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Regional Action Framework for Control and Elimination of Neglected Tropical Diseases in the Western Pacific

World Health Organization
Western Pacific Region

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ABBREVIATIONS

CL-SWASH	community-led initiative to eliminate schistosomiasis with water, sanitation and hygiene
DEC	diethylcarbamazine citrate
DHIS	District Health Information System
FAO	Food and Agriculture Organization of the United Nations
FBT	foodborne trematodiases
G2D	grade 2 disability
GPELF	Global Programme to Eliminate Lymphatic Filariasis
MDA	mass drug administration
MDT	multi-drug therapy
NTD	neglected tropical disease
OIE	World Organisation for Animal Health
PacELF	Pacific Programme to Eliminate Lymphatic Filariasis
RPRG	Regional Programme Review Group
SDG	Sustainable Development Goal
SOP	standard operating procedure
STH	soil-transmitted helminthiases
TCT	total community treatment
TF	trachomatous inflammation - follicular
TT	trachomatous trichiasis
TTT	total targeted treatment
UNICEF	United Nations Children’s Fund
WASH	water, sanitation and hygiene
WHO	World Health Organization
WSP	water safety planning

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EXECUTIVE SUMMARY

Neglected tropical diseases (NTDs) are a diverse group of disease conditions that are most common in tropical and subtropical regions. These diseases most heavily affect people living without access to adequate sanitation, basic infrastructure and health services. In addition to significant morbidity and mortality, these diseases can lead to stigma and discrimination in communities.

WHO prioritizes 20 diseases affecting more than 1 billion people in 149 countries as NTDs. Of these, 15 are endemic in 28 countries and areas in the Western Pacific Region. These diseases are prioritized not only because of the magnitude and impact of their burden, but also because they are amenable to broad control, elimination or eradication by delivering one or more of the five interventions recommended by WHO. The interventions are: (1) preventive chemotherapy; (2) veterinary public health; (3) provision of safe water, sanitation and hygiene; (4) vector and intermediate host control; and (5) case management and rehabilitation.

In 2012, WHO and partners adopted *Accelerating Work to Overcome the Global Impact of Neglected Tropical Diseases: A Roadmap for Implementation*. The Roadmap set out goals and targets to be reached by 2020 and strategies for each NTD based on World Health Assembly resolutions and global initiatives. In the same year, the Regional Committee endorsed the *Regional Action Plan for Neglected Tropical Diseases in the Western Pacific Region (2012–2016)* (WPR/RC63.R4), setting disease-specific elimination and control goals, in line with the NTD Roadmap.

Since then, the Western Pacific Region has seen remarkable progress, primarily through preventive chemotherapy or so-called mass drug administration. From 2016 to 2017, six countries (Cambodia, Cook Islands, the Marshall Islands, Niue, Tonga and Vanuatu) were validated for elimination of lymphatic filariasis as a public health problem. These are the first countries in the world to be validated, since China in 2007 and the Republic of Korea in 2008. Cambodia and the Lao People's Democratic Republic became the first countries in the Region to be validated for elimination of blinding trachoma in 2017. The burden of schistosomiasis in many endemic areas of the Region has also been reduced significantly, to the point that elimination is now within reach. In addition, many countries have institutionalized nationwide annual or semi-annual rounds of deworming in children, resulting in reduced prevalence of soil-transmitted helminthiases in many areas. In 2016 alone, more than 51 million people in 14 countries in the Region received preventive chemotherapy for at least one NTD.

With these achievements, the NTD landscape in the Western Pacific Region is changing. While intensified campaigns can accelerate elimination of some NTDs, efforts are under way to gradually expand focus from dependence on preventive chemotherapy to combining preventive chemotherapy with a whole-of-system multisectoral approach to accelerate control and elimination of NTDs. This approach will be informed by accurate determination of burden and distributions through strengthened surveillance, including in pre- and post-elimination settings.

In 2017, three disease conditions were added to the global NTD portfolio, namely scabies and other ectoparasitic infestations, snakebite envenoming, and chromoblastomycosis and other deep mycoses. As new disease conditions are added, actions must be taken to assess the most effective way to integrate them into the overall framework for control and elimination of NTDs.

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NTDs are included in the Sustainable Development Goals. Universal health coverage will be key for NTD control and elimination, helping sustain gains by ensuring that needed health services reach all people, particularly marginalized and neglected populations. The Sustainable Development Goals present opportunities to accelerate progress on NTDs through whole-of-system multisectoral interventions, such as improvements in water and sanitation, food safety, environmental health and veterinary public health, in addition to health services.

The Regional Action Framework is intended to guide Member States, WHO and all other donors and partners to work together to systematically and progressively strengthen various weaknesses existing in key programmatic areas and/or contribute to enhancing relevant health system components so that universal and equitable access to essential NTD interventions and services, particularly in hard-to-reach marginalized populations, is achieved and control and elimination of NTDs are accelerated.

The vision of the Western Pacific Region free from NTDs is achieved through twin goals:

1) Achieve and sustain the status of elimination of NTDs targeted in resolutions of the World Health Assembly, namely yaws, rabies, schistosomiasis, trachoma, lymphatic filariasis and leprosy.

2) Achieve and sustain control of other NTDs and alleviate suffering from NTD-associated morbidity and disabilities.

The goals are achieved through four interrelated strategic pillars with seven key programmatic areas:

Pillar 1 – Catalysing coordinated multisectoral actions

Programmatic area 1. Strategic planning and programme review

Programmatic area 2. Advocacy and partnership

Pillar 2 – Enhancing intervention and service delivery

Programmatic area 3. Supply and logistics management

Programmatic area 4. Intervention and service delivery

Pillar 3 – Engaging and empowering communities

Programmatic area 5. Health risk communications and social mobilization

Pillar 4 – Measuring impacts and generating evidence

Programmatic area 6. Surveillance, laboratory and health information system

Programmatic area 7. Research and innovation

There is a significant diversity in endemic diseases, their burden, progress of control interventions and local context between countries and areas in the Western Pacific Region. The Regional Action Framework provides a framework for countries and areas in the Region to use when they develop or update national plans to strengthen key aspects of the NTD programme and to accelerate control and elimination of NTDs endemic in each country. Guided by an analysis of their respective situation, each country and area is encouraged to identify key programmatic areas and issues to be addressed, identify relevant sectors and partners to cooperate and jointly plan and deliver key actions.

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1. BACKGROUND

Neglected tropical diseases (NTDs) are a diverse group of disease conditions, the majority of which are caused by parasitic infections and most usually affect people living without access to adequate sanitation, basic infrastructure and health services in tropical and subtropical regions. NTDs are both a cause and consequence of poverty, causing physical and intellectual impairments, preventing children from attending schools, and reducing economic productivity. People affected by NTDs are frequently the target of stigmatization and discrimination in their communities. For example, individuals affected by lymphoedema or hydrocele because of lymphatic filariasis, who are visually impaired because of trachoma or who have severe skin lesions or physical deformity resulting from yaws, Buruli ulcer or leprosy can be socially excluded, affecting their ability to work and care for and live with their families. NTDs are termed "neglected" because the affected populations are often the most vulnerable, hard-to-reach populations who often cannot afford appropriate medical services and who have little political voice in the society for change.

NTDs are an integral part of the Sustainable Development Goals (SDGs). Target 3.3 specifically aims to "end the epidemics of neglected tropical diseases by 2030". Achieving this target will also have a direct impact on Target 3.8, which aims to "achieve universal health coverage". The World Health Organization (WHO) defines universal health coverage to mean that all people in need can access promotive, preventive, curative, rehabilitative and palliative health services of sufficient quality, without suffering financial hardship *(1).* NTDs proliferate in underdeveloped settings where people have little or no access to adequate health care, clean water, sanitation, housing, education and information, and therefore a presence of NTDs often indicates health system weaknesses and poor infrastructure. In May 2013, the World Health Assembly adopted a resolution calling on WHO Member States to intensity efforts to address NTDs, integrate such efforts into primary health services and ensure universal access to preventive chemotherapy and treatment. Target 3.8 can be achieved only if all people and communities affected by NTDs receive appropriate health services *(2).* In other words, the fight to control and eliminate NTDs is a journey to ensure that the most marginalized and neglected populations, who are most in need, are equitably reached by appropriate health services and no one is left behind (Box 1, 4).

Box 1. Strengthening eye health services through trachoma elimination efforts in the Pacific

Trachoma is the leading cause of infectious blindness worldwide. In the Western Pacific Region, it is endemic in seven countries, namely, Australia, Fiji, Kiribati, Papua New Guinea, Solomon Islands, Vanuatu and Viet Nam.

In 1996, WHO launched the WHO Alliance for the Global Elimination of Trachoma by 2020, and in 1998, the World Health Assembly endorsed resolution WHA51.11, calling for the global elimination of blinding trachoma. To support elimination efforts, WHO recommends countries to adopt the SAFE strategy: surgery for trichiasis; antibiotics to clear infection; facial cleanliness to reduce transmission; and environmental improvement for elimination of trachoma. The WHO process to validate achievement of elimination of trachoma as a public health problem also includes an assessment of the country's health system capacity to detect and treat potential patients even beyond validation.

Member States, WHO and other partners have been working together to strengthen capacity to implement the SAFE strategy in all trachoma-endemic countries globally. In the Pacific, this includes training for

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ophthalmologists, other doctors and nurses on surgical interventions and eye examinations and training for health workers in remote island nations with limited ophthalmologic capacity, such as Kiribati, Solomon Islands and Vanuatu, to ensure sustained access to quality-assured antibiotics and facial cleanliness. These disease-specific elimination efforts are driving health system strengthening so that marginalized populations in remote, hard-to-reach communities, who are most in need, have access to quality eye health service.

1.1 NTDs in the Western Pacific Region

Through a systematic process for evaluation, WHO has classified 20 diseases affecting more than 1 billion people in 149 countries as NTDs, based on the following criteria *(3)*:

1) disproportionately affect populations living in poverty and cause important morbidity and mortality – including stigma and discrimination – in such populations, justifying a global response;
2) primarily affect populations living in tropical and subtropical areas;
3) are immediately amenable to broad control, elimination or eradication by applying one or more of the five public health interventions recommended by WHO, namely, preventive chemotherapy, intensified case management, vector control, veterinary public health, and safe water, sanitation and hygiene (WASH); and/or
4) are relatively neglected by research – that is, resource allocation is not commensurate with the magnitude of the problem – when it comes to developing new diagnostics, medicines and other control tools.

Of the 20 classified diseases, 15 are currently endemic in countries and areas of the Western Pacific Region (Table 1) and in total 28 countries or areas have at least one endemic NTD. Many NTDs are parasitic diseases transmitted to humans through insects or other vectors, such as mosquitoes, flies or freshwater snails, while others are caused by bacteria, mites, viruses or toxins. For most causal agents of NTDs, transmission is due to a lack of safe water, proper sanitation and/or hygiene in affected households and communities. Furthermore, many are zoonotic. As such, populations without basic infrastructure such as adequate water supply and sanitation facilities and who are in frequent contact with infectious vectors, domestic animals and livestock are those most affected.

