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REVIEW ARTICLE

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An Overview of Neglected Tropical Diseases: Global Perspective

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ABSTRACT

Neglected tropical diseases (NTDs) are a set of infectious diseases that primarily affect populations living in low-income countries, caused by a diversity of pathogens such as viruses, bacteria, and parasites, and can lead to significant morbidity and mortality. It is estimated that 1 billion people are affected worldwide by NTDs. These diseases pose a formidable public health problem that disproportionately affects the world's poorest and most disadvantaged population. The control and elimination efforts of these diseases must be led by an integrated approach that addresses the underlying social determinants of health. The World Health Assembly officially designated January 30th as World Neglected Tropical Diseases Day on May 31, 2021. The objective of this article is to provide an overview of the NTDs, their global burden, and the current efforts to control and eliminate them. The background and rationale for reviews on NTDs emphasize the significant burden of these diseases, their impact on individuals and communities, and the need for increased investment in global health initiatives.

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Introduction

Background and Rationale for the Review

Neglected tropical diseases (NTDs) are a set of infectious diseases that primarily affect populations living in low-income countries. These diseases are caused by a diversity of pathogens such as viruses, bacteria, and parasites and can lead to significant morbidity and mortality [1]. NTDs are prevalent in tropical and subtropical regions of the world and often coexist with poverty, inadequate sanitation, and limited access to healthcare. Engles et al estimated that the sheer burden of NTDs culminates in about 1.7 billion people being threatened by it, many of whom barely make ends meet and constitute the marginal communities of the world [2].

The global burden of NTDs is humungous, with an estimated 1 billion people affected worldwide [3]. These diseases have a significant effect on the population at an individual level as well as community level, leading to disability, stigma, and economic hardship [4]. As such, there is a growing need to address the challenges associated with NTDs and develop effective strategies for control and elimination.

A review article by Hotez et al highlights the need for increased investment in NTD control and elimination efforts [4]. The authors

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argue that NTDs have been overlooked by the global health community and that significant progress can be made through increased funding and coordination [5]. Similarly, a review by Molyneux examines the prevalence, distribution, and disease burden of NTDs in sub-Saharan Africa, emphasizing the need for a comprehensive approach to NTD control that includes prevention, treatment, and surveillance [6].

Another review by Raso et al evaluates the impact of NTDs on global health and development, emphasizing the need for integrated control strategies that address the social determinants of health [7]. This review highlights the economic and social consequences of NTDs and argues that effective control will require a collaborative effort involving governments, international organizations, and civil society.

In summary, the background and rationale for reviews on NTDs emphasize the significant burden of these diseases, their impact on individuals and communities, and the need for increased investment in global health initiatives. These reviews call for a comprehensive approach to NTD control that includes prevention, treatment, and surveillance, as well as collaboration across sectors and stakeholders.

Brief Summary of the Article

NTDs are a group of infectious diseases that affect more than a billion across the world, primarily in low-income countries. These diseases are often related to destitution and inadequate hygiene and can lead to significant morbidity and mortality. Several review articles have been published on NTDs that provide a clear outline of the present scenario and the challenges associated with control and elimination efforts.

One such review by Molyneux provides a comprehensive review of the current state of understating NTDs, including their prevalence, distribution, and disease burden [6]. The author highlights the need for a panoramic approach to NTD control which includes prevention, treatment, and surveillance. He also highlights the potential for integration with other public health initiatives to maximize impact and efficiency.

Another review by Hotez et al focuses specifically on the global burden of NTDs and the need for increased investment in control and elimination efforts [4]. The authors argue that NTDs have been overlooked by the global health community and that significant progress can be made through increased funding and coordination.

A review by Raso et al evaluates the impact of NTDs on global health and development, emphasizing the need for integrated control strategies that address the social determinants of health [7]. The authors argue that effective control will require a collaborative effort involving governments, international organizations, and civil society.

Overall, review articles on NTDs provide a valuable resource for policymakers, researchers, and practitioners working to address these diseases. These reviews summarize the current state of knowledge on NTDs and highlight the challenges and opportunities associated with control and elimination efforts.

