

HEALTH SYSTEMS STRENGTHENING AS A CATALYST FOR NEGLECTED TROPICAL DISEASE ELIMINATION

Author: Akaninyene Mark

Akwa Ibom State Ministry of Health, Uyo, Akwa Ibom State

Corresponding Author: Akaninyene Mark

Directorate of Health Planning, Research and Statistics, Akwa Ibom State Ministry of Health, Uyo, Akwa Ibom State, Nigeria

Email: akanmark466@gmail.com

Authors' contributions

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ABSTRACT

Neglected tropical diseases (NTDs) remain a significant global health challenge, disproportionately affecting poor and marginalized populations. They are a group of parasitic, bacterial, fungal and viral infections. Despite progress, NTDs continue to cause disability, stigma, and socioeconomic hardship, largely due to their neglected status compared to higher-profile diseases. Addressing NTDs requires more than vertical, disease-specific programs; it demands robust, integrated health systems capable of delivering prevention, diagnosis, treatment, and surveillance sustainably. One of the main reasons these diseases persist is their “neglected” status, stemming from a lack of attention, commitment and resources. Often overshadowed by the so-called high-profile diseases like malaria, HIV/AIDS, and tuberculosis, NTDs struggle to attract funding and research efforts. Overall, Neglected Tropical Diseases continue to pose a significant threat to the health and well-being of millions of people worldwide, particularly in the sub-region. This article explores key health system components essential for effective NTD control governance and policy, workforce, financing, service delivery, health information systems, and supply chains, while highlighting the broader benefits of health system strengthening, including sustainability, equity, and resilience.

Keywords: tropical, diseases, health, systems, strengthening

INTRODUCTION

Neglected tropical diseases (NTDs) are a group of parasitic, bacterial, fungal, and viral infections affecting over 1.6 billion people worldwide, particularly in low- and middle-income countries (Hotez *et al.*, 2020). They disproportionately impact vulnerable populations, perpetuating cycles of poverty, disability, and stigma. These diseases contribute to maternal and child morbidity and mortality, reduce agricultural productivity, and hinder economic development (WHO, 2021). Despite their burden, NTDs are often overshadowed by high-profile

diseases such as malaria, HIV/AIDS, and tuberculosis, resulting in limited research, funding, and political attention (WHO, 2024). Their persistence reflects both biological challenges and systemic weaknesses, including fragmented programs and inadequate health infrastructure. Sustainable progress requires moving beyond vertical interventions to integrated health system approaches capable of addressing both NTDs and broader public health needs. Addressing these diseases requires a multifaceted approach that includes increased awareness, funding, research, political commitment and multisectoral collaboration. By tackling NTDs, the process cannot just follow in the improvement of health outcome of affected communities alone but also contribute to breaking the cycle of poverty and fostering sustainable development. Health-wise, it is a high time to bring NTDs out of the shadows and work towards a healthier, economically productive and more equitable future for humanity to strive.

Health System Integration in NTD Control

In previous years, attempts to control neglected tropical diseases (NTDs) has been done through specialized programs, especially mass drug administration (MDA) for whole at-risk populations. Such efforts have been quite successful in reducing the prevalence of diseases in the short term and reducing morbidity, and they continue to be one of the critical strategies for halting transmission in high-burden areas. Still, the siloed approach of the programs has introduced some troubling issues for sustainability in the long term. Implementation strategies, in many cases, are fragmented, overly reliant on external funding, and misaligned with more comprehensive country-wide health goals. Such fragmentation undermines the efficiency of the approach and, worse, erodes the sense of community ownership of the intervention, posing considerable risk to the sustainability of the positive impact once foreign assistance wanes (Molyneux *et al.*, 2012).

Differently, the incorporation of NTD programs into national public health systems has, in contrast, been seen as a more sustainable pathway to elimination. Integration allows for the NTD programs to be deployed within the routine health service delivery systems such as primary health care, maternal and child health, and school health programs. By integrating NTD control into these systems, governments are able to minimize duplication of efforts and optimize the available resources as well as synergies across multiple public health programs. Such integration also improves the equity of the health system, as the populations that are the most vulnerable to NTDs often are the same ones that have the least access to the most basic health care services.