Table 1. NTDs endemic in the Western Pacific Region and their causal agents, major vectors and intermediate and final hosts

Disease	Causal agent	Major vector or intermediate host	Major final host
Buruli ulcer	Bacteria	—	Human
Dengue	Virus	Mosquito	Human
Echinococcosis	Parasitic helminth	Sheep, goat (*Echinococcus granulosus*) Rodents (*E. multilocularis*)	Dog, wolf (*E. granulosus*) Fox, dog (*E. multilocularis*)
Foodborne trematodiases	Parasitic helminth	Freshwater snail, freshwater fish or crustacean	Human Dog, cat, rat, pig, etc.
Leishmaniasis	Parasitic protozoa	Phlebotomine sandfly	Human, dog, rodents
Leprosy	Bacteria	—	Human
Lymphatic filariasis	Parasitic helminth	Mosquito	Human

Rabies	Virus	–	Dog
Scabies and other ectoparasites	Mite	–	Human
Schistosomiasis	Parasitic helminth	Freshwater snail	Human Buffalo, cattle, dog, cat, etc.
Snakebite envenoming	(toxin "venom")	–	–
Soil-transmitted helminthiases	Parasitic helminth	–	Human
Taeniasis/cysticercosis	Parasitic helminth	Pig, human (cysticercosis)	Human
Trachoma	Bacteria	–	Human
Yaws	Bacteria	–	Human

1.2 Feasibility for control, elimination and eradication of NTDs

Since the 1950s, WHO has prioritized NTDs not only because of the magnitude and impacts of their burden, but also because there is accumulated evidence to indicate that effective delivery of public health interventions to affected communities will enable broad control, elimination and eradication of the diseases, as defined by WHO (Box 2).

Box 2. Definitions of eradication, elimination and control of NTDs

WHO recommends using the following practical definitions for the global NTD roadmap targets *(4)*:

Eradication is the permanent reduction to zero of a specific pathogen, as a result of deliberate efforts, with no more risk of reintroduction. The process of documenting eradication is called certification.

Elimination of transmission (also referred to as interruption of transmission) is the 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 eff orts; continued actions to prevent re-establishment of transmission may be required. The process of documenting elimination of transmission is called verification.

Elimination as a public health problem is a term related to both infection and disease. It is defined by achievement of measurable global targets set by WHO in relation to a specific disease. When reached, continued actions are required to maintain the targets and/or to advance the interruption of transmission. The process of documenting elimination as a public health problem is called validation.

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

Since its founding in 1948, the agenda of the World Health Assembly has included a commitment to working to reduce the burden of diseases that are now part of NTDs. To date, the World Health Assembly has adopted 70 resolutions calling on Member States to work to overcome NTDs. Global goals and targets endorsed by the World Health Assembly are listed in Table 2.

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Table 2. WHO global 2020 goals for NTDs endemic in the Western Pacific Region

Disease	WHO global goals			Relevant resolution
	Eradication	Elimination*	Control	
Buruli ulcer			✓	WHA57.1 (2004)
Dengue			✓	WHA55.17 (2002)
Echinococcosis			✓	WHA3.23 (1950)
Foodborne trematode infections			✓	WHA31.48 (1978)
Leishmaniasis			✓	WHA60.13 (2007)
Leprosy		✓		WHA51.15 (1998)
Lymphatic filariasis		✓		WHA50.29 (1997)
Rabies		✓		WHA3.20 (1950)
Schistosomiasis		✓		WHA65.21 (2012)
Snakebite envenoming			✓	WHA71.5 (2018)
Soil-transmitted helminthiases			✓	WHA54.19 (2001)
Taeniasis/cysticercosis			✓	WHA31.48 (1978)
Trachoma		✓		WHA51.11 (1998)
Yaws	✓			WHA31.58 (1978)

* Including elimination as a public health problem and elimination within a specific geographical region
Source: World Health Organization *(5).*

1.2.1 Diseases targeted for eradication, elimination (interruption of transmission) or elimination as a public health problem

Yaws is targeted for global eradication. Humans are the only host, and effective treatment and serologic rapid diagnostic tests to detect clinically active yaws are available *(6)*. Furthermore, elimination feasibility has been demonstrated in the past. In 1954, WHO and the United Nations Children's Fund (UNICEF) launched a global yaws eradication campaign using benzathine penicillin injection that reduced global cases by 95% by the late 1960s. However, premature programme abandonment and weak surveillance led to a resurgence of cases in many countries, prompting WHO to restart control programmes in 2007 *(4)*. Mass treatment with a single oral dose of azithromycin has been proven as effective as benzathine penicillin injection for eradication *(7)*. Since 2018, azithromycin is donated free of charge through WHO.

Lymphatic filariasis is targeted for global elimination as a public health problem. Humans are the only reservoir of infection, except for *Brugia malayi*, which has a reservoir in nonhuman primates that does not appear to contribute significantly to transmission to humans *(8,9)*. Effective treatment and serologic rapid diagnostic tests are available. Mass drug administration (MDA) with a combination therapy of albendazole and diethylcarbamazin citrate (DEC) – or albendazole and ivermectin in countries where onchocerciasis is co-endemic – has been a principal strategy for interruption of transmission of lymphatic filariasis *(8)*. In 2017, WHO recommended a triple drug therapy of albendazole, DEC and ivermectin as a more effective strategy with potential to shorten the time frame for elimination from 5–6 years to 1–2 years *(10)*. Albendazole and DEC are donated free of charge through WHO, whereas ivermectin is donated through the Mectizan Donation Program in coordination with WHO. Feasibility of elimination has been demonstrated in many countries. In the Western Pacific Region alone, eight countries have been validated for having eliminated lymphatic filariasis as a public health problem since 2000.

Trachoma is targeted for global elimination as a public health problem referring to blinding trachoma. Mass treatment with a single oral dose of azithromycin is recommended as part of the SAFE strategy for elimination of the disease (*11*). Azithromycin is donated free of charge through the International Trachoma Initiative. Trachoma is clinically diagnosed, and the WHO trachoma simplified grading system is available to ease field diagnosis *(12)*. In the Western Pacific Region, two countries were validated in 2017 for having eliminated trachoma as a public health problem.

Schistosomiasis is targeted for elimination in the Eastern Mediterranean Region, the Caribbean and the Western Pacific Region *(13)*. Praziquantel is effective in killing *Schistosoma* worms, and MDA with praziquantel has been proven to be highly effective in reducing transmission. Japan, where *S. japonicum* was once endemic, eliminated the disease through effective vector control and surveillance with the last reported case in 1977 *(14)*. China has significantly reduced the disease prevalence through a multisectoral approach involving WASH and the treatment and management of animal reservoirs; it claims to have achieved interruption of transmission in over 80% of endemic counties in by the end of 2017. Praziquantel is currently donated through WHO, but the donated drugs are distributed mainly to children in Africa.

Dog-mediated rabies in humans is targeted for global elimination. Although rabies can infect and be transmitted by a wide range of mammals, 99% of all rabies transmissions to humans result from the bites of rabid dogs *(15)*. Mass dog vaccination campaigns are the mainstay of dog-mediated rabies control. Effective control and eventual elimination of dog-mediated rabies can be achieved if campaigns are conducted recurrently (usually annually) with a vaccination coverage of at least 70%. This coverage should be sufficient to maintain the required level of herd immunity in the susceptible population despite dog population turnover (births, deaths, animal movement) in the period between campaigns *(16)*. Many developed countries have eliminated rabies in humans by dog registration, mass vaccination of dogs and control of stray dog population. In addition, effective and safe rabies vaccines – intended as both pre- and post-exposure prophylaxis – are available to prevent rabies in humans. Prompt administration of post-exposure prophylaxis after exposure, combined with proper wound management and simultaneous administration of rabies immunoglobulins where indicated, is almost invariably effective in preventing rabies, even after high-risk exposure *(16)*.

Global elimination of **leprosy** as a public health problem was achieved in 2000 and a decade before at the Western Pacific Regional level. Currently leprosy is targeted for global elimination defined as interruption of transmission (*5*). The exact mechanism of transmission of leprosy is not known. Humans are the only known reservoir of infection (*17*). However, a naturally occurring disease with organisms indistinguishable from *Mycrobacterium leprae* has also been detected among a few wild animals *(17)*. Leprosy can be easily diagnosed on clinical signs alone. Effective treatment – multidrug therapy (MDT) – is available and donated free of charge through WHO *(18)*.

1.2.2 Diseases targeted for control

Taenia solium **taeniasis/cysticercosis** is currently targeted for control. Effective, safe and inexpensive medicines (niclosamide, praziquantel or albendazole) are available for mass treatment of humans *(19,20)*. Additionally, a vaccine to prevent infection in pigs and thus prevent transmission of *T. solium* to humans and antihelminthics to treat infected pigs are available *(20)*. These interventions for prevention and treatment make the ultimate elimination of *T. solium* taeniasis/cysticercosis

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potentially achievable, as declared by the International Task Force for Disease Eradication in 1992 *(9)*. Feasibility of elimination of *T. solium* taeniasis/cysticercosis has been demonstrated in Europe and in parts of Peru.

Soil-transmitted helminthiases are also targeted for control. Humans are known to be the only reservoir for these infections *(9)*; however, humans might be accidentally infected by zoonotic species. Effective, safe and inexpensive medicines (albendazole and mebendazole) are available and used for regular large-scale deworming to reduce worm burdens and control associated morbidity in infected individuals and affected communities *(21)*. Albendazole and mebendazole are currently donated through WHO for large-scale deworming to control soil-transmitted helminthiases in school-aged children worldwide. However, improving sanitation and hygiene is equally important to effectively reduce and ultimately interrupt transmission in the long term.

Foodborne trematode infections, consisting of clonorchiasis, opisthorchiasis, fascioliasis and paragonimiasis, are targeted for control. For these trematodes, effective, safe and inexpensive medicines (praziquantel for clonorchiasis, opisthorchiasis and paragonimiasis; triclabendazole for fascioliasis and paragonimiasis) are available to be used for mass treatment of humans in high-risk communities to reduce worm burden and the prevalence of infection in affected communities *(20)*. However, these trematodes are closely linked with food habits and hygiene in endemic areas. Therefore, food safety risk communications play a key role for prevention of reinfection. As they are also zoonotic, veterinary public health and environmental measures, including treating domestic or livestock animals, enforcing separation between husbandry and humans and draining grazing lands, might also be adopted *(20)*.

Echinococcosis is targeted for control. Humans act as accidental intermediate hosts and are not involved in transmitting the infection to the definitive host *(21)*. Therefore, control interventions should be targeted to the definitive hosts (dogs and foxes) with the aim to reduce or eliminate their adult worm burdens, and, in the case of cystic echinococcosis, to reduce transmission through the parasite's livestock intermediate hosts. Effective anticestode medicine (praziquantel) is available for mass treatment of such animals, but the logistics of regular mass treatment is a challenge. Vaccines for intermediate hosts such as sheep and goats to prevent their infection are also available for control of cystic echinococcosis. Cystic echinococcosis has been eliminated in several previously highly endemic regions through regular deworming of dogs, health education, meat inspection, and effective surveillance in livestock and human populations *(22)*.

Dengue is targeted for control. Humans are the major vertebrate hosts of the virus. There is no direct person-to-person transmission. Dengue is transmitted principally by the *Aedes aegypti* mosquito, which bites during daylight hours. There are no specific antiviral treatments against dengue fever. Early detection and case management, surveillance, outbreak response and sustainable vector management are key technical elements of the control strategy (*23*).[1] Several candidate vaccines are currently under evaluation.

Buruli ulcer is targeted for control. The transmission dynamics of Buruli ulcer have yet to be completely elucidated. Different combinations of antibiotics given for 8 weeks are used to treat the

[1] The regional response to dengue is covered in the *Western Pacific Regional Action Plan for Dengue Prevention and Control (2016)*.

Buruli ulcer irrespective of the stage *(24).* Early detection and antibiotic treatment is the cornerstone of the control strategy.

