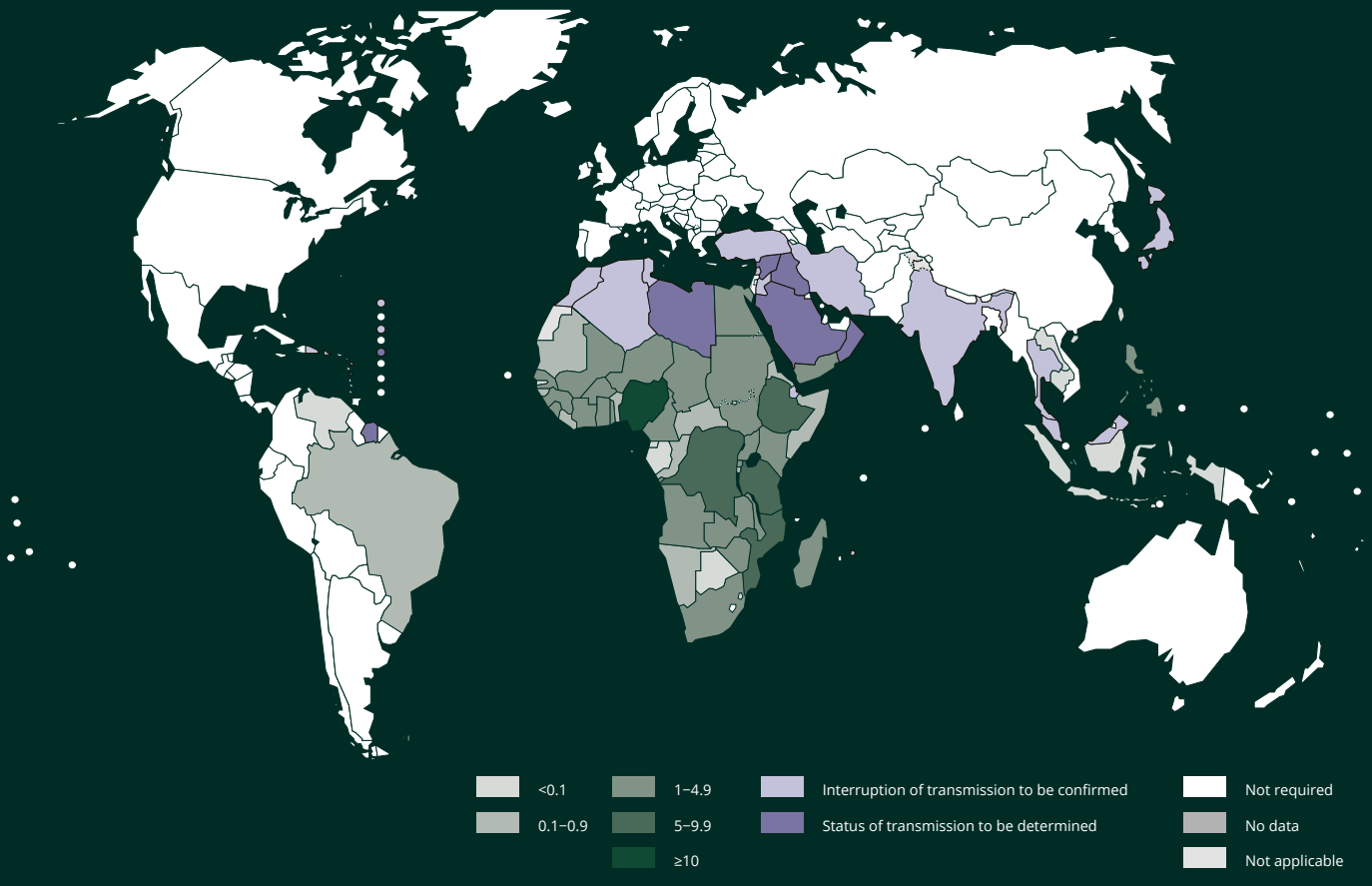
About 2.5 million
DALYs in 2016

As of January 2020, schistosomiasis is endemic in 78 countries, of which 51 countries have moderate to severe transmission and require preventive chemotherapy; more than 90% of people requiring treatment live in Africa. Deaths and DALYs are likely underestimated due to underreporting, method used to assess disability and other factors.

DALYs per region, thousands



Proportion (%) of global population requiring preventive chemotherapy, 2019



Schistosomiasis: assessment of actions required to meet 2030 sub-targets


© WHO/Olivier Asselin

Summary of critical actions to achieve targets

- Define indicator for measuring morbidity.
- Implement effective interventions, including extending preventive chemotherapy to all populations in need and ensuring access to the necessary medicines; implement targeted snail control with updated guidelines; continue micro-mapping and targeting.
- Develop diagnostic tests, including standardized point-of-care diagnostic, and develop new interventions, including alternatives to praziquantel and methods of snail control.
- Create effective cross-sectoral governance mechanisms to coordinate with WASH, vector control, animal health, environment and other key sectors.
- Ensure sufficient resources, including domestic financing, for access to interventions (including MDA for children and adults as well as snail control), development of new tools and strengthening of health care capacity.

Category and current assessment	Current status	Actions required
Technical progress		
Scientific understanding	• Decent understanding of transmission and parasite life cycle • Unclear understanding of resurgence pathways • Gaps in understanding of specific snails, hybrid species and zoonotic reservoirs; zoonotic reservoirs maintain transmission • Insufficient understanding of spectrum of morbidities	• Determine causes and strategies to prevent resurgence and to sustain elimination as a public health problem once achieved • Understand zoonotic transmission and interventions to address zoonotic reservoirs • Determine causes and develop strategies to address areas not responding to treatment • Determine impact of female genital schistosomiasis and association with HIV • Define both economic and health impact of clinical and "subtle" morbidity
Diagnostics	• Kato–Katz and urine filtration used to measure prevalence and intensity but suboptimal in low prevalence areas • More sensitive and specific rapid diagnostic tests are being used and others are under development	• Develop and introduce standardized, sensitive, point-of-care diagnostics for different prevalence settings and all schistosome species; use for mapping and transmission assessment • Create biorepository of sera, urine and stool for diagnostic development, validation and evaluation • Develop test for resistance to praziquantel • Develop molecular test for xenomonitoring and surveillance • Develop point-of-care diagnostic for female genital schistosomiasis
Effective intervention	• Regular treatment with praziquantel, through MDA or test and treat, reduces infections and prevalence • Research on improved formulations of praziquantel and paediatric formulation is ongoing • Tailored snail control is being implemented in some countries; however, environmental concerns exist • There is a need to strengthen the evidence of effective WASH and behavioural change interventions	• Utilize or implement current strategies according to guidelines (e.g. expand treatment to adults, implement WASH) and conduct operational research simultaneously to inform future interventions • Introduce or improve micro-targeting of MDA and other interventions at community level • Develop new, alternative medicines to complement praziquantel in case of resistance • Develop and launch safer, cheaper and effective snail control technology considering the environment • Conduct operational research to improve effective WASH and behaviour interventions for prevention • Consider development of a vaccine for humans and animals to prevent reinfection and reduce transmission • Improve morbidity management including coinfection and secondary infection • Coordinate with WASH services and organizations effectively to ensure access to sufficient clean water for bathing and washing and provide health education