Importance and Relevance of the Article

The importance and relevance of the review articles on NTDs lie in the fact that these diseases disproportionately affect the world's poorest and most marginalized populations. NTDs cause significant morbidity and mortality, leading to a substantial burden of disease in economically developing nations. As highlighted in a review article by Hotez et al, NTDs account for more than 534,000 deaths annually and contribute to the cycle of poverty that affects billions of people worldwide [4].

In addition, NTDs have been overlooked in global health policy and funding, as pointed out by Molyneux et al, despite the fact that many of these diseases are preventable and treatable with existing interventions [8]. By providing a comprehensive overview of the current state of knowledge on NTDs, review articles help in raising awareness about these diseases and promoting investment in control and elimination efforts.

Review articles also emphasize the need for an integrated approach to NTD control, as highlighted by Raso et al [7]. NTDs are often associated with a lack of hygiene and sanitation, unavailability of clean water, and other social determinants of health. To effectively control and eliminate these diseases, it is necessary to address these underlying social determinants through collaborative efforts involving governments, international organizations, and civil society.

Overall, review articles on NTDs are essential resources for policymakers, researchers, and practitioners working to address these diseases. They provide a clear outline of the present scenario and the challenges associated with the control and elimination efforts of NTDs. Also, they highlight the significance of an integrated approach that addresses the social determinants of health.

Statement of the Article

The statement for review articles on NTDs is that these diseases pose a formidable public health problem that disproportionately affects the world's poorest and most disadvantaged populations and that control and elimination efforts must be led by an integrated approach that addresses the underlying social determinants of health.

This thesis is supported by several publications. For example, the review by Hotez et al emphasizes the high burden of NTDs on global health and the need for integrated approaches to control and eliminate these diseases [4]. Similarly, the review by Molyneux et al underscores the chronic pandemic of NTDs and the need for a coordinated global response [8]. The review by Raso et al highlights the impact of social determinants of health on NTDs and the importance of addressing these determinants in control and elimination efforts [7].

In addition to these reviews, there are numerous other publications that support the thesis statement. For example, a study by Awaca et al found that community engagement was pivotal to the success of NTD control and elimination programs [9]. Another study by Krentel et al highlighted the significance of integrating NTD control efforts with maternal and child health programs [10].

Overall, the thesis statement for review articles on NTDs emphasizes the need for a comprehensive and integrated approach to control and eliminate these diseases. This approach should be guided by an understanding of the social considerations of health that contribute to the liability of NTDs and should involve collaboration between governments, international organizations, and civil society.

Overview of NTDs

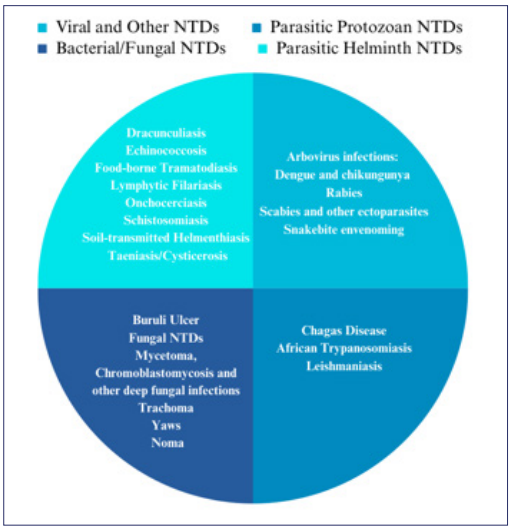

Figure 1: The WHO's list of Neglected Tropical Diseases (NTDs) [1].