Placing NTD activities within health systems, therefore, improves access to and contributes to the overarching aim of universal health coverage (Bockarie *et al.*, 2013). Furthermore, the resilience of health systems is enhanced by integrated approaches through constructed capacity which can be utilized beyond the controls of NTDs. Adaptive surveillance mechanisms designed to monitor treatment coverage or to identify hotspots of transmission may be used to address other infectious disease threats, thus enhancing epidemic readiness. Similarly, the community health worker investments to deliver NTD medicines strengthen the human resource base for other strategic health programs like immunization, maternal health, and primary healthcare. Integration also strengthens multi-sectoral collaboration by associating health interventions with better water, sanitation, and hygiene - important for disrupting transmission of many NTDs. Indeed, the migration from vertical to integrated NTD programming is more than a change in delivery strategy. It is a paradigm shift in global health. It demonstrates the understanding that robust and inclusive health systems serving marginalized populations is a development goal for many countries and that systematic elimination will not happen in silos.

Governance and Policy

Good governance remains one of the most critical components for the effective control and eradication of neglected tropical diseases (NTDs). Governance sets the context for policymaking, resource allocation, and intervention for program the fragmentation governance is absent, integration is weak. NTD programs tend to be fragmented, duplicative, and poorly accountable; all of which the long term sustainability of these programs. (WHO, 2021). Political will is perhaps the defining characteristic of governance. Countries that place NTDs as a priority on their health agenda are more likely to resource and implement favorable policies as well as

coordinate multi-sectoral actions to address the determinants of the transmission. National NTD strategies and masterplans aligned with the WHO 2021–2030 Roadmap provide guiding frameworks for action. NTD strategies and masterplans aligned with the WHO 2021–2030 Roadmap provide guiding frameworks for action. These frameworks national NTD strategies and master plans, aligned with the WHO 2021–2030 Roadmap, enable the holders to monitor and achieve predefined targets. These frameworks delineate the roles and responsibilities of stakeholders, fostering accountability. These national frameworks also provide the foundation for collaborating with international stakeholders to enhance and not duplicate the national plans.

Collaboration with different industries is also important. NTDs do not occur in a vacuum, surrounding social issues which include poverty, unclean water, poor sanitation, and insufficient education. Effective governance, therefore, involves not just the health sector, but also water and sanitation, education, housing, and even agriculture. Such cross-sectoral moves tackle the upstream drivers of disease, which adds to the sustainability of elimination attempts. For instance, the integration of school-based deworming programs and other educational programs helps facilitate health and education simultaneously, while improved sanitation infrastructure in certain regions helps reduce the communities' risk of reinfection.

Accountable and transparent governance is also important. Trust is built on transparency, and therefore, stakeholders, donors and the local community become more engaged. Mechanisms such as public reporting of progress, stakeholder consultations, and independent evaluations empower NTD programs to leverage country ownership. Countries are more likely to remain invested when the government is accountable and the population is expecting in support of NTD programs in the absence of external funding. Enhancing cross border cooperation is facilitated by good governance since it allows countries to mesh their internal policies with external regional and global strategies. Initiatives like the London Declaration on NTDs and the WHO Roadmap are only possible if governments take ownership of such commitments to their active policies. Thus, good governance not only improves the NTD control country programs, but it also strengthens the global progress toward elimination.

Health Workforce

The neglected tropical diseases (NTDs) address the exposure that rests unattended for long durations, particularly the downtrodden regions. It is easily the most underreported affliction for suspicion factors almost always overshadow the confirmed cases. It is indeed troubling, considering the gravity of the situation. This brings us to the importance of NTD's policymakers who this brings us to the importance of NTD's policymakers who function as the only remaining point of dichotomy between universal healthcare and the exposed neglect. The nature of their work allows them to easily glide through the thick layers of chains that refrain direct approachable hand, appearing as touching points. It is for these reasons that NTD's policymakers deserve to be acclaimed for their contribution within these stark underbelly regions. Their expansive definition of frontline exposes the indispensable nature of their work. Policy of universal healthcare missing, It policy of universal healthcare missing, It disregard the core principle of helping those who need the most.

Health support, and who is the most vulnerable. The consequence of which is offering intuitive and blanket services that is nothing else for the sake of and running healthcare as a business." It is beyond the shadow of a doubt that rationally exposed factors too. Whence and shadows nigh. It is troubling, albeit only a snapshot to address the immediate needs NTD's. The layers of chains cannot be overlooked, preserved to keep and escape but are only so easily shed the contemporary burden of affliction, NTD's, indeed most neglected. It is these extenuating circumstances, crippling a pseudo service. The challenges NTD's burden is the direct response to the aching gaps of policy. NTD attempts to SDK. They address rest policy missing. The contradiction the policy missing. The contradiction threaten underbelly regions. The consequence of which is bending the exposed confusion of no universal healthcare.