Leishmaniasis is targeted for control (visceral leishmaniasis is targeted for regional elimination in the Indian subcontinent) *(5).* Control of the disease requires a combination of strategies including early case detection and treatment, control of vectors and animal reservoirs hosts. Some species of *Leishmania* parasites also may be spread via contaminated needles or blood transfusions *(25).* Congenital transmission has also been reported *(25).*

Snakebite envenoming and **scabies and other ectoparasites** were added to the NTD portfolio in 2017. Effective treatments are available for both conditions. Snake antivenoms are effective treatments to prevent or reverse most of the harmful effects of snakebite envenoming and are included in the WHO list of essential medicines *(26).* Most deaths and serious consequences from snake bites are entirely preventable by making safe and effective antivenoms more widely available and accessible, and raising awareness on primary prevention among communities and health workers. For scabies, a number of effective medications are also available. Feasibility of MDA using oral ivermectin for elimination of scabies is being investigated in a number of countries *(27).* Roadmaps for effective control of these health conditions are being developed.

1.3 Public health interventions for control, elimination and eradication of NTDs

NTDs share several common features. The most profound commonality is geographical distribution of the diseases and their stranglehold on the poor and marginalized populations in tropical and subtropical areas, but another important commonality is the effectiveness of public health interventions for control, elimination and eradication across the diseases *(5).*

In 2003, WHO shifted the focus of control measures away from treating specific diseases to addressing multiple NTD burdens through the application of public health interventions *(5).* One or more of the five WHO-recommended public health interventions may predominate for the control of a specific NTD or group of NTDs depending on its endemicity, its local transmission dynamics, recent burden and existing health system capacity (Table 3); however, disease control is more effective when these approaches are combined and delivered locally in a coordinated manner.

1) **Preventive chemotherapy**
   Preventive chemotherapy is defined as the large-scale distribution of safe medicines, either alone or in combination, to population groups at risk. It is implemented at regular intervals with an aim to reduce the extensive morbidity associated with selected NTDs and ultimately reduce and interrupt their transmission where possible. The diseases targeted by preventive chemotherapy are characterized by a chronic evolution of morbidity that gives rise to late or nonspecific symptoms, with the consequence that individuals are frequently unaware of being infected for a long time *(28).* Treatment must therefore be provided actively and does not need to be repeated frequently by virtue of the previously mentioned slow disease evolution. Preventive chemotherapy has been the mainstay of control and elimination of many NTDs endemic in the Western Pacific Region. There are three modalities by which preventive chemotherapy interventions are implemented *(28)*:
   - MDA: when the entire population of an area is administered;

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- targeted chemotherapy: chemotherapy is administered to specific risk groups in the population as defined by age sex, or other social characteristics (for example, school-aged children, fisherman; and
- selective chemotherapy: when, as a result of regular screening in a population living in an endemic area, chemotherapy is administered to all individuals found (or suspected) to be infected.

2) Veterinary public health

Veterinary public health is defined as the application of veterinary science, including animal vaccination, deworming and veterinary surveillance, to detect, prevent, control and eventually eliminate zoonoses and thus protect health of humans. A number of NTDs are zoonotic, naturally transmitted between animals and humans. Preventing and mitigating their occurrence in humans requires controlling and, where feasible, eliminating the diseases in their animal reservoirs (particularly final hosts) through collaborative, cross-sectoral efforts of human and animal health systems *(29).*

3) Provision of safe water, sanitation and hygiene (WASH)

WASH interventions include improvements of:

- safe water supply: for consumption, reducing contact with surface water, and enabling hygiene practices, treatment, care and rehabilitation;
- sanitation: to reduce contamination of the environment and prevent vector breeding; and
- hygiene practices: for preventing primary and secondary infections and reducing transmission.

For a majority of NTDs, transmission is due to a lack of safe water, proper sanitation and/or hygiene in affected families and communities. While preventive chemotherapy can exert immediate impacts in reducing prevalence of infection and morbidity burden, WASH interventions are required to sustain such impacts and further reduce and ultimately eliminate transmission. Clean water and hygiene are also essential for provision of appropriate care and rehabilitation services for those affected by residual morbidities and chronic disabilities caused by NTDs. WASH interventions aim to reduce and ultimately eliminate transmission of such NTDs and also to ensure effective care for those with physical impairments and disabilities due to NTDs *(30).*

4) Control of vectors and intermediate hosts

Many NTDs involve vectors (insects) or intermediate hosts (for example, aquatic snails) in their transmission. This intervention refers to safe and judicious use of public-health pesticides to control vectors and intermediate hosts through integrated vector management *(5).* Control of vectors and intermediate hosts is aimed at contributing to reducing the heavy burden of vector-borne NTDs and has the potential to play a significant role during the elimination of some of NTDs such as lymphatic filariasis, schistosomiasis and leishmaniasis.

5) Case management and rehabilitation

Many NTDs, if not treated in a timely manner, cause acute or chronic morbidities and disabilities that often require long-term care and rehabilitation services, including psychosocial and physical support. This intervention includes detection, treatment and management of acute

and chronic clinical manifestations of NTDs, including skin/wound care and surgery, and rehabilitation services. It aims to allow affected individuals to be detected and managed within the primary health care system along the continuum of care, in line with the *WHO Global Disability Action Plan 2014–2021: Better Health for All People with Disability (31).*

Table 3. WHO-recommended public health interventions for NTDs

NTD	Preventive chemotherapy	Veterinary public health	WASH	Vector control	Disease management and rehabilitation
Buruli ulcer			✓		✓
Dengue				✓	✓
Echinococcosis		✓	✓		✓
Foodborne trematode infections	✓	✓	✓	*	✓
Leishmaniasis		*	✓	✓	✓
Leprosy			✓		✓
Lymphatic filariasis	✓		✓	*	✓
Rabies		✓	✓		✓
Scabies and other ectoparasites					✓
Schistosomiasis	✓	*	✓	*	✓
Snakebite envenoming					✓
Soil-transmitted helminthiases	✓		✓		✓
Taeniasis/cysticercosis	✓	✓	✓		✓
Trachoma	✓		✓		✓
Yaws	✓		✓		✓

* Recommended depending on species, geographical locations and/or endemicity status.
WASH, water, sanitation and hygiene.

1.4 Global and regional roadmaps for control, elimination and eradication of NTDs

In 2012, the WHO Strategic and Technical Advisory Group for Neglected Tropical Diseases and partners adopted a global roadmap for control, elimination and eradication of NTDs – *Accelerating Work to Overcome the Global Impact of Neglected Tropical Diseases: A Roadmap for Implementation (11).* The roadmap has been serving as a guide and direction for all stakeholders involved in the fight against NTDs. Subsequently, pharmaceutical companies, donors, governments of endemic countries and nongovernmental organizations collectively signed the *London Declaration on Neglected Tropical Diseases* in 2012, forming one of the biggest public–private partnerships in global health and committing to control, eliminate or eradicate 10 diseases by 2020 and improve the lives of over 1 billion people *(32).*

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In September 2012, the sixty-third Regional Committee for the Western Pacific endorsed the *Regional Action Plan for Neglected Tropical Diseases in the Western Pacific (2012–2016)* (RC63.R4) *(33).* The Plan was designed to serve as a regional NTD roadmap for a five-year period by linking the WHO global NTD roadmap with national NTD plans of action. Disease-specific targets were set as follows:

1) elimination of lymphatic filariasis in 10 additional countries and areas by 2016;
2) elimination of schistosomiasis in Cambodia, China and the Lao People's Democratic Republic by 2016;
3) elimination of trachoma in Cambodia, China and Viet Nam by 2016;
4) elimination of leprosy in Kiribati, the Marshall Islands and the Federated States of Micronesia, and further reduction of disease burden in other countries and areas by 2016;
5) reduction of clinical cases of yaws to zero in high-risk areas in Vanuatu and progress towards elimination in Papua New Guinea and Solomon Islands by 2016;
6) reduction in morbidity from soil-transmitted helminthiases through national deworming coverage of at least 75% of at-risk school-aged children in 12 countries, preschool-aged children in 10 countries, and women of childbearing age in four countries by 2016; and
7) reduction in morbidity from foodborne trematodiases through preventive chemotherapy coverage of at least 75% of the at-risk population in the Lao People's Democratic Republic, the Republic of Korea and Viet Nam by 2016.

The Regional Action Plan also identified five areas for strengthening to achieve the above-mentioned targets: 1) political commitment, advocacy and resource mobilization; 2) NTD programme management and intersectoral collaboration; 3) access to NTD prevention and case management interventions; 4) integrated surveillance, monitoring and evaluation; and 5) research capacity.

1.5 Progress and achievements in 2012–2017

The Western Pacific Region has seen remarkable progress towards the achievement of goals and targets put forth by the roadmap and the Regional Action Plan since their launch in 2012.

1.5.1 Six more countries validated for elimination of lymphatic filariasis as a public health problem

Six out of 22 countries endemic for lymphatic filariasis (Cambodia, Cook Islands, the Marshall Islands, Niue, Tonga and Vanuatu) were validated by WHO as having eliminated lymphatic filariasis as a public health problem in 2016–2017 (Table 4). The last countries to be validated were China and the Republic of Korea in 2007 and 2008, respectively. Six additional countries have stopped MDA and have been undertaking post-MDA surveillance nationwide (Table 4). As a result, compared to 2011, 16.46 million people in the Western Pacific Region no longer required MDA for lymphatic filariasis in 2016 (14.67 million people required MDA in 2016). All other countries have been either implementing post-MDA surveillance in many of their endemic areas or enhancing MDA coverage in all remaining areas with residual transmission.

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Table 4. Progress of elimination of lymphatic filariasis in the Western Pacific Region, 2017

MDA at <100% geographical coverage	MDA at 100% geographical coverage	Under post-MDA surveillance	Validated
New Caledonia Papua New Guinea	American Samoa Fiji French Polynesia Federated States of Micronesia. Malaysia Philippines Samoa Tuvalu	Brunei Darussalam Kiribati Lao People's Democratic Republic Palau Viet Nam Wallis and Futuna	Cambodia Cook Islands Marshall Islands Niue Tonga Vanuatu

1.5.2 Two countries validated for elimination of trachoma as a public health problem

Two of eight countries endemic for trachoma (Cambodia and the Lao People's Democratic Republic) were the first in the Region to be validated by WHO as having eliminated trachoma as a public health problem (Table 5). China has also announced achievement of the elimination targets. Kiribati, Solomon Islands and Vanuatu implemented the first round of MDA following pre-MDA surveys between 2014 and 2017, with coverage ranging between 74% and 91%.

WHO convened an expert consultation to review the trachoma situation in the Pacific on 17-19 January 2018 in Melbourne, Australia. The consultation recommended country-specific action priorities for all endemic Pacific island countries.

Table 5. Progress of elimination of trachoma in the Western Pacific Region, 2017

SAFE at <100% geographical coverage	SAFE at 100% geographical coverage	Under surveillance/ claims to have eliminated	Validated
Fiji Papua New Guinea Samoa (suspected) Nauru (suspected)	Australia Kiribati Solomon Islands Vanuatu Viet Nam	China	Cambodia Lao People's Democratic Republic

1.5.3 Three countries achieved criteria for elimination of schistosomiasis as a public health problem and progressing with multisectoral interventions towards transmission interruption

Prevalence of schistosomiasis in all four endemic countries (Cambodia, China, the Lao People's Democratic Republic and the Philippines) has declined significantly through decades of annual MDA (Fig. 1). Resultantly, China has shifted from MDA to selective and targeted treatment. Cambodia and the Lao People's Democratic Republic sustained above 80% coverage with preventive chemotherapy among all school-aged children and adults in endemic villages, whereas the Philippines continued to make efforts to improve MDA coverage.

