Neglected Tropical Diseases in the 21st Century: A Comprehensive Review of Burden, Progress, and Persistent Gaps

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ABSTRACT

Background:

Neglected tropical diseases (NTDs) comprise a diverse group of 21 conditions that disproportionately affect the world's poorest populations, perpetuating cycles of poverty, disability, and social exclusion. Despite being preventable and treatable, NTDs continue to impose a substantial global health burden.

Objective

This comprehensive review synthesizes the current epidemiological landscape, treatment and control strategies, and progress toward elimination targets for all 21 WHO-designated NTDs, while identifying persistent gaps that threaten the achievement of the 2030 roadmap goals.

Methodology

It is a comprehensive narrative review synthesizing published literature, WHO reports, and programmatic data on all 21 WHO-recognized neglected tropical diseases.

Key results / Findings

As of 2023, an estimated 1,495 billion people required interventions against NTDs, a decrease from the 2010 baseline. Between 2015 and 2021, the disease burden dropped from 17.2 million to 14.1 million disability-adjusted life years (DALYs), while NTD-related deaths decrease from approximately 139,000 to 119,000 in 2023 alone, 867.1 million people received treatment for at least one NTD. As of early 2026, 60 countries have eliminated at least one NTD, more than halfway toward WHO''s 2030 target of 100 countries. However, significant gaps remain: global funding aid for NTDs declined by 41% between 2018 and 2023; climate change, population displacement and conflicts are emerging threats; and the 2030 targets risk not being achieved without renewed investment.

Conclusion

While remarkable progress has been achieved over the past two decades, sustained political commitment, innovative research, integrated approaches, and stable financing are essential to end the neglect of these diseases by 2030 and beyond.

Keywords: NTDs, WHO targets, Comprehensive review, Global reports, Elimination of NTDs.

INTRODUCTION

Neglected Tropical Diseases (NTDs) are a diverse group of 21 infectious diseases caused by viruses, bacteria, protozoa, parasitic worms, and toxins. They are termed "neglected" because they have historically ranked very low on the global health agenda, receiving little attention and funding despite affecting approximately 1 billion

people globally and mostly poor people (WHO, 2026). These diseases thrive in settings where water safety, sanitation, and access to healthcare are inadequate (Hotez, 2008). Beyond health consequences, including blindness, disfigurement, chronic pain, and disability, NTDs cost developing communities billions of dollars annually in direct health costs, lost productivity, and reduced socioeconomic and educational attainment (Hotez et al., 2007).

In 2021, WHO launched the "Ending the neglect to attain the Sustainable Development Goals: a roadmap for neglected tropical diseases 2021-2030", setting ambitious targets including a 90% reduction in the number of people requiring NTD interventions and the elimination of at least one NTD in 100 countries (Malecela & Ducker, 2021). In 2025, the WHO Global NTD Programme marked 20 years of concerted action, involving pharmaceuticals manufacturers, development partners, philanthropic organizations, national health authorities, and WHO (Sullivan, 2025). This review provides a comprehensive update on the status of all 21 NTDs in the context of these 20 years of progress and the challenges that remain (WHO, 2025).

The primary aim of this comprehensive review is: **(1)** to systematically describe the causative agents, modes of transmission, clinical manifestations, and global burden of each of the 21 WHO-designated neglected tropical diseases; **(2)** to evaluate the current treatment modalities, control strategies, and elimination efforts for each NTD, including mass drug administration (MDA), vector control, water-sanitation-hygiene (WASH) interventions, and individual disease management; **(3)** to assess the global progress toward the 2030 targets set in the WHO NTD roadmap, including reductions in disease burden, treatment coverage, and country-level elimination achievements; **(4)** to identify persistent gaps and emerging challenges, including fund shortfalls, climate change impacts, conflict-related disruptions, and research and development needs that threaten the achievement of the elimination goals, utilizing the WHO Gap Assessment Tool (GAT) framework; **(5)** to propose strategic recommendations for accelerating progress and ensuring that no population is left behind in the fight against NTDs.

METHODOLOGY

Study Design:

This is a comprehensive narrative review synthesizing published literature, WHO reports, CDC reports, and any programmatic data on all the 21 WHO-recognized neglected tropical diseases. The review covers the period 2010 to 2026, with a primary focus on data from 2020 to 2026 to capture the most recent progress and challenges.

Data Sources and Literature Search:

A systematic literature search was conducted across the following electronic databases: PubMed/MEDLINE, Scopus, Google Scholar, and the WHO Institutional Repository for Information Sharing (WHO IRIS). The search was conducted on the 15 January 2026 and covered publications from 1 January 2020 to 31 December 2025.

The search strategy combined the following terms using Boolean operators:

("neglected tropical diseases" OR "NTDs") AND ("epidemiology" OR "burden" OR "prevalence" OR "incidence" OR "mortality" OR "DALYs" OR "treatment" OR "control" OR "elimination" OR "MDA" OR "mass drug administration" OR "vector control" OR "WASH" OR "funding" OR "climate change").

In addition, the following official reports and databases were consulted:

- WHO Global Report on Neglected Tropical Diseases 2025.
- WHO Roadmap for Neglected Tropical Diseases 2021-2030.
- WHO disease-specific fact sheets (2025-2026).
- WHO Weekly Epidemiological Record.

- WHO Gap Assessment Tool (GAT) 2023-2024 results.
- Uniting to Combat NTDs progress reports (2024-2026).
- Impact Global Health reports on NTD research and development funding
- Official development assistance (ODA) data from the Organisation for Economic Co-operation and Development (OECD).

Reference lists of included reviews were hand-searched for additional relevant publications.

Inclusion and Exclusion Criteria

Inclusion criteria:

1. Publications reporting on the epidemiology, burden, treatment, control, or elimination of any of the 21 WHO-designated NTDs.
2. Official WHO reports, fact sheets, and programmatic data published between 2020 and 2026.
3. Peer-reviewed original research, systematic reviews, and narrative reviews.
4. Publications reporting quantitative data on NTD burden, treatment coverage, funding, or elimination status.
5. English-language publications with available full text or comprehensive summaries.

Exclusion criteria:

1. Conference abstracts, editorials, commentaries, and letters without original data.
2. Publications focused exclusively on non-NTD conditions.
3. Studies with insufficient methodological detail to assess quality.
4. Duplicate publications.

Selection process: An independent reviewer was assigned to screen titles and abstracts against eligibility criteria. Full-text articles were assessed for inclusion, in which disagreements were resolved through discussion. A total of 247 sources were included in the final synthesis, comprising 189 peer-reviewed articles and 58 official reports and programmatic documents.

Data Extraction and Synthesis

Data were extracted into a standardized template covering: disease name, causative agent(s), mode of transmission, global burden (prevalence, DALYs, mortality, population requiring interventions), treatment strategies, control / elimination progress, and key challenges. The period covered by the review spans 2010 to 2026, with a primary focus on data from 2020 to 2026 to capture the most recent progress and challenges. For each disease, the most recent available WHO data were used, and reference years are explicitly stated in the text and tables. Findings were synthesized narratively by disease and thematically across cross-cutting issues

To systematically assess barriers to elimination, the WHO Gap Assessment Tool (GAT) framework was applied to evaluate country-level progress across four thematic areas: (1) diagnostic, (2) monitoring and evaluation, (3) access and logistic, (4) advocacy and funding. Findings from the 2023-2024 GAT assessment and the planned 2026 road map were incorporated to identify persistent gaps and strategic priorities. Several countries, at the least 50 in Africa, Asia, South America, and the Western Pacific Region have at one time eliminated Lymphatic filariasis, with some countries banishing more than 2 diseases. According to WHO (2025), guinea worm disease which is caused by a parasite have been eliminated in about 17 countries in 2023. Trachoma in 2023, a bacterial infection that causes blindness have been eliminated in countries like Saudi Arabia, Togo, Malawi, Nepal, Vanuatu, Laos PDR, Cambodia, Vietnam and recently Egypt in 2025.