The NTD workforce effectiveness may be improved through more training and capacity building postulates. Professional development enables health workers to monitor treatment coverage properly, detect and report drug reaction cases, and motivate communities to adopt hygiene and sanitation practices that break transmission cycles. Also on practice, workers gain confidence and competence and May then serve as credible and reliable change agents in their communities. Expenditures on the NTD workforce capacity translates to the integration of NTD services into other health programs, which is a step to general improvement of primary health care.

Motivation, incentives and retention strategies are equally important for sustaining interventions at the grassroots level. In many endemic countries, health workers are poorly paid, overworked, and stagnant in career advancement, which raises the attrition rate for these workers. These challenges can be met with blank policies that acknowledge and compensate the efforts of health workers at the frontline. Financial incentives in the form of training, social appreciation, and increased payment within better frameworks can be used to increase the satisfaction of health workers. Health worker retention, especially in underserved regions, is of immense value and value retention of these workers. This results in stronger health systems more broadly and sustained investment in health workers, which strengthens NTD programs. The NTD workforce, more than ever, cannot operate in a vacuum. Functioning at the local level with community health workers (CHWs) and primary health care (PHC) staff strengthens coverage of more than health and development. NTD workers need supportive supervision, adequate supplies, coordination with teachers, health, sanitation, and water (WASH) workers, and even agricultural extension workers at the local level for stronger, more equitable and sustainable health systems. This results in better, more equitable, and sustainable health systems that NTD workers can directly strengthen.

Funding and Financial Support

The Challenge of Sufficient Funding has been one of the most significant challenges in the conquer and ultimate eradication of neglected tropical diseases (NTDs) is the ability to finance them sustainably. Traditionally, the funds for various NTD initiatives have been received from the multilateral organisations, philanthropic bodies, and global health initiatives. Though such external assistance has been vital in the scaling of the mass drug administration (MDA) programs and in the improvement of the supply chain systems, the high dependence on external donor assistance is fraught with risks to the sustainability of the initiatives over the long term. NTD programs often collapse and become susceptible to the risk of disease resurgence (Fitzpatrick *et al.*, 2017) when there is a shift in donor funding priorities or a withdrawal of donor funding.

Continuity and resilience can only be guaranteed through domestic financing, and particularly appropriation from the national budget. NTD programs must be adopted and integrated with national health systems, and the necessary funds committed if the governments in countries where the disease is endemic are to take responsibility for NTD programs. Such arrangements not only guarantee funding, but also that NTD control is not a development goal secondary to the demands of the external donor community. Political willingness, in this instance, becomes a key factor in making and executing such financing strategies, which are likely to be the countries that incorporate NTDs into the primary health funding. Emerging alternative financing mechanisms are being recognized as integral to closing the funding gap. In the case of 'results-based financing,' accountability and efficiency in the use of funds in NTD programs are enhanced because the payment for the funds is tied to the attainment of results. In the same way, including NTD services in national health insurance schemes is a sustainable way of financing the diagnosis, treatment, and preventive services while mitigating household expenditure. These strategies also reduce the financial risk while improving service coverage and access for the underserved and impoverished populations.

There is a compelling case for the economics of investing in NTD control. Evidence shows that, by alleviating the direct and indirect costs of the household, the interventions provide excellent value for money. Productivity

is lost and poverty perpetuated because NTDs cause disability and inability to work. Investments in NTD control improve labor productivity, attendance in schools, and economic growth because the disease burden is lowered. For most low and middle income countries, the income benefit with the NTD control is enormous as the development is primarily dependent on the human capital available. The funding for the elimination of NTDs cannot be borne only by governments and donors. A collaborative approach is required which includes NGOs, the private sector, and local community initiatives. In Nigerian, for example, the burden of NTDs is particularly high. There is hence, an imperative for both the federal and state governments to enhance domestic financing, integrate the NTD program into broader health sector reforms, and promote investment across different sectors. In the absence of these measures, donor-driven programs will continue to jeopardize sustainability. Ultimately, financing the global goals for the elimination of NTDs is only possible with a robust and predictable financing system that is equitable for all communities.