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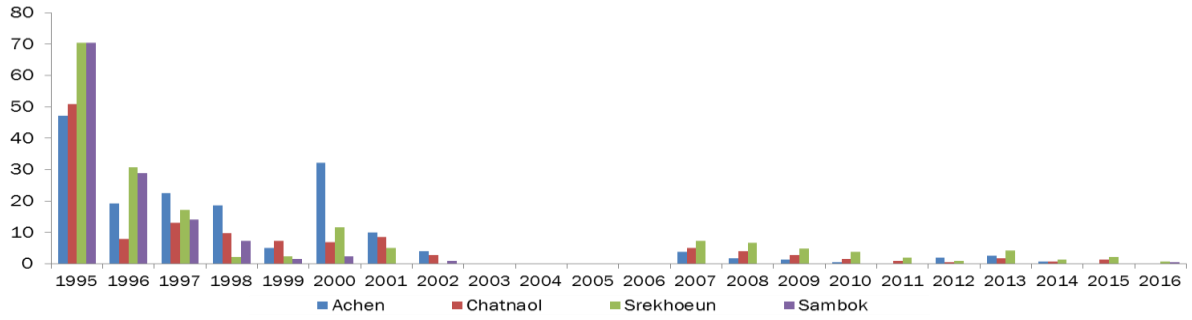
Fig. 1. Evolution of *S. mekongi* prevalence in four sentinel sites in Cambodia after implementing a control programme consisting of MDA and health education, 1995–2016



Cambodia, China and the Lao People's Democratic Republic achieved the criteria for elimination of schistosomiasis as a public health problem by 2017. All endemic countries are strengthening and institutionalizing intersectoral collaboration with WASH and veterinary sectors in their efforts to shift their targets from control to elimination of schistosomiasis (Table 6) (*34*).

Table 6. Progress of elimination of schistosomiasis in the Western Pacific Region, 2017

MDA at 100% geographical coverage	MDA at 100% geographical coverage + WASH, veterinary and vector control interventions	Under surveillance	Verified
Philippines	Cambodia China Lao People's Democratic Republic		

1.5.4 Mass drug administration for elimination of yaws started in Papua New Guinea, Solomon Islands and Vanuatu

In 2013, Vanuatu carried out a total community treatment or MDA campaign for yaws in Tafae, a province with the highest reported number of cases, and achieved 95% coverage. Since then, active detection and treatment of cases and all contacts have continued nationwide. In 2016, MDA against trachoma was implemented in Vanuatu. In Solomon Islands too, nationwide MDA for trachoma was implemented in 2014 with 87% coverage. The impacts of trachoma MDA using the same medicine (azithromycin) are being assessed and followed up in both countries. In Papua New Guinea, six-monthly targeted treatments have been ongoing in Lihir Islands since 2013. The Philippines confirmed the transmission of yaws in three provinces and plans to continue endemicity mapping and develop an action plan in 2018.

Table 7. Progress of elimination of yaws in the Western Pacific Region, 2017

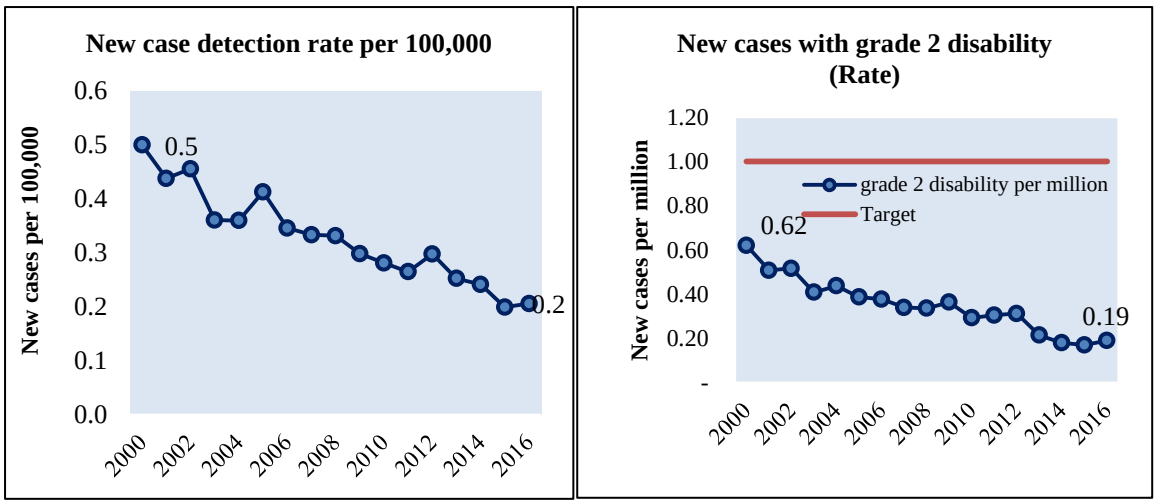
Mapping	TCT/TTT	Under post zero case surveillance	Verified
Philippines	Papua New Guinea Solomon Islands Vanuatu		

TCT, total community treatment; TTT, total targeted treatment.

1.5.5 Elimination of leprosy as a public health problem

The reduction of new cases and the grade 2 disability (G2D) rate continued in 2012–2016. In this period, the number of new cases detected decreased by over 27% from 5419 cases in 2012 to 3914 in 2016, with a reduction of the new case detection rate from 0.30 per 100 000 population to 0.21 per 100 000 in the same period. The number of G2D cases among new cases declined by over 36% from 568 cases in 2012 to 362 cases in 2016 with a corresponding reduction of the G2D rate from 0.31 per million population to 0.19 per million population in the same period (Fig. 2).

Fig. 2. Evolution of new case detection rate per 100,000 population (left) and new cases with grade 2 disability per million population in the Western Pacific Region, 2000-2016



However, three Pacific island countries – Kiribati, the Marshall Islands and the Federated States of Micronesia – continue to bear a high burden of leprosy in terms of new case detection rate being over 150 per 100 000 population. China, Papua New Guinea and the Philippines account for over 70% of the regional burden in terms of numbers of new cases with pockets of higher endemicity at subnational levels.

1.5.6 Deworming against soil-transmitted helminthiases increased and impact evaluation progressed

The number of children in the Western Pacific Region who received preventive chemotherapy for soil-transmitted helminths increased from 14.5 million (19% coverage) in 2012 to 46.6 million (54% coverage) in 2016. Regional coverage of regular deworming for school-aged and preschool-aged children steadily increased from 19% in 2012 to 54% in 2016. Cambodia, Kiribati, the Lao People's Democratic Republic, the Marshall Islands, Tuvalu and Viet Nam achieved 75% national coverage for school-aged children (Table 8), and Cambodia and Viet Nam started treatment of women of child-bearing age in high-risk provinces. Evaluations of the impacts of regular deworming on the prevalence and intensity of infection are ongoing, and control strategies are revised as needed.

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Table 8. National coverage of deworming against soil-transmitted helminthiases in the Western Pacific Region, 2011-2016

Country	2011	2012	2013	2014	2015	2016
School-aged children						
Cambodia	77%	88%	92%	95%	96%	95%
Fiji	56%	45%	5%	7%	9%	0%
Kiribati	100%	100%	99%	52%	69%	74%
Lao People's Democratic Republic	57%	60%	85%	87%	92%	92%
Marshall Islands	0%	0%	0%	38%	100%	34%
Micronesia (Federated States of)	0%	0%	0%	32%	0%	12%
Papua New Guinea	1%	0%	0%	2%	2%	2%
Philippines	21%	20%	13%	42%	72%	71%
Solomon Islands	0%	0%	0%	6%	9%	9%
Tonga	0%	0%	0%	0%	0%	0%
Tuvalu	88%	84%	87%	89%	76%	73%
Vanuatu	55%	52%	42%	57%	38%	68%
Viet Nam	64%	47%	68%	77%	100%	83%
Preschool-aged children						
Cambodia	85%	0%	100%	96%	99%	95%
Fiji	0%	0%	0%	0%	0%	0%
Kiribati	100%	100%	100%	62%	100%	100%
Lao People's Democratic Republic	96%	100%	48%	85%	88%	91%
Marshall Islands	0%	0%	0%	56%	100%	58%
Micronesia (Federated States of)	54%	0%	0%	44%	0%	14%
Papua New Guinea	1%	52%	0%	1%	1%	15%
Philippines	36%	15%	18%	90%	63%	94%
Solomon Islands	0%	86%	0%	2%	2%	3%
Tonga	0%	0%	0%	0%	0%	0%
Tuvalu	50%	94%	90%	75%	76%	72%
Vanuatu	0%	0%	0%	0%	66%	24%
Viet Nam	26%	49%	48%	34%	76%	52%

Source: WHO PCT Databank [webpage]. Geneva: World Health Organization (http://www.who.int/neglected_diseases/preventive_chemotherapy/sth/en/, accessed 27 July 2018).

1.5.7 Priority actions for control of foodborne trematodiases identified in all endemic countries

Implementation of preventive chemotherapy was limited to the Lao People's Democratic Republic, the Republic of Korea and Viet Nam largely due to limited availability of financial resources. In May 2017, the WHO Regional Office for the Western Pacific organized an Expert Consultation to Accelerate Control of Foodborne Trematodiases, Taeniasis and Cysticercosis (*18*). The Consultation classified countries as those with urgent epidemiological mapping needs (Cambodia, Mongolia and the Philippines) and those where strengthening control interventions was a priority (China, the Lao People's Democratic Republic, the Republic of Korea and Viet Nam), and recommended the comprehensive One Health approach as a core strategy to accelerate control of foodborne trematodiases and taeniasis/cysticercosis.

1.6 Emerging challenges and opportunities

With unprecedented achievements in recent years, the NTD landscape in the Western Pacific Region is changing fast and new opportunities are arising, justifying the need for a new vision and direction to accelerate the control and elimination of NTDs and sustain gains in the Western Pacific Region.

1.6.1 The need to address "unfinished business" and eliminate NTDs with available tools

The elimination of lymphatic filariasis and trachoma as public health problems in the Western Pacific Region has been achieved through the commitment and diligence of Member States to conduct MDA campaigns in all endemic communities annually, with pharmaceutical donors and partners supplying medicines and operational support. Building on this success, yaws-endemic countries in the Western Pacific Region are extending efforts to eradicate the disease through MDA. Regional success in significantly reducing the burden of schistosomiasis increases the feasibility of accelerating efforts to eliminate the disease from the Region.

Eradication and elimination of communicable diseases are global public goods that benefit the population as a whole. With the availability of proven elimination strategies, large-scale donation of medicines and decades of experience of Member States in conducting MDA, completing the unfinished business of eliminating all these tool-ready NTDs in the Western Pacific Region, should be an ethical priority.

1.6.2 The need to shift the paradigm to effectively combat all NTDs

While some of NTDs are amenable to eradication or elimination with MDA as the principal strategy, increasing evidence demonstrates that controlling or eliminating other NTDs requires comprehensive multisectoral actions, such as enhancement of the water supply and sanitation coverage, veterinary public health, increased access to vaccines and antisera, food safety and vector control interventions, for all vulnerable and affected populations.

The need for comprehensive multisectoral action goes beyond containment and elimination of transmission of NTDs. Many NTDs cause debilitating residual morbidities and disabilities, such as lymphedema and hydrocele associated with lymphatic filariasis, blindness caused by trachoma, or severe skin lesions and deformities associated with leprosy, yaws and Buruli ulcer. Such residual morbidities and disabilities remain even after countries have achieved elimination targets. Assessment of morbidity burden and availability of care for patients affected with associated morbidities and disabilities is an essential component of the WHO validation process for elimination of lymphatic filariasis and trachoma as a public health problem. As such, they require well-coordinated partnerships to deliver sustained access to curative and rehabilitative services beyond elimination.

