The Role of One Health Framework to Neglected Tropical Diseases in South East Asia

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Abstract

Neglected tropical diseases (NTDs) remain a significant public health challenge in Southeast Asia, disproportionately affecting marginalized communities and exacerbating cycles of poverty and poor health. These diseases often arise at the interface of human, animal, and environmental health, necessitating a transdisciplinary approach. The One Health framework, which integrates human, animal, and environmental health strategies, offers a holistic and sustainable solution to combat NTDs in the region. This article explores the application of One Health in addressing NTDs such as dengue, leptospirosis, schistosomiasis, and rabies across Southeast Asia. It highlights current regional initiatives, identifies challenges including fragmented surveillance systems and limited intersectoral coordination and underscores the importance of cross-border collaboration, community engagement, and policy integration. Emphasizing the need for sustained investment and capacity building, the article advocates for strengthening One Health systems as a pathway toward effective NTD control and elimination in Southeast Asia.

Keywords: One Health; Neglected tropical diseases; Southeast Asia

Introduction

Neglected tropical diseases (NTDs) are a diverse group of communicable diseases that primarily affect populations living in resource-limited settings, particularly in the tropical and subtropical regions of Africa, Asia, and Latin America. These diseases are caused by a range of pathogens, including viruses, bacteria, protozoa, and parasitic worms, and are often chronic, debilitating, and sometimes fatal. According to the World Health Organization (WHO), there are currently 21 recognized NTDs, which include both vector-borne diseases like dengue, chikungunya, leishmaniasis, and human African trypanosomiasis, as well as water- and soil-transmitted infections such as schistosomiasis, soil-transmitted helminthiases, and leptospirosis. Others, like lymphatic filariasis, onchocerciasis (river blindness), and rabies, are notable for their devastating social and economic impacts.

Methods

Neglected Tropical Diseases (NTDs) predominantly affect impoverished and marginalized communities, where access to clean water, adequate sanitation, health services, and education is limited or absent. The environmental and socioeconomic conditions in these settings—such as poor housing, lack of infrastructure, overcrowding, and close proximity to animals or vectors—create ideal conditions for the transmission and persistence of these diseases. Moreover, NTDs often cause long-term disability, including blindness, disfigurement, cognitive impairment, and chronic pain, which can prevent individuals from attending school or participating in the workforce. This, in turn, perpetuates a vicious cycle of poverty and disease, especially in rural and underserved areas.

Despite their substantial impact on global morbidity and mortality, NTDs have historically been neglected in terms of research, funding, and political prioritization, receiving significantly less attention than diseases like HIV/AIDS, tuberculosis, and malaria. This neglect stems in part from the perception that NTDs affect only small, isolated, or “invisible” populations, rather than being seen as pressing global health priorities.

Increasingly, multisectoral approaches, such as the One Health framework, are being proposed to address the complex interplay of factors driving NTD transmission—recognizing that sustainable progress will require coordinated efforts across health, veterinary, environmental, and sociaThe One Health framework is an interdisciplinary, collaborative approach that recognizes the interconnectedness of human health, animal health, and environmental health. Rooted in the idea

that the health of people is closely linked to the health of animals and our shared ecosystems, One Health aims to foster cross-sectoral collaboration to prevent, detect, and respond to health threats that arise at this interface. This approach is especially important for managing zoonotic diseases, which are diseases that are transmitted between animals and humans and make up over 60% of emerging infectious diseases worldwide.

Discussion

Rising global temperatures are expanding the geographic range and breeding seasons of many vectors, such as mosquitoes (*Aedes*, *Anopheles*), sandflies, and snails. For instance, dengue fever, transmitted by *Aedes aegypti*, is now being reported in higher altitudes and previously non-endemic areas, driven by increased vector survival and faster virus replication at warmer temperatures. Similarly, schistosomiasis, which depends on freshwater snail hosts, is sensitive to changes in water temperature and flow, making its transmission dynamics highly responsive to shifts in rainfall and irrigation practices.