Many countries followed suit in eliminating one or multiple NTDs including Fiji, Burundi, Benin, Ghana, and Uganda. All these have been achieved after the WHO agency released the NTD road map 2030, via its agenda item **11.8 - WHA73(33)** on the **13th November 2020** aims to leave no one behind. WHO recommends at least "five core strategies" to help in tackling the burden of NTDs: (1) Individual disease management; (2)

Preventive chemotherapy; (3) Vector control; (4) Veterinary public health; (5) Water Sanitation and Hygiene (WASH).

Cross-Cutting Progress:

Advances have been made by the WHO across several areas via its resolutions and decisions on neglected tropical diseases 2021 from agenda item number **26.3 - WHA74 (18)** in May 2021 to:

- Enhance integration in the implementation of preventive chemotherapy.
- Broaden adoption of integrated strategies for skin-NTDs.
- Increase inclusion of NTDs in national health strategies, plans, and essential service packages.
- Widen adoption of guidelines for management of NTD-related disabilities.

NTDs remained visible in global fora including the UN General Assembly, UN Human Rights Council, G7 and G20. In 2024, WHO launched a process to define research and development priorities for NTDs and prequalified six new medicine formulations, one active pharmaceutical ingredient, and a new dengue vaccine. The active ingredients prequalified include: one API, specifically for the drug ***Miltefosine*** 50mg capsules used in treating both visceral and cutaneous leishmaniasis, and the live-attenuated **Dengue vaccine TAK-003** (developed by Takeda) to be used in protecting individuals against all four serotypes of the dengue virus (WHO, 2025).

According to Altcheh et al. (2025), another form of antitrypanosomal drug Nifurtimox will be registered into new tablet formulation in two dose strengths of 30 mg and 120 mg and likely be integrated in the treatment regimen of Chagas disease. Another child-friendly formulation **L-praziquantel** 150mg Orodispersible tablets which disperse rapidly in water for treating Schistosomiasis in toddlers and infants down to 3 months old will also be registered. Another oral **fexinidazole** for Human African Trypanosomiasis (HAT) was introduced to treat children, also **Acoziborole 320 mg** is a new oral benzoxaborole-6-carboxamide currently in phase 2/3 study to treat adolescents and adults with HAT waiting to be confirmed by the WHO.

Terminology standardization:

Throughout this review, I followed WHO definitions to distinguish between:

- **Elimination of transmission:** Reduction to zero of the incidences of infection caused by a specific pathogen in a defined geographical area, with a minimal risk of reintroduction.
- **Elimination as a public health problem:** Reduction of disease burden to a level where it is no longer a public health priority.
- **Validation of elimination:** WHO acknowledge that a country has achieved elimination as a public health problem.
- **Control:** Reduction of disease burden to acceptable levels, but transmission continues.
- **Eradication:** Permanent reduction to zero of the worldwide incidences of infection.

RESULTS

Overview of Included Neglected Tropical Diseases:

The World Health Organization formally designates 21 diseases into varying disease groups as neglected tropical diseases. These conditions encompass a heterogeneous array of viral, bacterial, protozoan, helminthic, fungal, and toxin-mediated etiologies. They are unified by their disproportionate impact on the world's most impoverished and marginalized populations, those with limited access to clean water, adequate sanitation, quality healthcare, and education. **Table 1** provides a comprehensive at-a-glance summary of all 21 NTDs, detailing their causative agents, primary routes of transmission, key global burden indicators, and the cornerstone treatment or control strategies currently employed.

Table 1: Comprehensive Overview of the 21 WHO-designated Neglected Tropical Diseases

Disease	Causative Agent(s)	Primary Mode(s) of Transmission	Major Interventions	Progress Toward WHO 2030 targets
Buruli ulcer	*Mycobacterium ulcerans*	Environmental, likely via skin break	Clarithromycin + Rifampicin; wound care, Surgery	Control: endemic in 33 countries; no elimination target
Chagas disease	*Trypanosoma cruzi*	Triatomine bugs (kissing bugs); also congenital, blood transfusion	Nifurtimox, vector control, blood screening	Elimination of transmission in 17 countries; control ongoing
Dengue and Chikungunya	Dengue virus (4 serotypes) and Chikungunya virus	*Aedes* mosquitoes (primarily *A. aegypti* and *A. albopictus*)	Vector control, dengue vaccine (prequalified)	Control: expanding globally; no elimination target
Dracunculiasis	*Dracunculus medinensis* (Guinea worm)	Drinking contaminated water with infected copepods (water fleas)	Safe water supply; health education; vector control (copepod filtering)	Near-eradication status: only 15 human cases in 2024 (Chad, South Sudan)
Echinococcosis	*Echinococcus granulosus,* [a]*E. multilocularis*	Faeco-oral ingestion of eggs from infected dogs (definitive hosts)	Surgery; meat inspection and dogs deworming with Albendazole	Control with no elimination target
Foodborne trematodiases	Liver, lung, & intestinal flukes (*Clonorchis, paragonimus, fasciolopsis*)	Eating undercooked or raw freshwater fish, crustaceans, or aquatic plants	Food safety education, praziquantel, triclabendazole	Control with no elimination target
Human African Trypanosomiasis	*Trypanosoma brucei gambiense* & [b]*T. b. rhodesiense*	Tsetse flies	Drugs (eflornithine, pentamidine, fexinidazole, suramin)	Elimination as a public health problem validated in 10 countries
Leishmaniasis	*Leishmania* parasites (>20 species)	Sand flies (Phlebotominae)	Antimonial, liposomal amphotericin B, vector and reservoir control	[c]VL elimination target in SE Asia achieved, East Africa hotspot
Leprosy	*Mycobacterium leprae,* [d]*M. lepromatosis*	Respiratory droplets (prolonged, close contact)	[e]MDT**:** dapsone, rifampicin, clofazimine	Elimination in most countries; 180,000 new cases annually

