Neglected Tropical Diseases

16

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Abstract

Neglected tropical diseases (NTDs) are a diverse set of 20 diseases caused by different groups of pathogens (virus, bacteria, fungi, protozoa, helminths, toxins) that affect populations living in poverty. Approximately 1.8 billion people worldwide live in areas where they are transmitted. NTDs have been chronically overlooked by global policymakers and donor agencies but grouping them as a single entity of high morbidity diseases that are preventable and treatable with relatively simple, low-cost control interventions has facilitated the expansion of control measures which in 2020 reached over 800 million individuals.

Five core interventions are recommended by WHO for the control of NTDs: preventive chemotherapy, innovative and intensified disease management, vector control, veterinary public health measures and provision of safe water and sanitation.

The WHO Department of Control of Neglected Tropical Diseases has been preparing guidelines and recommendations for NTD control and conducting advocacy and technical support activities to promote control and elimination of NTDs in countries where they are endemic.

Keywords

Neglected tropical diseases · Control · Morbidity · DALYs · Vector control · Safe water · Preventive chemotherapy · Veterinary public health

16.1 Introduction

Neglected tropical diseases (NTDs) are a heterogeneous set of 20 diseases and disease groups (Table 16.1) that are transmitted in tropical and subtropical areas where they affect impoverished populations [1]. NTDs thrive in areas where sanitation is poor, and populations have close contact with infectious vectors and infected animals. More than 1 billion people are infected with one or more NTD [1].

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Table 16.1 The 20 NTDs, their main causative agent and the WHO target for 2030

Disease	Main causative agent	WHO target for 2030
Buruli ulcer	*Mycobacterium ulcerans* (bacteria)	Control
Chagas disease	*Trypanosoma cruzi* (protozoa)	Elimination as a public health problem
Dengue and Chikungunya	*Flaviviridae* and *Alphavirus* (virus)	Control
Dracunculiasis	*Dracunculus medinensis* (helminths)	Eradication
Echinococcosis	*Echinococcus* spp. (helminths)	Control
Foodborne trematodiases	*Clonorchis sinensis*, *Opisthorchis felineus*, *O. viverrini*, *Fasciola hepatica*, *F. gigantica*, *Paragonimus* spp. (helminths)	Control
Human African trypanosomiasis	Gambiense form: *Trypanosoma brucei gambiense* (protozoa)	Elimination (interruption of transmission)
	Rhodesiense form: *Trypanosoma brucei rhodesiense* (protozoa)	Elimination as a public health problem
Leishmaniasis	Cutaneous forms: *Leishmania* spp. (protozoa)	Control
	Visceral forms: *Leishmania* spp. (protozoa)	Elimination as a public health problem
Leprosy	*Mycobacterium leprae* (bacteria)	Elimination (interruption of transmission)
Lymphatic filariasis	*Wuchereria bancrofti,* *Brugia malayi,* *B. timori* (helminths)	Elimination as a public health problem
Mycetoma, chromoblastomycosis and other deep mycoses	Several microorganisms of bacterial and fungal origin (bacteria and fungi)	Control
Onchocerciasis	*Onchocerca volvulus* (helminths)	Elimination (interruption of transmission)
Rabies	Rabies virus (virus)	Elimination as a public health problem
Scabies and other ectoparasitoses	*Sarcoptes scabiei* (mite)	Control
Schistosomiasis	*Schistosoma haematobium*, *S. mansoni,* *S. japonicum* (helminths)	Elimination as a public health problem
Soil-transmitted helminthiases	*Ascaris lumbricoides*, *Trichuris trichiura*, Hookworms, *Strongyloides stercoralis* (helminths)	Elimination as a public health problem
Snakebite envenoming	Toxin following a bite of a venomous snake	Control
Taeniasis and cysticercosis	*Taenia solium* (helminths)	Control
Trachoma	*Chlamydia trachomatis* (bacteria)	Elimination as a public health problem
Yaws	*Treponema pallidum* subspecies *pertenue* (bacteria)	Eradication

16.2 Global Burden and Challenges

NTDs have been chronically overlooked by global policymakers and donor agencies, by the national health agendas of endemic countries and, sometimes, even by affected communities themselves for two main reasons:

1. NTDs cause relatively low numbers of deaths compared with the "three big killers" (malaria, HIV and TB) which, since the 1990s, have attracted the largest share of attention from global policymakers and, consequently, most of the financial investment by donors.
2. Each of the 20 NTDs "individually" causes limited morbidity.

