



International Health 2020; **0**; 1–6
doi:10.1093/inthealth/ihaa040 Advance Access publication 0 2020

COVID-19 and neglected tropical diseases in Africa: impacts, interactions, consequences

David H. Molyneux^{a,*}, Agatha Aboe^b, Sunday Isiyaku^c and Simon Bush^d

^aEmeritus Professor, Liverpool School of Tropical Medicine, Pembroke Place, Liverpool L3 5QA, UK; ^bGlobal Trachoma Coordinator, Sightsavers, PO Box KIA 18190, Airport, Accra, Ghana; ^cCountry Director Ghana and Nigeria, Sightsavers, 1 Golf Course Road, Kaduna, Nigeria; ^dDirector, Neglected Tropical Diseases, Sightsavers, PO Box KIA 18190, Airport, Accra, Ghana

*Corresponding author: Tel: +44 151 705 3291/+44 7780 991 824; E-mail: david.molyneux@lstmed.ac.uk

Received 8 June 2020; editorial decision 8 June 2020; accepted 22 June 2020

Keywords: Covid-19, Neglected Tropical Diseases, Africa, Socio-Economics, Communities, Pandemic.

The world has been assaulted by COVID-19. Unpredictable changes in all sectors of economies and societies will manifest themselves over the coming months and years. The most robust health systems have become overwhelmed and pre-occupied in response to the virus. The impact of COVID-19 will evolve from an acute medical emergency response to a chronic ‘maintenance’ phase, with health services adapting to life with the virus as another infectious agent. However, economic and societal costs will vastly outweigh initial medical costs, given the widely predicted global depression—trivial compared with the cost of preparedness that should have been undertaken. The most vulnerable in society will be driven into deeper poverty. The consequential mental health morbidity and suicidal ideations will place an increased burden on already overstretched services, against the background of mental illness being the world’s leading cause of morbidity.¹ This is likely to be exacerbated by increased violence and social stress on already depressed economies with high levels of unemployment. There may be hope for a vaccine, but its efficacy, duration of immunity and the complexities of distribution in low- and middle-income countries (LMICs) will be major challenges. The longer-term consequences of the pandemic for Africa will be profound, given health system fragilities.² In this editorial, we discuss the potential impact of COVID-19 on neglected tropical disease (NTD) programmes as health services seek to function in the newly changed COVID-19 environment.³

A view of the African context

The current recommended strategies to reduce transmission (isolation, lockdown and social distancing) will be difficult to apply and practice in many African settings. In addition, with the prevalence of human immunodeficiency virus (HIV) and tuberculosis (TB) in sub-Saharan Africa (HIV as an infection with a capacity to immunosuppress and TB as a predominantly respiratory

condition) there will be serious implications for those carrying either and often both conditions.⁴ In addition to TB, there are several other significant causes of respiratory insufficiency in Africa.⁵

Many NTD infections also have the capacity to immunosuppress in COVID-19 patients, and thus NTDs themselves represent ‘underlying health issues’. The limited surgical provision will be overwhelmed by hospitalised patients occupying bed space, thus patients in need of specialist care in rural settings will be unable to access medical care. There is also limited availability of personal protective equipment (PPE). Immunization programmes will likely be disrupted and the longer-term results of this are unpredictable in younger children (measles potentially resurgent). Medical and health staff will be at higher risk, thus depleting already limited human resources. Self-isolation in order to reduce transmission will be difficult in many African settings. Although behaviour change is notoriously difficult to message and implement, rapidly disseminated and socially acceptable messaging needs to be developed as a matter of urgency. An antibody test will be an essential tool to determine the true exposure of individuals and populations. The antibody test, when available, given the huge global demand, may be less accessible to LMICs due to affordability.

The consequences of sexual activity in the COVID-19 era seems a taboo subject. There is a high risk of transmission from any intimacy. Within the post-puberty population, multiple partners is a high transmission risk behaviour. Until the prevalence of asymptomatic carriers is known or if sexual activity is taking place during an incubation period when the individual is infective, the risks of sexual encounters cannot be factored into the transmission models.

A potential impact for NTD pharmaceutical donors might be their ability to maintain drug manufacturing at current levels given the complexity of the supply chain of active ingredients. There is the potential for disruption of the supply chain because of the closing of airports and increased costs of freight.