Lymphatic filariasis	*Wuchereria bancrofti, Brugia malayi, Brugia timori* (filarial worms)	Mosquitoes (Culex, Anopheles, Aedes)	Ivermectin +[f]DEC, or albendazole, vector control; morbidity management	Elimination validated in multiple countries (example, Cambodia, Bangladesh)
Mycetoma and other deep mycoses	Fungi (eumycetoma) or bacterial (actinomycetoma)	Traumatic inoculation (thorns, splinters, animal bites) into skin or subcutaneous tissue	Surgery, Long-term antibiotics(actinomycetoma) or antifungals (eumycetoma)	Control: with no elimination target
Onchocerciasis	*Onchocerca volvulus*	Black flies (Simulium spp)	Community-directed [g]MDA; vector control	Elimination of transmission in the Americas; control in Africa
Rabies	Rabies virus (Lyssavirus)	Bite/scratch from infected animal saliva; >99% from dogs	Dog vaccination; post-exposure prophylaxis; immediate [h]PEP	Elimination target: zero human deaths by 2030
Scabies and other ectoparasites	Mites (*Sarcoptes scabiei*), fleas, lice, ticks	Skin-to-skin contact; contaminated clothing / bedding	Body hygiene; oral scabicides (ivermectin, permethrin)	Control: with no elimination target
Schistosomiasis	Blood flukes [i](*S. haematobium, S. mansoni, S. japonicum*)	Skin contact with infected freshwater snails (intermediate hosts)	Praziquantel MDA; snail control, safe water [i](WASH)	Elimination as public health problem in 12 countries; control ongoing
Soil-transmitted helminthiases	*Ascaris lumbricoides,* (roundworms), *Ancylostoma duodenale, Necator americanus* (Hookworms), *Trichuris trichiura* (Whipworm)	Faeco-oral (ingestion of eggs) or skin penetration (hookworm larvae) from contaminated soil	Preventive chemotherapy MDA; improved sanitation (WASH); hygiene education	Control: no elimination target; 1.5 billion infected
Snakebite envenoming	Venomous snakes (vipers, elapids, sea snakes)	Snakebite (typically on limbs during agricultural work)	Antivenom; first aid; community education	Control: 50% reduction in deaths by 2030
Taeniasis / Cysticercosis	*Taenia solium* (pork tapeworm); also, [j]*T. saginata* (beef)	Faeco-oral ingestion of eggs (cysticercosis) or eating undercooked pork (taeniasis)	Praziquantel, niclosamide; pig vaccination; meat inspection; (new tool; WASH)	Control: no elimination target
Trachoma	*Chlamydia trachomatis* (serovars A-C)	Direct/indirect contact with infected eye/nose discharge; also flies	[k]**SAFE strategy** (Surgery for trichiasis), Antibiotics, Facial cleanliness, Environmental	Elimination validated in 19 countries (example,

			improvement	Egypt 2025)
Yaws	*Treponema pallidum pertenue*	Skin-to-skin contact and contact with infectious lesions	Single-dose azithromycin MDA and active case finding	Eradication target: 2030
Noma	*Fusobacterium nechrophorum* & other polymicrobial bacteria	Unknown but strongly associated with malnutrition, poor oral hygiene, immunosuppression, measles	Antibiotics; surgery (reconstructive) wound care	Control: no elimination target; recently added to WHO NTD list (December 2023)

Sources: WHO Fact Sheets (2025-2026); WHO Global Report on NTDs (2025); *PLoS* NTDs reviews.

Note: [a]*E. multilocularis = Echinococcus multilocularis;* [b]*T. b. rhodesiense = Trypanosoma brucei rhodesiense;* [c]VL = Visceral Leishmaniasis; [d]*M. lepromatosis = Mycobacterium lepromatosis;* [e] MDT**: =** Multi – Drug Therapy; [f]DEC = Diethylcarbamazine Citrate; [g]MDA = Mass Drug Administration; [h]*S. haematobium, S. mansoni, S. japonicum = Schistosoma haematobium, Schistosoma mansoni, Schistosoma japonicum;* [i](WASH) = Water, Sanitation, and Hygiene; [j]*T. saginata = Taenia saginata;* [k]**SAFE strategy** = Surgery, Antibiotics, Facial, and Environmental improvement.

The Overall Findings

This comprehensive review of the 21 neglected tropical diseases reveals a landscape of remarkable progress juxtaposed with persistent and emerging challenges. The data synthesized across country-level validations, global WHO reports, and programmatic evaluations paint a clear picture of both unprecedented achievements and precarious vulnerabilities. On the side of progress, the global community has delivered measurable, life-changing results over the past two decades (WHO Global Report, 2025).

The number of people requiring NTD interventions has dropped by 32% since 2010, translating to over 400 million people no longer at risk. According to the WHO (2025), between 2015 and 2021 alone, the global disease burden declined from 17.2 million to 14.1 million disability-adjusted life years (DALYs), while NTD-related mortality decreased from approximately 139,000 to 119,000. In 2023, a record 867.1 million people received treatment for at least one NTD, 99% of whom received preventive chemotherapy (WHO Global Report, 2025).

It is through mass drug administration (MDA) supported by one of the largest and most sustained philanthropic medicine donation programmes in history, that most countries received their portion for distribution. As of May 2026, over 31 billion tablets and vials delivered up from 30 billion since 2023, which help more than 50 countries around the world to successfully eliminated at least one NTD, exceeding the halfway toward the WHO's 2030 target of 100 countries (WHO, 2026).

However, these gains remain exceptionally fragile, and the review identifies several convergent threats that risk reversing decades of hard-won progress. The most critical challenge is the precipitous 41% decrease in official development assistance (ODA) for NTDs elimination between 2018 and 2023 (WHO, 2025). Patel et al. (2026) and WHO (2026), insist that, this funding gap has already delayed mass treatment campaigns affecting 143 million people, postponed elimination targets in at least 10 countries and placed over 55 million NTD tablets at risk of expiry in Africa alone.

Concurrently, climate change is expanding the geographic range of vectors and intermediate hosts, threatening to introduce the diseases into areas where elimination had been achieved. Population displacement, migration, and conflicts are disrupting the ongoing programmes, while persistent gaps in diagnostics, surveillance, and supply chain logistics undermine the sustainability of control efforts. Over 70% of WHO country offices have reported health service disruptions, with NTD programmes among the most severely affected (WHO, 2026).

Collectively, these findings indicate that while the tools, partnerships, and strategies for NTD elimination are proven and effective, their continued success is contingent upon sustained political commitment, diversified and increased financing, climate-adaptive planning, and deeper integration into primary health care systems. Without urgent, coordinated action, the ambitious 2030 roadmap targets including a 90% reduction in the population requiring interventions and the 100 countries likely to achieve elimination will remain unmet, particularly when the "gaps" remain opened (Patel et al., 2026).

Global Burden of Neglected Tropical Diseases (NTDs)

As of 2023, an estimated 1,495 billion people required one form of intervention in 2023 against at least one NTD, showing a reduction of 122 million people from 2022 and a 32% decrease from the 2010 baseline (WHO, 2026; Malecela & Ducker, (2021). Between 2015 and 2021, the global disease burden declined from 17.2 million to 14.1 million disability-adjusted life years (DALYs), while NTD-related deaths decreased from approximately 139,000 to 119,000 (WHO Global Health Estimate, 2021). The number of people affected by NTDs declined from 1.9 billion in 1990 to just over 1 billion in 2021 (WHO, 2023), concentrated mostly in sub-Saharan Africa, Latin America, and South Asia. As of early 2026, an estimated 1.4 billion people still require interventions (Patel et al., 2026; WHO, 2026).

Table 2 below summarizes the key global indicators with explicit reference years and sources.