Service Delivery

Integrating NTD services into primary health care which is the bedrock and first tier of care enhances efficiency and equity. Embedding preventive, diagnostic, and treatment services into existing structures such as immunization campaigns, maternal health programs, and school-based initiatives reduces duplication and expands access for underserved populations (Linehan *et al.*, 2011).

Health Information Systems

The role of health information systems in the planning, execution, and evaluation of the elimination of neglected tropical diseases (NTDs) is multifaceted, as they provide the necessary evidence to plan and evaluate their elimination. Why is evidence-based technology critical in the planning stage? The presence of robust surveillance and monitoring systems helps in tracking the progress and guiding decisions to target elimination goals. Without the requisite information, necessary interventions could not only under target the needed areas, but resources could also fall victim to malevolent allocation, resulting in the unchecked advancement of threats like the emergence and reemergence of the disease (WHO, 2020).

The health information systems can determine the geographic areas of high resistance and treatment to make appropriate interventions. For instance, geo-spatial mapping of endemic regions improves the timeliness and appropriateness of planning the needed health actions. During the execution of the health systems, specific surveillance improves the monitoring of the health target. In addition, the inclusion of the NTD Information system within the broader national health information system reduces effort duplication. These technologies also improve accountability of surveillance and reporting of NTD by providing open, readily accessible data and insights to policymakers, donors, and the community. In Nigeria and other high-burden countries, mobile applications for drug distribution monitoring have been successfully piloted, improving data quality and coverage verification, monitoring and evaluation, and supply chain management. These technologies, alongside traditional methods, enhance the NTD programs while progressing the overall advancement of health system digitization.

An information system for health (HIS) is maximally effective when paired with other non-technical aspects like training and professional growth. Surveillance, monitoring, and Evaluation (M and E) of the health information system generated by the health workers is only actionable if they have been trained on data collection, analysis, and interpretation. These workers need to be part of the feedback mechanism to enhance their trust in the health system and promote active community engagement on NTD programs.

The 'intelligent health systems' (HIS) empower the crafting of responsive, resilient frameworks by allowing the prompt identification of outbreaks and efficient management of response systems. The NTD surveillance systems, as we saw during the Ebola and COVID-19 outbreaks, can be used for the control of a wider epidemic. Thus, investments in NTD health information systems (HIS) support health system strengthening as much as they advance the goal of eliminating the diseases.

Essential Medicines and Supply Chains

Reliable access to medicines and diagnostics is fundamental to effective NTD control. Strengthened supply chains prevent stock-outs, ensure timely distribution, and build community trust. Coordinated procurement, efficient last-mile distribution, and local capacity in logistics are essential for resilient systems (Burke *et al.*, 2015). However, Interruptions in medicine distribution or diagnostic availability undermine program effectiveness and erode community trust. Coordinated procurement and strong pharmacovigilance systems help prevent stock-outs and wastage (Burke *et al.*, 2015). Building local capacity in logistics and supply chain management is critical to strengthening health systems' resilience.

Benefits of Health System Strengthening for NTD Control

Integrating NTD control into broader health systems provides multiple benefits. First, embedding interventions within primary health care enhances sustainability and reduces reliance on external donors (Hotez *et al.*, 2020). Second, health system strengthening promotes community trust and participation, as services are delivered through holistic, familiar platforms. Third, integration contributes to universal health coverage (UHC), ensuring that marginalized populations access essential services equitably. Beyond NTDs, investments in health system strengthening enhance preparedness for epidemics, humanitarian crises, and emerging health threats. Workforce capacity, infrastructure, and surveillance systems developed for NTDs can be leveraged for broader public health challenges, building resilient communities and advancing sustainable development (Hotez *et al.*, 2020).

MATERIALS AND METHODS

This whole study is a secondary data analysis. No primary data collection was undertaken, and evidence was only drawn from published scientific literature, technical reports and policy documents focus on neglected tropical diseases (NTDs) and health system strengthening. This was because a chronic gap in the analysis was the lack of comprehensive understandings which the research aimed to fill on the functioning of health system strengthening and its capacity as an accelerator to facilitate the elimination of NTDs.