16.3 Strategic Approach

Under the guidance of the WHO Department of Control of Neglected Tropical Diseases, that was created in 2005 with the aim of reverting this situation, intensive advocacy has been organized to promote that:

1. Despite their relatively low mortality, NTDs cause significant morbidity: they debilitate, deform and blind infected individuals. They disable through both overt (skin and eye lesions, internal organ lesions, limb deformation, impairment and retardation of mental functions) and silent morbidity (energy deficits, anaemia, growth retardation, chronic pain, exercise intolerance), with the potential to stunt the social, educational and professional lives of affected individuals.
2. Collectively, NTDs cause a loss of DALYs that is in the same order of magnitude as the three big killers (Fig. 16.1) [2].
3. Interventions to control NTDs are simpler and of lower cost than those to control the three big killers; in addition, they can be easily integrated among themselves or with existing platforms to further reduce control costs.

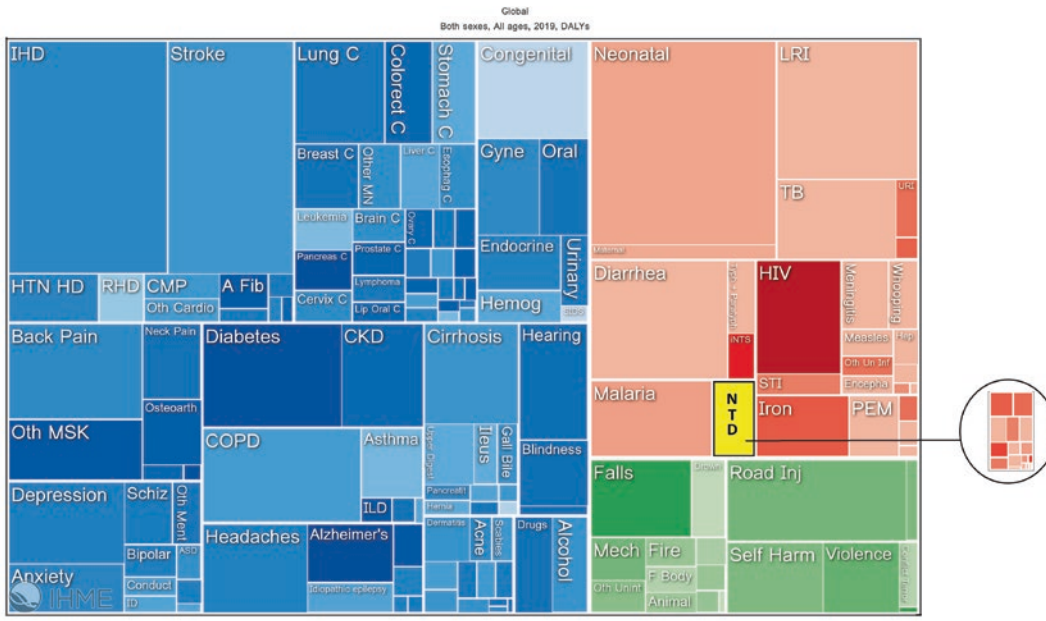

Fig. 16.1 Relevance of NTDs in the global burden of diseases; the total weight of NTDs is presented in yellow; the circles present the individual weights of each NTD. (Source: Institute for Health Metrics Evaluation [2]. Used with permission. All rights reserved)

This advocacy effort has resulted in a progressive intensification of the control activities that reach over a billion people every year [3].

16.4 Interventions for Prevention and Control

WHO recommends five core interventions to control NTDs.

Preventive chemotherapy is the regular, large-scale administration of medicines to entire population groups with the aim of reducing transmission or associated morbidity. Individual diagnosis is not necessary: surveys are conducted to assess if the disease is endemic in the area (community diagnosis), and if so, community treatment is organized. This approach is effective and easy to administer using safe, low-cost medicines; the treatment of uninfected individuals is without risk [4]. This approach is recommended for the following NTDs: lymphatic filariasis, onchocerciasis, schistosomiasis, soil-transmitted helminthiases, trachoma and yaws.

