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Review Article

Global Health Challenges: Understanding Tropical Diseases

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Abstract

Infectious diseases that are either more common in the tropics or more difficult to prevent or control are those that either occur only in the tropics or more frequently in hot, humid regions. The majority of people affected by these diseases are the poorest, who frequently reside in isolated rural areas, urban slums, or conflict zones. The world's poorest population is primarily affected by infectious diseases known as neglected tropical diseases, or NTDs. They have been disregarded for many years—first as a result of an overall disdain for the underdeveloped countries, and more lately as a result of the intense attention that has been paid to HIV/AIDS, TB, and malaria. The World Health Organization recently created an assortment of 17 NTDs; an extended list of these illnesses can be found on the PLOS Neglected Tropical Diseases website. Helminth infections account for about 85% of the disease burden associated with NTD. Nearly half of the poorest people in Sub-Saharan Africa are infected with hookworm, which affects the primary cause of anemia in 40–50 million school-aged children and nearly seven million pregnant women worldwide. With 192 million cases Schistosomiasis ranks second among the most common Neglected Tropical Diseases worldwide. It accounts for 93% of all cases and may be linked to a higher risk of HIV/AIDS horizontal transmission.

Keywords: Tropical Diseases; Neglected Tropical Diseases; Malaria; WHO

Introduction

In contrast to the temperate world, infectious diseases have historically had a more severe impact on tropical regions of the planet. The main biological and environmental factors that maintain high levels of pathogen, vector, and host biodiversity, as well as the social factors that lessen the burden of managing these diseases, are responsible for the spread of infectious diseases in these areas [1]. As everyone knows, some of the world's most common causes of death, morbidity, and burden are diseases like HIV/AIDS, malaria, and tuberculosis. It has been highlighted that they have a detrimental effect regarding the social and economic advancement of the countries most severely impacted. It is true that these "big three" cause several millions of Disability-Adjusted Life Years and many million deaths annually, which worsens poverty. Interestingly, however, HIV/AIDS, tuberculosis, and malaria were still regarded as neglected diseases ten years ago in two brief assessments related to science, medicine, and society that were published in prestigious journals along with an extensive 25-year review of drug development efforts [2]. The WHO did not coin the term "tropical diseases," although it has been used in medicine since the

1800s. It started at an unknown time and became more and more unified as microbes were recognized as the root causes of illnesses and their modes of transmission were clarified. The Caribbean and the Pacific were colonized by England, France, and other minor allies, including the United States. This led to the discovery of a new world full of lucrative resources but also unwelcome or unwelcome diseases [3]. All infectious and non-infectious diseases, genetic illnesses, and illnesses brought on by dietary inadequacies or environmental factors (heat, humidity, altitude, etc.) that are present in regions that are situated between and adjacent to the Tropics of Cancer and Capricorn are included in the category of tropical diseases. Tropical countries suffer from a substantial disease burden due to a range of different microorganisms, parasites, land and marine animals, and arthropods, along with noncommunicable diseases [4].

Neglected tropical diseases

On September 19, 2012, a search for "neglected tropical diseases" on PubMed produced 730 results. According to the results of this search, the initial editorials, publications, as well as private opinions with the word "neglected diseases" the years 2001 and 2002 were mentioned in the title. A class of infections caused by bacteria, parasites, viruses, and fungi that arise in tropical and subtropical regions and are closely associated with poverty are known as neglected tropical diseases, or NTDs. Thus, they thrive in settings such as rural and isolated areas, unofficial settlements, or areas of violence where humans are surrounded by animals and infectious disease vectors and have limited access to healthcare, clean water, and sanitary conditions [5]. A World Bank study states that 51% of people in sub-Saharan Africa, a region that is a primary concern for NTDs, make lower compared to $1.25 per day, and 73% make less than $2. In the year the 2010 Global Burden of Disease Study, NTDs have been linked to 26.06 million disability-adjusted life years (95% confidence interval: 20.30, 35.12). Previous research shows that NTDs are common among the impoverished throughout Sub-Saharan Africa. Some of relatively prominent NTDs, which collectively affect over 500 million people, are infections caused by soil-transmitted helminths (STH), trachoma, lymphatic filariasis (LF), schistosomiasis, and onchocerciasis [6,7]. Similar diversity can be found in clinical characteristics, diagnostic algorithms, and approaches to treatment, prevention, and control. But there are two key similarities that are implied when one refers to all of these illnesses as "neglected tropical diseases." First, these illnesses are more common in tropical regions; however, the main reason for their preference for hot climates is poverty, which is primarily found in displaced populations near the0 poles, remote rural villages, and urban slum areas. Second, funders, researchers, and policy-makers have all, to varying degrees, ignored them until very recently. For instance, the United Nations and the international community announced in September 2000 an ambitious global commitment to end extreme poverty by the year 2015 [8].

