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Neglected infectious diseases in the Americas: current situation and perspectives for the control and elimination by 2030

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Neglected infectious diseases (NID) are a diverse group of conditions including more than 20 parasitic, bacterial, and fungal diseases, and envenoming by poisonous animals. Their risk factors include poverty, income inequality, lack of access to safe drinking water and proper sanitation, and barriers to education and health services, among other social determinants of health. They impose a large burden on marginalized populations globally and in the region of the Americas, including women and ethnic minorities. The region of the Americas has a track record of elimination of communicable diseases and countries have made significant progress in the elimination of NID in recent years. Between 2011 and 2020, one country eliminated trachoma, four eliminated onchocerciasis, one eliminated human rabies transmitted by dogs, and three were declared free of lymphatic filariasis. The COVID-19 pandemic impacted the continuity of actions to eliminate NID and there are challenges in controlling and eliminating NID, particularly in vulnerable and hard-to-reach populations with issues in accessing health services. There are still difficulties in the coordination between health and other sectors to work together on the socioeconomic and environmental determinants of NID. Forwarding the elimination of NID in the Americas involves continuous advocacy and resource mobilization at various levels (international, regional, national, and subnational), ensuring sufficient allocation of human and financial resources, access to essential health supplies, and implementing people-centered services. It also entails engaging and empowering civil society, communities, local governments, and public-private partnerships, while collaborating with stakeholders and donors for effective action.

KEYWORDS

neglected tropical diseases, Americas, elimination, skin-NTD, neglected infectious diseases

Introduction

Neglected Infectious Diseases (NID), also referred to as Neglected Tropical Diseases (NTD), constitute a group of more than 20 conditions primarily afflicting individuals in impoverished and marginalized communities, predominantly in tropical and subtropical regions (1). These diseases significantly contribute to the overall disease burden due to their chronic and often incapacitating nature, often resulting in irreversible sequelae. Women and girls bear a disproportionate impact from NID, influenced by social, economic, biological, and cultural factors that hinder their access to health services (2). Furthermore, some NID are associated with visible disfigurements and disabilities, leading to social stigma, isolation, exclusion, discrimination, and mental health challenges.

NID impose substantial economic burdens on developing countries, amounting to billions of United States dollars annually in direct health expenses, productivity loss, and diminished socioeconomic and educational achievements. The economic repercussions can have profound and enduring effects on affected individuals, families, and communities, perpetuating a cycle of poverty as those impacted struggle to maintain employment and access education (3). Globally, NID contribute to the loss of an estimated 14.5 million disability-adjusted life years (4). Unfortunately, these diseases often receive inadequate attention, limited research funding, and fewer resources compared to other communicable diseases such as malaria, HIV/AIDS, and tuberculosis (1, 5).

Addressing NID involves a multifaceted approach, incorporating strategies like surveillance, mass drug administration, case management, enhanced sanitation and hygiene, vector control, increased awareness and education, and intersectoral actions from the One Health approach (1, 6). Governments, international organizations, non-governmental organizations, and communities all play pivotal roles in the collective efforts to eliminate or control these diseases, thereby enhancing the health and well-being of affected populations.

While the Americas region has made strides in the control and elimination of diseases, including NID, challenges persist in accelerating the achievement of set targets. This paper aims to provide an overview of the current situation of NID in the Americas, highlighting achievements, challenges, and perspectives for their elimination by 2030.

Current situation of NTD prevention and control in the Americas

The Americas have witnessed commendable progress in achieving disease control and elimination targets for Neglected Infectious Diseases (NID), owing to the tireless efforts of thousands of communities and health workers, along with the commitment of ministries of health, partners, and donors. [Supplementary Figure 1](#) illustrates the significant milestones achieved.

Onchocerciasis was eliminated in Colombia, Ecuador, Mexico, and Guatemala, with the last remaining active transmission focus in

the Yanomami area bordering Brazil and Venezuela, with approximately 36,000 people still requiring preventive chemotherapy. Costa Rica, Suriname, and Trinidad and Tobago were removed from the World Health Organization (WHO) list of lymphatic filariasis endemic countries in 2011. Dominican Republic suspended the mass drug administration in 2018 and Brazil is compiling the necessary documentation to request the validation of the elimination of this disease as a public health problem to PAHO/WHO by 2024. Guyana and Haiti, where it is estimated that 5.1 million people are still at risk, have made significant progress towards the elimination target, as measured by the number of districts which stopped mass drug administration (MDA). Haiti went from 140 communes needing MDA to 18, a reduction of 87.2%. and Guyana went from 8 regions with MDA to 2, a reduction of 75% (7, 8).