© The Author(s) 2020. Published by Oxford University Press on behalf of Royal Society of Tropical Medicine and Hygiene. This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited. For commercial re-use, please contact journals.permissions@oup.com

The longer-term implications for NTD elimination and control will be unclear for some time, but it is appropriate to envisage and plan for various scenarios. Many NTD stakeholders will be impacted by COVID-19 in their operational activities. Research organizations and institutions are temporarily closed and unable to undertake funded laboratory-based work and field studies. Drug distribution has been suspended and travel stopped or extremely limited, thus impacting the availability of technical support and the ability to monitor programmes. Health resources may be overwhelmed by demand. In Sahelian countries political instability driven by jihadist movements can be predicted to increase food insecurity by reduced farming as a result of jihadist control of rural areas, factors which together with COVID-19 will create food price inflation for urban and rural populations. The current locust swarms in eastern Africa pose a further challenge to NTD-endemic countries, with a loss of crops over a significant area and the resulting food insecurity, to which (given the scale) the World Food Programme will be challenged to respond.

It can be predicted that the pandemic will have a differential impact on African countries given their different geographies, economic situations, population sizes and health systems. Some countries have NTD programmes with a history of success to date, while others can be categorised into those most at risk of COVID-19 impact, especially given their relatively weak health systems, limited capacity, difficulties of access and insecurity and fragile governance.^{2,3} A depleted health system caused by COVID-19 impact on health staff will have potentially catastrophic consequences for the short to medium term on all health activities, while economic stagnation and recession will impact the poorest as economies fall into recession. Climatic factors may be relevant if COVID-19 is less likely to survive the high temperatures prevailing in the tropics. However, some 40% of the total population live in urban or peri-urban settings where social distancing and hygiene are physically impossible or extremely difficult even if the population is prepared to adhere to the message. In urban areas there is a significant proportion of individuals with chronic heart diseases and diabetes as a result of the demographic changes in recent years, with a higher level of vulnerability in older adults.⁶ However, the overall clinical impact may be less, given the high proportion of the population that is younger than in Western societies. In Africa, the median age is between 15 and 20 y, in Europe the median age is 40 y, but in Africa even younger age groups are likely to have a higher frequency of underlying health conditions.⁷ This is not the case in Europe or the USA, where older age groups have chronic conditions and benefit from access to healthcare and the ability to access high-quality specialist services.

Traditionally, LMICs have appealed in emergencies for United Nations (UN), International Monetary Fund (IMF), bilateral or charitable sector support, but it is likely that because of the global nature of the pandemic these traditional donor sources will not have the liquidity to support LMICs given their own needs to provide social and economic support to their populations. The economic impact for countries heavily dependent on traditional financing through loans will be serious given their inability to repay interest, resulting in defaulting on debt as their economies fall into recession. The IMF and World Bank have committed to offering support, but the conditions associated with this commitment are unclear.⁸ Figure 1 provides a summary of some of the potential projected impacts of COVID-19 on NTD-endemic countries in terms of social and economic factors

High-population countries

Countries with high-density populations in large coastal cities such as Lagos, Accra, Dakar and Abijan, with relatively strong health systems, have some comparative advantage in terms of capacity. However, traditionally there is a huge amount of in-country travel in crowded vehicles, suggesting the virus will spread rapidly despite some current restrictions. The crowded road transport systems in many African countries are not compatible with social distancing.

Clearly, even in the more developed LMICs there will be a significant impact on the local economies. With falling oil prices, several countries will lose significant revenue from which it may take years to recover (if the projected global recession occurs post-COVID-19 and oil prices remain at low levels). There could be potential impact on coffee and cocoa production and other agricultural export crops, with resultant declines in foreign exchange earnings through disruption of harvesting, freight and reduced global demand.