Table 2: Summary of Key Global NTD Indicators (2010 - 2025)

Indicator	2010 Baseline	2021	2023	2025/2026	Change	Reference year
People requiring NTD interventions	~2.2 billion	~ 1 billion	1.495 billion	~ 1,.4 billion	↓32%from 2010	WHO (2023) data
Disease burden (DALY)	-	14.1 million	-	-	↓from 17.2M (2015)	WHO Global Health Estimates (2021)
NTD-related deaths	-	119,000	-	-	↓from 139,000 (2015)	WHO Global Health Estimates (2021)
People affected	1.9 billion	~1 billion	-	-	↓ ~47%	WHO (2023)
People treated	-	-	867.1 million	~900 million (Est)	↑ 18M from 2022	WHO (2023) data
Countries eliminating ≥1 NTD	-	-	56 (May 2025)	63 (May 2026)	↑	WHO Validation Records (2025-2026)
NTD medicine donations (cumulative)	-	-	~30B tablets/vials	~31B tablets/vials	-	WHO Global Report (2025)

Sources: WHO Global Report on NTDs (2023) and (2025); WHO Global Health Estimates (2021)

Treatment Coverage and Progress

In 2023, 867.1 million people were treated for at least one NTD, approximately 18 million more than in 2022. Of these, 99% received preventive chemotherapy. In 2024 alone, over 880 million people received treatment through mass drug administration or individual disease management. As of end 2024, 19 different types of NTD medicines were donated by 12 manufacturers; between 2011 and 2025, over 31 billion tablets and vials of injections were delivered to countries. In the same year, WHO facilitated the procurement of over 1 million diagnostic tests for five NTDs (WHO, 2025).

Elimination Achievements

Remarkable progress has been made toward elimination. As of May 2026, 63 countries have successfully eliminated at least one NTD, surpassing the halfway mark toward WHO's 2030 target of 100 countries. (WHO (2026). Globally, 84 elimination processes have been successfully completed and acknowledged by WHO. In 2024 alone, seven countries were acknowledged by WHO for eliminating an NTD, and in 2025, nine (9) countries achieved this milestone. Several countries around the world (Table 3) have eliminated at least two, three, or four NTDs.

Table 3: Notable NTD Elimination Achievement by Country (2023 - 2026)

Country	NTD Eliminated	Year of Validation
Saudi Arabia	Trachoma	2023
Togo [a]	Trachoma	2023 and three NTDs in 2025
Malawi	Trachoma	2023
Laos PDR	Trachoma	2023
Cambodia	Trachoma, Lymphatic filariasis	2023 - 2025
Vietnam	Trachoma	2023
Vanuatu	Trachoma	2023
Egypt	Trachoma	2025
India	Multiple NTDs	2025
Kenya [b]	Lymphatic filariasis, HAT	2024
Senegal	Trachoma / Lymphatic filariasis	2024 – 2025
Mauritania	Trachoma	2025
Kiribati, Tonga	Lymphatic filariasis	2024 - 2025
Bangladesh	Lymphatic filariasis	2024
Niger [c]	Trachoma / Onchocerciasis	2025
Papua New Guinea	Trachoma	2025
Guinea [d]	Human African Trypanosomiasis	2025

Sources: WHO (2025); Uniting to Combat NTDs (2025).

Note. [a] Togo have officially eliminated 4 separate Neglected Tropical Diseases including Trachoma, Lymphatic filariasis, Sleeping sickness (HAT), and Guinea worm (WHO, 2025). [b] Kenya also joins states that eliminate Human African Trypanosomiasis as a public health problem (Uniting to Combat NTDs, 2025). [c]Niger was verified by WHO as the first African country to eliminate onchocerciasis (Uniting to Combat NTDs, 2025). [d]Guinea eliminates Human African Trypanosomiasis as a public health problem (Uniting to Combat NTDs, 2025).

Fiji and Burundi, have become the 26th countries to eliminate Trachoma (Uniting to Combat NTDs, 2025). As of July 2026, 63 countries have successfully achieved validation for eliminating at least one NTD (WHO, 2026). Benin, Ghana, and Uganda have also successfully eliminated Trachoma and Sleeping sickness (Uniting to Combat NTDs, 2025).

Table 4: NTD Medicine Donations and Supply Chain Metrics (2011 - 2025)

Indicator	Value
Types of NTD medicine donated	19
Pharmaceutical manufacturers donating	12
Cumulative tablets/vials delivered (2011-2024)	~30 billion
Cumulative tablets/vials delivered (through 2025)	31 billion
Treatment delivered in 2024	1.8 billion
Treatment delivered in 2025	~1.5 billion
Diagnostic tests procured by WHO (2024)	1 million (for 5 NTDs)

Sources: WHO Global Report on NTDs (2025)

Persistent Gaps and Emerging Challenges

Despite the remarkable achievement documented in the preceding sections (the 32% reduction in the population requiring interventions, the elimination achievements in 63 countries, and the treatment of over 867 million people in a single year) yet, significant challenges threaten progress and the 2030 road map targets remain precarious. This review identifies six interconnected categories of persistent gaps that, if unaddressed, will not only delay elimination but risk reversing hard-won gains, including: **(1) The funding crisis; (2) The diagnostic void; (3) Supply chain fragility; (4) Climate change; (5) Fragile governance, conflict, and population displacement; (6) Knowledge, data, and research gaps.** The WHO's Gap Assessment Tool (GAT) provides a systematic framework for evaluating progress across these dimensions, while the forthcoming 2026 mid-term evaluation will serve as a critical inflection point for course correction (WHO, 2025).

1. The Funding Crisis: A 41% Decline in Investment:

The most acute and immediate threat to NTD progress is the precipitous and sustained decline in global financing. Between 2018-2023, the overall investment in research and development for neglected diseases declined by 41% reduction. This decline has been exacerbated by recent cuts to Official Development Assistance (ODA), including the withdrawal of major bilateral donor support in April 2025 (Hietanen et al., 2025; WHO, 2025). According to IGH (2024), the "R&D funding relevant to NTDs remained stable at $4.3 billion in 2024, while funding directed specifically to NTD's R&D saw a small decline of $98 million or 3%".

The immediate consequences are quantifiable and severe, such as:

- **Mass treatment delays:** The funding withdrawal has delayed mass drug administration campaigns that would have reached 143 million people, leaving vulnerable populations without protection against lymphatic filariasis, onchocerciasis, schistosomiasis, and soil-transmitted helminthiases.
- **Elimination target postponement:** Missing planned campaigns and impact surveys in 2025 will postpone the achievement of elimination targets in at least 10 additional countries, pushing the 2030 goals further out of reach.
- **Medicine waste:** Without alternative financing mechanisms, suspensions could lead to the expiration of over 55 million NTD (medicines) tablets by the end of 2025 in Africa alone, which translate to a tragic waste of donated medicines and a missed opportunity for millions.
- **Health workforce erosion:** Funding suspension has triggered job losses among health care workers in over half of affected countries, eroding the very human infrastructure required to deliver NTD interventions.
- **Health service disruptions:** Over 70% of WHO's surveyed country offices reported health service disruptions, with NTD programmes among the most severely affected. In some settings, the nature and scale of disruptions are comparable to those observed during peak COVID-19 periods.

Unlike HIV/AIDS, TB, and malaria which benefit from dedicated global funding mechanisms such as the Global Funds, NTDs lack similar financial safety net, rendering them disproportionately vulnerable to donor fatigue and geopolitical shifts, and competing health priorities (Hotez, 2008). The GAT assessment consistently identifies "advocacy and funding" as the most critical gap across all regions, with countries reporting the unpredictable and insufficient financing as the primary barrier to sustained wider programme implementation (Donadeu et al., 2025).

