

The Pan American Health Organization's role and perspectives on the mapping and modeling of the neglected tropical diseases in Latin America and the Caribbean: an overview

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Abstract. The Pan American Health Organization (PAHO), which functions as the regional office for the Americas of the World Health Organization, is committed to provide technical cooperation to countries to update the epidemiological information available for mapping and modelling of the neglected tropical diseases (NTDs), a set of diseases mainly caused by parasites affecting people living in low socioeconomic and favourable environmental conditions. This communication discusses PAHO's role and perspectives in the use of mapping and modelling of these diseases with a view to promote its use in the development and implementation of integrated, inter-programmatic and inter-sectoral plans for the prevention, control or elimination of the NTDs and other infectious diseases related to poverty.

Keywords: neglected tropical diseases, poverty, Pan American Health Organization, geospatial modelling, Latin America.

Introduction

Neglected tropical diseases (NTDs) are a set of mainly infectious diseases, most of them caused by parasites, which affect people living in low socioeconomic and favourable environmental conditions, which govern their transmission, including poor housing, low education, lack of access to proper drinking water and basic sanitation and low income (WHO, 2010). Because the affected communities often have a weak political voice, and because of the generally chronic and silent nature of these diseases, governments used to give low priority to their prevention, surveillance and control. Moreover, the private sector had limited its investments in research and development of new and better drugs and diagnostic tests due to lack of incentives to invest with no expectation of future profits.

It is estimated that more than a billion people worldwide suffer at least one of the NTDs (WHO, 2010). The collective burden of disease caused by the NTDs is 56.6 million disability-adjusted life years (DALYs), lower than the burden of disease by lower respiratory tract infections, HIV/AIDS and diarrhoeal diseases, but greater than the individual burden of

disease by malaria, tuberculosis and measles (Hotez et al., 2007).

NTDs in the Americas

In Latin America and the Caribbean (LAC), the NTDs disproportionately affect indigenous groups and African descendants, as well as the poorest inhabitants of the rural areas and urban slums, who often are either excluded from primary health care or experience barriers in their access to health services. The collective burden of neglected tropical diseases in LAC is estimated to be 8.8% of the worldwide burden, approximately 5 million DALYs, greater than the individual burden of disease by HIV/AIDS (Hotez et al., 2008). This can be explained by the fact that 40% of the inhabitants in LAC (i.e. more than 200 million people) live in poverty, including 47 million people getting by on a daily income under US\$ 1 and 74 million under US\$ 2. Though LAC is not the poorest region of the world, it is the region with the greatest inequalities: the richest 10% of the population receives 48% of its income, while the poorest 10% receives only 1.6% (World Bank, 2003). In 2008, 7% of the population in LAC lacked access to proper drinking water, 3% of them living in urban areas and 21% in rural areas, while 21% of the population lacked access to proper sanitation, 14% in urban areas and 45% in rural areas (PAHO, 2011).

Since the 1990s there has been a growing interest and political commitment globally to reduce or elimi-

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nate the NTD burden with cost-effective strategies. These strategies include mass drug administration, strengthening of primary health care, health education, community participation, and inter-programmatic actions and intersectoral coordination to address their social determinants. This resulted in the creation of the Department of Control of Neglected Tropical Diseases at the World Health Organization (WHO), the formulation of WHO's "*Global plan to combat neglected tropical diseases 2008–2015*" and the promotion of public-private partnerships. The increased interest in controlling the NTDs has also contributed to increase the amount of resources allocated by governments, international organizations, philanthropic foundations and some in the private sector to support control and elimination efforts in developing countries. In the Americas, this political commitment has been expressed through PAHO's 2009 Directing Council Resolution CD49.R19, "*Elimination of Neglected Diseases and other Infections Related to Poverty*", which urges member states to eliminate or drastically reduce the burden of disease caused by a set of 12 infectious diseases related to poverty by 2015 (PAHO, 2009). In accordance with this, a strategic plan for "*Control and Elimination of Five Neglected Diseases in Latin America and the Caribbean, 2010–2015*" was formulated by PAHO's Neglected Infectious Diseases Program and published in 2010 (PAHO, 2010).

Discussion

One of the main approaches for NTD control and elimination in LAC is the integration of efforts between health programmes and platforms to increase access and coverage of interventions to the most affected people, including primary health care, expanded programme of immunizations, integrated management of childhood illness, nutrition programmes, health programmes for children enrolled in schools and access to integrated actions to address the social determinants of health. Social determinants favour the persistence of NTD transmission (lack of safe drinking water, basic sanitation, education, housing, etc.), prompting inter-sectoral efforts to reduce inequalities, stigma and discrimination within the framework of granting human rights, gender equality, cultural diversity and health promotion.

Both the resolution and the strategic plan emphasize the need to identify gaps in epidemiological information and the priority geographic areas for intervention (areas with overlapping of these diseases or "hot

spots") at subnational levels in the countries. Given the importance of socioeconomic and environmental risk factors in the persistence of transmission of NTDs, geospatial mapping and modeling can help predict the distribution and prevalence of diseases such as soil-transmitted helminthiasis (STHs), schistosomiasis, fascioliasis, lymphatic filariasis (LF), leishmaniasis, American trypanosomiasis (Chagas disease) and trachoma and identify areas where overlapping of diseases occur. The research papers published in this special issue of *Geospatial Health* on "*Neglected Tropical Diseases and Poverty in Latin America and the Caribbean*" provide important examples of this. Geospatial methods can also be useful for modeling and monitoring the behaviour of diseases as a result of control interventions. Thus, the information resulting from geospatial mapping and modelling can be used for public health purposes and contribute to the control and elimination of NTDs in LAC and elsewhere.

Conclusion

Some recent and important achievements towards the control or elimination of NTDs from the Americas include the interruption of vector-borne domestic transmission of Chagas disease by the principal vectors at national level in seven countries in Central and South America and in highly endemic areas of another seven countries. As a result, the population at risk in the Americas was reduced from an estimated 108 million people in 2006 to 65 million in 2010. By the end of 2011, onchocerciasis transmission was either eliminated or interrupted in 10 of the 13 foci in six countries in the region. In 2011, WHO received a request for certification of elimination of onchocerciasis from Colombia as the first country in the world to do so. In addition, three countries were removed from the WHO's list of LF-endemic countries that year. Elimination of leprosy as a public health problem at the national level has now been achieved in 34 of 35 countries and efforts have been made to increase the region's provision for regular deworming of school-aged children. The public health surveillance for leishmaniasis has been strengthened and prompt and adequate diagnosis as well as treatment of the patients has been achieved.

PAHO and WHO are committed to provide technical cooperation to countries to update the epidemiological information available for mapping and modelling of NTD and, in partnership with the Inter-American Development Bank (IDB) and the Sabin Vaccine Institute/Global Network for Neglected Tropical

Diseases, to promote its use in the development and implementation of integrated, interprogrammatic and intersectoral plans for the control or elimination of the NTDs as well as other infectious diseases related to poverty.

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