1.6.3 NTDs as the pathfinder for community engagement and empowerment

Globally, NTDs are now less neglected than ever, as a result of strong pledges and partnerships between governments, donors and partners. However, the "neglect" of these diseases by affected populations continues in some endemic countries. Despite years of preventive chemotherapy, some affected populations continue to lack awareness and basic knowledge regarding transmission of NTDs.

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As a result, prevention and control remain challenging, with noncompliance to recommended treatment regimens and persisting risk behaviours, such as bathing and washing in infested river water, open defecation and unhygienic handling of food and livestock, which often result in reinfection.

Public health interventions and services are only effective when they reach the people who need them. Their impact is sustainable when people understand the need, demand the services, and own and drive changes that prevent continued transmission. NTDs are more visible than many other communicable diseases because many are caused by macroparasites and cause visible chronic morbidities and disabilities. This visibility makes NTDs a powerful tool to engage and mobilize affected communities. Well-coordinated multisectoral interventions and public health services for all vulnerable and hard-to-reach populations affected by NTDs should be considered an opportunity and entry point to engage and empower people, families and communities to strengthen their behaviours relating to health.

1.6.4 Weak surveillance capacity to move towards and beyond elimination of NTDs

With successful interventions and significant reductions in transmission of diseases, enhanced laboratory and surveillance capacity becomes more and more critical in order to deliver targeted interventions and measure their impact.

The need for effective surveillance does not end with elimination of a disease. Even in countries having achieved elimination status, residual transmission may persist. The disease may also be reintroduced from other countries with active transmission, particularly those countries with limited overall health system capacities. Sustained laboratory and surveillance capacity to continuously detect cases and foci of transmission and enable targeted response is required beyond elimination of NTDs, to ensure that the NTDs do not again become a public health problem.

As NTD transmission typically occurs in resource-limited and hard-to-reach communities, opportunities for strengthening integrated surveillance platforms should be maximized with other communicable diseases and beyond in the context of broader health system strengthening.

1.6.5 Inclusion of new diseases in the NTD portfolio

In 2016, WHO established the process and criteria for adoption of additional diseases in the NTD portfolio. Accordingly, three disease conditions – mycetoma, chromoblastomycosis and other deep mycosis; scabies and other ectoparasites; and snakebite envenoming – were added in the NTD portfolio in 2017. Decision to adopt a new disease as NTD is based on the criteria stated in Section 1.1. As a new disease condition is added in the NTD portfolio, actions need to be initiated to assess the situation and determine a roadmap for their effective control.

There is a need to build robust programme capabilities that can seamlessly accommodate any new disease by enabling execution of such needed actions, interventions and service delivery integrated and coordinated with other diseases and in the broader health system in the overall framework of control and elimination of NTDs.

1.6.6 NTDs as a journey to achieve universal health coverage and the Sustainable Development Goals

NTDs are now an integral part of SDGs. Target 3.3 specifically aims to "end the epidemics of neglected tropical diseases by 2030". Universal health coverage will help sustain gains in NTD control and elimination by ensuring that needed health services reach all people, particularly marginalized and neglected populations.

SDGs also present opportunities to accelerate progress on NTDs through whole-of-system multisectoral interventions, such as improvements in water and sanitation, food safety, environmental health and veterinary public health, in addition to health services.

At the same time, tackling NTDs contributes to the advancement of other SDG targets, from reducing poverty and malnutrition to improving water and sanitation, education and equity. Effective and sustained delivery of such comprehensive interventions also requires strong multisectoral collaboration and partnership as emphasized in the 2030 SDG agenda.

1.7 Purpose of the Regional Action Framework

Since the endorsement of the *Regional Action Plan for Neglected Tropical Diseases in the Western Pacific* in 2012, significant progress has been made towards agreed targets and new opportunities and priorities have emerged, leading to a fast change in the NTD landscape in the Region. Acknowledging progress and recognizing emerging challenges, existing programmatic weakness and opportunities, participants of the NTD Programme Managers Meeting and the Sixteenth Meeting of the Regional Programme Review Group (RPRG) on NTDs in the Western Pacific Region in 2016 recommended that WHO should consult with Member States and develop a new vision and direction to support accelerated control and elimination of NTDs in the Region.

Accordingly, WHO held a series of consultations with national NTD programme managers, experts and partners at national and regional levels, including the Seventeenth Meeting of the RPRG in June 2017, the Programme Managers Meeting on NTDs in the Pacific in February 2018 and the Programme Managers Meeting in Asia subregion in March 2018 to discuss and further improve the draft framework.

The Regional Action Framework is intended to guide Member States, WHO and all other donors and partners to work together to systematically and progressively strengthen weaknesses existing in key programmatic areas and/or contribute to enhancing relevant health system components so that universal and equitable access to essential NTD interventions and services, particularly in hard-to-reach marginalized and vulnerable populations, is achieved and control and elimination of NTDs are accelerated.

Annex

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Annex

2. REGIONAL ACTION FRAMEWORK FOR CONTROL AND ELIMINATION OF NTDS IN THE WESTERN PACIFIC

2.1 Vision, goals, aim and objectives

2.1.1 Vision

The Western Pacific Region free of NTDs

2.1.2 Goals

1) Achieve and sustain the status of elimination of NTDs targeted in resolutions of the World Health Assembly, namely yaws, rabies, schistosomiasis, trachoma, lymphatic filariasis and leprosy.

2) Achieve and sustain control of other NTDs and alleviate suffering from NTD-associated morbidity and disabilities.

Disease-specific elimination and control targets currently set at the global or regional level are listed in Annex 1.

2.1.3 Aim

To build a robust and sustained health system capable of detecting, responding to, managing and preventing NTDs and associated morbidity and disabilities so that the quality of life of affected people and communities is improved in the Western Pacific Region.

2.2 Strategic pillars, programmatic areas and major activities

The vision, goals and aim are achieved through four interrelated strategic pillars with seven key programmatic areas (Fig. 3).

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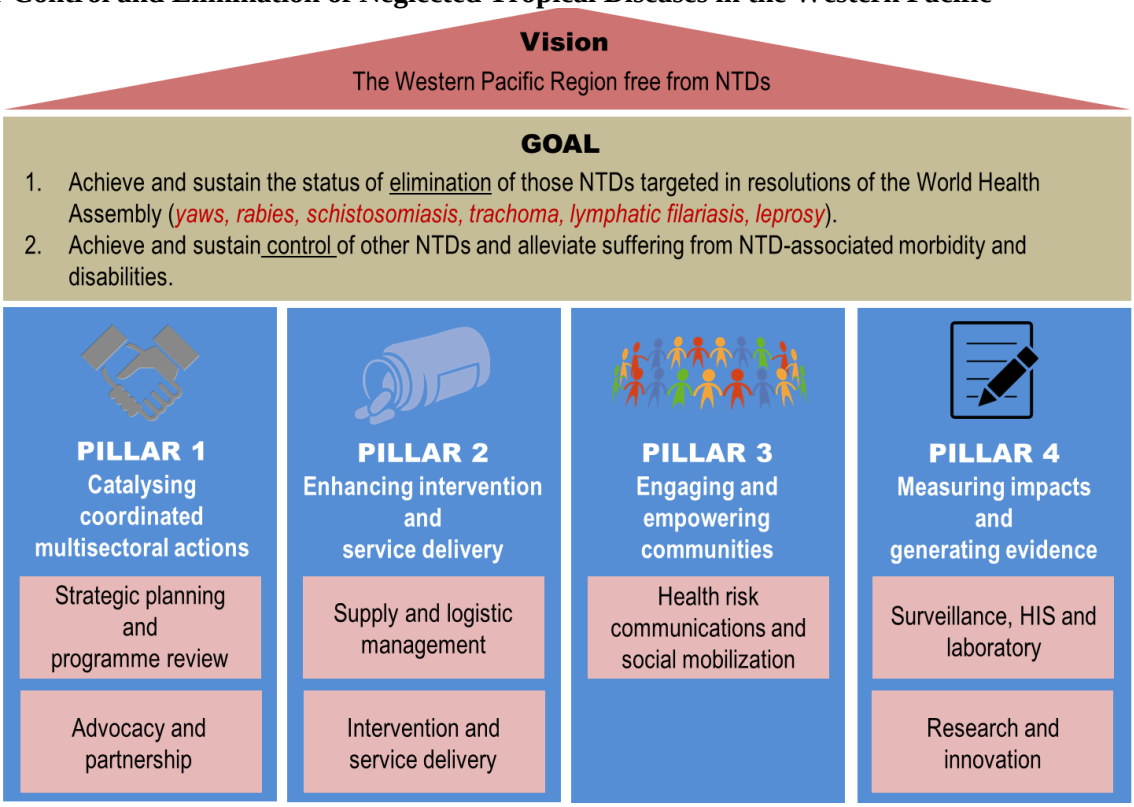
Fig. 3. Vision, goal, strategic pillars and programmatic areas of the Regional Action Framework for Control and Elimination of Neglected Tropical Diseases in the Western Pacific



2.2.1 Strategic pillar 1: Catalysing and sustaining coordinated multisectoral actions

Elimination and control of NTDs can be accelerated through effective delivery of veterinary public health, WASH and vector control interventions by other programmes or sectors. For instance, elimination of rabies can be achieved through effective delivery of mass dog vaccination. Elimination of schistosomiasis requires provision of proper sanitation and access to safe water supplies, treatment and management of animal reservoirs and targeted snail control in areas with persistent transmission after multiple rounds of MDA. Provision of care and rehabilitation services for those affected by NTD-associated morbidity and disabilities need to be integrated and sustained within the people-centred health system.

However, NTDs continue to be neglected by other health programmes and non-health sectors that might be unaware of the disease burden and the significance of their contributions for control or elimination efforts when there are so many other competing public health priorities. NTDs are often unnoticed by clinical sectors because visible morbidity and disabilities often appear many years after initial infection. NTDs continue to be neglected by policy-makers as they often affect the vulnerable populations living in remote, hard-to-reach parts of the country.

NTD programme managers or focal points should continue to advocate for NTDs and serve as facilitators to engage relevant sectors and partners and catalyse strong and sustained multisectoral partnership.

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Priorities evolve as interventions progress and disease burden reduces. For instance, in the initial phase of a lymphatic filariasis elimination effort, MDA is necessary to interrupt transmission. At the same time, the assessment of morbidity associated with lymphatic filariasis and strengthening of access to care for patients should be planned and progressed towards achieving validation of elimination of lymphatic filariasis as a public health problem. As MDA progresses, monitoring and evaluation and transmission assessment surveys to assess the impacts of the intervention becomes the priority. Along the way, progress should be assessed and programme priorities should be adjusted regularly, engaging all relevant sectors and partners.