The popular characteristics of neglected tropical diseases

A summary regarding the commonalities among the 17 NTD's that this report is about are listed in Table 2. Their grip over populations whose lives are destroyed by poverty is their most striking similarity. A community of partners dedicated to breaking the cycle of poverty and disease has grown over the last ten years as a result of the international community's recognition of this intolerable situation. Working to mitigate the effects of NTDs offers a largely unexplored development opportunity to reduce poverty in a large number of people, which will directly contribute to the accomplishment of the MDGs and providing the best possible health care for all people as an essential human right is the aim of the World Health Organization [10].

Objectives for sustainable development in the NTDs:

- A Sustainable Development Goals (SDGs) have officially designated neglected tropical diseases as a target for international action.
- The NTDs have been included shortly after being determined by the Inter-Agency and Expert Group on Sustainable Development Goal The variables to meet target 3.3, which is to "end the epidemics of HIV, tuberculosis, malaria, and neglected tropical diseases" by 2030.
- A wide variety of existing goals have been recognized by the World Health Assembly, which involves 11 goals aimed at preventing or reduce diseases. The total number of people who require strategies towards non-communicable diseases (NTDs) is the organization's proposed NTD indicator.
- The idea behind the worldwide NTD indicator is to provide an entire set of programs targeted at the most impoverished and excluded communities.

Sr. no	Disease	Global distribution (millions)	The People at Risk	Areas of Maximum Frequency
	Ascariasis	807	4.2 billion	East Asia and Pacific Islands, sub-Saharan Africa, India, South Asia, China, Latin America and Caribbean
	Trichuriasis	604	3.2 billion	Sub-Saharan Africa, East Asia and Pacific Islands, Latin America and Caribbean, India, South Asia
	Hookworm infection	576	3.2 billion	Sub-Saharan Africa, East Asia and Pacific Islands, India, South Asia, Latin America and Caribbean
	Schistosomiasis	207	779 million	Sub-Saharan Africa, Latin America and Caribbean
	Lymphatic filariasis	120	1.3 billion	India, South Asia, East Asia and Pacific Islands, Sub Saharan Africa
	Trachoma	84	590 million	Sub-Saharan Africa, Middle East and North Africa
	Onchocerciasis	37	90 million	Sub-Saharan Africa, Latin America and Caribbean
	Leishmaniasis	12	350 million	India, South Asia, sub-Saharan Africa, Latin America and Caribbean
	Chagas' diseases	8-9	25 million	Latin America and Caribbean
	Leprosy	0.4	ND	India, sub-Saharan Africa, Latin America and Caribbean
	Human African trypanosomiasis	0.3	60 million	Sub-Saharan Africa
	Dracunculiasis	0.01	ND	Sub-Saharan Africa
	Buruli ulcer	ND	ND	Sub-Saharan Africa

Table 1: Priority Ranking of the Main Neglected Tropical Diseases [9].

- The promise to "leave no one behind" would have suffered an early setback if NTDs had not been included in the monitoring record for goal 3.3.
- In addition to the NTD indicators, encouragement of NTD trace elements of equality that are relevant to other objectives related to sustainable development has been the focus of the WHO's Department of Control of Neglected Tropical Diseases [11].