The literature search was conducted across major electronic database like PubMed, Scopus and the Web of Science and was also done on Google Scholar to retrieve the NTD related grey literature. In an attempt to cover the author's perspectives and the latest strategic frameworks on the topic, reports and policy briefs from the WHO, UNICEF, and the World Bank were also investigated. The study was also limited to the documents and information published between 2010 and 2024. This was done to give balanced historical context and current relevance for research.

The criteria included only those publications which studied NTDs in conjunction with at least one of the WHO health system building blocks (i.e. governance and leadership, health workforce, financing, service delivery, health information system, and access to essential medicines). Excluded were articles that dealt exclusively with the biomedical, parasitology, or clinical aspects of NTDs in the absence of health systems. Likewise, commentaries or opinion articles lacking substantive citation were not included.

The thematic analysis was performed on literature that was selected after retrieval. Evidence was aligned with the WHO health system building blocks which served as the organizing structure for the review. This included the identification of patterns, distillation of shared insights, and assessment of the prevailing approaches to prevailing strengths and gaps. This helped the review distill the cross-cutting conclusions that emerged from several documents, collectively derive insights from diverse situations, and deliberate on the impact of health system strengthening for the sustainable elimination of NTDs.

DISCUSSION

The findings of this review highlight that eliminating neglected tropical diseases (NTDs) cannot be done through vertical, disease-specific interventions only. Approaches like mass drug administration (MDA) have short-term gains in lowering prevalence, but long-term effectiveness is threatened by weak health systems, low

domestic financing, and inadequate community participation (Molyneux et al., 2012). It is, therefore, crucial that initiatives aimed at eliminating NTDs begin the shift towards health system strengthening (HSS) to help integrate NTDs into systems that can offer equitable, effective, and sustainable health care.

A major conclusion that can be drawn from the evidence is the need to integrate national NTD strategies with the goal of achieving universal health coverage (UHC). Incorporating NTDs into primary health care (PHC) not only improves efficiency and cost effectiveness, but also enhances equity by increasing access to high-risk populations that are the most neglected (Linehan et al., 2011). Moreover, integrating NTDs into health systems generates positive programmatic interactions, decreases duplication of efforts, and improves overall service delivery. This is of considerable importance in low resource settings, as fragmentation is unsustainable and unaffordable.

The impact of governance and political will is another significant dimension of the problem. Countries with successful political leadership on the NTDs are the ones more likely to allocate domestic financing, garner donor confidence, and facilitate cross-sector partnerships (WHO, 2021). In comparison, weak governance, and the over reliance on external financing creates the vulnerabilities which jeopardizes progress. In achieving greater control of NTDs, the systems which are in place, which are transparent and accountable, country ownership, and control are all vital to maintaining the progress which has been made.

In addition, the review outlines the economic argument for expenditure on NTD elimination. In addition to the health benefits, the NTDs are associated with loss of economic value due to declining productivity, lower educational outcomes, and increased poverty (Fitzpatrick et al., 2017). It is important to treat the control of NTDs not only as a public health issue, but also as a development issue. In countries like Nigeria, greater argument for increased domestically-funded multi-sector cooperation is required because the NTDs are a disproportionate burden on the more marginalized.

Integrating systems sometimes goes hand in hand with resistance because of institutional inertia, competing health priorities, and doubts about the value of spending resources. To resolve these issues, concrete actions from outside the health sector must be undertaken, such as result-orientated financing, the application of digital health technologies to strengthen surveillance and community mobilization for greater ownership and sustainability of the health actions.

In addition, the commitment globally to achieving the Sustainable Development Goals (SDGs) provides an opportune entry point to situate NTD elimination within integrated development frameworks. Target 3.3 to end the NTDs' epidemic by 2030 will not be accomplished without targeted expenditure on equitable, resilient, and people-centered health systems. There is enough evidence to argue that advances in the NTDs control are also likely to provide health systems co-benefits, in areas such as epidemic preparedness, maternal and child health, and water, sanitation and hygiene (WASH).

CONCLUSION

Strengthening health systems is vital to achieving the long-term control and elimination of neglected tropical diseases. By reinforcing governance, financing, workforce, service delivery, health information systems, and supply chains, countries can build sustainable, integrated approaches that reduce disease burden, promote equity, and advance universal health coverage. Ultimately, health system strengthening not only improves NTD outcomes but also contributes to resilient, inclusive, and sustainable health systems capable of addressing future challenges.

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