Mexico successfully eliminated trachoma as a public health problem in 2017, while Brazil, Colombia, Guatemala, and Peru continue efforts with an estimated 5.6 million people requiring preventive chemotherapy. Guatemala is poised to achieve the elimination target by 2024 and PAHO is supporting other countries in the Americas to find out whether more populations are at risk of trachoma, a necessary step to eventually declare the regional elimination (9, 10).

Schistosomiasis transmission has likely been eliminated in most, if not all, of the Caribbean countries and territories with a previously known endemicity but persists in a few states of Brazil (Alagoas, Bahia, Espírito Santo, Maranhão, Minas Gerais, Paraíba, Pernambuco, Rio Grande do Norte and Sergipe) and in the Bolivarian Republic of Venezuela, where about 1.6 million people are considered at risk of infection (11).

By 2019, leprosy was eliminated (defined as a prevalence of less than 1 case per 10,000 population) at the first subnational level in 19 countries, with all countries except Brazil achieving national elimination. The impact of COVID-19 disrupted leprosy surveillance and case detection from 2020 onwards, causing a 37% drop in the number of new cases detected from 29,936 in 2019 to 19,195 in 2020. In 2021, 19,826 new cases were detected of which 92% occurred in Brazil (12). Countries where less than 10 new cases are detected annually could further advance towards interruption of transmission and elimination of the disease.

In 2019, Mexico was the first country in the world to achieve the elimination of dog-mediated human rabies as a public health problem, with other countries nearing elimination (Argentina, Brazil, Chile, and Uruguay). Only four countries reported dog-mediated human rabies cases from 2018 to 2022 (12 cases in Bolivia, 1 in Cuba, 3 in Dominican Republic, and 5 in Haiti) (13, 14).

Chagas disease is endemic in 21 countries where it is estimated that between 6 and 8 million people are infected, that about 30,000 new cases occur annually due to vector-borne transmission and approximately 8,000 more due to congenital transmission. Sixty-five million people are estimated to be at risk of contracting the infection and about 12,000 deaths are caused by this disease each year (15, 16), mostly in Brazil, Argentina, and Bolivia. Eighteen countries in the region have interrupted transmission by the main domestic vector of Chagas disease at the national level or in some areas and all the endemic countries screen blood donors.

In 2021, 20 countries reported 57.8 million children aged 1 to 14 years requiring preventive chemotherapy for soil-transmitted helminthiasis (STH). Of these, six countries conducted deworming activities, treating 10.7% (4.4 million) of school-age children at-risk and 4.3% (0.7 million) of preschool-age children at risk (17). Despite progress, strengthened efforts are needed to eliminate STH as a public health problem in the region by 2030.

There has been some progress in addressing other neglected infectious diseases, with improvements in cystic echinococcosis/hydatidosis control or elimination capacities such as the case of Argentina, Brazil, Chile, Peru, and Uruguay that have included indicators and interventions for the elimination of the disease as a public health problem in their national plans (18). Cases of human visceral leishmaniasis (VL), endemic in 13 countries, have decreased by 57% in the region between 2017 (4,228 cases reported) and 2021 (1,799 cases reported). In 2021, four countries (Costa Rica, Honduras, Mexico, and Nicaragua) reported zero VL cases, and eight countries (Argentina, Bolivia, Colombia, El Salvador, Guatemala, Paraguay, Venezuela, and Uruguay) reported zero deaths or reduced the fatality rate. Brazil is the only country where the VL fatality rate continues to increase, being 9.7% in 2021. Cutaneous leishmaniasis (CL) is endemic in 17 countries and the number of reported cases went from 67,949 in 2005 to 37,786 in 2021 which is a 44% reduction. This reduction is mainly due to the decrease observed in Brazil, Colombia, Nicaragua, and Peru, countries that together represent approximately 80% of the CL cases in the Americas (19, 20).

Efforts to control or eliminate taeniasis/cysticercosis, fascioliasis, yaws, tungiasis, and scabies face challenges due to limited availability of data on the current epidemiological status and the low visibility of these diseases in the public health agendas of countries and donors (21–27). Colombia, Costa Rica, Guatemala, Haiti, Honduras, Mexico, Nicaragua, and Paraguay identified focal areas of potential transmission of taeniasis/cysticercosis. Bolivia has the largest mass drug administration program for fascioliasis control in the world, and the country treated 233,000 people in 2019 (25). Ecuador is close to confirming the interruption of transmission of yaws, while there is still a need to compile information in all the other countries in the region to confirm the current epidemiological status.