For more details, please visit:
www.who.int/schistosomiasis/en/

No hindrance towards target

Critical action required to reach target

Category and current assessment	Current status	Actions required
Strategy and service delivery		
Operational and normative guidance	• Process for verification of elimination of transmission under development • WHO manual on indicators of morbidity published • New guideline includes treatment of all at-risk groups	• Create guidance on how to sustain elimination as a public health problem and elimination of transmission • Develop methodological guidance for measuring progress and impact assessment • Develop intervention and monitoring strategies for urban and periurban settings
Planning, governance and programme implementation	• Good coordination among stakeholders • National programmes at different stages of development concerning multisectoral integration of snail control, WASH and behavioural change interventions	• Adopt and implement current strategies nationally (e.g. expand to other groups including adults, school-aged children (SAC) not at school); improve compliance of MDA and WASH by strengthening social mobilization and behavioural change • Implement test, treat and track strategies in countries striving for elimination of transmission • Develop a coherent cross-sectoral governance structure (e.g. WASH, vector, education, animal) within countries to deliver interventions effectively; include schistosomiasis in their packages of universal health coverage
Monitoring and evaluation	• Epidemiology of the disease currently not well understood • Working group established to provide new guidance for M&E, granular mapping and impact assessment	• Improve data quality and mapping to support target and track progress at the lowest level; implement granular mapping (harnessing new technologies) to support targeted MDA and other interventions at lower administrative or community levels • Collect M&E data from pre-SAC, SAC and adults to inform optimal treatment strategy • Implement impact assessments for potential strategy adjustment • Use endemicity data to target WASH investment and track progress to elimination • Improve reporting on distribution, leveraging new tools • Implement monitoring for efficacy of and drug resistance to praziquantel • Develop economic impact indicators to assess disease burden and programmatic progress
Access and logistics	• Donation of 250 million tablets of praziquantel from Merck available for treatment of school-aged children and some adult treatment through community delivery in the African Region • Some countries use alternative sources of praziquantel • Reliance on school-based delivery of treatment can miss children not attending school, preschool-aged children (pre-SAC) and adults	• Utilize donor coordination, supply and logistic tools to ensure access to sufficient quality-assured praziquantel to treat all in need • Ensure access to and delivery of treatment to all at-risk populations, including adults, according to the guidelines (e.g. through strengthening logistical aspects) • Ensure access to paediatric formulation of praziquantel for pre-SAC once available • Ensure access to molluscicides and zoonotic interventions as available • Ensure access to diagnostics as available
Health care infrastructure and workforce	• Health care infrastructure and laboratory capacity variable, with certain regions lacking capacity • Low availability of skills in malacology and snail control • Lack of awareness of female genital schistosomiasis by health care providers	• Integrate schistosomiasis into primary health care • Build laboratory capacity for surveillance • Strengthen health care capacity for morbidity assessment and case management • Build capacity in malacology and snail control
Enablers		
Advocacy and funding	• Currently, treatment programmes rely heavily on external funding, which in many countries can be short-term	• Advocate to international and domestic stakeholders and policy-makers to strengthen ownership of schistosomiasis control and elimination programmes and their integration into universal health coverage • Mobilize extra resources for progress towards the ultimate goal of elimination of transmission, which would allow MDA to be stopped; mobilize resources for medicines, molluscicides and other needs • Develop a request of interest for WASH investments in areas endemic for schistosomiasis
Collaboration and multisectoral action	• Manual (2013) and Global strategy on WASH and NTDs (2015) published • Advocacy document on female genital schistosomiasis and HIV published (2019) • Level integration with other sectors (e.g. WASH, agriculture, education, vector control, environment) • Coordination organizations include the Global Schistosomiasis Alliance and the Neglected Tropical Diseases NGO Network	• Coordinate cross-sectoral interventions to implement treatment, WASH and behavioural strategies in communities, schools and health facilities; ensure access to clean water • Integrate schistosomiasis interventions with other NTDs for efficiencies (e.g. MDA/preventive chemotherapy) • Strengthen collaboration with other actors in the health care sector for genital manifestations, coinfections and severe morbidity management • Promote snail control as part of the Global Vector Control Response and coordinate with environment groups • Coordinate with animal sectors and the One Health approach
Capacity and awareness building	• Female genital schistosomiasis atlas published to help in diagnostics (2015) • Manual on morbidity management under development • Manual on malacology, web training platform and App under development • Manual on field use of molluscicides published (2017)	• Support training of health staff in laboratory diagnostics, clinical management of cases and genital manifestations, malacology and snail control; integrate trainings with other NTDs and sectors • Develop epidemiological skills in workforce to enable assessment of treatment strategies and their tailoring • Adopt strategy for long-term sustainability and greater national ownership • Raise awareness among general public of the disease and its transmission, prevention and WASH and NTD interventions through production of manuals

Soil-transmitted helminthiases including strongyloidiasis

Soil-transmitted helminthiases are caused by infection with intestinal parasites (*Ascaris lumbricoides* and *Trichuris trichiura*), hookworms (*Necator americanus* and *Ancylostoma duodenal*e) and roundworms (*Strongyloides stercoralis*).

Disease and epidemiology

- Soil-transmitted helminthiases (STH) are caused by infection with intestinal parasites (*Ascaris lumbricoides* and *Trichuris trichiura*), hookworms (*Necator americanus* and *Ancylostoma duodenale*) and roundworms (*Strongyloides stercoralis*).
- Infection results in anaemia, malnutrition, impaired physical and cognitive development, abdominal pain and diarrhoea.
- Human transmission occurs through eggs or larvae in faeces, which contaminate soil in areas with poor sanitation.
- *S. stercoralis* is transmitted similarly to other STH, requires a different diagnostic method and can cause hyper-infection syndrome leading to death; it has not been addressed due to lack of access to ivermectin.

Progress against WHO 2020 targets

Impact indicator	2020 target	Current status
Proportion of preschool and school-aged children in need of treatment that are regularly treated	75%	59%
Number of endemic countries with 75% treatment coverage in preschool and school-aged children	75	21

Core strategic interventions

Preventive chemotherapy	• Strategy for preschool and school-aged children: - albendazole or mebendazole against *A. lumbricoides, T. trichiura* and hookworms: • twice per year where STH prevalence is ≥50% • once per year where STH prevalence is ≥20% - ivermectin should be added where prevalence of *S. stercoralis* exceeds 10% and as a complement for areas with high prevalence of *T. trichiura* • Women of child-bearing age treated with the same medicines through antenatal care
WASH	• Provision of adequate sanitation and waste management facilities • Improved hygiene practices (e.g. prevention of open defecation, hand washing) and access to safe water at the household level and beyond (e.g. in schools)
Vector control	N/A
Veterinary public health	N/A
Case management	• Provision of treatment to individuals living in areas endemic for STH and *S. stercoralis* is a way to increase universal health coverage
Other	• Education for behavioural change targeted to population group at risk

WHO 2030 target, sub-targets and milestones

Indicator[1]	2020 (baseline)	2023	2025	2030
Number of countries validated for elimination as a public health problem (defined as <2% proportion of soil-transmitted helminth infections of moderate and heavy intensity due to *Ascaris lumbricoides*, *Trichuris trichiura*, *Necator americanus* and *Ancylostoma duodenale*)[2]	0	60/101 (60%)	70/101 (70%)	96/101 (96%)
Number of countries including ivermectin in preventive chemotherapy in all areas endemic for *S. stercoralis*	0	10/101 (10%)	15/101 (15%)	96/101 (96%)

[1] Additional details and sub-indicators to be defined in forthcoming publication entitled "2030 targets for soil-transmitted helminthiases control programmes"
[2] Using Kato–Katz
SOURCE: All data sourced from WHO unless otherwise indicated

Burden of disease (*A. lumbricoides*, *T. trichiura* and hookworms only)

About 1.5 billion
people estimated to be infected with STH[1] in 2016

About 6300
deaths reported in 2016[1]

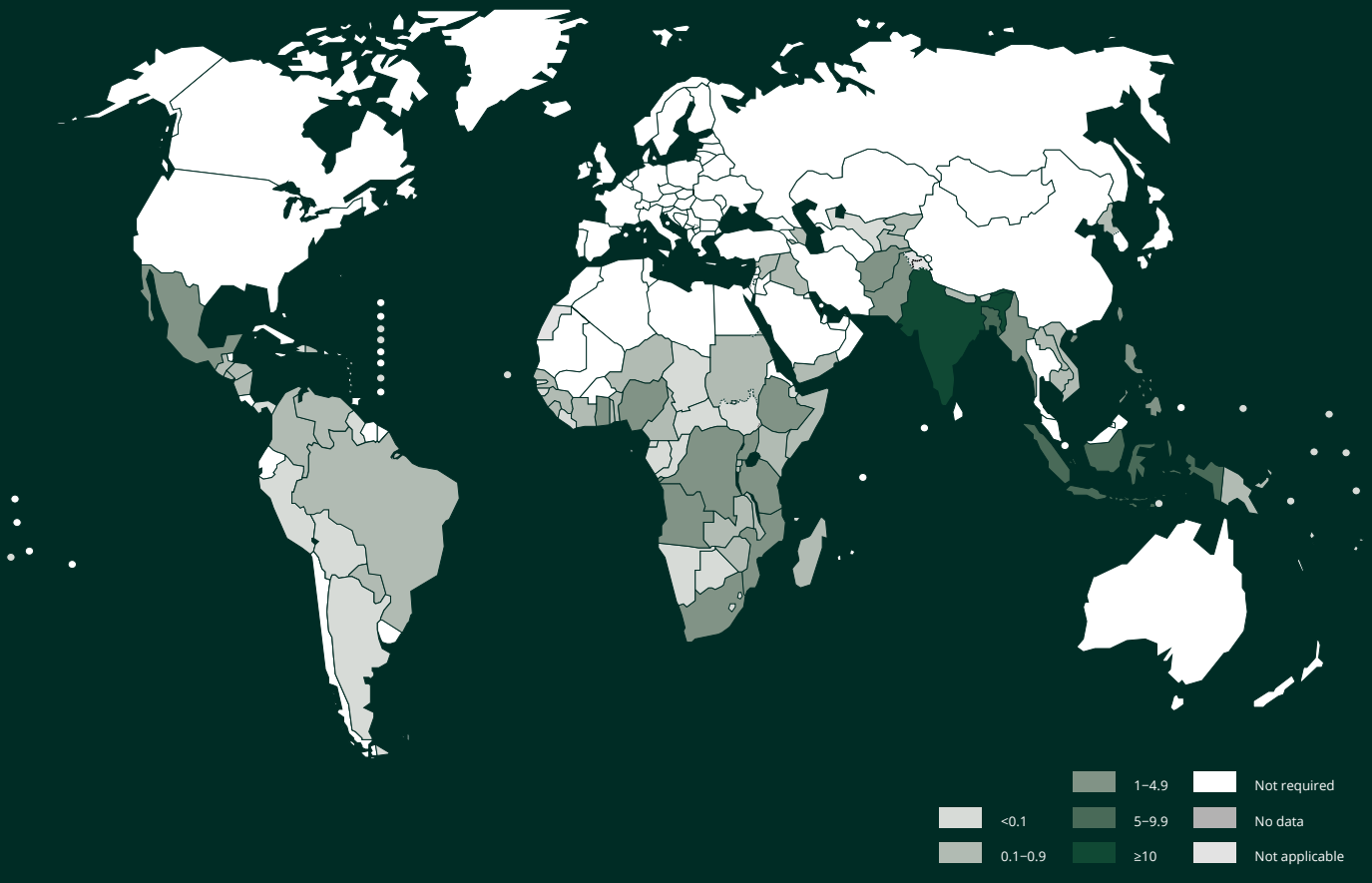
About 3.5 million
DALYs in 2016[1]

In 2019, 92 countries required MDA, mostly in tropical and subtropical areas across sub-Saharan Africa, Latin America and Asia but also in some areas of the European Region.

The burden of *S. stercoralis* should be quantified precisely.