Challenges of neglected tropical diseases

The major challenges for controlling NTDs are:

- Purchasing and distributing anthelminthic medications.
- Measuring the prevalence of NTDs in populations that are neglected.
- Offering communities in need free treatment and other interventions.
- A medication delivery system for the whole population that is at risk.
- Provision of packages with multiple interventions.
- Quick development of medications, pesticides, and diagnostic equipment [12].

Classification of tropical diseases

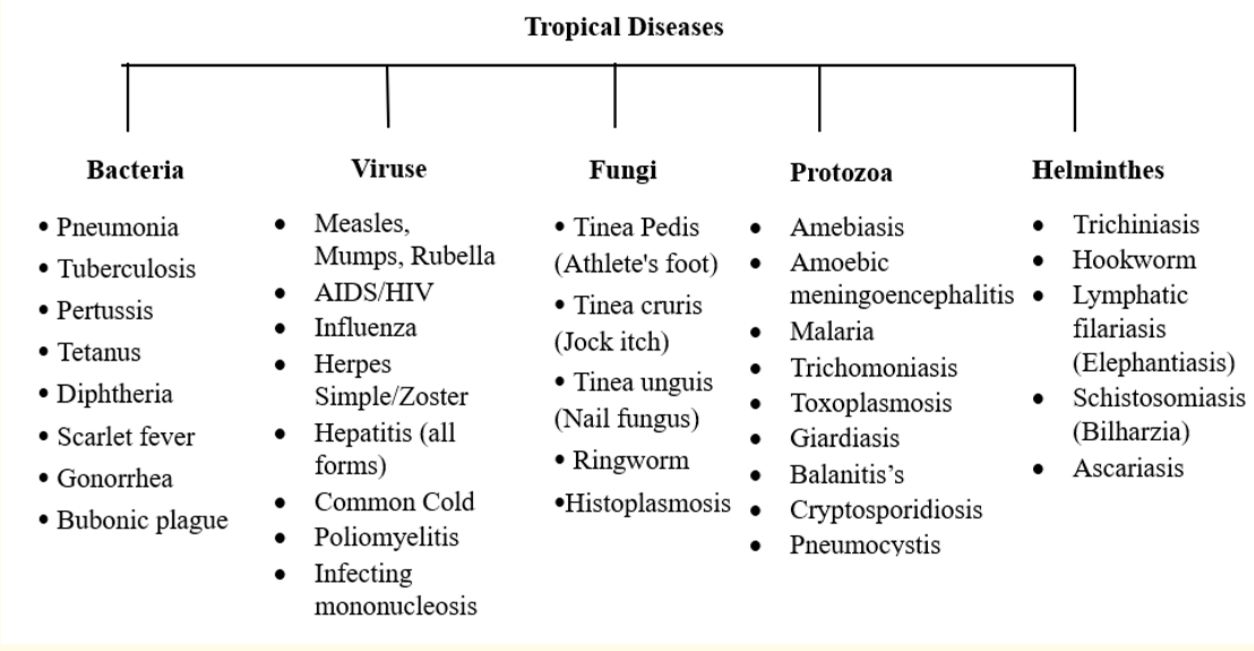

Figure 1: Classification of Tropical Diseases [13].

Bacteria

Many diseases, including Bartonellosis, tropical ulcers, and tropical pyomyositis, are caused by bacterial tropical infections. Certain bacterial infections that are spread through sexual activity, like lymphogranuloma venereum and granuloma inguinale, are significant in certain parts of the world. A noteworthy category of bacterial infections includes nonvenereal treponematosis, which includes pinta and yaws. Nonetheless, mycobacteriosis, which is brought on by non-sporogenic, acid-fast, weakly gram-positive rods, affects tropical nations particularly. According to estimates, the Mycobacterium genus hurts people more than all the other bacterial genera put together. In most tropical nations, tuberculosis and leprosy continue to be serious problems. Furthermore, it is becoming more widely acknowledged that the so-called atypical mycobacteria are human pathogens and may be more common than Mycobacterium tuberculosis in the etiology of skin diseases, particularly Buruli ulcer. Cutaneous symptoms can be seen in cases of Rickettsial, Ehrlichia, Babesial, and other infections [14].