Table 5: Funding Trends and Documented Impact on NTD Programmes

Indicator	Value / Status
Global R&D investment in NTDs (2018)	$4.7 billion
Global R&D investment in NTDs (2023)	$3.7 billion
Decline in funding (2018-2023)	41%
US funding withdrawal (April 2025)	Impacted 47 campaigns across 19 years
People affected by delayed campaigns due to cut	143 million
Countries where 2030 targets will be delayed	At least 10
NTD tablets at risk of expiry in Africa (2025)	55 million
WHO country offices reporting health disruptions	70%

Sources: WHO Global Report on NTDs (2025)

2. The Diagnostic Void: A Barrier to Elimination and Surveillance

For the majority of NTDs, the "affordable, and sensitive point-of-care diagnostics remain unavailable or inadequately scaled". This diagnostic gap undermines programmes at every stage, from initial case detection to post-elimination surveillance.

According to Marks et al. (2024), the key diagnostic challenges include:

- **Buruli ulcer and leprosy:** Both require molecular Polymerase Chain Reaction (PCR) or histological test confirmation that is inaccessible in remote endemic villages, leading to underdiagnosis, delayed treatment, and preventable disability. This is where WHO in conjunction with eleven (11) laboratories combined their efforts to create the Buruli Ulcer Laboratory Network for Africa (BU-LABNET), in 2019 (Marion et al., 2022).
- **Visceral leishmaniasis:** In East Africa, the lack of rapid, accurate, and affordable diagnostics hampers active case finding in a disease that is fatal if untreated (Scarpini et al., 2022).
- **Post-elimination surveillance:** Current tools have limited sensitivity in low-prevalence settings, making it difficult to confidently validate elimination.
- **Skin NTDs:** Overlapping clinical presentations create diagnostic confusion; the WHO Skin NTDs App remains under evaluation. This mobile app uses artificial intelligence algorithms to assist frontline health workers identify 12 skin-related NTDs (Carrion et al., 2025). In 2024, WHO facilitated the procurement of over 1 million diagnostic tests for five NTDs, a significant achievement, yet a small fraction of what is needed. The GAT assessment consistently ranks "diagnostics" as the second-most critical gap.

Table 6: Implementation Status of Integrated Skin NTD Strategies

Indicator	Status
Countries implementing integrated skin NTD strategies by 2023	29 of 40 countries
Skin NTDs covered	Buruli ulcer, leprosy, cutaneous leishmaniasis, yaws, lymphatic filariasis (skin manifestations), scabies, onchocerciasis.

Key integration platforms	Primary health care systems
Digital tools deployed	WHO Skin NTDs App (Android/iOS; under evaluation in Senegal)
Strategic framework	WHO strategic framework for integrated control

Sources: WHO Second Global Meeting on Skin NTDs (2025).

3. Supply Chain Fragility:

The donation of NTD medicines by 12 pharmaceutical manufacturers represents one of the most successful public-private partnerships in global health history. However, the scale of these operations has expanded the logistical, financial, and technical complexity of NTD medicine management to unprecedented levels.

The key supply chain vulnerabilities according to Villacorta Linaza et al. (2021), include:

- **Last-mile delivery:** Ensuring medicines reach the most remote and conflict-affected communities remains a persistent challenge.
- **Medicine forecasting and procurement:** Inaccurate forecasting has led to both stockouts and oversupply
- **Sustainable financing for logistics:** While medicines are donated, operational costs of distribution are not.
- **Dependency on a small number of manufacturers:** This creates systematic vulnerability to production delays and disruptions.

The GAT assessment reveals that "access and logistics" remains a significant gap, particularly in fragile and conflict-affected states.

4. Climate Change: An Emerging and Accelerating Threat

Climate change has emerged as a new and rapidly accelerating threat to NTDs control and elimination. The WHO has explicitly identified climate change as a key challenge, noting that NTDs are particularly sensitive to shifting global climate patterns. According to WHO (2025), the key climate-related threats include:

- **Vector range expansion:** Rising global temperatures are expanding the altitudinal and latitudinal ranges of sandflies, blackflies, and Aedes mosquitoes into previously non-endemic regions.
- **Water availability changes:** Schistosomiasis and dracunculiasis depend on freshwater ecosystems vulnerable to climate-induced changes.
- **Food system disruptions:** Foodborne trematodiases are affected by changes in the distribution of intermediate hosts.
- **Population displacement:** Climate-induced migration can introduce NTDs into new areas and disrupt ongoing programmes.
- **Extreme weather events:** Floods, cyclone, and droughts disrupt mass drug administration campaigns and damage health infrastructure.

Table 7: Climate Change and Emerging Threats to NTDs

Threat	Affected NTDs	Mechanism of Impact
Vector range expansion	Dengue, Chikungunya, Lymphatic filariasis, Leishmaniasis	Temperature/rainfall changes alter vector distribution and breeding cycles
Water availability changes	Schistosomiasis, Dracunculiasis	Altered freshwater ecosystems intermediate hosts affected snail and copepod
Food system	Foodborne trematodiases	Shifts in distribution of fish, plant

changes		intermediate hosts and crustacean
Population displacement	All NTDs	Migration introduces diseases to new areas; disrupts active programmes
Extreme weather events	All NTDs	Destruction of health infrastructure; interruption of MDA campaigns

Sources: WHO Key Messages for World NTD Day 2025

The One Health approach, combined with climate-adaptive surveillance, will be essential for anticipating and mitigating these emerging threats. However, the GAT assessment reveals that climate adaptation is almost entirely absent from current NTD programme planning.

5. **Fragile Governance, Conflict, and Population Displacement:**
   Political instability, violent conflicts, and population displacement constitute chronic and severe barriers to NTD programme implementation.
   Key challenges as described by den Boer and Ritmeijer (2026) include:
   - **Programme disruption:** In conflict-affected settings, mass drug administration campaigns are frequently interrupted or cancelled.
   - **Population displacement:** Displaced populations often lack access to health services and may introduce NTDs into new areas.
   - **Weak surveillance systems:** In fragile states, disease surveillance is often the first casualty of conflict.
   - **Competing priorities:** NTD programmes are deprioritized in humanitarian emergency.
   - **Erosion of institutional capacity:** Prolonged instability erodes technical expertise and administrative capacity.

The GAT assessment consistently identifies **"country ownership and governance"** (a phrase referring to where an aid is delivered but government leadership, accountability, and domestic policy control are absent) as a significant gap, thereby making the programmes unsustainable, particularly when foreign donors stop fund from coming, as it happened in "**the Funding Crisis".**

6. **Knowledge, Data, and Research Gaps:**
   Beyond immediate operational challenges, Bhaumik et al. (2015) and Kumar et al. (2026) conclude that systemic knowledge and data gaps undermine evidence-based decision-making, such as:
   - **Data quality and completeness:** Many countries lack robust monitoring and evaluation systems.
   - **Implementation research:** There is a dearth of operational research on the most effective delivery strategies.
   - **Drug resistance:** Emerging resistance to anthelminthics is a growing concern, yet surveillance remains minimal.
   - **Neglected within neglect:** Some NTDs including mycetoma, Noma, and snakebite envenoming, receive disproportionately little attention.
   - **Post-elimination sustainability:** Very little research has been conducted on sustaining elimination gains after validation.