Population requiring preventive chemotherapy for STH by WHO region, 2019, million

Proportion (%) of children requiring preventive chemotherapy globally, 2019



[1] Control of strongyloidiasis was not included in the targets for 2020

Soil-transmitted helminthiases: assessment of actions required to meet 2030 sub-targets

© WHO/Yoshi Shimizu

Summary of critical actions to achieve targets

- Increase political commitment to ensure sustainable domestic financing.
- Develop more effective medicines and medicine to improve patient outcomes and in case of drug resistance.
- Develop comprehensive surveillance and mapping systems to target treatment and monitor drug resistance.

Category and current assessment	Current status	Actions required
Technical progress		
Scientific understanding	• Good understanding of epidemiology and pathology • Research ongoing into the feasibility of elimination of transmission	• Estimate precisely the epidemiology and burden of *S. stercoralis*
Diagnostics	• Current Kato–Katz diagnostic method involves examination of stool samples under a microscope • No standard method for diagnosis of *S. stercoralis*	• Develop rapid, more sensitive and specific, easy-to-use point of care diagnostics for mapping and surveillance including for *S. stercoralis* • Devise sensitive and specific biomarkers for a field test • Design field-deployable tests to detect resistance • Standardize diagnostic procedure and develop guidance to limit variation in prevalence
Effective intervention	• Anthelminthic medicines are effective but their number is limited to albendazole and mebendazole, which may be an issue in case of increasing drug resistance • Ivermectin is highly effective but difficult to procure	• Develop more effective medicines and drug combinations against *T. trichiura* and hookworm infections • Promote prequalification of generic ivermectin at affordable cost or/and donated ivermectin

For more details, please visit:
www.who.int/intestinal_worms/disease/en/

No hindrance towards target

Critical action required to reach target

Category and current assessment	Current status	Actions required
Strategy and service delivery		
Operational and normative guidance	• Guidelines on preventive chemotherapy to control STH in at-risk population groups published (2017) • Manual on indicators and procedures to measure the reduction of morbidity due to STH exists • Initial estimation of the need of ivermectin, prequalification of a generic ivermectin and pilot interventions are under way for control of strongyloidiasis	• Develop guidelines on preventive chemotherapy to control strongyloidiasis • Devise practical guidelines for interventions for women of reproductive age
Planning, governance and programme implementation	• STH control is currently integrated into child health days (with vitamin A and vaccination) for preschool-aged children and into school health programmes for school-aged children • Strongyloidiasis control is potentially very easy to integrate into school health programmes for school-aged children	• Adopt policies for effective quality control of diagnostics and medicines by countries based on WHO global guidance including control procedures • Integrate deworming in endemic areas in universal health coverage policies and programmes • Prioritize control efforts against strongyloidiasis
Monitoring and evaluation	• M&E done principally on report from implementers • Currently limited scope of additional M&E activities due to lack of resources • Guidance exists on continuing surveillance after preventive chemotherapy has been suspended • Currently, there is no reported drug resistance; however, the risk is high	• Utilize new technologies (drone mapping, environmental DNA, etc.) to decrease the costs of surveillance and mapping • Develop a surveillance guide with standard indicators • Establish an M&E system or integrate M&E with the national health information system • Simplify impact assessment survey • Monitor the efficacy of medicines and of drug resistance
Access and logistics	• Albendazole and mebendazole for school-aged children are donated and distributed through WHO • Ivermectin is neither donated nor available as a prequalified generic medicine	• Improve access to medicines for women of reproductive age and preschool-aged children • Increase the availability of ivermectin for control of *S. stercoralis* and *T. trichiura*
Health care infrastructure and workforce	• Albendazole and mebendazole are distributed through schools and communities using teachers and community health workers as drug distributors • Teachers are not trained in distributing ivermectin	• Include distribution of ivermectin • Increase the number of testing facilities for routine laboratory testing of STH • Ensure transition to school-based programmes in settings where LF MDA stops
Enablers		
Advocacy and funding	• Many countries depend on drug donations and external funding for programme implementation • The number of donated tablets needed is expected to decrease substantially as populous countries become self-sufficient and as the frequency of preventive chemotherapy decreases after successful intervention; the number of individuals in need of treatment is expected to remain similar • No funds or donations are currently available for control of strongyloidiasis	• Increase domestic financing to ensure sustainability • Secure drug donations for women of reproductive age and preschool-aged children • Secure funding for *S. stercoralis* • Advocate for expanded sanitation in endemic areas and develop a return on investment for WASH investments in STH-endemic areas
Collaboration and multisectoral action	• Collaboration with ministries of education for school-based programmes is ongoing and highly productive and can be used for strongyloidiasis control • Collaboration with vaccination programmes during child health days is ongoing and highly productive	• Integrate PC with other programmes (e.g. nutrition, vaccinations) to increase cost–effectiveness and coverage • Integrate surveillance and mapping across diseases (e.g. lymphatic filariasis, schistosomiasis, onchocerciasis, polio, scabies) • Ensure effective WASH strategies to prevent resurgence • Coordinate effectively with other ministries (water, education, housing)
Capacity and awareness building	• Teachers and community health workers are partially trained • Laboratory technicians are trained on STH diagnostics but more rarely on strongyloidiasis diagnosis • Training manuals are available	• Integrate training in the routine activities of health facilities

Snakebite envenoming

Snakebite envenoming results from the injection of a complex mixture of different toxins ("venom") following the bite of a venomous snake or from venom sprayed into the eyes by certain species of snakes.

Disease and epidemiology

- Snakebite envenoming results from the injection of a complex mixture of different toxins ("venom") following the bite of a venomous snake or from venom sprayed into the eyes by certain species of snakes.
- The toxins can cause shock (fall in blood pressure), paralysis that may arrest breathing, and bleeding disorders that can lead to fatal haemorrhage or cause other effects such as acute kidney injury and tissue damage leading to permanent disability, limb amputation and other physical and psychological sequelae.
- Risk factors include agricultural occupations, walking barefoot at any time, sleeping inside or outside on the ground without a tucked-in mosquito net and walking outside at night without a light.

Progress against WHO 2020 targets

Not applicable: snakebite envenoming was categorized as a WHO neglected tropical disease only in 2017

Core strategic interventions

Preventive chemotherapy	N/A
WASH	N/A
Vector control	N/A
Veterinary public health	N/A
Case management	• High-quality, safe and effective snake antivenoms that are available in rural health posts and can be delivered by qualified health care workers • Ancillary treatments such as mechanical ventilation, wound care, infection control, surgery and treatment of shock
Other	• Housing improvements including beds with bed nets to prevent sleeping on the floor, improved sealing of gaps in walls, roofs and around doors • Behavioural changes, e.g. use of footwear, use of lights outdoors from dusk to dawn • Community education to reduce risky behaviours, to seek proper health care and to avoid unproven, potentially harmful first aid interventions (e.g. traditional treatment methods)

WHO 2030 target, sub-targets and milestones

Indicator	2020 (baseline)	2023	2025	2030
Number of countries having achieved reduction of mortality by 50%	Not applicable	39 (30%)	61 (46%)	132 (100%)
Percentage of new antivenom producers joining market by 2030	Not applicable	5%	15%	25%
Number of effective treatments for snakebite envenoming available worldwide	50 000	300 000	500 000	3 million
Minimum number of WHO-recommended poly-specific antivenom products in each region	Not applicable	2	3	6

SOURCE: All data sourced from WHO unless otherwise indicated

Burden of disease

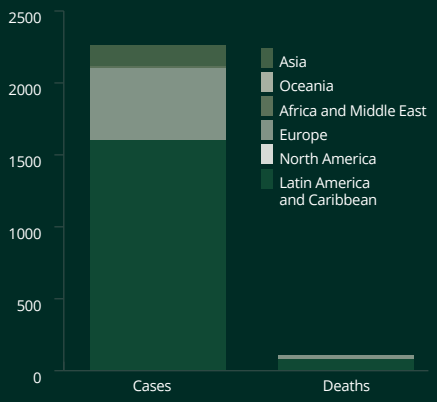
About 2.7 million
people bitten by snakes with envenoming annually