Viruses

Studies on arbovirus infections have only been conducted on animals. There have been no reports of dengue, sand fly fever, or Hantaan fever (the first two having happened in Saudi Arabia). Since 1995, there have been seven cases of Crimean Congo hemorrhagic fever (CCHF), all of which have been linked to contact with fresh animal blood or ticks (the main virus vectors are various Hyalomma ticks, which are extensively distributed). HIV infection is rare and appears to have been around for a short time; in a 1996 seroepidemiologic survey of pregnant patients, no cases were discovered. However, acquired immunodeficiency syndrome (AIDS) cases had been reported in 165 cases cumulatively since 1996 by June 1998. Acute viral hepatitis disease is a serious issue; 1,219 cases of infection were reported in 1998. Hepatitis A virus infection is endemic, and the majority of people most likely develop a seropositive result in childhood. In reference to the hepatitis B virus (HBV), a survey conducted among pregnant clinic attendees revealed that 8.9% of them tested positive for the HBsAg (hepatitis B surface antigen) and 38.5% had anti-s antibodies [15].

Fungi

The tropics and subtropics have a higher frequency and diversity of fungal infections in humans, probably because warm, humid weather promotes the growth and spread of fungi. Many of the geographically limited and dimorphic fungi, like Lacazia loboi, are restricted to the tropical zone; however, because human migration and travel are becoming more common, infections caused by these organisms can occur anywhere in the world. Fungal infections are consistently one of the most frequent causes of dermatologic disorders in returning travellers, according to international surveys of diseases related to travel. Based on the tissue that is initially colonized, a classification scheme for fungal infections is frequently employed. There is no inflammation associated with superficial mycoses, which are limited to the stratum corneum, the outermost layer of the epidermis. Cutaneous mycoses typically cause skin inflammation and affect the integumentary system, which includes the hair and nails. Subcutaneous mycoses are defined as an infection of the deeper tissue layers; the fungi typically infect the tissue directly after causing minor trauma. In contrast to the mycoses discussed earlier, these infections have the ability to spread to deeper tissues such as muscle, deep fascia, and even bone. Systemic mycoses primarily affect the respiratory and gastrointestinal tracts. They can be further divided into primary and opportunistic mycoses according to whether the fungus can infect a healthy host [16].

Protozoa

A sandfly bite can spread the ancient disease leishmaniasis, which is brought on by protozoans belonging to the Leishmania genus. It has four subtypes, including cutaneous and visceral infections, that range in severity. Disfiguring lesions are often formed on the face, arms, and legs as a result of cutaneous infections. Lesions can persist for several weeks to more than a year; they can also develop years after the original lesion has healed. If untreated, visceral cases can lead to anemia, fever, debility, and even death. For the past 200 years, human African trypanosomiasis, also known as sleeping sickness, has periodically devastated sub-Saharan Africa. Its range is restricted by the distribution of multiple tsetse fly species, which serve as its vector and are endemic in more than 60 countries. Compared to T. b. gambiense, Trypanosoma brucei rhodesiense is believed to be more virulent. Treatment is inevitably required because the progression is lethal. It first affects the circulatory and lymphatic systems before eventually passing through the blood-brain barrier and entering the brain. Transfusions of blood or organs can also transmit Trypanosoma cruzi. There are two phases to the symptoms: the acute phase can be asymptomatic, or it can target the heart, digestive tract, or both [17].

