

The neglected zoonoses—the case for integrated control and advocacy

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Abstract

The neglected zoonotic diseases (NZDs) have been all but eradicated in wealthier countries, but remain major causes of ill-health and mortality across Africa, Asia, and Latin America. This neglect is, in part, a consequence of under-reporting, resulting in an underestimation of their global burden that downgrades their relevance to policy-makers and funding agencies. Increasing awareness about the causes of NZDs and how they can be prevented could reduce the incidence of many endemic zoonoses. Addressing NZDs by targeting the animal reservoir can deliver a double benefit, as enhanced animal health means a reduced risk of infection for humans, as well as improved livelihoods through increased animal productivity. Advocacy for NZD control is increasing, but with it comes a growing awareness that NZD control demands activities both in the short term and over a long period of time. Moreover, despite the promise of cheap, effective vaccines or other control tools, these endemic diseases will not be sustainably controlled in the near future without long-term financial commitment, particularly as disease incidence decreases and other health priorities take hold. NZD intervention costs can seem high when compared with the public health benefits alone, but these costs are easily outweighed when a full cross-sector analysis is carried out and monetary/non-monetary benefits—particularly regarding the livestock sector—are taken into account. Public–private partnerships have recently provided advocacy for human disease control, and could prove equally effective in addressing endemic zoonoses through harnessing social impact investments. Evidence of the disease burdens imposed on communities by the NZDs and demonstration of the cost-effectiveness of integrated control can strengthen the case for a One Health approach to endemic zoonotic disease control.

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The origins of neglect

The Millennium Development Goals aimed, by 2015, to halve the proportion of people living on less than a dollar a day, and to halve the proportion of people suffering from hunger. Millennium Development Goal 6 aimed to 'combat Tuberculosis, HIV and AIDS, malaria (the 'big three') and other diseases';

the major focus of these 'other diseases' became known as the neglected tropical diseases (NTDs) [1]. In 2008, Molyneux [2] suggested that these 'other diseases' were being ignored by policy-makers and politicians, who over-focused on targets around the 'big three' diseases; targets that were likely to prove unattainable. The Global Fund (<http://www.theglobalfund.org>) was created to finance the fight against the 'big three', but only limited funding was mobilized to scale up NTD interventions.

The NTDs comprise 17 viral, parasitic and bacterial infections, and include dengue/severe dengue, rabies, Chagas disease, human African trypanosomiasis (HAT), leishmaniasis, three soil-transmitted helminth (STH) infections (ascariasis, hookworm infection, and trichuriasis), lymphatic filariasis, onchocerciasis (river blindness), dracunculiasis (guinea worm disease), schistosomiasis, cysticercosis/taeniasis, foodborne

trematodiasis, echinococcosis, lymphatic filariasis, Buruli ulcer, leprosy, trachoma, and Yaws. The NTDs affect several hundred million people (with a disease burden equivalent to malaria), killing at least half a million annually, but continue to attract relatively little attention from donors, policy-makers, and public health bodies [1]. NTDs are both drivers and manifestations of poverty and social inequality that often lead to long-term disability [2].

In 2005, the European Parliament adopted a resolution on 'Major and Neglected Diseases in Developing Countries', regretting 'the lack of R&D into diseases which almost exclusively affect poor people in developing countries' [3]. The resolution identified leishmaniasis, HAT, tuberculosis (TB), Chagas disease and neurocysticercosis as causes for concern, and called for the European Commission to broaden its approach to other NTDs (including, among others, anthrax, rabies and brucellosis, rabies, and echinococcosis (hydatid disease)). These neglected zoonotic diseases (NZDs) constitute a major burden for poor rural communities [4–6].

Since then, more than a decade of advocacy for NTDs has resulted in ambitious control and elimination targets being set by the WHO for 2020, and several successful partnerships have been formed to raise funds and provide advocacy for NTD control, including the Global Programme to Eliminate Lymphatic Filariasis (<http://www.filaria.org/>) and the Global Network for Neglected Tropical Diseases (<http://globalnetwork.org/>). Such advocacy resulted in the 2012 'London Declaration' (<http://unitingtocombatntds.org/resource/london-declaration>), followed by the World Health Assembly (WHA) Resolution WHA66.12 in May 2013. WHA66.12 targets all 17 NTDs and addresses diseases as co-endemic clusters rather than individually, marking a distinct change in our approach to dealing with these diseases of poverty.

WHA66.12 was a turning point for advocacy for the NTDs; however, although a number of NZDs were included (rabies, echinococcosis (hydatid disease), leishmaniasis, *Trypanosoma brucei rhodesiense* sleeping sickness, and *Taenia solium* cysticercosis), three major bacterial NZDs (anthrax, brucellosis, and bovine TB) were omitted. Examination of all resolutions arising from the 66 WHAs (from 1948 to 2013) indicated that only 21 resolutions targeted one or more NZDs (<4% of the total resolutions passed to date on infectious diseases) [7]. A WHA resolution for all NZDs is an essential prerequisite for advocacy [7].

Costs and burden of NZDs

The impact of NZDs falls most heavily on the poor, impacting on the health systems in which they live. Affected populations

often live in close contact with their animals, and are at risk for infection (directly or indirectly from the animal reservoir). Once infected, poor people have less access to the required health information that would lead to appropriate diagnosis and treatment. Primary healthcare facilities are often not readily accessible in remote rural areas or in slums, and patients can ill afford the time and money for repeated visits to a health centre. The burden of caring for a sick family member can push households further into poverty, and the death of a breadwinner can devastate a rural household.

Livestock are central to survival strategies in poor households, and may be sold to meet emergency expenditures—such as school fees, treatment and hospitalization of family members, or food in times of shortage. Poorer people keep fewer animals and suffer disproportionately from any illness or death of their livestock, so that intervening to control NZDs improves both the health of livestock and livelihoods, while at the same time protecting human health [4–6].

'Neglect' is, in part, an unintended consequence of the adoption of a system of disease prioritization, which impacts directly on investment and funding. Calculating a global burden of human disease (GBD), although logical, does not offer an equitable strategy on which to base investments to control neglected diseases. Where hospitals and clinics are not accessible, accurate measurements of morbidity and mortality resulting from NTDs are difficult to obtain, and, for most sub-Saharan African countries, use of the disability-adjusted life-year (DALY) can result in systematic undervaluation of NTDs [8]. Over-reliance by policy-makers on GBD methodology in setting health priorities tends to devalue diseases for which reliable metrics are not available [9]. King and Bertino [8] concluded that 'for most sub-Saharan African countries, GDB burden has been extrapolated from scant data taken from other locations, meaning estimates will be only approximate with a strong tendency towards underestimation of disease burden' [9]. Efforts have been made to improve on GDB estimates for three endemic zoonoses (rabies, echinococcosis, and HAT) by the use of mathematical modelling to estimate under-reporting, but, for most NZDs, data are scant. Whereas the socio-economic burden has been considered for several parasitic zoonoses [10], the NZDs are largely under-reported, which contributes to underestimation of the disease burden. In humans, NZDs may be confused with other diseases; for example, where malaria is present, fevers due to brucellosis [11] or HAT [12] are often misdiagnosed. Although diagnostic tests are available for screening NZDs in animal populations, many are not standardized for routine surveillance in the community in developing world settings, and the absence of a reference standard is problematic [13,14].

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