Envenoming by poisonous animals poses a significant public health concern. Approximately 500,000 annual poisonings from scorpions, spiders, and snakes, with varying lethality and disability rates, necessitate urgent attention to decrease mortality by 50% by 2030 (28–31). The creation of the Network of Public Laboratories Producing Antivenoms (RELAPA) since 2018, supported by PAHO, aims to enhance antivenom production, strengthen national programs, and address epidemiological needs for public health attention (30, 31).

Figure 1 presents a map with the distribution of NID by country in the Americas.

The political commitment of countries in the Americas to control and eliminate NID

The advancement in the control and elimination of Neglected Infectious Diseases (NID) within the Americas can be attributed to

the unwavering commitment of countries in strengthening their capabilities and sustaining endeavors to meet elimination targets. In 2009, PAHO's Directing Council approved a landmark plan of action for the elimination of NID (32), followed by a comprehensive 2016–2022 strategy aimed at eliminating select NID, consolidating achievements, and instituting post-elimination measures to prevent re-emergence (5). These regional initiatives have been instrumental in inducing governments to integrate ambitious NID actions into national public health policies, programs, and plans, allocating domestic resources for critical interventions focused on prioritized disease elimination.

While tools are still lacking for elimination of certain NID, these initiatives present an opportunity to address and alleviate the burden of all NID in overlapping disease scenarios. The initiatives prioritize innovative and intensified disease surveillance, diagnosis, clinical case management, preventive chemotherapy, improved primary health care access, integrated vector management, control of neglected zoonoses, and intersectoral approaches to minimize NID transmission risk through increased access to safe water, basic sanitation, hygiene, and improved housing conditions. These strategic initiatives foster regional progress by adopting integrated, sustainable approaches that address overlapping diseases in vulnerable populations.

In a significant development in 2019, the countries of the Americas endorsed PAHO's ambitious initiative to eliminate over 30 communicable diseases, including several NID, and related conditions by 2030 (33). This forward-thinking initiative focuses on four crucial pillars—strengthening health systems, enhancing information and surveillance systems, addressing environmental and social determinants of health, and increasing financial resources and governance. The regional efforts underscore a proactive and innovative approach, reflecting a collective commitment to combat NID, amongst other communicable diseases, through comprehensive strategies and collaborative action, particularly targeting vulnerable populations.

In 2020, the World Health Assembly approved the WHO roadmap to eliminate Neglected Tropical Diseases by 2030, defining global targets and milestones for prevention, control, elimination, and eradication of 20 diseases and disease groups (1). This roadmap advocates for expedited programmatic actions, intensified cross-cutting approaches, and transformative operational models to facilitate country ownership. In 2021, PAHO's Directing Council further endorsed the regional One Health approach, complementing efforts to address NID determinants by taking action at the interface of the environment, animals, and humans (34).

Challenges looming over the efforts to control and eliminate NID in the Americas

Latin America grapples with persistent challenges, such as high levels of income inequality, social disparities, and uneven distribution of resources, rooted in historical factors such as