The Gap Assessment Tool (GAT): A Framework for Action:

To systematically address these persistent gaps, WHO developed the "Gap Assessment Tool (GAT)", a standardized framework for evaluating country-level progress This assessment tool provides a critical information of identifying an immediate research need through quantitative and qualitative predefined indicators. Quantitative assessments integrate data from multiple sources across a set of predefined global indicators. In contrast, qualitative assessments rely on findings derived from the implementation of Gap Assessment Tool (GAT) across four "thematic areas" according to Donadeu et al. (2025), as shown in Table 8:

Table 8. The Result from the 2023-2024 GAT

Thematic Area	Key Indicators Assessed
Diagnostics	Availability of diagnostic tests; laboratory capacity; quality assurance; access to point-of-care tools.
Monitoring and Evaluation	Surveillance systems; data quality; reporting completeness; elimination verification processes.
Access and Logistics	Medicine forecasting; supply chain management; last – mile delivery; training and supervision.
Advocacy and Funding	Political commitment; domestic financing; resource mobilization; advocacy capacity.

Sources: Donadeu et al. (2025).

The 2023-2024 GAT assessment provide critical insights into:

- **Funding:** Scored as the lowest thematic area, with countries consistently reporting that unpredictable and insufficient financing is the primary barrier.
- **Diagnostics:** Scored as the second-lowest, reflecting the persistent gap in field-deployable tools and laboratory capacity.
- **Access and logistics:** Scored variably, with higher scores in countries with strong health systems and lower scores in fragile settings.
- **Monitoring and evaluation:** Scored moderately, but significant gaps remain in post-elimination surveillance.

The 2026 Mid-Term Evaluation: A Critical Inflection Point

Recognizing the urgency of the challenges outlined above, WHO (2026) is conducting a mid-term evaluation of the 2021-2030 road map in 2026. This evaluation is explicitly designed to assess:

- **Relevance:** Are the road map targets and strategies still appropriate given the current context?
- **Effectiveness:** How much progress has been made, and where has the progress stalled?
- **Efficiency:** Are resources being used optimally?
- **Sustainability:** Are gains likely to be sustained beyond 2030?
- **Equity:** Are the poorest and most marginalized populations being reached?

The mid-term evaluation will also assess the impact of the funding crisis on the programme implementation and explore strategies to mobilize domestic resources, diversify financing, and build resilience. The GAT assessment, combined with the mid-term evaluation, will generate a comprehensive evidence base to guide course-correction. However, the value of these tools depends entirely on the willingness of governments, donors, and partners to act on their findings.

Strategic Imperatives: The Path to 2030 and Beyond

The 2026 mid-term evaluation of the WHO roadmap represents a critical reflection point. To course-correct and salvage the 2030 targets, the following strategic imperatives must be prioritized. Each recommendation in the following Table 9 is explicitly linked to the specific gap identified in "**Persistent Gaps and Emerging Challenges**" Section above.

Table 9: Recommendation for Specific Gap

Strategic Imperatives	Gap Addressed	Linkage Statement
Diversified and sustained financing	Funding Crisis	"To address the 41% decline in funding, the study recommends increasing domestic resource mobilization and exploring innovative financing mechanisms"

Accelerated R&D for diagnostic and treatments	Diagnostic Void	"To address the persistent diagnostic void, the review recommends prioritizing the development and deployment of field-deployable, affordable diagnostics for all NTDs".
Access and logistic supply	Supply Chain Fragility	"To address the low technical complexity of the NTD medicine management, finances and logistics among healthcare staff by the experience public health experts".
Climate-adaptive surveillance and planning	Climate Change	"To address the accelerating threat of climate change by incorporating climate modeling into epidemiological forecasting and adjusting vector control and MDA timing".
Embedding NTDs into Universal Health Coverage (UHC)	Fragile Governance	"To address the erosion of institutional capacity in fragile settings, it is recommended that integrating NTD interventions into primary health care packages and national health strategies would improve the public health".
Strengthened the engagement of the community and accelerate health literacy	Knowledge, Data, and Research Gaps	"To address knowledge and data gaps, the review recommends sustained health education, community-directed treatment, to address social determinants".

DISCUSSION

The journey over the past two decades underscores a fundamental truth: NTD elimination is not a theoretical aspiration but a practical, achievable reality. The data synthesized in this review spanning treatment coverage, country validations, and burden reduction provide unequivocal proof of concept. Yet, the sustainability of these achievements is under unprecedented strain. Since WHO consolidated disease-specific activities under a single programme in 2005, a concerted effort involving pharmaceutical manufacturers, development partners, philanthropic organizations, national health authorities, and WHO has contributed to a measurable decline in the global burden of NTDs (WHO, 2025). The coordination between human medicine, environmental management, and veterinary care to stop these diseases at their source has been sought by the WHO in a symposium, through a strategic frameworks, regional workshops, and global advisory meetings rather than a standalone merger. The framework is anchored by the WHO NTD road map 2021-2030 and One Health: approach for action against neglected tropical diseases 2021-2030 (Laing, 2023).

Key Integration Initiatives

- **Strategic and Technical Advisory Group (STAG-NTD):**
  Convenes regularly the global expert to evaluate the cross-cutting themes which include multi-disease integration, One Health models, and climate impacts.
- **Regional One Health Workshops:**
  Focused on the community-level implementation events, such as WHO/AFRO-ESPEN workshops targeting co-endemic taeniasis and schistosomiasis.
- **Global Skin NTD Meetings:**
  The periodic global meeting to break down disease-specific to evaluate complex human-animal-environment path of transmission.

The One Health Approach: An Essential Framework for NTD Elimination

The One Health framework is defined by Peterson et al. (2020) "as an approach to achieve better health outcomes for humans, animals, and the environment through collaborative and interdisciplinary efforts", has emerged as an indispensable paradigm for addressing many NTDs particularly those with zoonotic reservoirs, environmental transmission cycles, or vector-borne dynamics. NTDs are particularly sensitive to shifting global climate patterns, and addressing their impact is possible only through a One Health approach (Laing et al., 2021).

The integration of One Health principles into NTD programmes has been further reinforced through the WHO-

's broader adoption of integrated strategies for skin-NTDs and the increased inclusion of NTDs in national health strategies and essential service packages. As climate change continues to alter the geographical distribution of vectors and pathogens, the One Health framework will become increasingly vital for anticipating and mitigating emerging NTD threats (WHO, 2022).

The transformative power of this integration is the most significant strategic evolution in NTD control which shifted from "vertical, disease-specific silos to integrated cross-cutting platforms". The actual integration of preventive chemotherapy for lymphatic filariasis, onchocerciasis, schistosomiasis, and soil-transmitted helminthiases has dramatically improved cost-efficiency and coverage, enabling 867 million people to be treated in a single year (Onwe et al., 2021).

Similarly, the implementation of integrated skin NTD strategies in 29 countries which combined active case finding for Buruli ulcer, leprosy, and yaws within primary health care has demonstrated that shared clinical signs presentations and community-based approaches can be leveraged to maximise limited resources. Crucially, One Health framework has proven indispensable for zoonotic and environmentally-sensitive NTDs. The Rabies elimination is impossible without mass dog vaccination; echinococcosis and taeniasis require concurrent veterinary and human health interventions (Akoachere et al 2016; Edward & Owoicho 2025; WHO, 2025).

This approach, combined with strengthened surveillance systems and climate-adaptive programmatic planning, will be essential for participating and mitigating these emerging threats. The integration of climate adaptation into the NTD programme helps in strengthening surveillance and ensure treatment continuity for climate-sensitive diseases. The embedded NTD interventions into the primary health care and national health strategies will ensure sustainability and progress toward Universal Health Coverage (Peterson et al., 2020; WHO, (2022).