Definition and Types of NTDs

NTDs are a varied group of communicable diseases. The World Health Organization (WHO) Roadmap 2020 sheds light on 20 NTDs which include Buruli Ulcer, Chagas Disease, Dengue fever, Chikungunya, Dracunculiasis, Echinococcosis, Foodborne Trematodiases, Human African Trypanosomiasis, Leishmaniasis, Leprosy, Lymphatic Filariasis, Mycetoma, Chromoblastomycosis and Other Deep Mycoses, Onchocerciasis, Rabies, Scabies and other Ectoparasitoses, Schistosomiasis, Soil-Transmitted Helminthiases, Snakebite Envenoming, Taeniasis/Cysticercosis, Trachoma and Yaws. The most common NTDs include soil-transmitted helminths (STHs), schistosomiasis, lymphatic filariasis (LF), onchocerciasis, and trachoma. These diseases can cause significant morbidity and mortality, leading to long-term disabilities and reduced economic productivity. Another group of NTDs is neglected zoonotic diseases, which are caused by pathogens that are transmitted from animals to humans, such as leptospirosis, brucellosis, and rabies [11]. Other NTDs include dengue fever, Chagas disease, leprosy, Buruli ulcer, yaws, and mycetoma. These diseases are often neglected by public health programs and research, which can exacerbate their impact on affected populations [4]. Some NTDs, such as leishmaniasis and trypanosomiasis, culminate in outbreaks and epidemics in response to environmental and social factors such as conflict, displacement, and natural disasters [12]. The burden of NTDs is often compounded by co-infections and co-morbidities, such as malnutrition and HIV/AIDS, which can increase the severity and complications of NTDs. In addition to their health impact, NTDs also have social and economic consequences, including reduced access to education and employment opportunities and increased poverty and inequality. NTDs are often neglected because they primarily affect poor and marginalized populations and are not given priority by governments and international organizations [8]. A recent classification system for NTDs categorizes these diseases into three groups based on their impact on disability-adjusted life years (DALYs) and economic productivity: high-priority, intermediate-priority, and low-priority NTDs [13]. Neglected tropical skin diseases (NTDs) are a category of dermatological conditions that affect more than a billion across the world. This group of diseases includes leprosy, yaws, Buruli ulcer, cutaneous leishmaniasis, and others [14]. NTDs can be addressed through modalities such as distributing drugs of choice for mass administration, improving sanitation and hygiene, controlling disease-carrying pathogens, and providing health education. However, sustained political commitment and funding are needed to control and eliminate these diseases effectively.

Prevalence and Distribution of NTDs

NTDs affect over a billion people across the world. The prevalence and distribution of NTDs rely heavily on geographic location and population characteristics. WHO reports that sub-Saharan Africa, Asia, and Latin America are the regions most affected by NTDs, with the highest burden of disease found in rural areas [13]. A study by Hotez et al. estimated that 149 countries and territories were affected by NTDs, with over 50% of the global NTD burden concentrated in just 17 countries, including Nigeria, India, and the Democratic Republic of the Congo [4]. Onchocerciasis, also known as river blindness, is endemic in 31 African countries, as well as Yemen and some foci in Central and South America [14]. Lymphatic filariasis affects over 120 million people in tropical and subtropical regions of Africa, Asia, and the Pacific [15]. Chagas disease is prevalent in Latin America, affecting an estimated 6-7 million people, and it has become a growing health concern in the United States and Europe due to migration [16]. Leishmaniasis affects over 12 million people worldwide, with the highest burden in countries such as Brazil, India, and Sudan [17]. Dengue fever is indigenous in more than 100 countries, with an estimated 390 million infections and 96 million symptomatic cases annually [18]. STH infections are common in areas with poor sanitation and hygiene, particularly in sub-Saharan Africa, Asia, and Latin America, with an estimated 1.45 billion people at risk of infection [19]. Trachoma is indigenous in 44 countries, mainly in Africa and the Middle East, with an estimated 137 million people at the likelihood of infection [20]. Buruli ulcer, a debilitating skin disease, is prevalent in West and Central Africa and is also reported in some foci in Latin America and Southeast Asia [21].

Overall, a direct correlation can be established between NTDs and a lack of access to healthcare as well as a dearth of resources. Addressing the burden of NTDs requires targeted interventions,

including increased availability of clean water and good sanitation, improved control of disease-carrying organisms, and effective treatment and prevention programs.