Increased precipitation and flooding events, often linked to more frequent and intense storms, create ideal conditions for water-borne diseases such as leptospirosis, particularly in urban slums and agricultural regions with poor drainage and sanitation. Conversely, periods of drought can lead to water scarcity and the contamination of remaining water sources, facilitating the spread of soil- and water-related helminth infections. Additionally, climate-induced shifts in land use, habitat fragmentation, and biodiversity loss can disturb ecosystems and increase human-animal contact, raising the risk of zoonotic spillover events involving pathogens that may not have previously been in close proximity to human populations.

These ecological and climatic changes do not act in isolation but interact with social and economic factors—such as urbanization, migration, and food insecurity—to shape vulnerability and exposure. Populations in low- and middle-income countries, particularly those in climate-sensitive regions like Southeast Asia, are disproportionately affected due to limited adaptive capacity, fragile healthcare systems, and high dependence on natural resources.

Southeast Asia is one of the most ecologically diverse and densely populated regions in the world, encompassing tropical rainforests, extensive river basins, coastlines, and agricultural landscapes. This region is highly endemic for numerous neglected tropical diseases (NTDs), including dengue fever, lymphatic filariasis, schistosomiasis, leptospirosis, and soil-transmitted helminthiases. The

environmental and socioeconomic conditions—such as high population density, poor urban infrastructure, and reliance on subsistence agriculture—contribute to the persistence of these diseases.

Importantly, Southeast Asia is also highly vulnerable to climate change, with several countries already experiencing more frequent flooding, rising sea levels, extreme heat events, and changes in precipitation patterns. These climatic shifts are altering vector breeding sites, water quality, and the dynamics of disease reservoirs, all of which have profound effects on the transmission of NTDs. For instance, increased rainfall and flooding in the Philippines and Thailand have been linked to spikes in leptospirosis and dengue outbreaks. In rural and coastal areas of Indonesia and Vietnam, rising sea levels and saltwater intrusion are changing land use patterns and forcing population movement, which may increase exposure to NTDs.

This complex landscape underscores the importance of adopting One Health strategies that integrate environmental management, animal health, and human health policies. However, there is a notable gap in the operationalization and documentation of One Health efforts targeting climate-sensitive NTDs across Southeast Asia. By consolidating current evidence, the article aims to inform future research, guide policy development, and support the effective design of integrated programs that align with regional health priorities, climate adaptation strategies, and global NTD elimination goals. Neglected tropical diseases (NTDs), such as dengue, leishmaniasis, Chagas disease, and schistosomiasis, are increasingly influenced by climate change, which alters disease transmission patterns by affecting the habitats and behaviors of vectors and reservoirs.

The relevance of One Health to climate-sensitive NTDs includes environmental Change and Vector Ecology: Rising temperatures and changes in rainfall patterns influence the distribution of disease vectors (e.g., mosquitoes, sandflies). One Health provides a framework to monitor and predict these changes. Zoonotic pathways in which many NTDs are zoonotic (transmitted between animals and humans). Understanding animal reservoirs and their interactions with humans is key to breaking transmission cycles. Ecosystem Disruption such as deforestation, urbanization, and agricultural expansion disrupt ecosystems, increasing human exposure to vectors and animal reservoirs. Human Vulnerability and Socioeconomic Factors proving that One Health considers how poverty, sanitation, and access to healthcare shape the burden of disease which is critical for managing NTDs in low-resource settings.