Helminthes

A hookworm and lymphatic filariasis leading the way, helminth infections may be the most common NTDs in Oceania, though there are also a sizable number of cases of ascariasis, trichuriasis, strongyloidiasis, and hymenolepiasis. With an estimated 5.5 million cases, or about 1% of all cases worldwide, hookworm infection is conceivably the most common NTD in Oceania. The majority of hookworm cases in Oceania are found in PNG, where some estimates place the infection rate at 75% of the population. Fiji, the Solomon Islands, and Vanuatu are the next most infected countries. In certain regions of PNG, Necator americanus makes up all hookworms, making it the most common species. Although the presence of Ancylostoma duodenale in PNG is unknown, N. americanus was virtually the only hookworm found in PNG during the Australian Hookworm Campaign (1919–1924). Filariasis Lymphatic (LF) If strongyloidiasis and hookworm are excluded, LF is probably the most common helminthic NTD in Oceania. Despite the fact that LF is widespread in Oceania, PNG is the only country where the national prevalence estimate has been made public. Roughly 2.7 million people were thought to be infected in 1997, making up more than 2% of the world's total disease burden [18].

Role of pharmacist for controlling and preventing tropical diseases

The following are some of the roles that pharmacists play in the Controlling and Preventing Tropical Diseases.

- Communicator.
- Quality Drug Supplier.
- Collaborator.
- Trainer and Supervisor.
- Health Supporter.

Being a part of the medical staff, the pharmacist is required to take part in the following initiatives: Strategic Planning areas such as clothes, the body, structures, creature ecosystems, and mosquito nets are treated with insecticides and repellents to keep insects away. Using a mosquito net over a bed reduces transmission during

the night because certain tropical mosquito species feed primarily at night. De-wetlanding to lower bug and additional vector-borne diseases Making use of groundwater reservoirs, water filtration, water filters, or tablet-based water treatment to produce potable water free of parasites, maintaining good sanitation to stop the spread of disease through human waste, developing and applying vaccines to increase immunity to illness, Pharmacologic treatment, Pharmacologic post-exposure prophylaxis, Pharmacologic pre-exposure prophylaxis, etc. [19].

Opportunities for Control of Tropical Diseases in India:

- **Political commitment:** India has already made a political pledge to fight tropical diseases that are neglected. India is party to the World Health Assembly's conclusions on NTDs, leishmaniasis, and lymphatic filariasis. India joined the international community in the fight against neglected tropical diseases by signing these resolutions. To eradicate the Southeast Asian herb kala-azar by 2015, In 2005, a tripartite Memorandum of Understanding was executed by Bangladesh, Nepal, and India. Renewing the MoU that was signed in 2014 between Bhutan, Thailand, and these three nations has reinvigorated the political commitment and elimination efforts. 2017 is the new goal year.
- **Supporting programs:** In 2014, the Indian government was established the "Swachh Bharat Abhiyan" campaign. The elimination will be sustainable if it is connected to this Mission and other programs related to waste management, safe water supply, and basic sanitation. The National Vector Borne Disease Control Program prioritizes integrated vector management, which is critical for the prevention of NTDs, in addition to other tactics.
- **Epidemiology of NTDs:** The only certain places are endemic for these diseases. This offers a chance to exert coordinated control over them in these domains.
- **Availability of diagnostic tools and treatment:** For majority of neglected tropical diseases, the majority of suggested interventions such as straight forward diagnostic instruments and efficient, reasonably priced treatments are accessible.
- **Strengthening of Primary Health Care System:** It is advised that primary healthcare services incorporate interventions for neglected tropical diseases. There is a newfound commitment in India to revitalize primary health care services. This offers a rare chance to provide services for community mobilization, awareness-raising, and the prevention of NTDs [20].

Conclusion

In the short term, global warming undoubtedly won't lead to any epidemic situations on its own, but it does play a role in the introduction and spread of more diseases worldwide. Under the umbrella term of neglected tropical diseases, over 40 diseases caused by helminths, protozoan species, bacteria, viruses, fungi, and ectoparasitic are currently recognized, compared to an original set of 13–15 diseases. Our understanding of the epidemiology and treatment of numerous neglected tropical diseases is still severely lacking, which necessitates more money in order to support creative research that will eventually result in the development of new, field-tested techniques and tools. More focus is needed than is currently being applied to the prevention and control of NTDs. A human-rights-based approach to intervention will necessitate the availability and accessibility of medical treatment, uncontaminated housing and water, adequate food, schooling, equal opportunity for women and men, and a non-discriminatory environment. There has already been progress made in the fight against neglected tropical diseases. In order to support the efforts to eradicate neglected tropical diseases, a coordinated approach is required. In some of the most effective control programs, identifying health system bottlenecks, addressing them nationally, and enlisting community support are essential components.