Table 9. Targeted outcomes, proposed key actions, and relevant sectors and partners to be involved to strengthen programmatic areas under strategic pillar 1 in relevant countries

Programmatic areas	Outcomes	Key actions	Relevant sectors and partners
1. Strategic planning and programme review	• Roles and responsibilities clearly defined under agreed multisectoral actions • Commitment obtained from all relevant programmes and sectors from the highest political level to the local level	Establish a multisectoral governance mechanism, such as a NTD taskforce or technical working group, or incorporate NTDs in an existing mechanism at all levels. Regularly conduct thorough analysis and review of the NTD burden situation, areas of active NTD transmission and patients with associated morbidities and disabilities, and intervention progress and gaps pertaining to control and elimination of NTDs. Identify critical and effective interventions and services to accelerate elimination and control of NTDs and develop or update national multisectoral action plan, outlining agreed goals and targets, priority actions to build programme system capabilities and enhance interventions delivery, timelines and roles and responsibilities of each stakeholder.	Ministries responsible for*: Education Sanitation Water supply Livestock Agriculture Food safety Rehabilitation Local governments Representatives of affected communities Nongovernmental organizations
2. Advocacy and partnership	• NTDs included in health-related priorities at all levels • Stakeholders commitment sustained at all level • Increased resources for	Maximize opportunities to disseminate information on programme success and the remaining NTDs burden through advocacy events, media or publications to celebrate success and end "neglect" of NTDs at all levels of society.	Ministries responsible for*: Education Sanitation Water supply Livestock Agriculture Food safety Rehabilitation

	control and elimination of NTDs mobilized	Regularly convene intersectoral stakeholders meeting to share progress and updates, reaffirm joint commitment and sustain momentum to fight against NTDs at all levels. Explore opportunities to secure adequate funds and human resources for efficient delivery of planned interventions at all levels such as innovative resource mobilization from diverse international and national resources, utilization of targeted government subsidies for disadvantaged population groups and active engagement of local governments. Increase accessibility to NTD data and information for stakeholders, including local governments, affected communities and partners, through development of a regular feedback mechanism, creation of online dashboards and dissemination of regular reports.	Finance ministry Communications team and media Local governments Representatives of affected communities Nongovernmental organizations

* Involvement of relevant ministries depends on the disease and intervention(s).

Box 3. Forging intersectoral partnership and commitment through annual NTD Stakeholders Forum in the Philippines

The NTD Unit at the Disease Prevention and Control Bureau of the Department of Health Philippines convenes the NTD Stakeholders Forum annually to bring together all stakeholders working on elimination and control of NTDs ranging from relevant ministerial partners such as the Environmental Related Diseases Division, the Pharmaceutical Division, the Research Institute for Tropical Medicine, Regional and provincial authorities, nongovernmental organizations, local and national universities to international donors and partners. The Forum provides a valuable opportunity to update progress of control and elimination of NTDs in the country and research gap, share various best practices to improve advocacy on NTDs, recognize and forge the existing partnership and explore other possible collaboration opportunities to advance the NTD agenda in the country. The Forum also enables information sharing between the national programme and academia so that translation of scientific evidence into policies and guidance to support control programme's progress is enhanced.

2.2.2 Strategic pillar 2: Enhancing intervention and service delivery

NTDs most heavily affect areas with weak health systems and poor infrastructure. Efforts to strengthen relevant health system components that enable quality-assured, efficient, equitable,

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accountable and sustainable delivery of NTD interventions and services are key to achieve NTD elimination and control goals effectively and sustainably.[2]

For instance, with support from pharmaceutical companies, WHO can distribute large-scale donations of medicines for preventive chemotherapy for a number of NTDs. In return, recipient countries have an ethical duty to properly manage and account for the usage of donated medicines. However, many countries lack capacity in supply chain management of NTD medicines and diagnostic tools. Some countries have had incidences of clusters of adverse events following preventive chemotherapy, but prompt referral, investigation, reporting and management of adverse events for preventive chemotherapy were done on an ad hoc basis because of a lack of agreed operating procedures and training for health staff involved in interventions. Many countries continue to have trouble securing quality-assured medicines, vaccines, antivenoms and diagnostic tools that are not available through the donation programme due to various challenges relating to resource mobilization, coordination across the relevant programmes and sectors, and lack of information on needs of such goods.

Even if needed medical goods are available and interventions are delivered, a number of countries observe persistent transmission of NTDs or failure in post-intervention surveillance, potentially due to inadequate intervention coverage or compliance with the interventions. Efforts are also needed to enhance the reach of the interventions using various innovative approaches.

Table 10. Targeted outcomes, proposed key actions, and relevant sectors and partners to be involved to strengthen programmatic areas under strategic pillar 2 in relevant countries

Programmatic areas	Outcomes	Key actions	Relevant sectors and partners
3. Supply and logistics management	• Supplies of quality-assured supplies of medicines, vaccines, antivenoms and diagnostic tools available in time and in sufficient volumes and fully utilized for planned interventions without wastage	Ensure timely availability of sufficient and quality-assured medicines, vaccines, antivenoms and diagnostic tools at all levels through improved forecasting and planning. Secure adequate financial resources to procure necessary quality medicines and diagnostic tests outside the donation programme and ensure timely distribution and proper management of such supplies. Improve efficiency and transparency of supply chain management during procurement, storage and delivery, assure quality through the supply chain and minimize wastage of NTD medicines, vaccines, antivenoms and diagnostic tools at all levels through standardized recording and reporting and regular monitoring.	National drug regulatory authority Central medical store Procurement unit
4. Intervention and service delivery	• Interventions and services delivered safely and efficiently	Develop and regularly update national guidelines, policies and/or standard operating procedures	Clinical sectors

[2] See Universal health coverage: moving towards better health: action framework for the Western Pacific Region. Manila: World Health Organization Regional Office for the Western Pacific; 2016.

	• National and geographical coverage targets set in line with global targets achieved for planned interventions and services	(SOPs) for NTD interventions and services, including case treatment and/or care provision of NTDs through the health system, to ensure quality and safety of intervention delivery at all level. Establish and implement SOPs and strengthen referral system for monitoring, reporting and response of adverse events associated with NTD interventions in collaboration with relevant authorities. Strengthen the competency of health workforce at all levels to effectively plan, delivery and report interventions and services with high ethical standards through regular trainings (Box 4). Implement locally appropriate mechanisms to optimize intervention and service coverage such as well-organized social mobilization, regular supervision of interventions and feedback for field health workers, and timely coverage evaluation and mop-up. Explore opportunities to integrate intervention and service delivery across diseases and with other programmes, such as delivery of deworming and vitamin A supplementation, regular follow-up of patients affected by disabilities, sharing of cold chains for vaccines, integration of cysticercosis vaccines with a classical swine fever vaccination programme and of hydatid vaccines with a Peste des Petits Ruminants (PPR) control programme.	National drug regulatory authority Clinical sector

Box 4. Building health workforce capacity in efforts to eliminate lymphatic filariasis in Samoa

Lymphatic filariasis, commonly known as elephantiasis, is a parasitic disease. Infection occurs when filarial parasites are transmitted to humans through mosquitoes. Infection is usually acquired in childhood, causing hidden damage to the lymphatic system. The painful and profoundly disfiguring visible manifestations of the disease, lymphoedema, elephantiasis and scrotal swelling occur later in life and lead to permanent disability.

In 1997, the World Health Assembly in resolution WHA50.29 called on Member States to eliminate lymphatic filariasis as a public health problem. In response, WHO launched the Pacific Programme to Eliminate Lymphatic Filariasis (PacELF) in 1999 and the Global Programme to Eliminate Lymphatic Filariasis (GPELF)

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in 2000, with the aims of 1) stopping the spread of infection through large-scale annual treatment of all eligible people in areas where infection is present known as mass drug administration (MDA), and 2) alleviating the suffering caused by lymphatic filariasis through increased morbidity management and disability prevention (MMDP) activities.

Efforts to control transmission of lymphatic filariasis were initiated in the 1960s and high prevalence of lymphatic filariasis in Samoa has been known since the 1980s. Samoa joined the PacELF in 1999 and started implementation of annual rounds of MDA in the same year. A series of impact assessments have been conducted and once MDA was stopped in part of the country where the prevalence had decreased to below the threshold to sustain transmission. However, the latest transmission assessment survey carried out in 2017 revealed resurgence of transmission, warranting restart of MDA nationwide.

In order to maximize community participation and ensure safety and efficiency of the MDA campaign, the Ministry of Health of Samoa conveyed a series of consultations with various stakeholders including community leaders and local churches. All villages in the country were allocated to MDA teams, health professionals were allocated to each team as team leaders, and community health workers were assigned to each village as community drug distributors. From 16 to 20 July 2018, a series of training workshops were carried out for all health professionals and approximately 1500 community health workers nationwide. The training aimed to equip all involved health personnel with knowledge on: transmission of lymphatic filariasis; efficacy, mechanism of actions and safety of the medicines; logistics of efficiently implementing MDA; and practical skills for management and prevention of adverse events.

2.2.3 Strategic pillar 3: Engaging and empowering communities

NTDs may be neglected even by affected communities, especially when there is a lack of awareness and when prevalence of infection is significantly low and visible morbidities are rare (in the pre-elimination phase), leading to a drop in compliance with interventions.

Limited community awareness of transmission of NTDs and of key interventions, even after decades of annual preventive chemotherapy campaigns, lead to low compliance with preventive chemotherapy or persistent risk behaviours such as open defecation, use of contaminated river water or consumption of raw freshwater fish harvested in contaminated rivers. Also, many NTDs are typically endemic in remote, hard-to-reach settings, where health risk communications and community empowerment could be considered cost-effective and sustainable solutions while waiting for infrastructure development and adequate access of public health services.

Table 11. Targeted outcomes, proposed key actions, and relevant sectors and partners to be involved to strengthen programmatic areas under strategic pillar 3 in relevant countries

Programmatic areas	Outcomes	Key actions	Relevant sectors and partners
5. Health risk communications and social mobilization	• Affected or high-risk individuals and communities are aware of social determinants of NTDs situation in their localities • Affected of high-risk individuals and	Leverage ongoing community participatory health education activities to integrate NTD prevention and control aspects or develop innovative and integrated community participatory health education activities across diseases to enhance communities' understanding of the link between their hygiene, farming or food preparation	Ministries responsible for*: Education WASH Food safety Health promotion Rehabilitation Communication team

	communities are empowered to actively participate in interventions, make necessary improvement in their practices and manage their health risks.	practices, transmission of NTDs and the purpose of interventions. Actively involve local authorities, community leaders and culturally influential people in health risk communications and social mobilization to maximize community participation. Institutionalize a mechanism to sustain community engagement in efforts to control and eliminate transmission of concerned NTDs in their own communities (for example, regular monitoring visits, establishment of community fund and committee of elected villagers, culturally acceptable and sustainable incentives, referral systems/help-lines for the management of adverse events).	Local governments Nongovernmental organizations Culturally influential individuals in communities

* Involvement of relevant ministries depends on the disease and intervention(s).

Box 5. Community efforts to eliminate schistosomiasis drive improvements in water, sanitation and hygiene in remote communities in Cambodia and the Lao People's Democratic Republic

Schistosomiasis is a parasitic disease caused by blood flukes. The disease is endemic in remote communities along the Mekong River in Cambodia and the Lao People's Democratic Republic. Transmission occurs through contact with freshwater that has been contaminated by excreta from people already infected. The disease was highly endemic with high mortality a few decades ago. Decades of annual MDA have significantly reduced the prevalence of infection in these endemic villages such that elimination of the disease is within reach. However, experience has demonstrated that MDA alone cannot interrupt transmission in affected villages with poor sanitation. Efforts to prevent contamination of river water by improving access to sanitation and eliminating open defecation are essential to eliminate the disease.

Encouraged by progress but concerned about poor sanitation in affected areas, government authorities responsible for NTDs and water, sanitation and hygiene joined forces in 2016 to establish a community-led initiative to eliminate schistosomiasis with water, sanitation and hygiene (CL-SWASH). CL-SWASH builds on ongoing national efforts to expand participatory water safety planning (WSP) to all rural communities and integrate risk communications on schistosomiasis as part of the WSP process. It aims to empower communities to drive the elimination of schistosomiasis by improving WASH in affected villages, in addition to annual rounds of MDA. Using an integrated WSP–NTD approach, local facilitators conduct training in endemic villages with a focus on the empowerment of villagers to identify and address local issues.