About 8000–140 000
deaths annually

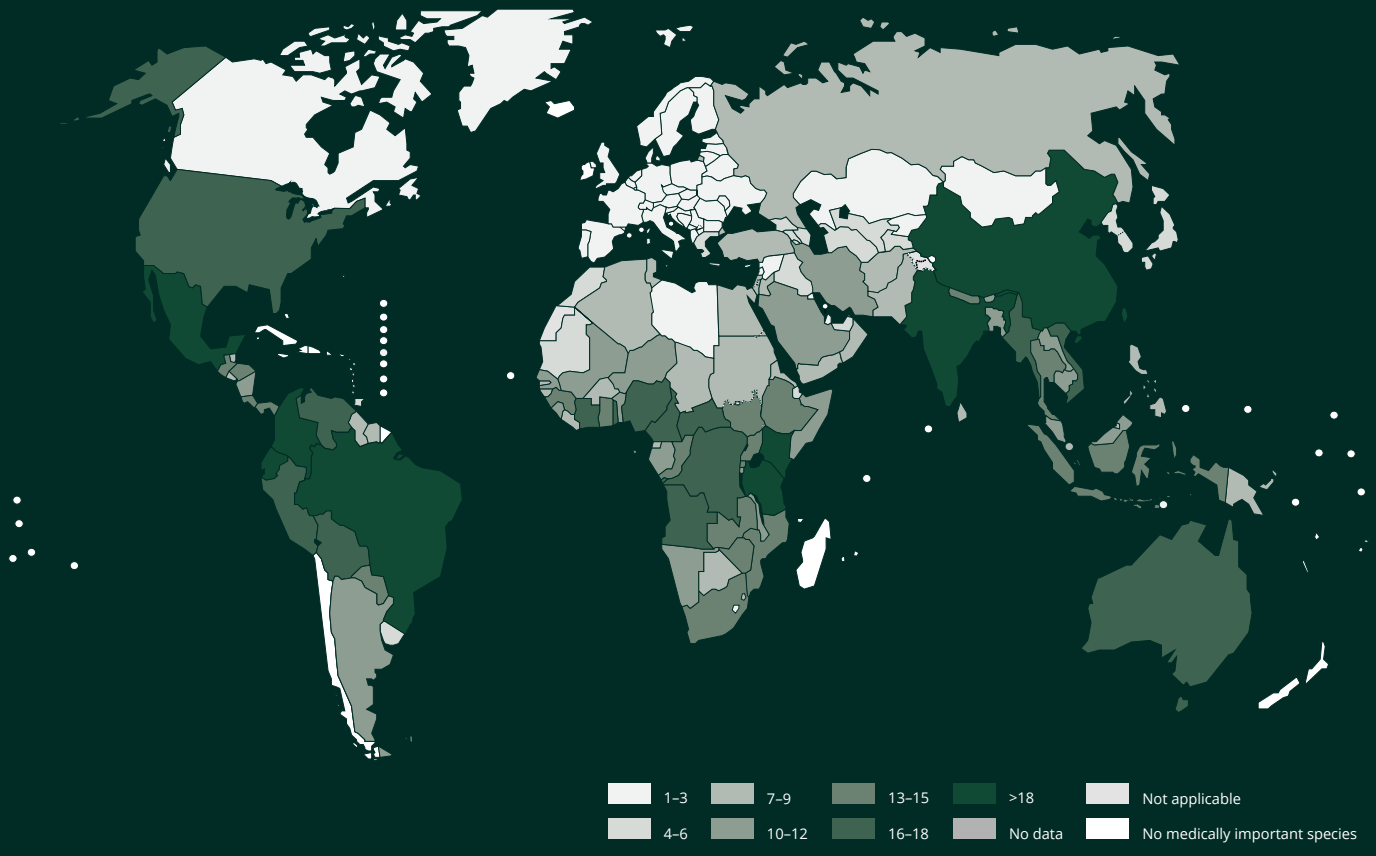
About 400 000
people disabled by snakebite envenoming annually[1]

There are an estimated 132 countries with incidence of snakebite, although global/regional/national data can be incomplete or of variable quality/completeness.

Cases and deaths per region[2], thousands, 2016



Number of venomous snake species per country[3]



[1] Snakebites. In: Peden M, Oyegbite K, Ozanne-Smith J, Hyder AA, Branche C, Fazlur Rahman AKM, et al., editors. World report on child injury prevention. Geneva: World Health Organization; 2008: Box 6.1 (http://whqlibdoc.who.int/publications/2008/9789241563574_eng.pdf)
[2] Gutiérrez JM, Calvete JJ, Habib AG, Harrison RA, Williams D, Warrell DA. Snakebite envenoming. Nat Rev Dis Primers. 2017;14;3:17063. doi:10.1038/nrdp.2017.63
[3] Guidelines for the production, control and regulation of snake venom immunoglobulins. In: WHO Expert Committee on Biological Standardization: sixty-seventh report. Geneva: World Health Organization; 2017: Annex 5 (https://www.who.int/bloodproducts/AntivenomGLrevWHO_TRS_1004_web_Annex_5.pdf)

Snakebite envenoming: assessment of actions required to meet 2030 sub-targets


© WHO/A. Loke

Summary of critical actions to achieve targets

- Improve training of physicians in managing snakebite, and build awareness in communities on best practices in prevention and seeking treatment for snakebite envenoming.
- Improve the quality of anti-venoms, and invest in research and development of new products.
- Enhance overall production capacity for quality-assured products, and ensure their availability and accessibility in rural areas.

Category and current assessment	Current status	Actions required
Technical progress		
Scientific understanding	• Substantial knowledge of disease pathology, venom composition and immunological properties of venoms • Lack of clinical and preclinical evidence for safety and effectiveness of specific antivenoms; hampered by cost, logistics and lack of available expertise in countries	• Build baseline on epidemiology, ecology and disease burden • Encourage investment on research questions related to WHO strategy needs, e.g. sociocultural, toxinological, clinical, economic, ecological and epidemiological research areas • Balance demand for stronger clinical and preclinical evidence against high costs and other barriers; need for rapid and pragmatic approach (a) is it safe? (b) is it effective? (c) is it cost–effective?
Diagnostics	• Recognition of specific syndromes associated with some venoms, which help in diagnosis • Species-specific immunodiagnosis not essential for effective treatment but valuable for clinical research and disease ecology	• Standardize and validate clinically relevant bedside diagnostic tests that confirm specific clinical syndromes (e.g. 20WBCT for coagulopathy) in specific populations • Develop simple low-cost "Yes/No" diagnostics (immunoassay or other diagnostic methods for identification of biting species for disease ecology) to reduce delays in administration of antivenom
Effective intervention	• Substandard antivenoms (especially in Africa and Asia) and limited knowledge on clinical and preclinical efficacy = loss of confidence among users = reduced demand = declining production = higher cost	• Review the design of antivenoms and the selection of geographically appropriate sources of venoms for production • Invest in the research and development of new products • Improve rational preclinical and clinical testing pathways with accelerated market deployment that includes post-marketing surveillance

For more details, please visit:
www.who.int/health-topics/snakebite#tab=overview

No hindrance towards target

Critical action required to reach target

Category and current assessment	Current status	Actions required
Strategy and service delivery		
Operational and normative guidance	• Global strategy to prevent and control snakebite envenoming has been published (2019) • Results of WHO antivenom assessment for Africa are being released	• Integrate effective prevention, treatment and snakebite envenoming management into national health systems through uptake of strategy by countries, including detailed refinement on specifications of the appropriate antivenoms • Develop additional regulatory guidance and controls, undertake additional regional assessments and strengthen norms and standards • Expand WHO assessment on antivenom products to other regions
Planning, governance and programme implementation	• Work plan with measurable outcomes required • Need for coordination of implementation efforts	• Establish and implement a coordination framework • Set up a small technical working group of experts to support WHO
Monitoring and evaluation	• Baseline epidemiological and burden of disease data are deficient, fragmented or incomplete	• Implement mandatory reporting to improve data on disease burden • Improve quality and extent of epidemiological surveillance (with clear common definitions of parameters) for accurate disease burden measurement and resource planning • Develop and implement a framework to measure outcomes and outputs
Access and logistics	• Weak confidence drives demand and supply down, raising prices and reducing availability • Weak regulatory environments facilitate spread of ineffective and counterfeit products • Poor procurement, supply and distribution policies and practices and need for education and training	• Invest in the modernization of production capacity and the expansion of overall manufacturing capacity of antivenoms and hyperimmune plasma • Create a virtuous cycle: requires quality-assured products, market stimulus, monitoring and surveillance • Ensure effective national and regional regulation to stop the spread of ineffective, inferior or counterfeit products • Establish a revolving stockpile of effective antivenoms
Health care infrastructure and workforce	• Substandard infrastructure and lack of basic medical equipment, consumables and other essential medicines	• Identify or create national sentinel sites for clinical research • Develop resources to support health system strengthening activities such as equipment, medicines and consumables lists for various levels of health facility, treatment flowcharts and antivenom selection charts
Enablers		
Advocacy and funding	• Advocacy and fundraising limited by need to identify and map donors and their interests • Limited programmatic and national funding	• Conduct donor mapping and develop a resource mobilization strategy based on a business plan e.g. for envenoming management, to WHO • Mobilize domestic financing for country-level projects
Collaboration and multisectoral action	• WHO strategy calls for action in 10–12 African and Asian countries during 2019–2020	• Hold multi-stakeholder engagement meetings in Africa and Asia to initiate implementation of pilot projects in selected countries • Build interdisciplinary One Health approaches, e.g. research to understand the impact on snakebite of climate change and other ecological parameters; the impact of snakebite on livestock and the associated socioeconomic impact
Capacity and awareness building	• Capacity-building required for health workers (e.g. in basic clinical and specific clinical skills) and community partners • Countries need increased regulatory, health ministry, health work force and antivenom producer capacity-building	• Develop and deploy capacity-building training packages, resources and implementation guidance, e.g. initial and ongoing training for health care personnel on treating snakebite envenoming and guidance for manufacturers and regulators • Devise a best-practice model of community-level interventions, e.g. prevention, first aid and treatment guidance and community-led advocacy initiatives • Strengthen health systems and support effective regulatory frameworks

Taeniasis and cysticercosis

Taeniasis and cysticercosis are caused by infection with the tapeworm *Taenia solium*. Taeniasis is usually asymptomatic, whereas neurocysticercosis can cause chronic headaches, epilepsy, intracranial hypertension and other neurological symptoms.

Disease and epidemiology

- Taeniasis and cysticercosis are caused by infection with the tapeworm *Taenia solium*.
- Whereas taeniasis is usually asymptomatic (but may cause abdominal pain, nausea, diarrhoea or constipation), neurocysticercosis (NCC) can cause chronic headaches, epilepsy, intracranial hypertension and other neurological symptoms.
- The tapeworm is acquired by ingesting contaminated undercooked pork; NCC occurs after ingestion of the parasite's eggs through the faecal-oral route, hand contamination and contaminated food or water.