Bibliography

1. Pujara P., *et al*. "An introduction to Tropical Disease: A review article". *International Journal of Medical Microbiology and Tropical Diseases* 2 (2016): 81-83.

2. Utzinger J., *et al*. "Neglected tropical diseases: diagnosis, clinical management, treatment and control". *Swiss Medical Weekly: Official Journal of the Swiss Society of Infectious Diseases, the Swiss Society of Internal Medicine, the Swiss Society of Pneumology* (2012): 142.

3. Camargo EP. "Tropical diseases". *Estudos Avançados* 22 (2008): 95-110.

4. Zumla A and Ustianowski A. "Tropical diseases: Definition, geographic distribution, transmission, and classification". *Infectious Disease Clinics* 26.2 (2012): 195-205.

5. Engels D and Zhou XN. "Neglected tropical diseases: an effective global response to local poverty-related disease priorities". *Infectious Diseases of Poverty* 9.1 (2020): 9-17.

6. Mitra AK and Mawson A R. "Neglected tropical diseases: epidemiology and global burden". *Tropical Medicine and Infectious Disease* 2.3 (2017): 36.

7. Hotez PJ and Kamath A. "Neglected tropical diseases in sub-Saharan Africa: review of their prevalence, distribution, and disease burden". *PLoS Neglected Tropical Disease* 3.8 (2009): e412.

8. Feasey N., *et al*. "Neglected tropical diseases". *British Medical Bulletin* 93.1 (2010): 179-200.

9. Hotez PJ., *et al*. "Control of neglected tropical diseases". *New England Journal of Medicine* 357.10 (2007): 1018-1027.

10. World Health Organization. "Working to overcome the global impact of neglected tropical diseases: first WHO report on neglected tropical diseases (No. WHO/HTM/NTD/2010.1)". World Health Organization (2010).

11. Engels D. "Neglected tropical diseases in the Sustainable Development Goals". *The Lancet* 387 (2016): 223-224.

12. World Health Organization. "Investing to overcome the global impact of neglected tropical diseases: third WHO report on neglected tropical diseases". World Health Organization 3 (2015).

13. Ranjita S. "Nanosuspensions: a new approach for organ and cellular targeting in infectious diseases". *Journal of Pharmaceutical Investigation* 43.1 (2013): 1-26.

14. Lupi O., *et al*. "Tropical dermatology: bacterial tropical diseases". *Journal of the American Academy of Dermatology* 54.4 (2006): 559-578.

15. Scrimgeour EM., *et al*. "Infectious and tropical diseases in Oman: a review". *The American Journal of Tropical Medicine and Hygiene* 61.6 (1999): 920-925.

16. Hsu L Y., *et al*. "Tropical fungal infections". *Infectious Disease Clinics* 26.2 (2012): 497-512.

17. Kealey A. "Neglected tropical diseases: infection, modeling, and control". *Journal of Health Care for the Poor and Underserved* 21.1 (2010): 53-69.

18. Kline K., *et al*. "Neglected tropical diseases of Oceania: review of their prevalence, distribution, and opportunities for control". *Plos Neglected Tropical Diseases* 7.1 (2013): e1755.

19. Maity T., *et al*. "A literature review on current tropical diseases and the role of Pharmacist in public health with special reference to tropical diseases". *BioMedRx* 1.1 (2013): 4-10.

20. Acharya A S., *et al*. "Neglected tropical diseases—Challenges and opportunities in India". *Indian Journal of Medical Specialities* 8.3 (2017): 102-108.