As part of a CL-SWASH team, villagers go house to house with checklists, water test kits and malnutrition screening kits to assess the situation. They map the results of the survey including areas used for open defecation and households without latrines, discuss the findings and identify possible solutions that could be enacted without outside assistance. As the final step, they develop and pledge to follow their own CL-SWASH plan, including building and using latrines at their own expense. This is another example of a disease elimination effort driving intersectoral partnership and collaboration to improve water supply and sanitation coverage in the most hard-to-reach communities.

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As a result of CL-SWASH, the number of endemic villages achieving full sanitation coverage has been increasing since 2016. Encouraged by the enthusiasm of villagers, the Governments of Cambodia and the Lao People's Democratic Republic have developed a roll-out plan for expanding the initiative to all endemic villages, with the goal of eliminating schistosomiasis by 2025.

2.2.4 Strategic pillar 4: Measuring impacts and generating evidence

Information is key to ensure that people receive appropriate NTD interventions and services that they need and that the interventions and services are delivered efficiently and effectively, to document the incidence or prevalence of the diseases necessary to validate or verify achievement of elimination, and to ensure that the disease does not re-establish after achieving elimination.

However, WHO-recommended rapid diagnostic tests are currently available only for a few NTDs, and detection and diagnosis of other NTDs require microscopy or other advanced laboratory methods. Microscopy typically has low sensitivity without regular training efforts. Most countries in the Region have limited laboratory capacity for advanced testing of NTDs and also face challenges with transport of specimens from remote, hard-to-reach endemic areas.

For diseases where WHO-recommended standard diagnostic tests are not available, different diagnostic methods and tools are used across countries and even within countries, making comparison of results over time and across areas a challenge.

Also, many countries continue to have limited capacity at all levels on timely collection and reporting of data and strategic use of data for programmatic evaluation and response following interventions.

Furthermore, many countries in the Region are progressing ahead of other countries globally, increasing the programmatic areas needing to move with operational research. For instance, countries achieving elimination of lymphatic filariasis as a public health problem need to establish and sustain post-validation surveillance as transmission continues in some countries in the Region and in neighbouring countries of other WHO regions and as there is a significant movement of people within and across the Region. However, there is no guidance yet on post-validation surveillance of lymphatic filariasis (Box 6). Schistosomiasis-endemic countries in the Region are also fast approaching the pre-elimination stage. In the absence of WHO guidance on surveillance and verification for elimination of schistosomiasis, countries will need to explore surveillance options. Many countries are in the process of accelerating control of foodborne and zoonotic NTDs. While there is knowledge on effective control interventions, the most effective combination with the maximum results will need to be piloted and evaluated. All these activities need to be done in the context of operational research with support of national and international partners so that needed evidence is generated not only to support countries to progress control and elimination of NTDs, but also to support WHO to develop further evidence-informed guidance.

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Table 12. Targeted outcomes, proposed key actions, and relevant sectors and partners to be involved to strengthen programmatic areas under strategic pillar 4 in relevant countries

Programmatic areas	Outcomes	Key actions	Relevant sectors and partners
6. Surveillance, laboratory and health information system	• Strengthening of NTD surveillance and monitoring capacity at all levels strategically planned and resources needs identified • Capacity of laboratory and programme staff at all levels strengthened for strategic use of data for improving programme efficiency • Data reporting and sharing improved	Develop SOPs for NTD detection, diagnosis and monitoring of control programmes, with the list of indicators, intended use, methods of specimen collection, detection and diagnosis, interpretation of results, reporting and response algorithm and roles and responsibilities of concerned personnel at all levels. Develop a strategic plan for strengthening NTD surveillance integrated and coordinated with other disease surveillance activities with budget estimates, based on epidemiological characteristics and geographical distributions of diseases, current programmatic phase, existing and required surveillance capacity and laboratory network. Ensure laboratory and programme staff at all levels have the necessary skills to collect data, interpret results accurately, use data for improving programme efficiency and report and respond promptly, in the context of health system strengthening and available resources. Develop standard reporting templates with agreed minimum core indicators at all levels and reporting protocols with reporting deadlines following interventions to ensure accurate and timely reporting at all levels up to WHO. Adopt use of electronic data reporting and management such as DHIS2 platforms for NTD data reporting where feasible.	Disease surveillance bureau Research and academic institutions Health information system unit
7. Research and innovation	• Innovation fostered and programme implementation enhanced • Evidence generated through programme implementation and	Establish a platform to regularly share research updates and priority knowledge gaps and to strategically plan collaboration to translate evidence into national policies between the control programmes and research institutions.	Research and academic institutions

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	research documented and disseminated	Strengthen programme capacity in developing, implementing and documenting operational and implementation research to improve programme efficiency and impacts with support of partners. Actively share the major knowledge gaps and operational challenges to advance the national NTD control and elimination efforts with partners and explore opportunities to mobilize necessary resources and support.	

Box 6. Exploring opportunities for sustainable post-elimination surveillance of lymphatic filariasis in the WHO Western Pacific Region

An increasing number of countries in the WHO Western Pacific Region are achieving elimination of lymphatic filariasis as a public health problem in recent years. However, there is a risk of recrudescence from remaining local pockets of transmission leading to re-emergence of diseases as a public health problem and possible reintroduction of diseases to areas that have achieved elimination from other countries and areas of the Region and in neighbouring regions where active transmission is still present. There is an urgent need to establish post-elimination surveillance that can be integrated and sustained within the general health system.

The Cambodian Ministry of Health, which was validated for having eliminated lymphatic filariasis as a public health problem in 2016, conducted a nationwide serosurvey of tetanus immunity in 2012 to monitor progress towards maternal and neonatal tetanus elimination. During this survey, the collected sera samples were also tested to measure specific antibody responses to the parasites that cause malaria, toxoplasmosis, lymphatic filariasis, cysticercosis and strongyloidiasis using a multiple bead assay with technical support from the United States Centers for Disease Control and Prevention. The results were able to provide nationally representative estimates of the presence and distribution of such parasitic diseases in the country. Encouraged by this experience, the Ministry is planning to integrate lymphatic filariasis serological testing in the next tetanus serosurvey as part of post-validation surveillance of lymphatic filariasis.

Palau also achieved the criteria for elimination of lymphatic filariasis as a public health problem in 2013. However, a lymphatic filariasis seroprevalence survey carried out among migrant workers originating from other endemic countries in 2017 detected high antigenaemia prevalence among such populations. According to the advice from the NTD Regional Programme Review Group, the Bureau of Public Health in the Ministry of Health of Palau convened a national consultation to determine opportunities for sustainable post-validation surveillance of lymphatic filariasis in July 2018. The Consultation involved the Bureau of Immigration and the Bureau of Labor in the Ministry of Justice among other ministerial partners and jointly reviewed the current policies and practices pertaining to the communicable disease screening of migrants. They reached consensus to revise the communicable disease screening requirement for issuance of work permit for migrant workers originating from selected countries still endemic for lymphatic filariasis to enable annual treatment of those who tested positive. Additionally, integration of lymphatic filariasis serological testing in the next population-wide noncommunicable disease STEPwise approach to surveillance (STEPS) survey planned in 2020 is an opportunity for post-validation surveillance.

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APPENDICES

Appendix 1. Global or regional disease-specific eradication, elimination and control targets as of June 2018 *

Disease	Target year	Geographical scope	Operational definition	Source
Eradication				
Yaws	2020	Global	Absence of a new, infectious, serologically confirmed indigenous yaws cases for three consecutive years, supported by high coverage of active surveillance.	(*1*)
Elimination (interruption of transmission)				
Asian schistosomiasis	2030	Regional	Reduction to zero of incidence of new indigenous infection in humans and animals, and reduction to zero of infected snails, validated after a minimum period of five consecutive years of adequate post-intervention surveillance.	(*2*)
Leprosy	2020	Global	Zero grade 2 disabilities (G2D) among paediatric leprosy patients; reduction of new cases with G2D caused by *Mycrobacterium leprae* to less than one per 1 million population; and zero countries with legislation allowing discrimination on basis of leprosy.	(*3*)
Rabies	2030	Global	Interruption of dog-to-dog rabies transmission with absence of human rabies cases due to a dog virus for two consecutive years.	(*4*)
Elimination as a public health problem				
Trachoma	2020	Global	Reduction in the prevalence of trachomatous trichiasis "unknown to the health system" to less than 0.2% in adults aged 15 years and older; a reduction in the prevalence of the active trachoma sign "trachomatous inflammation-follicular" (TF) in children aged 1–9 years to less than 5% (sustained for at least two years in the absence of intervening antibiotic mass drug administration); and the presence of a system to detect and manage incident cases of trachomatous trichiasis, with evidence of appropriate support for that system.	(*5*)
Lymphatic filariasis	2020	Global	Prevalence of infection with *Wuchereria bancrofti*, *Brugia malayi* or *Brugia timori* less than target thresholds in all endemic areas.	(*6, 7*)
Control				
Soil-transmitted helminthiases	2020	Global	Seventy-five per cent of preschool- and school-aged children in need of treatment regularly treated; and 75% coverage achieved in preschool- and school-aged children in 100% of countries.	(*8*)

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Foodborne trematodiases	2020	Global	Seventy-five per cent of population at risk reached by preventive chemotherapy; and morbidity due to foodborne trematodiases controlled in all endemic countries.	(*9*)
Taeniasis/ Cysticercosis	2020	Global	Interventions scaled up in selected countries for *Taenia solium* taeniasis and cysticercosis control and elimination.	(*9*)
Echinococcosis	2020	Global	Validated strategy available for echinococcosis/hydatidosis and interventions scaled up in selected countries for their control and elimination.	(*9*)
Buruli ulcer	2020	Global	Seventy per cent of all cases detected early and cured with antibiotics.	(*9*)

* Currently there are no global targets relevant to the Western Pacific Region for leishmaniasis, scabies and other ectoparasites and snakebite envenoming.