Progress against WHO 2020 targets

Impact indicator	2020 target	Current status
Validated strategy for control and elimination of *T. solium* taeniasis/cysticercosis available	Target for 2015	Validated framework developed
Interventions scaled up in selected countries for *T. solium* taeniasis/ cysticercosis control and elimination	TBC	Pilot projects conducted in 13 countries[1]

Core strategic interventions

Preventive chemotherapy	• Mass drug administration (MDA) with praziquantel or single-dose niclosamide, or albendazole for 3 consecutive days
WASH	• Sanitation for safe disposal of faeces • Hygiene and food safety (e.g. preparation of food in hygienic environment to avoid hand-to-food contamination, thorough cooking)
Vector control	N/A
Veterinary public health	• Improved pig husbandry (e.g. prevent pigs from accessing human faeces) • Pig vaccination • Anthelminthic treatment of pigs with oxfendazole
Case management	• Taeniasis: single administration of praziquantel or niclosamide, or 3-day albendazole • Neurocysticercosis: high doses and long courses of praziquantel and/ or albendazole and supporting therapy with corticosteroids and/or antiepileptic medicines; possible surgery
Other	• Community health education on WASH, veterinary public health and infection prevention

Risks that require mitigation

- Interventions may not be sustained in the long term due to lack of financing, political will and interventions being considered cumbersome

WHO 2030 target, sub-targets and milestones

Indicator	2020 (provisional estimate)	2023	2025	2030
Number of countries with intensified control in hyperendemic areas[2]	2/64 (3%)	4/64 (6%)	9/64 (14%)	17/64 (27%)

[1] *Taenia solium*: WHO endemicity map update. Wkly Epidemiol Rec. 2016 Dec 9;91:595–9 (https://www.who.int/taeniasis/resources/who_wer914950b/en/)
[2] Definition of hyperendemic area and intensified control will be published as part of guidance on detection, prevention and control in 2021
SOURCE: All data sourced from WHO unless otherwise indicated

Burden of disease

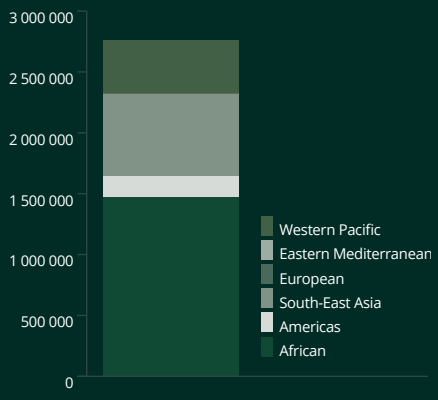
About 5.5 million
people infected worldwide[1]

About 28 000
annual deaths in 2015[2]

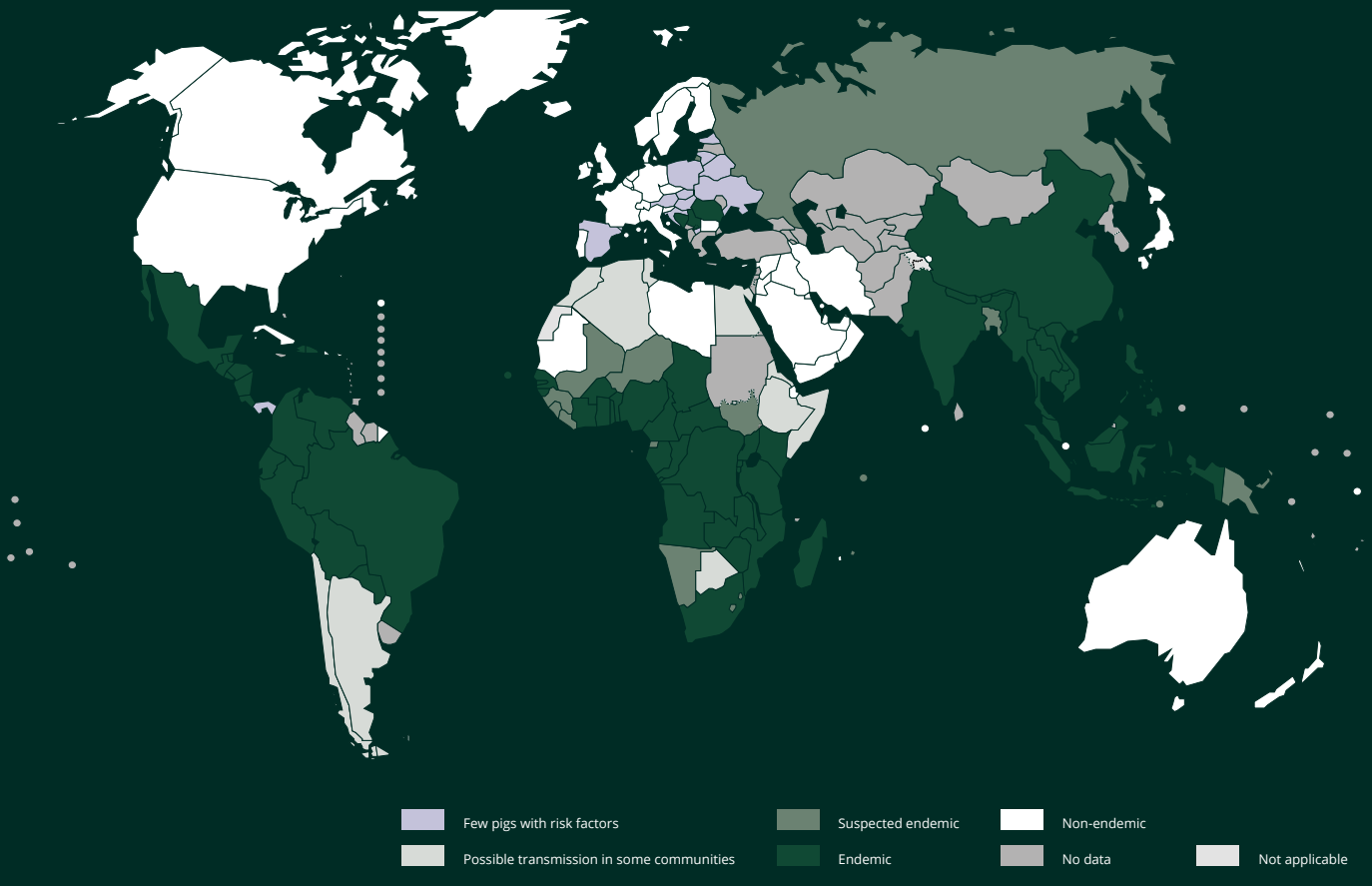
About 2.8 million
DALYs in 2015[2]

Taeniasis is endemic in more than 75 countries; the heaviest burden is in Africa, Latin America and Asia.

DALYs per region in 2016



Endemicity of *Taenia solium*, 2018[3]



[1] Global burden of disease. Seattle (WA): Institute for Health Metrics and Evaluation (http://www.healthdata.org/gbd/data)
[2] WHO estimates of the global burden of foodborne diseases: foodborne disease burden: epidemiology reference group 2007–2015. Geneva: World Health Organization; 2015 (https://www.who.int/publications/i/item/9789241565165)
[3] *Taenia solium:* WHO endemicity map update. Wkly Epidemiol Rec. 2016 2016;91:91:595–9 (https://www.who.int/taeniasis/resources/who_wer914950b/en/)

Taeniasis and cysticercosis: assessment of actions required to meet 2030 sub-targets


© WHO/Anuradha Sarup

Summary of critical actions to achieve targets

- Develop a high-throughput test for evaluating control programmes in resource-limited settings, and map endemic areas.
- Conduct targeted interventions in areas of high endemicity.
- Increase advocacy from WHO, FAO and OIE to raise the priority of controlling the diseases.

Category and current assessment	Current status	Actions required
Technical progress		
Scientific understanding	• Parasite cycle well understood • Lack of understanding of some aspects of transmission	• Understand lifespan of adult tapeworm and egg viability • Study processes regulating parasite acquisition in humans and pigs • Estimate health and economic burden (currently likely underestimated), and age distribution of patients
Diagnostics	• Most tools for taeniasis not sensitive enough; sensitive tools too expensive • Tools for porcine cysticercosis not specific enough	• Develop and validate specific and sensitive diagnostic tools for porcine cysticercosis • Devise a sensitive and specific test for taeniasis and point-of-care diagnostics for NCC in resource-limited settings
Effective intervention	• Integrated approaches between addressing the disease in animals and humans are essential • MDA alone is ineffective • Demonstrated successful interventions so far are expensive and not easily replicable • Porcine TSOL vaccine and medication can stop transmission to pigs	• Evaluate the efficacy of current treatment strategies • Develop simple and effective validated disease control model • Roll-out vaccination and treatment of pigs • Ensure availability of latrines and reduction of open defecation through cross-sector capacity-building and community engagement • Test long-term intervention approaches (e.g. minimum maintenance interventions in pigs) to asses long-term epidemiological impact