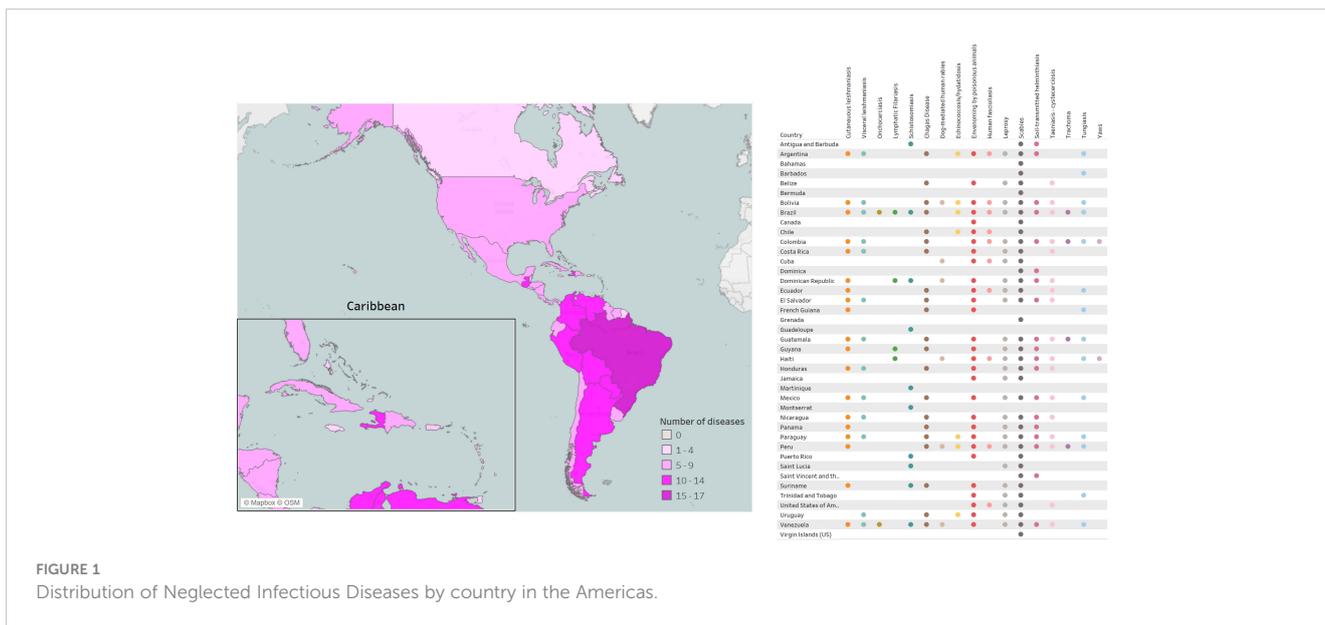


FIGURE 1 Distribution of Neglected Infectious Diseases by country in the Americas.

colonialism, socioeconomic structures, and limited access to education and healthcare. The region, with approximately 201 million people living in poverty and 86 million in extreme poverty in 2021, is the most unequal region in the world (35). In 2020 about 25% of the approximately 654 million inhabitants of Latin America and the Caribbean lacked access to safely managed drinking water services and a staggering 66% lacked access to safely managed sanitation facilities (36).

The COVID-19 pandemic exacerbated these challenges, redirecting resources from Neglected Infectious Diseases (NID) programs to support the pandemic response and disrupting community-based activities. The pandemic’s impact on health and socio-economic aspects hindered NID control efforts, postponing community-based activities such as mass drug administration, surveys, and active case searches until the latter half of 2021 (37, 38). Concerns for safety of health workers and communities, mobility restrictions, and screening limitations disrupted NID surveillance, diagnosis, and treatment. Health surveillance systems and healthcare services were significantly reduced, with healthcare workers reassigned to pandemic-related tasks. Interruption in surveillance systems affected the detection and report of cases of some diseases such as the case of leprosy.

Challenges persist in controlling and eliminating NID, especially in vulnerable populations in rural and hard-to-reach areas. Service delivery capacities for migrants, displaced persons, and indigenous peoples need to be improved. Surveillance systems to monitor disease elimination targets need to be reinforced mainly in settings where there are gaps in detecting and reporting cases or carrying out surveillance actions. Access remains a concern despite domestic funding investments in health coverage expansion. Coordination gaps within health systems, involving multiple actors, public and private, pose challenges, as does the limited collaboration between health and other sectors addressing the socioeconomic and environmental determinants of NID (39).

Certain NID, like brucellosis, envenoming from poisonous animals, fungal diseases, and skin-NID, lack prominence on the public health agenda and require increased attention, research and development support for diagnostics, treatments, vaccines, antivenoms, and other essential tools for advancing towards elimination.

Perspectives to control and eliminate NID in the Americas

Safeguarding the substantial progress achieved in controlling and eliminating Neglected Infectious Diseases (NID) in the Americas requires concerted efforts, extending advocacy and resource mobilization at international, regional, national, and subnational levels. The critical elements encompass sufficient allocation of human and financial resources, inclusive of domestic and external funding, and provision of essential medicines, diagnostics, and health-related supplies. Community engagement for social empowerment, with mobilization and community leadership involving local governments, fostering public-private partnerships, and collaboration with stakeholders, including donors, are integral components of these endeavors.

Interventions targeting the prevention, control, and elimination of NID are regarded as “best buys” in global public health, demonstrating a remarkable net benefit of approximately US\$ 25 per each US\$ 1 invested in preventive chemotherapy, for example. This represents a 30% annualized rate of return and significantly contributes to universal health coverage and social protection for the most vulnerable (40).