Innovative and intensified disease management is applicable to diseases which require a more traditional clinical approach entailing proper diagnosis and treatment rather than large-scale distribution of medicines. This "individual" approach (as opposed to the "community" approach of preventive chemotherapy) is justified by two main considerations: (1) the infectious agents that transmit these diseases are able to produce severe and possibly lethal outcomes, and infected individuals should therefore be carefully cared for and completely cured; (2) the treatment of such diseases necessitates long and complex treatment courses, specialized equipment and highly toxic medicines. These considerations mandate an approach involving close, individual, clinical case-management and follow-up of the patient by an experienced physician or nurse [5]. This approach is recommended for the following NTDs: Buruli ulcer, Chagas disease, human African trypanosomiasis, leishmaniasis, leprosy and snakebite envenoming.

Vector control is the reduction or elimination of the vectors that transmit infectious diseases using multiple strategies that entail environmental, chemical and biological control, and reduction of contacts between vectors and humans. This approach is recommended for the following vector-borne NTDs: Chagas disease, dengue, chikungunya, dracunculiasis, human African trypanosomiasis, lymphatic filariasis, onchocerciasis, schistosomiasis and trachoma.

Veterinary public health measures, such as vaccination or treatment of livestock and domestic animals, safe slaughtering and rodent control, are used to target NTDs for which animals play an active role in transmission. This approach is recommended for diseases such as rabies, echinococcosis, foodborne trematodiases, human African trypanosomiasis, leishmaniasis, taeniasis and cysticercosis.

Provision of safe water and sanitation is the improvement of water and sanitation services to levels that improve general hygiene living conditions and impede environmental contamination with human excreta. This approach is applicable to most of the NTDs because it reduces not only NTD-associated morbidity but also that of several other infections.

16.5 Role of WHO in the Control of NTDs

WHO is the specialized agency of the United Nations responsible for directing and coordinating international public health. Aside from its normative role in developing technical guidance and recommendations, WHO has two additional main tasks: advocacy and technical support to Member States.

NTD advocacy consists in raising the international level of attention and interest for NTDs: documenting the burden of NTDs and the benefits resulting from their control; promoting the inclusion of NTDs into public health agendas at national and international levels; sensitizing potential supporting institutions (bilateral cooperation agencies, public and private foundations and pharmaceutical companies or firms interested in corporate social responsibility); and coordinating all the actors involved in combating NTDs

through the establishment of global partnerships and the organization of regular meetings [5].

WHO provides technical support to Member States upon request by national governments. This support concerns the development of national plans of action based on WHO strategies and recommendations but adapted to the country's prevailing conditions and specificities; the implementation of disease-control activities; and the supervision, monitoring, evaluation and validation of such activities. Technical support is a key role of WHO, which has to be considered as a technical support agency rather than a funding agency. This implies that WHO does not cover the expenses related to implementation of national policies but does assure that implementation meets agreed technical standards. Furthermore, by leveraging its network of partners, WHO can facilitate resource mobilization from third parties willing to support the efforts of national governments [5].

References

1. Ending the neglect to attain the sustainable development goals: a road map for neglected tropical diseases 2021–2030. Geneva: World Health Organization; 2020. https://apps.who.int/iris/handle/10665/338565.
2. GBD compare: Viz Hub. Seattle: Institute for Health Metrics and Evaluation; 2022. https://vizhub.healthdata.org/gbd-compare/.
3. Crossing the billion: preventive chemotherapy for neglected tropical diseases. Geneva: World Health Organization; 2017. https://apps.who.int/iris/handle/10665/255498.
4. Gabrielli A, Montresor A, Engels D, Savioli L. Preventive chemotherapy in human helminthiasis: theoretical and operational aspects. Trans R Soc Trop Med Hyg. 2011;105:683–93. https://doi.org/10.1016/j.trstmh.2011.08.013.
5. Gabrielli AF, Mariotti SP, Montresor A, Rio F, Savioli L. Neglected tropical diseases: an introduction for the Italian medical and scientific community. Ital J Trop Med. 2008;13:1–7.