For more details, please visit:
www.who.int/taeniasis/en/

No hindrance towards target

Critical action required to reach target

Category and current assessment	Current status	Actions required
Strategy and service delivery		
Operational and normative guidance	• Guidance on detection, prevention and control will be available in 2021	• Create standardized definition of control (WHO/expert group)
Planning, governance and programme implementation	• Currently, very limited planning and governance in almost all endemic countries	• Make the disease notifiable in endemic countries • Collect baseline data • Set up targeted interventions in high endemicity setting adapted to local conditions • Combine community-wide MDA with One Health interventions
Monitoring and evaluation	• Minimum list of indicators defined • M&E systems do not exist in most endemic countries	• Develop comprehensive screening programmes to fully understand the scope of the challenge and map endemic areas • Devise a high-throughput diagnostic tool for evaluation of control programmes for taeniasis and asymptomatic NCC in resource-limited settings
Access and logistics	• Limited availability of praziquantel in the market • Recent commitment of donated praziquantel and niclosamide from Bayer for all patients aged above 5 years; contractual agreement being finalized • As donations only recently secured, existing supply chain very limited	• Register TSOL18 pig vaccine in more endemic countries • Register oxfendazole for treatment of porcine cysticercosis in endemic countries and ensure its availability • Develop supply chain of medicines in endemic countries
Health care infrastructure and workforce	• Infrastructure in highly endemic areas is lacking • Workforce with sufficient understanding of the disease	• Provide access to imaging for NCC diagnosis • Establish NCC diagnosis, case management and referral systems in high endemic settings • Integrate in the context of universal health coverage, especially with mental health services and diagnosis and surveillance for epilepsy
Enablers		
Advocacy and funding	• Lack of advocacy to encourage governments and philanthropic agencies to invest in control • Lack of commitment by governments to invest in control	• Enhance advocacy from WHO/FAO/OIE for control activities • Increase funding and support for animal health through evidence collection and dissemination of economic losses • Increase commitment of governments to prioritize taeniasis/cysticercosis through evidence collection and dissemination on economic losses in domestic animals
Collaboration and multisectoral action	• Currently limited collaborations	• Foster coordination with programmes on schistosomiasis, soil-transmitted helminthiases and epilepsy (e.g. community awareness programmes, delivery and surveillance) • Coordinate with animal programmes (e.g. use cold-chain for rabies; vaccinate for taeniasis at the same time as for classic swine fever)
Capacity and awareness building	• Lack of capacity in NCC diagnosis and management	• Provide education adapted to local settings and values to improve effectiveness (local people, local language/culture, local health) • Educate health staff on new NCC guidance • Build capacity for disease triaging at secondary level • Build surveillance capacity

Trachoma

Trachoma is an eye disease caused by infection with the bacterium *Chlamydia trachomatis*. The disease causes a considerable economic burden for individuals and communities in terms of lost productivity (about US$ 2.9–8 billion).

Disease and epidemiology

- Trachoma is an eye disease caused by infection with the bacterium *Chlamydia trachomatis*.
- Repeated episodes of infection can scar the eyelids and cause eyelashes to turn inwards and rub the surface of the eye (trichiasis). This causes pain and may permanently damage the cornea, resulting in irreversible visual impairment or blindness.
- Infection is spread through personal contact (e.g. hands, clothes, bedding) or by flies through contact with ocular or nasal discharge of infected individuals; risk factors for transmission include inadequate hygiene, crowded households, inadequate access to water and lack of sanitation.
- Trachoma causes a considerable economic burden for individuals and communities in terms of lost productivity (about US$ 2.9–8 billion).[1]

Progress against WHO 2020 targets

Impact indicator	2012	2020 target	Current status
Proportion of endemic or unknown status countries achieving elimination as a public health problem	1/66 (1.5%)	100%	10/66 (15%)

Core strategic interventions

Preventive chemotherapy	• Mass drug administration (MDA) of azithromycin and tetracycline eye ointment to reduce the reservoir of ocular *C. trachomatis* infection (the A of the WHO-recommended SAFE strategy[2])
WASH	• Facial cleanliness and environmental improvement (the F and E of the SAFE strategy) • Includes access to water and improved sanitation as well as behavioural change measures
Vector control	• Improved access to and use of sanitation removes human faeces from the environment, reducing breeding sites for muscid flies, which are vectors of ocular *C. trachomatis*
Veterinary public health	N/A
Case management	• Surgery to treat trachomatous trichiasis, TT (the S of the SAFE strategy)
Other	N/A

Risks that require mitigation

- Possibility of recrudescence of infection in populations considered to have eliminated trachoma as a public health problem

WHO 2030 target, sub-targets and milestones

Indicator	2020 (provisional estimate)	2023	2025	2030
Number of countries validated for elimination as a public health problem (defined as (i) a prevalence of trachomatous trichiasis "unknown to the health system" of <0.2% in ≥15-year-olds in each formerly endemic district; (ii) a prevalence of trachomatous inflammation—follicular in children aged 1–9 years of <5% in each formerly endemic district; and (iii) written evidence that the health system is able to identify and manage incident cases of trachomatous trichiasis, using defined strategies, with evidence of appropriate financial resources to implement those strategies)	10/66 (15%)	28/66 (42%)	43/66 (65%)	66/66 (100%)

[1] Frick KD, Basilion EV, Hanson CL, Colchero MA. Estimating the burden and economic impact of trachomatous visual loss. Ophthalmic Epidemiol. 2003; 10:121–132; Frick KD, Hanson CL, Jacobson GA. Global burden of trachoma and economics of the disease. Am J Trop Med Hyg. 2003;69:1–10

[2] Surgery for individuals with trichiasis, MDA with antibiotics to reduce the reservoir of ocular chlamydial infection, and facial cleanliness and environmental improvement

SOURCE: All data sourced from WHO unless otherwise indicated

Burden of disease

About 137 million

people at risk of trachoma requiring A, F and E components of the SAFE strategy in 2020

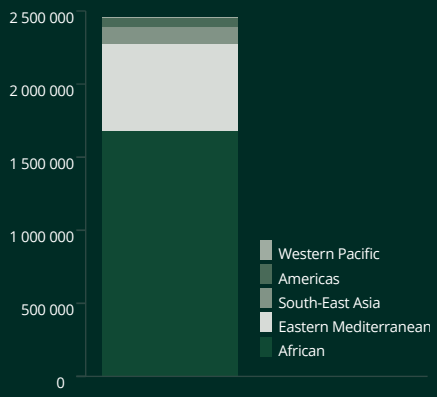
About 2.5 million

people requiring surgery for trachomatous trichiasis in 2019

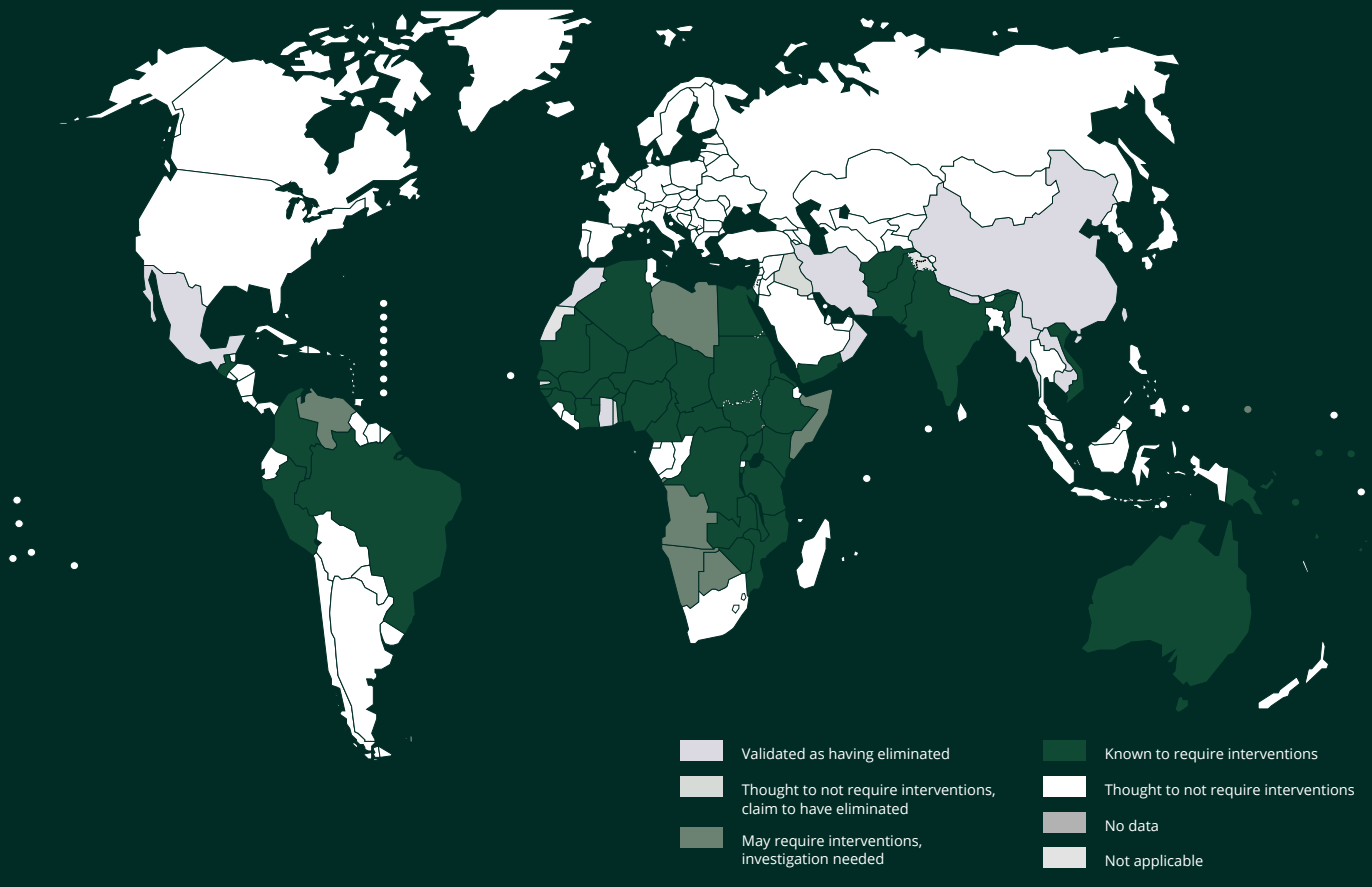
Trachoma is a public health problem in 44 countries and is responsible for blinding or visually impairing 1.9 million people.[1] The number of people at risk of trachoma has decreased by 91% from 1.5 billion in 2002 to about 137 million in 2020. The number of people requiring surgery has reduced by 68% from 7.6 million in 2002 to 2.5 million in 2019.[2]

