LONDON CENTRE FOR NEGLECTED TROPICAL DISEASE RESEARCH

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Selected research highlights 2021

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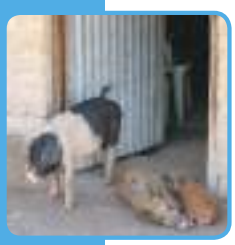


Director's note

The year 2020 has been a very challenging one with the SARS-CoV-2 pandemic causing so much suffering in every region of the world. We now understand that 2021 will also be a difficult year, as appreciation that the virus will become endemic worldwide grows and the threat of continual evolution threatens the hope that vaccines will provide a quick solution to control viral spread. The greatest impact has been in the resource-poor settings of the world where lack of healthcare facilities and shortages of personal protective equipment (PPE) for healthcare workers have exacerbated the impact of the virus. This is not just in terms of mortality and morbidity, but also with respect to trade, tourism and manufacturing which often sustain economic performance in many developing countries as growth worldwide slows.

In terms of NTD control, as detailed in a recent report from the Bill and Melinda Gates Foundation-funded NTD Modelling Consortium, on the impact of the pandemic on interventions in countries with endemic NTD infections, the spread of the coronavirus has caused delays in many mass drug administration and treatment programmes but not all[1]. These setbacks can be remedied in the coming years by increasing the frequency of treatment and expanding treatment coverage, but such adjustments will require extra resources to be made available not just to provide PPE equipment but also to cover the associated additional logistical costs.

The effectiveness of such remedies will of course also depend on vaccines to protect against SARS-CoV-2 infection being made available to developing countries on the same scale as to the rich nations of the world. The unit of vaccination to create sufficient herd immunity to greatly restrict viral transmission is the world, not any individual country. Our strong connectedness between countries ensures rapid spread via corridors of air transport.

As recently noted by the Director General of the World Health Organization, Dr Tedros Adhanom Ghebreyesus, in his opening remarks at the 148th session of the Executive Board, 'vaccine equity' is not just a moral imperative, it is a strategic and economic imperative. A recent study estimated that the economic benefits of equitable vaccine allocation for 10 high-income countries would be at least 153 billion U.S. dollars in 2021, rising to 466 billion dollars by 2025.

Some positives may eventually emerge from the COVID-19 pandemic including an increased focus globally on health care infrastructure. In the NTD world, we should all look to see how our experiences and research can benefit the immediate task of vaccinating populations in resource-poor settings to ensure populations can be adequately protected. It is only then that a refocus on NTD control and morbidity elimination can occur.

One obvious example for us all to consider is how the delivery platforms for NTD control, so effectively built up over the past decade, can also be employed to help deliver vaccines. Current mass vaccination programmes to protect against the common viral infections, such as measles and diphtheria, are targeted at young children. For the novel coronavirus it is the older age groups who are most in need of protection. Given that in many areas of NTD control, such as the MDA programmes for lymphatic filariasis and onchocerciasis, community-wide treatment is required, these platforms could play an important role in helping to roll out SARS-CoV-2 vaccination.

Multi-use delivery infrastructures are of obvious importance more generally in NTD control, as we move into a period where, seeking ways to reduce costs in health care delivery, we try to see how NTD platforms can be adapted, not just to treat one infection, but many at the same time as outlined in the new WHO 2021-2030 road map for NTDs. By building capacity and health care infrastructure for NTD control we will also help to deliver mass vaccination to protect against COVID-19. We must constantly seek synergies for control across diseases rather than staying in a disease-specific silo.

Professor Sir Roy Anderson FRS FMedSci
Director, LCNTDR

1 Predicted Impact of COVID-19 on Neglected Tropical Disease Programs and the Opportunity for Innovation. DOI: 10.1093/cid/ciaa933

Anticipating the impact of global change on snakebite envenoming

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What is the research?

Snakebite envenoming is the only non-infectious neglected tropical disease (NTD). The geographic patterns of envenoming and their severity vary as a result of the distribution, abundance, ecology and behaviour of different venomous snake species. Given that snakes are ectothermic and have specific habitat preferences, their abundance and distributions are being affected by global change (global warming, land use and demographic changes). Naturally, these processes are also expected to gradually change the geographic patterns of snakebite burden. However, due to the current lack of process-based epidemiological frameworks for the study of snakebite, changes in snakebite risk are difficult to track or forecast. This study aims to develop a framework based on models for the transmission of infectious diseases, which represents snakebites as the product and outcome of human-snake encounters. The model is fully parameterised using data on observed snakebite envenoming incidence, estimates of snake abundance, prevailing land cover and human population density in Sri Lanka. The developed framework allows us to infer some of the potential implications of global change for snakebite envenoming.

Young adult of Hypnale zara, one of the three hump-nosed viper species, which are among the leading cause of snakebite envenoming across the wet, western region of Sri Lanka. Photo credit: Gerardo Martín.

Why is this research necessary?

Global sustainability goals encompass curbing global climate change, protecting biodiversity and human health. As global change is the greatest force driving biodiversity loss, it is natural that diseases related to biodiversity, such as snakebite, will also be affected. Other NTDs are expected to shift to higher or lower elevations or latitudes in response to changes in climate, while habitat discontinuities are known determinants of vector and host species distributions. In contrast, snakebite is still poorly understood ecologically and epidemiologically, hampering efforts to infer how its burden will change in future as a result of global change. Being able to predict these changes is necessary in order to optimise the allocation of post-bite treatments in regions affected by some of the many venomous snake species, and to design novel and locally appropriate strategies for prevention informed by patterns of risk.

How will the research support the achievement of targets set in the WHO NTD road map 2021-2030?

This research provides a baseline estimate of the expected trends of envenoming incidence under a series of scenarios of climate, land use change and human population growth. The predictions shed light on current burden distribution and potential future changes in risk, which can help fine tune the allocation and distribution of prevention and treatment options. These could include anticipating changes in species-specific antivenom requirements or for communicating risk patterns, contributing to the WHO NTD road map 2021-2030 targets for reducing the unacceptable burden of snakebite.