Challenges in applying One Health can be in institutional and policy fragmentation such as achieved governance across sectors (health, agriculture, environment) leads to poor coordination. Inconsistent or unclear mandates prevent cross-sectoral planning and action. Lack of standardized protocols and weak legal frameworks undermine cohesive responses to emerging threats. Resource and capacity limitations include inadequate funding for One Health initiatives, especially at the local and sub-national levels. Limited human capacity, including shortages of trained personnel in veterinary, environmental, and public health fields. Fragile health and veterinary infrastructure reduce the ability to respond to zoonotic and climate-sensitive disease threats. Data and surveillance gaps show fragmented or non-interoperable data systems across ministries and sectors. Limited real-time surveillance and weak laboratory networks for both animal and human diseases. Challenges in collecting reliable environmental and ecological data that inform vector-borne disease forecasting. Limited Climate-Health modeling and forecasting tools which few countries in the region have access to or capacity to develop predictive models for climate-sensitive diseases. Lack of integration of meteorological and climate data with health surveillance systems and insufficient localized research on the impacts of climate change on vector and disease dynamics can be difficult in applying one health method.

To overcome these challenges and realize the potential of One Health, we can recommend actions as strengthening intersectoral coordination, establishing and reinforcing One Health coordination mechanisms involving ministries of health, agriculture, environment, and disaster risk management. Developing national and regional One Health action plans with clearly defined roles, responsibilities, and funding streams. One Health can be supported by promoting joint training and capacity-building activities across sectors, investing in Integrated Surveillance and Early Warning Systems, and developing interoperable surveillance platforms that link data from human, animal, and environmental sectors. Using remote sensing, GIS, and climate data to support early warning for vector-borne diseases to enhance community-based surveillance to improve detection at the local level. Climate-Resilient Infrastructure and Community Engagement by building or upgrading health and veterinary infrastructure to be resilient to climate hazards (e.g., flooding, heatwaves). We also recommend engaging communities in vector control, animal vaccination, and environmental health activities. Supporting risk communication strategies tailored to local contexts and vulnerable populations. Regional Cooperation and Knowledge-Sharing Platforms

by leveraging existing ASEAN frameworks (e.g., ASEAN Health Cluster, ASEAN Biodiversity Centre) to share best practices, tools, and expertise. Development regional centers of excellence on One Health, climate-health research, and disease forecasting. Promoting cross-border collaboration on surveillance, outbreak response, and climate adaptation. Embedding One Health in National and Regional Climate Adaptation Plans to integrate One Health into National Adaptation Plans (NAPs) and Nationally Determined Contributions (NDCs) under the Paris Agreement, ensure climate financing mechanisms (e.g., Green Climate Fund) support One Health investments and advocate for the inclusion of One Health in regional climate resilience frameworks and development strategies.

Conclusion

The One Health approach is far more than a theoretical construct—it represents a practical and essential paradigm shift in how we address the complex, interconnected challenges of the 21st century. As climate change intensifies and reshapes ecosystems, it is driving the emergence, re-emergence, and shifting patterns of neglected tropical diseases (NTDs), many of which disproportionately impact the most vulnerable communities in low- and middle-income countries. By viewing human, animal, and environmental health as part of a single, interdependent system, One Health provides a strategic framework for anticipating and managing the health impacts of climate variability and ecological disruption. It fosters collaboration across disciplines and sectors that have traditionally worked in silos—public health, veterinary medicine, agriculture, environmental science, climate policy—enabling early detection, coordinated response, and more efficient use of limited resources.

Implementing One Health at scale is not without challenges. Institutional fragmentation, capacity constraints, data gaps, and limited climate-health modeling remain significant hurdles. However, these barriers are surmountable—particularly in regions with strong regional bodies and growing political will. Through investments in integrated surveillance, intersectoral coordination, community-based engagement, and regional cooperation, countries can develop resilient, inclusive, and climate-adaptive health systems. Moreover, embedding One Health within national and regional climate adaptation and development agendas not only addresses immediate public health threats but also contributes to broader goals of sustainable development, food security, and environmental protection.

Ultimately, embracing the One Health framework is not simply a technical decision—it is a moral and strategic imperative in a world where the health of humans, animals, and the planet is inextricably linked. By operationalizing One Health principles now, countries can ensure a healthier, more secure, and more equitable future for generations to come.

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