Estimated trachomatous trichiasis cases by region

People requiring surgery, March 2019



Status of elimination of trachoma as a public health problem, 2020



[1] Global burden of disease. Seattle (WA): Institute for Health Metrics and Evaluation (http://www.healthdata.org/gbd)

[2] Eliminating trachoma: WHO announces sustained progress with hundreds of millions of people no longer at risk of infection. In: Neglected Tropical Diseases [news release]. Geneva: World Health Organization; June 2019 (https://www.who.int/neglected_diseases/news/Trachoma-WHO-announces-sustained-progress/en/)

Trachoma: assessment of actions required to meet 2030 sub-targets

Summary of critical actions to achieve targets

- Improve access to high-quality surgery, tracking of outcomes and management of post-surgery trachomatous trichiasis; initiate management of people with trachomatous trichiasis as soon as possible (about 2.5 million in 2019).
- Increase knowledge through research, and extend partnerships to increase work, specifically on facial cleanliness and environmental improvement to reduce transmission.
- Develop an efficient, cost–effective way to detect and monitor recrudescence of infection, which could be important for post-validation.
- Accelerate research to understand why progress in high-transmission settings has been weaker and whether a different strategy may be needed in these settings.
- Mobilize additional funding, including importantly domestic funding; coordinate efforts with other NTDs on advocacy and funding, surveillance and WASH.

Category and current assessment	Current status	Actions required
Technical progress		
Scientific understanding	• Insufficient understanding of transmission pathways, vectors and infection reservoirs • Particular gaps in understanding of differences in transmission in high-transmission settings relative to other settings	• Conduct scientific and operational research in high-transmission settings and understand need for A, F & E • Improve understanding of the importance of coverage of A, F and E to achieving and sustaining elimination
Diagnostics	• Undertaken based on clinical examination by trained clinical graders	• Conduct research to understand whether tests for current or previous ocular *C. trachomatis* infection would help programmes determine the need for interventions or monitor populations after interventions are discontinued; if so, consider developing serological rapid diagnostic tests to support elimination and post-elimination surveillance
Effective intervention	• The SAFE (surgery for individuals with trichiasis, antibiotic MDA to clear ocular *C. trachomatis* infection, and facial cleanliness and environmental improvement to reduce transmission) strategy is effective. The evidence for the F and E interventions is weak	• Conduct research to determine how best to manage post-operative trachomatous trichiasis • Carry out research to identify critical F and E interventions for reducing transmission of *C. trachomatis* • Improve intervention strategies for certain populations (e.g. refugees)

For more details, please visit:
www.who.int/trachoma/en/

No hindrance towards target

Critical action required to reach target

Category and current assessment	Current status	Actions required
Strategy and service delivery		
Operational and normative guidance	• Operational guidelines for the SAFE strategy are clearly defined • Coherent country-level templates are in place	• Test decision algorithms for discontinuing antibiotic MDA • Assess need to adjust guidelines for high-transmission settings • Improve guidance on post-validation surveillance • Provide additional guidance to avoid or minimize adverse events • Formalize quality standards for patient outreach services and follow up • Provide additional guidance on integration with other programmes
Planning, governance and programme implementation	• Implementation of the SAFE strategy is driven by the WHO Alliance for GET2020 with support from multiple stakeholders • Implementation is very strong in-country for majority of countries; others may need to invest to decrease surgical backlog, coordinate A, F and E and integrate programming	• Reduce the number of districts yet to start interventions • Minimize the backlog of individuals requiring surgery • Coordinate F and E with WASH and other stakeholders nationally • Increase availability of accessible and inclusive care (e.g. stigmatization, mental well-being, rehabilitation) • Increase domestic commitment for implementation
Monitoring and evaluation	• The Global Trachoma Mapping Project was successfully completed with limited areas remaining unmapped by 2016 • WHO Global Health Observatory and the GET2020 database provide a global data repository	• Complete remaining limited mapping • Develop systems to track surgeries and outcomes • Devise methods for improved and sustainable surveillance and post-validation surveillance to limit recrudescence of infection • Design joint monitoring and indicators as appropriate • Develop a better indicator of TT to determine elimination as a public health problem and a better way to estimate the backlog of TT cases
Access and logistics	• Pfizer has donated more than 860 million doses of azithromycin since 1992 through the International Trachoma Initiative; support is pledged until 2025 • National systems manage supply chain with help of partners	• Continue to maintain, review and improve systems as needed; maintain support to prevention and management of serious adverse events
Health care infrastructure and workforce	• Many countries face surgery backlogs but some are beginning to address these (e.g. Ethiopia launched an initiative to clear the surgical backlog by including workforce training supported partly by domestic funding) • Currently, building capacity to provide benefits to populations at risk and minimize potential harm to individuals during scale-up	• Optimize methods for detecting trichiasis cases and reduce backlog of individuals requiring surgery • Develop a system to follow up individuals who have received trichiasis surgery and track outcomes • Deploy trained surgeons effectively • Ensure all health care facilities have access to safe water, sanitation and hygiene services for treatment and care, including for trichiasis surgery
Enablers		
Advocacy and funding	• Countries critically provide domestic funding • Interventions against trachoma have been identified as a "best buy" and donors include both bilateral and private donors	• Mobilize domestic and other financial resources and political will to implement SAFE at scale and sustain elimination • Develop return on investment case for F&E and WASH as evidence is generated
Collaboration and multisectoral action	• The WHO Alliance for GET2020 has proven a dynamic forum for information exchange; stakeholder roles are clearly defined; data are updated annually • A Network of WHO Collaborating Centres for Trachoma helps coordinate and prioritize research to inform elimination • The International Coalition for Trachoma Control is a membership group of nongovernmental, donor, private sector and academic organizations	• Coordinate F & E and any evidence generated with WASH activities with relevant stakeholders • Coordinate surveillance and post-elimination surveillance with other NTDs and relevant groups
Capacity and awareness building	• Technical skills for diagnosis and trichiasis surgery exist but there are limitations in some countries • The mannequin-based trichiasis surgery training system "HEAD START" helps in training TT surgeons • Training in Tropical Data helps in training on clinical grading	• Continue to build capacity, particularly in diagnosis and trichiasis surgery, emphasizing safety, quality and consistency • Build the WASH capacity of health care professionals and caregivers for hygienic treatment and care at health care facilities and households • Build capacity in surveillance

Yaws

Yaws is a chronic disease of childhood caused by infection with spiral bacteria *Treponema pallidum* subspecies *pertenue*. The disease affects the skin, bones and cartilage and causes disfigurement and debilitation.

Disease and epidemiology

- Yaws is a chronic disease of childhood caused by infection with spiral bacteria *Treponema pallidum* subspecies *pertenue*.
- The disease affects the skin, bones and cartilage and causes disfigurement and debilitation.
- Human transmission occurs by skin-to-skin contact through scrapes or cuts.
- Yaws was one of the first diseases targeted for eradication in the 1950s; renewed eradication efforts started in 2012.

Progress against WHO 2020 targets

Impact indicator	2020 target	Current status
Global eradication	194 countries	1 certified; 106 with no previous history of yaws

Core strategic interventions

Preventive chemotherapy	• Single-dose oral azithromycin
WASH	• Personal hygiene
Vector control	N/A
Veterinary public health	N/A
Case management	• Azithromycin used as first-line treatment • Intramuscular benzathine benzylpenicillin used for second-line treatment and for those with proven resistance to azithromycin • Patients should be examined after 4 weeks; in more than 95% cases are completely healed
Other	N/A

Risks that require mitigation

- Total targeted treatment (TTT) may not be effective as latent and active infections are often in different households
- The eradication goal demands enormous resources that may be difficult to sustain
- Impact of artificial and natural disasters on achieving eradication goal

WHO 2030 target, sub-targets and milestones

Indicator	2020 (baseline)	2023	2025	2030[1]
Number of countries certified free of transmission	1	97 (50%)	136 (70%)	194 (100%)

[1] For yaws, there will be a supplementary milestone for 2027, given that transmission should be interrupted in all countries by 2027 in order for the 2030 goal of eradication to be met

SOURCE: All data sourced from WHO unless otherwise indicated

Burden of disease

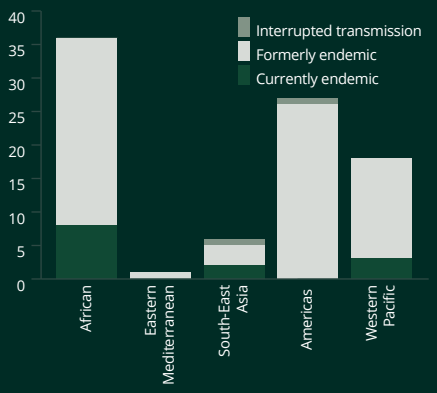
80 247
suspected yaws cases reported in 2018