Factors Contributing to NTDs

NTDs are caused by an array of factors that are closely linked to poverty, poor sanitation, and limited access to healthcare. These factors include environmental, socio-economic, and behavioral factors, as well as political instability and conflict, and they are described as follows: Poor sanitation and hygiene: NTDs such as STH infections, schistosomiasis, and trachoma are linked to poor sanitation and hygiene practices, including open defecation, lack of access to safe water, and inadequate handwashing [13]. Vector-borne transmission: Many NTDs, such as dengue, leishmaniasis, and Chagas disease, are transmitted by insects or other arthropods that thrive in areas with poor housing conditions and inadequate vector control measures [22]. Malnutrition: Malnutrition and undernourishment compromise the immune system, making individuals more susceptible to NTDs such as lymphatic filariasis, Buruli ulcer, and leishmaniasis [23]. Limited access to healthcare: Lack of access to healthcare services, including preventive measures and treatment, contributes to the burden of NTDs in low-income countries, where healthcare systems may be underfunded or underdeveloped [4]. Conflict and political instability: NTDs can be exacerbated by conflict and political instability, as displaced populations often lack access to basic services such as healthcare, clean water, and sanitation, making them more vulnerable to disease outbreaks [12]. Climate change: Climate change is likely to exacerbate the burden of NTDs in many regions, as rising temperatures and changing rainfall patterns may increase the prevalence and distribution of vector-borne diseases [24]. Socioeconomic factors: Poverty, lack of education, and social marginalization are also important contributors to the burden of NTDs, as these factors may limit access to healthcare and preventive measures [25].

Addressing the complex interplay of forces contributing to the NTDs requires a multi-faceted approach that includes improvements in sanitation and hygiene, increased access to healthcare services, and targeted interventions to address vector-borne transmission and other environmental factors.

Challenges in Controlling NTDs

Despite progress in addressing NTDs, there remain significant challenges in controlling and eliminating these diseases. Some of the major challenges include: Limited funding: NTDs disproportionately affect the world's poorest and most marginalized communities, and funding for research and development of new treatments and interventions is often limited. The lack of financial resources hinders efforts to scale up existing interventions and expand access to care [4]. Weak health systems: Many countries where NTDs are endemic have weak health systems, which limit their ability to provide basic healthcare services and respond to disease outbreaks. This includes limited access to essential medicines and vaccines, as well as inadequate disease surveillance and monitoring [13]. Stigmatization: Stigma and discrimination against individuals with NTDs can hinder efforts to control and eliminate these diseases. This includes social exclusion, discrimination in healthcare settings, and negative attitudes toward those affected by these diseases [26]. Drug resistance: As with other infectious diseases, the emergence of drug-resistant strains of NTDs poses a significant challenge to treatment and control efforts. For example, drug resistance has been reported in certain areas for NTDs, such as malaria, schistosomiasis, and lymphatic filariasis [27]. Vector control: Controlling the vectors that transmit many NTDs, such as mosquitoes and sandflies, is challenging due to the complexity of their life cycle and their ability to adapt to changing environments. This is further complicated by factors such as climate change and urbanization, which can influence vector distribution and behavior [22].

Addressing these challenges requires a coordinated and sustained effort from global health stakeholders, including governmental policies and organizations, non-governmental bodies, and private sector agencies. This involves increased funding for research and development of new treatments and interventions, strengthening health systems in NTD-endemic countries, and addressing social and cultural factors that contribute to the stigma associated with NTDs.

Global Perspective on NTDs

International Efforts to Control NTDs

International efforts to control NTDs have multiplied in recent years, driven by the recognition that these diseases are skewed in a way that affects the world's poorest and most marginalized populations. Some of the key international efforts to control NTDs include: The World Health Organization (WHO) NTD Roadmap: In 2012, the WHO launched a global roadmap to control and eliminate 17 NTDs by 2020. The roadmap includes targets for reducing the burden of disease, expanding access to treatment, and improving disease surveillance and monitoring [28]. The London Declaration: In 2012, a group of international partners, including governments, non-governmental organizations, and private sectors, signed the London Declaration on NTDs. The declaration committed signatories to increase investment in NTD control and elimination efforts and set ambitious targets for reducing the burden of disease [29]. The Expanded Special Project for Elimination of Neglected Tropical Diseases (ESPEN): Introduced in 2016, ESPEN is a collaboration between the African Union and WHO that aims to eliminate five NTDs in Africa by 2020. The program focuses on strengthening health systems, improving disease surveillance, and expanding access to treatment [30]. The Neglected Tropical Diseases Support Center (NTD-SC): Based on the Task Force for Global Health in the United States, the NTD-SC provides technical support and resources to countries working toward the control and elimination of NTDs. This includes support for drug donation programs, capacity building, and monitoring and evaluation [31]. The Coalition for Operational Research on Neglected Tropical Diseases (COR-NTD): COR-NTD is a partnership between the WHO and a group of academic institutions and non-governmental organizations. The coalition aims to strengthen the capacity for operational research on NTDs, with a focus on generating evidence to inform NTD control and elimination efforts [32].