Several NTDs exemplify the critical need for One Health integration:

- **Schistosomiasis and Taenia solium (taenia/cysticercosis):**
  WHO has conducted regional workshops specifically aimed at strengthening country capacity for integrated control through a One Health approach. It recognizes that these diseases require simultaneous interventions in human health, animal health, and environmental management. The integration of WASH interventions with veterinary public health measures is essential for sustainable control (Otuneme et al., 2019).
- **Echinococcosis:** The transmission cycle involves dogs as definitive hosts, requiring coordinated veterinary and human health interventions, including deworming of dogs and meat inspection (da Silva, 2010).
- **Rabies:** A classic One Health disease, rabies elimination depends almost entirely on mass dog vaccination campaigns rather than human post-exposure prophylaxis alone (Chen et al., 2025).
- **Foodborne trematodiases:** These parasitic infections require food safety interventions, veterinary surveillance, and health education alongside human treatment (Fried et al., 2004).
- **Snakebite envenoming:** While not infectious, snakebite exemplifies the intersection of al core One Health including human activity, environmental degradation, and biodiversity conservation (Afroz et al., 2024).

Integration of Preventive Chemotherapy

The integration of mass drug administration (MDA) for multiple preventive chemotherapy NTDs, including soil-transmitted helminthiases, lymphatic filariasis, onchocerciasis, and schistosomiasis has dramatically improved efficiency and coverage, where millions were treated. This integration has enabled countries to reach more people with fewer resources, a critical consideration in an era of constrained funding (WHO, 2025).

Integrated Skin NTD Strategies

The skin NTDs including Buruli ulcer, leprosy, cutaneous leishmaniasis, lymphatic filariasis, onchocerciasis, scabies, and yaws share common clinical presentations, diagnostic challenges, and opportunities for integrated case finding and management (Loftus et al., 2018). The Second WHO Global Meeting on Skin-related NTDs,

held from March 24-26, built momentum for integration, with discussions focused on embedding skin NTD interventions into national primary health care systems (WHO, 2025), including mycetoma, which infect deeply into underlying structures to become "subcutaneous infection" (van de Sande, 2013; Bonifaz et al., 2014).

Twenty-nine (29) of the aimed-at forty (40) countries had implemented skin NTD strategies (WHO, 2025). Various initiatives such as the integrated strategy conducted across 11 villages co-endemic for Buruli ulcer in Cote d'Ivoire and Ghana have demonstrated the feasibility and effectiveness of active case finding and capacity-building for medical workers (Gyamfi et al., 2026). WHO has published a strategic framework for integrated control and management of skin-related NTDs and recommends integrating yaws eradication activities with skin NTD programmes through active surveillance (WHO, 2024).

Progress on Specific Diseases

Diseases Nearing Elimination:

Several NTDs are on the verge of global elimination, according to Miri et al. (2010), Casulli (2021), Franco et al. (2024), WHO (2025), Hayibor et al (2025), including:

- **Dracunculiasis (Guinea worm disease):**
  Only 13 human cases were reported in 2024 (provisional), and 14 in 2023, confined to just 12 villages in Chad (7 cases) and (6 cases) in South Sudan (WHO, 2025). And this represents one of the most remarkable public health achievements in history, with the disease poised to become the second human disease ever eradicated Nigeria has achieved eradication status since 2009 (Miri et al. 2010), and received WHO certification of transmission interruption in 2013.
- **Human African trypanosomiasis (HAT, sleeping sickness):**
  Between 2020 and 2024, 10 countries were validated by WHO for eliminating either the *gambiense* or *rhodesiense* forms of this condition as a public health problem: Chad, Benin, Equatorial Guinea, Guinea, Ghana, Rwanda, Cote d'Ivoire have reported zero indigenous cases since 2009 (Franco et al., 2024).
- **Yaws:**
  WHO (2025) has published guidance for serological surveys to assess interruption of yaws transmission in 2025. And also renewed eradication efforts targeting global eradication by 2030 through mass drug administration (MDA) campaigns and diagnostic enhancement.
- **Trachoma:**
  Egypt has become the latest country to eliminate trachoma as a public health problem in 2025. Globally, 58 countries have now eliminated at least one NTD, including 10 countries that have received WHO certification for eliminating trachoma: Benin, The Gambia, Ghana, Burundi, Malawi, Mali, Mauritania, Morocco, Togo, and Senegal (WHO, 2025; Sokunbi et al., 2023).

Other Diseases Targeted for Elimination

- **Lymphatic Filariasis:**
  Lymphatic filariasis elimination has been achieved in multiple countries in varying times from 2016, 2017, and 2018, including Kiribati, Vanuatu, Vietnam, Bangladesh, Cambodia, and Tonga (Craig et al., 2025). However, challenges which leads to a comprehensive surveillance on Lymphatic filariasis activities in Niue region remain a high-burden country (Carlington et al., 2019), and in Africa, where co-endemicity with other NTDs complicates programmatic efforts.
- **Visceral Leishmaniasis:**
  Following the successful visceral leishmaniasis elimination programme in Southeast Asia, East Africa has emerged the hotspot for transmission (Scarpini et al., 2022). The Strategic Framework for Elimination of Visceral Leishmaniasis as a public health problem in Est Africa (2023-2030) was launched in June 2024. In a significant cross-border initiative, Chad, Ethiopia, South Sudan, Somalia, Djibouti, and Sudan signed a memorandum to eradicate visceral leishmaniasis (WHO, 2025).

- **Buruli Ulcer:**
  Buruli ulcer, the third most common mycobacterial disease after tuberculosis and leprosy, has been reported in 33 countries (Loftus et al., 2018), with over 80% of cases in Africa. Significant progress has been made, driven by the Global Buruli Ulcer initiative, updated WHO guidelines, and the establishment of the Buruli Ulcer Laboratory Network for Africa (WHO, 2015; WHO, 2025).
- **Leprosy:**
  Despite the availability of curative multidrug therapy that helps in eradicating the disease in India in 2005, still many new cases are being identified (Kumar et al., 2024). Over 180,000 new cases are reported globally each year, with approximately two-thirds in India, followed by Brazil and Indonesia (Edward & Owoicho, (2025). In Sri Lanka, approximately 2,000 new patients are detected annually as of 2021, including around 10% children under ten (Arudchelvam et al., 2025). The World Health Organization (WHO) continues to support countries clinicians training, specialized diagnostic tools, and free multidrug therapy in 2025.

Climate Change and Emerging Threats

Climate change has emerged as a new and significant threat to NTD control and elimination (Tidman et al., 2021). NTD are particularly sensitive to shifting global climate patterns, as temperature, rainfall, and humidity affect the distribution and biology of vectors, intermediate hosts, and pathogens (Bryson et al., 2020).