1177
confirmed cases reported in 2018

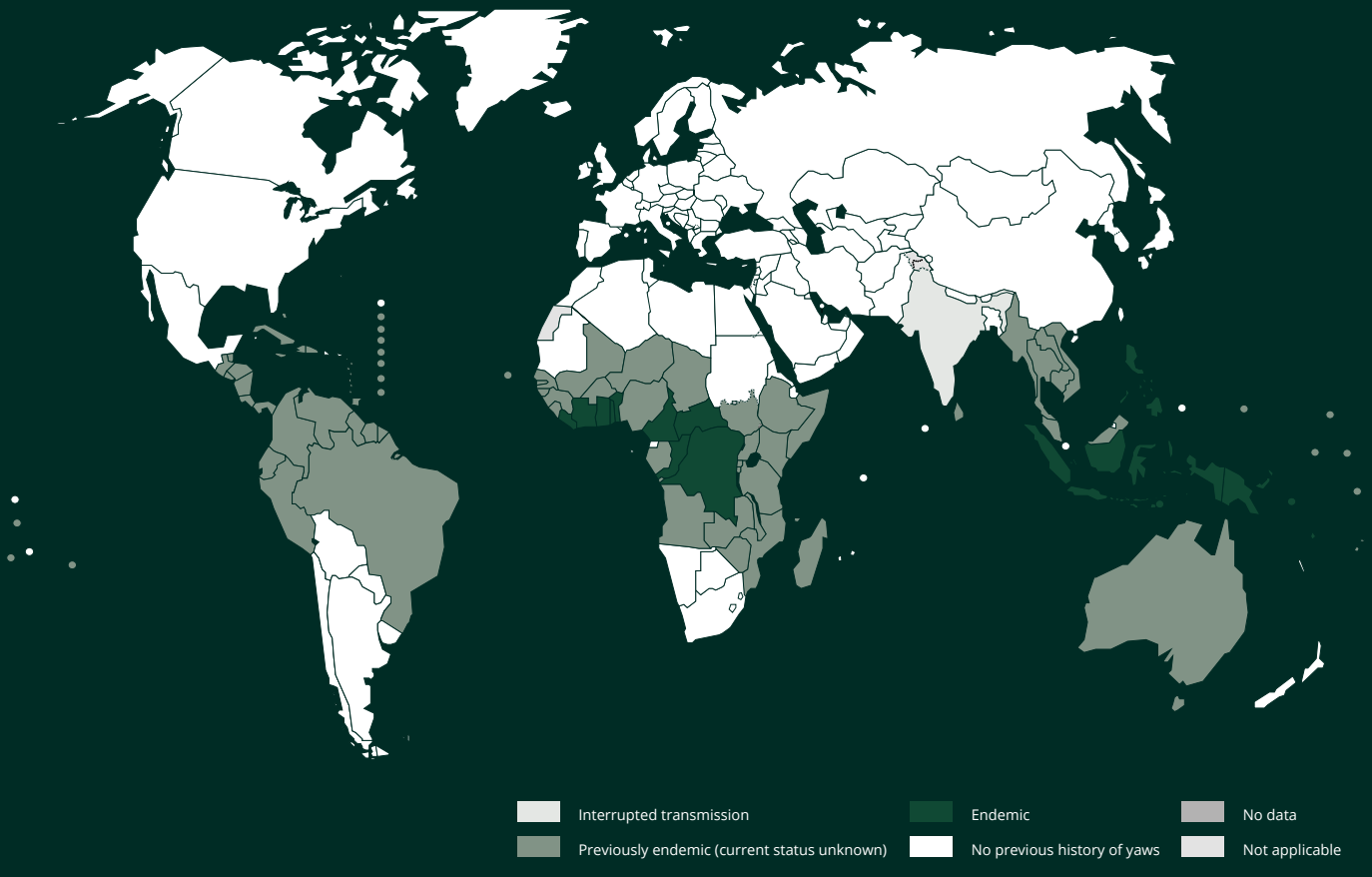
1
country certified free of transmission in 2019

In 2019, yaws was endemic in 15 countries; the status is unknown in 72 countries mainly in the African, Americas, South-East Asia and Western Pacific regions.

Number of countries by endemicity status, 2019



Endemicity of yaws, 2019



Yaws: assessment of actions required to meet 2030 sub-targets


© WHO/Yoshi Shimizu

Summary of critical actions to achieve targets

- Start mass drug administration (MDA) in all endemic areas after mapping.
- Strengthen active and passive surveillance, including in countries of unknown status.
- Ensure effective, efficient integration and/or co-implementation with other programmes and sectors (e.g. integrated management of skin NTDs).
- Increase funding and advocacy for yaws eradication, including securing longer-term commitments and increasing the priority of yaws as suitable for preventive chemotherapy and a skin NTD.

Category and current assessment	Current status	Actions required
Technical progress		
Scientific understanding	• Thorough understanding of epidemiology • No prominent negative effects of treatment known other than potential onset of drug resistance	• Understand the role of non-human primates as a potential disease reservoir
Diagnostics	• Diagnosis using rapid point-of-care tests and serological laboratory-based tests (TPHA/RPR) • Diagnosis confirmed by dual path platform syphilis screen (DPP) and/or swabs using PCR	• Develop a sensitive point-of-care molecular test (e.g. PCR) to distinguish yaws from other skin ulcers (e.g. *Haemophilus ducreyi*) and to monitor resistance to azithromycin
Effective intervention	• MDA aims for at least 90% coverage of endemic areas • TTT is used for immediate treatment of cases and contacts in between scheduled MDA rounds	• Start MDA in all endemic areas after mapping • Strengthen active and passive surveillance, including in countries of unknown status • Develop new antibiotics as a back-up option in case antimicrobial resistance develops against azithromycin

For more details, please visit:
www.who.int/yaws/en/

No hindrance towards target

Critical action required to reach target

Category and current assessment	Current status	Actions required
Strategy and service delivery		
Operational and normative guidance	• The Morges strategy (2012) outlines the way towards eradication of yaws by 2030 • Programme managers guide (2018), technical guidelines for integrated disease surveillance (2010) and verification and certification procedures (2018) published • WHO technical guidance on M&E will be finalized in 2021	• Provide technical guidance on establishing country committees on yaws (and other NTDs)
Planning, governance and programme implementation	• An ad hoc global advisory group can be convened • Many countries have NTD programmes and master plans; some have National Yaws Eradication Programmes	• Ensure effective, efficient integration and/or co-implementation with other programmes and sectors (e.g. integrated management of skin NTDs) • Create a global advisory group on yaws eradication • Expand the membership of the International Commission for the Certification of Dracunculiasis Eradication to include yaws expertise
Monitoring and evaluation	• PCR is used to monitor antimicrobial resistance • Surveillance systems are working well in some endemic countries	• Establish active integrated surveillance and response in all endemic and formerly endemic countries (status unknown) and increase the frequency of reporting • Assess 76 formerly endemic countries to confirm the current yaws status
Access and logistics	• Assured availability of azithromycin for MDA • Availability of antibiotics and diagnostics within primary health care facilities to diagnose and treat cases and contacts (TTT) in between MDA rounds • In remote areas, access to medicines and RDTs/DPPs may be difficult	• Improve access to RDTs/DPPs and medication in endemic locations including isolated foci (as part of universal health coverage) • Ensure medicines for MDA and TTT are of assured quality
Health care infrastructure and workforce	• Yaws is currently treated through a verticalized MDA programme • TTT is carried out through the primary health care system	• Strengthen health systems and laboratory infrastructure for yaws surveillance (including the use of PCR)
Enablers		
Advocacy and funding	• Limited political and donor/partner support for implementation • Strong community engagement • Good support from the research community	• Increase funding and advocacy for yaws eradication, including securing longer-term commitments and increasing the priority of yaws as suitable for preventive chemotherapy and a skin NTD • Sustain community engagement to support programme implementation • Maintain research community engagement for knowledge generation and advocacy to mobilize resources for research
Collaboration and multisectoral action	• Relatively effective integration with school health programmes exists in case detection • Community health workers are engaged in case detection as part of integrated skin NTDs	• Integrate with other programmes to increase surveillance (e.g. immunization, nutrition, maternal and child health, skin NTDs) • Collaborate with ministry of education school health programmes on case-finding, screening and treatment • Strengthen integrated management of skin NTDs and integrate MDA with other NTDs amenable to preventive chemotherapy where applicable • Strengthen collaboration with WASH providers and local government
Capacity and awareness building	• Health workers and community health workers in rural areas are trained to recognize and report yaws • Some integration in capacity-building across skin NTDs • Health workers are trained to use RDTs/DPP and to collect swabs for PCR	• Develop capacity of health workers and community health workers for case detection, treatment and reporting of yaws and other skin NTDs • Collaborate with WASH to raise awareness in communities of the importance of personal hygiene

Ending the neglect to attain the Sustainable Development Goals: a road map for neglected tropical diseases 2021–2030 was prepared through an extensive global consultation pursuant to decision EB146(9) of the Executive Board at its 146th session in February 2020 that culminated in the endorsement of the document by the Seventy-third World Health Assembly in November 2020.

The road map sets global targets and milestones to prevent, control, eliminate or eradicate 20 diseases and disease groups as well as cross-cutting targets aligned with the Sustainable Development Goals. Three foundational pillars will support global efforts to achieve the targets: accelerate programmatic action (pillar 1), intensify cross-cutting approaches (pillar 2) and change operating models and culture to facilitate country ownership (pillar 3).

This people-centred, country focused blueprint aims to renew momentum through concrete actions within integrated platforms for delivery of interventions, and thereby to improve the cost–effectiveness, coverage and geographical reach of programmes. Strengthening the capacity of national health systems will ensure delivery of interventions through existing infrastructures, improve the sustainability and efficiency of interventions and ensure that patients have equitable access to all aspects of treatment, care and support. Close coordination and multisectoral action within and beyond the health sector, embracing not only vector control, water and sanitation, animal and environmental health and health education, but also, for instance, education and disability, will maximize synergies.

The disease summaries annexed to the road map detail the current epidemiological status and burden of disease, core strategic interventions and progress towards the 2020 targets of the previous road map. The targets, sub-targets and milestones for 2030, and the critical actions required to achieve them, were used to generate the evidence in the road map document endorsed by the World Health Assembly.

World Health Organization

9 789240 010352