These international efforts have led to significant progress in the control and elimination of NTDs, with millions of people receiving treatment and the burden of disease decreasing in many areas. However, challenges remain, including funding constraints, the unfolding of drug resistance, and the need to strengthen health systems in NTD-endemic countries.

The Role of WHO in NTD Control

WHO plays a critical role in the global effort to control and eliminate NTDs. Some key roles and activities of the WHO in NTD control include: Setting global policies and guidelines: The WHO develops and disseminates guidelines and recommendations for the prevention, treatment, and control of NTDs. These guidelines are based on the latest scientific evidence and are intended to inform national policies and programs [13]. Coordinating global efforts: The WHO works closely with other international organizations, governments, and partners to coordinate efforts to control and eliminate NTDs. This includes convening meetings and conferences, sharing information and best practices, and facilitating collaboration between different stakeholders [33]. Providing technical assistance and support: The WHO provides technical assistance to countries to help them develop and implement NTD control programs. This includes support for disease surveillance, monitoring and evaluation, and the procurement and distribution of drugs and other interventions [34]. Conducting research and generating evidence: The WHO conducts and supports research on NTDs, with a focus on generating evidence to inform policy and programmatic decisions. This includes research on disease transmission, drug efficacy, and the effectiveness of different control strategies [35]. Advocacy and resource mobilization: The WHO advocates for increased attention and resources for NTD control and elimination, both at the global and national levels. This includes raising awareness of the burden of NTDs, advocating for increased funding, and working to build political will for NTD control efforts [36].

Overall, the WHO's role in NTD control is critical to ensuring that countries have the guidance, support, and resources to control and eliminate these diseases effectively. However, funding constraints and other challenges have limited the WHO's ability to fully address the burden of NTDs in many regions of the world.

Partnerships and Collaborations in NTD Control

Eradicating NTDs calls for coordinated efforts across multiple sectors and stakeholders. This has led to the inception of partnerships and collaborations between governments, international organizations, non-governmental organizations, academia, and private sectors. Some examples of partnerships and collaborations in NTD control include: The London Declaration on Neglected Tropical Diseases: This partnership was launched in 2012 and brought together a coalition of governments, pharmaceutical companies, non-governmental organizations, and other stakeholders to quicken the advancement toward the control and eradication of NTDs. The partnership has resulted in increased funding, drug donations, and other resources for NTD control efforts [29]. The Global Network for Neglected Tropical Diseases: This partnership was established in 2006 and brings together researchers, policymakers, and other stakeholders to support research and advocacy for NTD control. The partnership has focused on building capacity for NTD research and improving the use of research findings to inform policy and practice [37]. The World Health Organization Collaborating Centre for Neglected Tropical Diseases: This collaboration was established in 2012 and aims to support research, training, and technical assistance for NTD control efforts. The collaborating center has focused on building capacity for NTD surveillance, monitoring, and evaluation in Africa [38].

Overall, partnerships and collaborations are critical to advancing NTD control efforts, as they can help mobilize resources, build capacity, and foster innovation and learning across different sectors and stakeholders.

Achievements and Challenges in NTD Control

Remarkable advancements have been made in neoteric years toward the control and eradication of NTDs. Some key achievements include: Expanded access to treatment: The WHO estimates that over 1 billion people received treatment for at least one NTD in 2019, up from 980 million in 2015 [13]. Elimination of certain diseases: Several NTDs, including lymphatic filariasis, trachoma, and onchocerciasis, have been eliminated in several countries and regions through sustained control efforts [1]. Increased funding and political attention: NTDs have received increased attention and funding in recent years, with several major donors and international organizations increasing their support for NTD control efforts [8].

However, significant challenges remain in controlling and eliminating NTDs, including: Funding constraints: Despite increased attention and funding, NTD control efforts remain significantly underfunded. The WHO estimates that an additional $700 million per year is needed to reach the 2030 targets for NTD control and elimination [13]. Limited access to treatment: Despite expanded access to treatment, many people affected by NTDs still do not have access to appropriate treatment and care. This is particularly true in remote and marginalized communities [39]. Weak health systems: Weak health systems in many NTD-endemic countries can limit the effectiveness of NTD control efforts. This can lead to inadequate surveillance, limited access to treatment, and other challenges [40].