Key climate-related threats include:

- **Vector-borne diseases:**
  Dengue, leishmaniasis, chikungunya, and lymphatic filariasis are transmitted by vectors whose geographic ranges expanding with climate change (Witte et al., 2024; Zhao et al., 2026; CDC, 2024; Carlington et al., 2019; NCDC, (2017). The WHO report highlights slow progress in reducing deaths from vector-borne diseases (WHO, 2025).
- **Water-borne diseases:**
  Schistosomiasis and dracunculiasis depends on freshwater ecosystem that are vulnerable to climate-induced changes in water availability and quality (Miri et al., 2010; Otuneme et al., 2019).
- **Foodborne diseases:**
  Changes in temperature and rainfall patterns affect the distribution of intermediate hosts for foodborne trematodiases (Fried et al., 2004).
- **Population displacement:**
  Climate-induced migration can introduce NTDs into new areas and disrupt ongoing elimination programmes, where the most common challenge including physical destruction of health infrastructure was the impact of conflict on access to health care services (Bestwick et al., 2026).

Persistent Bottlenecks: Another Neglect within NTDs, and in the diagnosis

A stark illustration in both neglect and in diagnostic gap is “Noma” (cancrum oris, stomatitis gangrenosa, necrotizing ulcerative stomatitis), a noncontagious and rapidly progressive gangrenous disease of the mouth and face that primarily affects malnourished children living in extreme poverty (Srour et al., 2017; Braimah et al., 2023), but often referred to “infectious disease of unknown aetiology” (Baratti-Mayer et al., 2003), and “a face of poverty” (Marck, 2003). It has a yearly global incidence rate of 140,000 cases with approximately 90% mortality. Despite its recent inclusion in the WHO NTD portfolio in December 2023, Noma remains a clinical diagnosis in most endemic settings, with no rapid diagnostic test available.

It is frequently misdiagnosed as cutaneous leishmaniasis, tuberculosis of the mouth or malignancy, leading to catastrophic delay in treatment. By the time a correct diagnosis is made, the disease has often destroyed facial tissues, resulting in disfigurement, functional impairment, and mortality if untreated (Srour et al., 2017). The diagnostic void for “Noma” is not merely a technical gap; it is a “death sentence” for thousands of children each year, a tragedy that underscores the urgency of investing in field-deployable diagnostics for all NTDs, including the most recently recognized.

"Noma" further exemplifies this neglect, unlike the other NTD medicines donated by pharmaceutical manufacturers, there is no donated medicine package for "Noma". Its treatment requires a complex combination of broad-spectrum antibiotics, nutritional rehabilitation, surgical debridement, and reconstructive surgery, none of which are part of routine NTD supply chain. In most resource-limited settings particularly in sub-Saharan Africa and other poor settings, these essential interventions are simply unavailable, and patients are left to suffer disfigurement, social ostracism, and death (Ogbureke & Ogbureke, 2010).

The absence of a coordinated supply chain for "Noma" represents a systemic failure that mirrors and magnifies the broader supply chain vulnerabilities facing all the other NTD programmes. Addressing this requires not only donor commitment but also innovative public-private partnerships to develop and deliver comprehensive treatment packages for the most "neglected of the neglected" like "Noma" (Otorkpa et al., 2024).

CONCLUSION

The story of neglected tropical diseases in the 21st Century is one of extraordinary human achievement shadowed by profound vulnerability. When the WHO consolidated its NTD programmes twenty years ago, the notion that 63 countries could eliminate at least one of these ancient scourges by 2026 seemed distant and aspirational. Today, it is a documented reality, a testament to the power of global solidarity, unprecedented pharmaceutical philanthropy, community-driven health delivery, and evidence-based public health service delivery. The exact reduction of the population requiring interventions by 32%, the treatment of over 867 million people in a single year, and the donation of more than 31 billion tablets represent milestone that deserve recognition and celebration among the beneficiaries.

Yet, as this comprehensive review has demonstrated, "progress is not permanent, and neglect is a habit that dies hard". The same global community that built this remarkable infrastructure has allowed its financial foundation to crumble. The 41% decline in funding between 2018 and 2023, exacerbated by the abrupt withdrawal of major bilateral support in 2025, has already delayed treatment for 143 million people and postponed elimination targets in at least 10 countries. This is not a merely shortfall; it is a direct threat to the lives and livelihoods of the world's most marginalised populations.

Compounding this fiscal crisis is the silent, inexorable advance of climate change; an emerging threat that respect no national borders and threatens to redraw the global map of NTD transmission. Without a climate-adaptive surveillance, integrated One Health strategies, and resilient supply chains, decades of hard-worn gains risk being undone in a matter of seasons. The 2026 mid-term evaluation of the WHO 2030 road map arrives at a pivotal crossroads. The targets remain ambitious but attainable, provided the global community acts decisively on the following five strategic imperatives:

1. **Diversified and sustained financing:** National governments must increase domestic resource mobilization for NTDs, as exemplified by Uganda's pledge to raise domestic financing from 12% in 2020 to 30% by 2025. Simultaneously, innovative financing mechanisms such as blended finance, impact bonds, and pooled procurement should be explored to reduce donor dependency.

2. **Embedding NTDs into Universal Health Coverage (UHC):** NTD interventions must be fully integrated into primary health care packages, national health strategies, and essential service delivery. This ensures sustainability, reduces vertical programmatic costs, and advances the equity agenda. As of 2024, 14 African countries had incorporated NTDs into their national health strategies, plans, and essential health packages. This integration is essential for sustainability, as it reduces reliance on external donors and builds domestic capacity.

3. **Climate-adaptive surveillance and planning:** NTD programmes must incorporate climate modelling into their epidemiological forecasting and adjust vector control, MDA timing, and geographic targeting accordingly. Cross-sectoral and environmental collaboration with meteorological agencies is essential.

4. **Accelerated R&D for diagnostics and treatment:** The WHO's recent prequalification of a dengue vac-

cine and six new medicine formulations is encouraging, but far more investment is needed in field-deployable diagnostics, shorter treatment regimens, and next-generation vaccines.

5. **Strengthened community engagement and health literacy:** Elimination is ultimately a community-driven endeavour. Sustained health education, community-directed treatment, and addressing social determinants are non-negotiable.

Ultimately, the unfinished agenda of NTDs is not a scientific or technical problem, but rather, it is a political and moral one. The tools exist, the partnerships are proven, the successes of the past two decades provide an irrefutable blueprint. What remains is the collective will to protect and accelerate progress in the face of mounting headwinds. The 20230 targets of 100 countries eliminating at least one NTD is not just a bureaucratic benchmark; it is a measure of our shared humanity. To miss that target would be to accept that the poorest and most voiceless populations can be left behind, a failure not of strategy, but of conscience.

As the WHO NTD programme marks 20 years of action, the global community stands at a defining moment. The choice is clear: unite, act decisively, and eliminate the threat, or accept that the neglect is the destiny of the forgotten. For the 1.4 billion people at risk, the time to end the neglect is not tomorrow, but now. The finish line is in sight. History will judge whether we had the courage to cross it together.

List of Abbreviations:

DALYs – Disability-Adjusted Life Years

DEC – Diethylcarbamazine

GAT – Gap Assessment Tool

HAT – Human African Trypanosomiasis

IRIS – Institutional Repository for Information Sharing

MDA – Mass Drug Administration

NTDs – Neglected Tropical Diseases

ODA – Official Development Assistance

OECD – Organisation for Economic Co-operation and Development

PEP – Post-Exposure Prophylaxis

R&D – Research and Development

SAFE – Surgery, Antibiotics, Facial Cleanliness, Environmental Improvement

UHC – Universal Health Coverage

VL – Visceral Leishmaniasis

WASH – Water, Sanitation, and Hygiene

WHO – World Health Organization

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