Sources:

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3. Global leprosy strategy 2016–2020. Accelerating towards a leprosy-free world. Monitoring and evaluation guide. New Delhi: World Health Organization Regional Office for South-East Asia; 2017.
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Appendix 2. Situation of NTDs in the Western Pacific Region, by country or area (2017)

Country/Area	Buruli ulcer	Echinococcosis	FBT	Leishmaniasis	Leprosy**	Lymphatic filariasis*	Rabies	Scabies	Schistosomiasis	Snakebite envenoming	STH	Taeniasis/ cysticercosis	Trachoma*	Yaws
Pacific subregion														
Australia	Endemic	Not endemic	Not endemic	Not endemic	Low burden	Not endemic	Not endemic	Endemic	Not endemic	Endemic	Not requiring PC	Not endemic	Endemic, MDA ongoing	Not endemic
American Samoa	Not endemic	Not endemic	Not endemic	Not endemic	Low burden	Endemic, MDA ongoing	Not endemic	Endemic	Not endemic	Not endemic	Not requiring PC	Unknown	Not endemic	Not endemic
Cook Islands	Not endemic	Not endemic	Not endemic	Not endemic	Low burden	Elimination validated	Not endemic	Endemic	Not endemic	Not endemic	Not requiring PC	Unknown	Not endemic	Not endemic
Fiji	Not endemic	Not endemic	Not endemic	Not endemic	Low burden	Endemic, MDA ongoing	Not endemic	Endemic	Not endemic	Not endemic	PC ongoing	Unknown	Mapping	Not endemic
French Polynesia	Not endemic	Not endemic	Not endemic	Not endemic	Low burden	Endemic, MDA ongoing	Not endemic	Endemic	Not endemic	Not endemic	Not requiring PC	Unknown	Not endemic	Not endemic
Kiribati	Not endemic	Not endemic	Not endemic	Not endemic	High burden	Endemic, post-MDA surveillance	Not endemic	Endemic	Not endemic	Not endemic	PC ongoing	Unknown	Endemic, MDA ongoing	Not endemic
Marshall Islands	Not endemic	Not endemic	Not endemic	Not endemic	High burden	Elimination validated	Not endemic	Endemic	Not endemic	Not endemic	PC ongoing	Unknown	Not endemic	Not endemic
Micronesia, Federated States of	Not endemic	Not endemic	Not endemic	Not endemic	High burden	Endemic, MDA ongoing	Not endemic	Endemic	Not endemic	Not endemic	PC ongoing	Unknown	Not endemic	Not endemic
Nauru	Not endemic	Not endemic	Not endemic	Not endemic	Low burden	Not endemic	Not endemic	ND	Not endemic	Not endemic	Unknown	Unknown	Suspected	Not endemic
New Caledonia	Not endemic	Not endemic	Not endemic	Not endemic	Low burden	Mapping	Not endemic	ND	Not endemic	Not endemic	Not requiring PC	Unknown	Not endemic	Not endemic
Niue	Not endemic	Not endemic	Not endemic	Not endemic	Low burden	Elimination validated	Not endemic	ND	Not endemic	Not endemic	Not requiring PC	Unknown	Not endemic	Not endemic
Palau	Not endemic	Not endemic	Not endemic	Not endemic	Low burden	Endemic, post-MDA surveillance	Not endemic	ND	Not endemic	Not endemic	Unknown	Unknown	Not endemic	Not endemic
Papua New Guinea	Endemic	Not endemic	Not endemic	Not endemic	Low burden	Endemic, MDA ongoing	Not endemic	Endemic	Not endemic	Endemic	PC to start	Unknown	Mapping	Endemic, MDA started
Samoa	Not endemic	Not endemic	Not endemic	Not endemic	Low burden	Endemic, MDA ongoing	Not endemic	Endemic	Not endemic	Not endemic	Unknown	Unknown	Suspected	Not endemic
Solomon Islands	Not endemic	Not endemic	Not endemic	Not endemic	Low burden	Not endemic	Not endemic	Endemic	Not endemic	Not endemic	PC ongoing	Unknown	Endemic, MDA ongoing	Endemic, MDA for trachoma started
Tonga	Not endemic	Not endemic	Not endemic	Not endemic	Low burden	Elimination validated	Not endemic	ND	Not endemic	Not endemic	PC to start	Unknown	Not endemic	Not endemic

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Tuvalu	Not endemic	Not endemic	Not endemic	Not endemic	Low burden	Endemic, MDA ongoing	Not endemic	Endemic	Not endemic	Not endemic	PC ongoing	Unknown	Not endemic	Not endemic
Vanuatu	Not endemic	Not endemic	Not endemic	Not endemic	Low burden	Elimination validated	Not endemic	Endemic	Not endemic	Not endemic	PC ongoing	Unknown	Endemic, MDA ongoing	Endemic, MDA for trachoma started
Wallis and Futuna	Not endemic	Not endemic	Not endemic	Not endemic	Low burden	Endemic, post-MDA surveillance	Not endemic	ND	Not endemic	Not endemic	Unknown	Unknown	Not endemic	Not endemic
Asia subregion														
Brunei Darussalam	Not endemic	Not endemic	Not endemic	Not endemic	Low burden	Endemic, post-MDA surveillance	Not endemic	ND	Not endemic	Not endemic	Not requiring PC	Not endemic	Not endemic	Not endemic
Cambodia	Not endemic	Not endemic	Endemic	Not endemic	Low burden	Elimination validated	Endemic	Endemic	Endemic, MDA ongoing	Endemic	PC ongoing	Endemic	Elimination validated	Not endemic
China	Not endemic	Endemic	Endemic	Endemic	Low burden	Elimination validated	Endemic	ND	Endemic, MDA ongoing	Endemic	PC ongoing	Endemic	Elimination claimed	Not endemic
Lao People's Democratic Republic	Not endemic	Not endemic	Endemic	Not endemic	Low burden	Endemic, post-MDA surveillance	Endemic	ND	Endemic, MDA ongoing	Endemic	PC ongoing	Endemic	Elimination validated	Not endemic
Malaysia	Not endemic	Not endemic	Endemic	Not endemic	Low burden	Endemic, MDA ongoing	Endemic	ND	Not endemic	Endemic	Not requiring PC	Unknown	Not endemic	Not endemic
Philippines	Not endemic	Not endemic	Endemic	Not endemic	Low burden	Endemic, MDA ongoing	Endemic	ND	Endemic, MDA ongoing	Endemic	PC ongoing	Endemic	Not endemic	Endemic
Republic of Korea	Not endemic	Not endemic	Endemic	Not endemic	Low burden	Elimination validated	Not endemic	Endemic	Not endemic	Endemic	Not requiring PC	Not endemic	Not endemic	Not endemic
Viet Nam	Not endemic	Not endemic	Endemic	Not endemic	Low burden	Endemic, post-MDA surveillance	Endemic	ND	Not endemic	Endemic	PC ongoing	Endemic	Endemic, MDA ongoing	Not endemic
Mongolia	Not endemic	Endemic	Unknown	Not endemic	Low burden	Not endemic	Endemic	ND	Not endemic	Endemic	Not requiring PC	Unknown	Not endemic	Not endemic

FBT, foodborne trematodiases; MDA, mass drug administration; ND, no data; PC, preventive chemotherapy; STH, soil-transmitted helminthiases.
* Countries classified as "Elimination validated" has achieved elimination of the disease as a public health problem.
** Countries classified as "low burden" has achieved elimination of leprosy as a public health problem.

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Appendix 3. WHO-recommended interventions and services for control and elimination of NTDs

Intervention and service		Buruli ulcer	Echinococcosis	FBT	Leishmaniasis	Leprosy	Lymphatic filariasis	Rabies	Scabies	Schistosomiasis	Snakebite envenoming	STH	Taeniasis/cysticercosis	Trachoma	Yaws
Preventive chemotherapy				✓			✓	△		✓		✓	✓	✓	✓
Veterinary public health			✓	✓	△			✓		△			✓		
Vector control				△	✓		✓			△					
WASH	**Water**	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓
	Sanitation		✓	✓						✓		✓	✓	✓	
	Hygiene		✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
Case management and rehabilitation	**Case treatment**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Surgery	✓	✓				✓	✓		✓	✓		✓	✓	
	Skin/wound management	✓			✓	✓	✓	✓	✓		✓				✓
	Rehabilitation	✓			✓	✓	✓				✓				
Sources		*1–3*	*4, 5*	*6*	*7*	*8*	*9, 10*	*11*	*12*	*13*	*14*	*15*	*6, 16, 17*	*18*	*19, 20*

△Recommended depending on species, geographical locations and/or endemicity status; include prophylactic vaccines for rabies.
FBT, foodborne trematodiases; STH, soil-transmitted helminthiases

Sources:

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19. Eradication of yaws: a guide for programme managers. Geneva: World Health Organization; 2018.
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Appendix 4. Medicines and rapid diagnostic test supplies required for NTD interventions and services

Intervention and service	Buruli ulcer	Echinococcosis	FBT	Leishmaniasis	Leprosy	Lymphatic filariasis	Rabies	Scabies	Schistosomiasis	Snakebite envenoming	STH	Taeniasis/ cysticercosis	Trachoma	Yaws
Medicines														
Preventive chemotherapy	–	–	PZQ TCZ	–	–	ALB DEC IVM	–	–	PZQ	–	ALB MBD	PZQ Niclosamide ALB	ZTH	ZTH
Veterinary public health	–	PZQ EG95	PZQ TCZ	–	–	–	dog vaccines	–	PZQ	–	–	Oxfendazole TSOL18 vaccines	–	–
Case treatment	Antibiotics	ALB	PZQ TCZ	**	MDT	ALB DEC IVM	PEP RIG	Topical scabicide IVM	PZQ	Antivenom	ALB MBD	PZQ Niclosamide ALB *	ZTH	ZTH
Rapid diagnostic tests														
Surveillance (humans)	–	–	–	–	–	FTS	–	–	–	–	–	–	–	Rapid syphilis test DPP®
Sources	*1*	*2*	*3, 4*	*5*	*6*	*7, 8*	*9*	*10*	*11*	*12*	*11*	*13–16*	*17*	*18*

ALB, albendazole; DEC, diethylcarbamazin citrate; DPP®, Dual Path Platform syphilis assay; EG, *E. granulosus*; FBT, foodborne trematodiases; FTS, filaria test strip; IVM, ivermectin; MBD, mebendazole; MDT, multidrug therapy; NCC, neurocysticercosis; PEP, pre-exposure prophylaxis; PZQ, praziquantel; RIG, rabies immunoglobulin; STH, soil-transmitted helminthiases; TCZ, triclabendazole; ZTH, azithromycin;

* Treatment of neurocysticercosis depends on the imaging results, and might involve anthelmintics (PZQ, ALB), anti-epileptic drugs and steroids.

** Treatment of leishmaniasis depends on several factors including type of disease, concomitant pathologies, parasite species and geographic location.

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Appendix 5. Types of surveillance and currently recommended methods for diagnosis and detection of NTDs

	Buruli ulcer	Echinococcosis	FBT	Leishmaniasis	Leprosy	Lymphatic filariasis	Rabies	Scabies	Schistosomiasis	Snakebite envenoming	STH	Taeniasis/cysticercosis	Trachoma	Yaws
Surveillance type														
Population-based (community or school)	–	–	✓ Mapping M&E	–	–	✓ Mapping M&E TAS	–	✓ Mapping	✓ Mapping M&E	–	✓ Mapping M&E	✓ Mapping M&E	✓ Mapping IS	✓ Mapping
Active case finding	–	✓	–	✓	–	–	–	✓	–	–	–	–	–	✓ TCT
Facility-based	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ TTT
Diagnosis and detection methods in humans														
Tools/techniques	Clinical (skin) Microscopy PCR	Imaging IHA ELISA WB PCR	Microscopy ELISA PCR	Microscopy PCR	Clinical (skin, peripheral nerve) or microscopy	RDT	Clinical sign or exposure	Clinical (skin)	Microscopy	Clinical (bite) WBCT RDT	Microscopy	Microscopy ELISA EITB PCR Imaging	Clinical (eye)	RDT PCR
Specimens	Swab	Stool Blood	Stool Blood	Blood	Skin	Blood	–	–	Stool	Blood	Stool	Stool Blood	–	Swab
Sources	*13*	*10, 11*	*7*	*12*	*6*	*2*	*5*	*14*	*3*	*15*	*3*	*7–9*	*4*	*1*

EITB, enzyme-linked immunoelectrotransfer blot; ELISA, enzyme-linked immunosorbent assay; FBT, foodborne trematodiases; IHA, indirect haemagglutination; IS: impact survey; M&E, monitoring and evaluation; PCR, polymerase chain reaction; RDT, rapid diagnostic test; STH, soil-transmitted helminthiases; TAS, transmission assessment survey; TCT, total community treatment; TTT, total targeted treatment; WB, western blot; WBCT, whole blood clotting test.

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