Addressing these challenges will require sustained investment, innovation, and collaboration across different sectors and stakeholders.

Critical Evaluation of the Article

Strength of the Article

The strengths of this review article on NTDs include its comprehensive and systematic approach to discussing the prevalence, distribution, factors contributing to the diseases, challenges in control, and international efforts to address them [4,13-17]. The article also provides relevant statistics and case studies to support the arguments presented. However, a weakness

of this article is that it does not delve deeply into specific NTDs, instead giving a general overview of the topic.

Usefulness and Relevance of the Article

This article is valuable for healthcare professionals, policymakers, and researchers who want to understand the current global state of NTDs. It provides important insights into the challenges faced in controlling these diseases and the efforts made to address them [4,13-17]. The article highlights the importance of international collaboration and partnerships in tackling NTDs, which is crucial in addressing these complex health issues [16,17]. Overall, this article is highly relevant as NTDs remain a major public health concern, especially in low- and middle-income countries.

Applicability of the Article in Addressing NTDs

This article is highly applicable in addressing NTDs as it provides a broad overview of the current status and efforts made to control these diseases globally. It highlights the importance of international collaboration and partnerships in addressing NTDs, and it also identifies the challenges that impede progress. This information is useful for healthcare professionals and policymakers in designing and implementing effective strategies to control and prevent these diseases [4,13-15,41,42].

Inference for Practice and Future Research

This article has several inferences for present-day practice and improved scope for future research. In practice, it underscores the need for increased political commitment, funding, and resources to address NTDs effectively. It also emphasizes the importance of community engagement, health education, and behavior change communication in preventing and controlling these diseases. In terms of research, the article highlights the need for more studies on NTDs to identify effective interventions, improve diagnostics and treatment, and develop new drugs and vaccines [4,13-15]. The article also emphasizes the importance of multidisciplinary research, including social science research, to understand the complex elements constituting the persistence of NTDs.

Conclusion

Summary of the Article's Objectives and Key Findings

The objective of this article was to provide an overview of NTDs, their global burden, and current efforts to control and eliminate them. The key findings of the article are as follows: NTDs affect over a billion people across the world, primarily in low-income countries. The burden of NTDs is not only in terms of morbidity and mortality but also in economic and social consequences. NTDs are amenable to control and elimination through a combination of preventative chemotherapy, vector control, and improved sanitation. International collaboration and partnerships are critical for addressing NTDs effectively. Despite progress made, many challenges, including funding constraints, limited access to healthcare, and weak health systems, impede efforts to control NTDs. Community engagement, health education, and behavior change communication are essential components of NTD control programs. Innovative approaches, including novel diagnostics, drugs, and vaccines, are needed to overcome existing challenges and accelerate progress toward NTD elimination [4,8,13,15,16,41,42].

Implications for Practice and Future Research

The article has several implications for day-to-day practice and future research. In practice, it underscores the need for increased political commitment, funding, and resources to address NTDs effectively. It also emphasizes the importance of community engagement, health education, and behavior change communication in preventing and controlling these diseases [43-45]. In terms of research, the article highlights the need for more studies on NTDs to identify effective interventions, improve diagnostics and treatment, and develop new drugs and vaccines [4,8,13]. The article also emphasizes the importance of multidisciplinary research, including social science research, to understand the complex elements constituting the persistence of NTDs [46,47].

Limitations of the Article

The strengths of this article include its comprehensive review of the literature on NTDs and its focus on the role of partnerships and collaborations in NTD control. However, the article may be limited by its focus on English-language publications, which may result in some relevant studies being missed.

Conclusion and Recommendations

In conclusion, NTDs represent a significant global health challenge, particularly in low- and middle-income countries. Addressing the burden of NTDs requires a coordinated and sustained effort from all stakeholders, including government organizations, non-governmental bodies, international organizations, and private sector agencies. Partnerships and collaborations are critical in NTD control and should be strengthened and supported [13,48]. Additionally, investment in research and development of new tools and strategies for NTD control, as well as monitoring and evaluation of existing programs, is crucial in achieving the goal of eradicating NTDs, considering it as a public health issue by 2030 [39,49,50].

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