Accelerating progress towards the 2030 control and elimination targets for NID is feasible in the Americas. Countries are implementing integrated approaches, exemplified by the regional initiative to eliminate mother-to-child transmission of HIV, Chagas disease, syphilis, and hepatitis B (EMTCT Plus initiative) (41). This

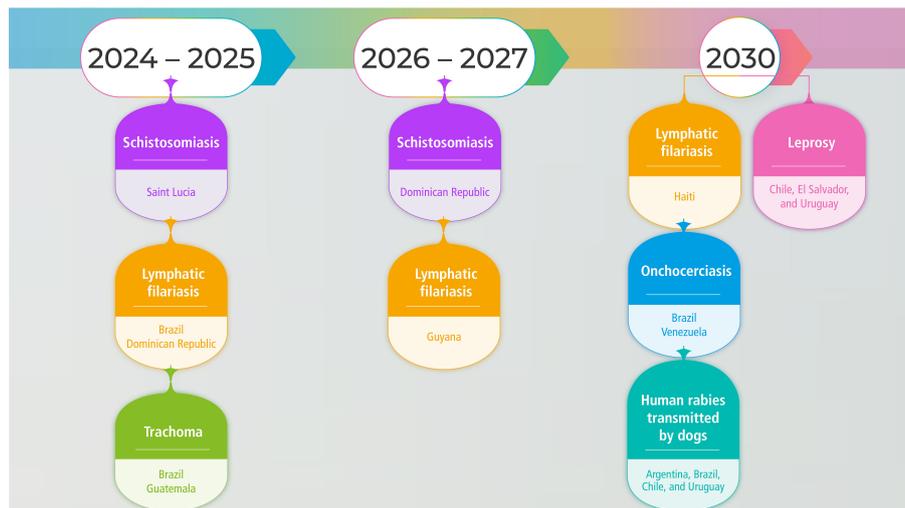


FIGURE 2
Neglected infectious diseases that might be eliminated in countries of the Americas by 2030 (Estimated timeline that depends on actions implemented by countries to achieve the targets).

approach has resulted in eight countries eliminating vertical transmission of HIV and syphilis by 2023, with anticipated benefits in accelerating actions toward the elimination of mother-to-child transmission of Chagas disease in endemic countries.

Innovations like the Multiplex initiative, enable the serosurveillance of multiple NID, vaccine-preventable diseases, and vector-borne diseases using a single blood sample and a common laboratory platform, which contributes to improving cost-effectiveness and maximizes the usefulness of samples taken during serosurveys (42, 43). Reinforced entomological surveillance platforms increase national capacities for integrated vector management (44) related to NID. Integrative approaches, including One Health and PAHO's initiative to eliminate over 30 communicable diseases, further support countries in expediting their efforts towards NID control and elimination in the Americas.

For 2030, based on data and progress in countries towards control and elimination of NID in the Americas presented by the authors in this manuscript, we envision four countries achieving lymphatic filariasis elimination; two, schistosomiasis elimination; two, trachoma elimination; two onchocerciasis elimination; three, elimination of leprosy transmission and disease; and at least four the elimination of human rabies transmitted by dogs (Figure 2).

Concluding remarks

There is an urgent need to boost actions to control and eliminate NID by focusing on intersectoral efforts from the perspective of human development. NID are intimately related to socioeconomic inequities, so the persistence of these diseases in poor populations is a tracer of the challenges that countries in the Americas face to progress toward the sustainable development goals (SDG). Addressing these deep-rooted inequities requires

comprehensive efforts from governments, civil society, and international organizations. It involves implementing policies that promote inclusive economic growth, invest in social infrastructure, improve access to quality education and healthcare, strengthen social protection systems, and empower marginalized communities. Immediate intersectoral and intergovernmental action to overcome the challenges in health and work together toward the SDG agenda is needed, including SDG3, whose target 3.3 specifically mentions the commitment to the elimination of NID.

The application of the One Health approach to accelerate the control and elimination of NID, and prevent the emergence and reemergence of diseases, is an opportunity to work holistically and achieve the NID elimination targets by 2030. Furthermore, it is critical to advocate for integrating NID-affected people into existing social protection systems and ensuring they receive comprehensive, high-quality prevention and healthcare services at the primary healthcare level. The goal is to provide comprehensive care to people and communities affected by NID through their life course, with equity and human rights approaches and guided by the principle of "leaving no one behind".

Data availability statement

The original contributions presented in the study are included in the article/Supplementary Material. Further inquiries can be directed to the corresponding author.

Author contributions

MISD: Writing – original draft, Writing – review & editing. ANSME: Writing – review & editing. AL: Writing – review &

editing. SYOBV: Writing – review & editing. RGCS: Writing – review & editing. RSN: Writing – review & editing. MANV: Writing – review & editing. LGC: Writing – review & editing. MAE: Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/ftd.2024.1326512/full#supplementary-material>

SUPPLEMENTARY FIGURE 1

Neglected infectious diseases eliminated in countries of the Americas between 2011 and 2019.

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