Post-conflict and Ebola countries

The countries that shared the impact of Ebola could be best equipped to deal with an emergency response, given their recent experience in pandemic response (e.g. contact tracing and isolation) and having human resources with skills for dealing with the 'critical care' of Ebola cases as well as being able to understand the personal protection equipment (PPE) measures required. Whether the needed resources and latent capacity can be mobilised will be an important part of the response.⁹

Sahelian and landlocked countries

Landlocked Sahelian countries will be under significant stress of insecurity, as jihadist groups are presenting governments with serious problems in Burkina Faso, Mali and northeast Nigeria. Political stability is fragile and COVID-19 could be a tipping point for these countries, impeding future growth. The impact of climate change and drought will be more pervasive in the Sahel and this will exacerbate existing conflicts between pastoralists and sedentary farming communities. Imports will be curtailed, given coastal ports are located hundreds of kilometres from major inland centres and, in particular, problems with oil supplies. Refugees and internally displaced camps in the Sahel have the least chance of COVID-19 mitigation given the crowded nature of such environments, pressure on medical services and limited food supplies and sanitation/wash facilities. The supply chain from the coast will be disrupted and food security compromised, with potential price rises further impoverishing the poor.

Informal communities and COVID-19 high-risk groups for infection and dissemination: mining, nomadic communities and pastoralists

Many parts of West Africa have established informal mining communities, particularly gold mining. These camps have limited social and organisational structures and attract workers

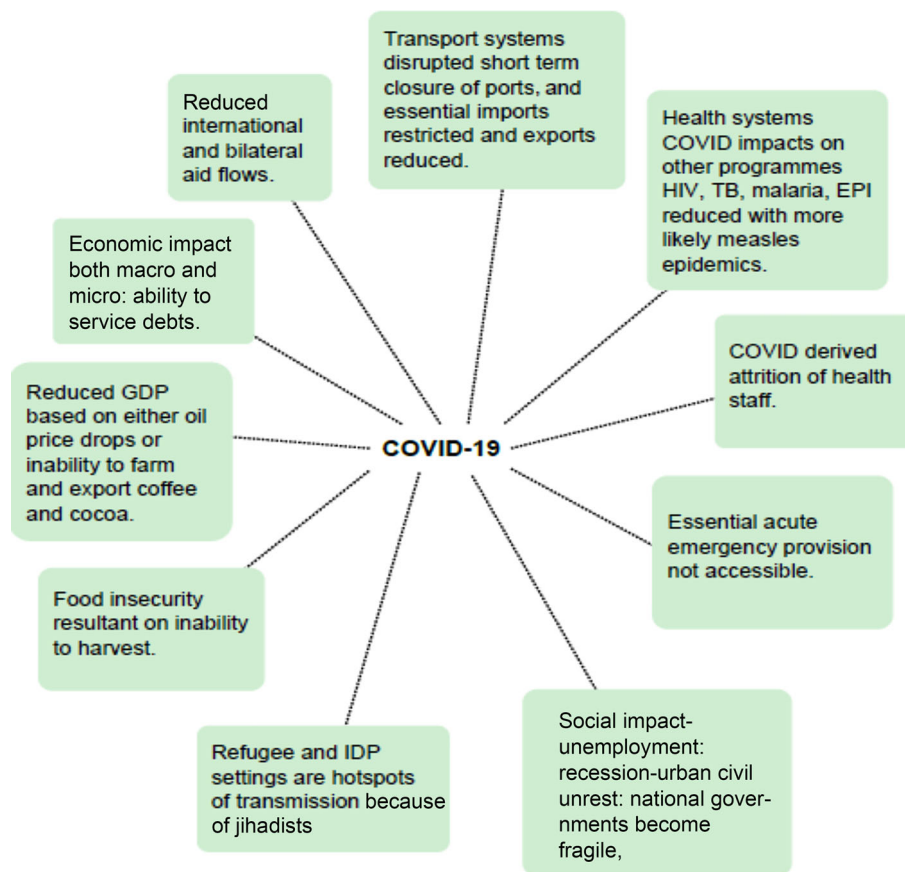


Figure 1. Broader impacts of COVID-19 in NTD-endemic countries.

from several countries who exploit the resources and then move to other sites that are more productive (often dependent on the gold price). These populations are highly mobile, have better cash availability, have reliable communication systems (cell/smartphones with quality coverage by networks even in the most remote areas) and circulate throughout the region regardless of frontiers. Such camps have limited access to healthcare and hygiene and access to safe water supplies is limited. These populations, although small, should be recognised as a potential hazard for COVID-19 transmission and its dissemination. Efforts to identify the locations of such activities present a challenge to the formal health sector to communicate the necessary preventive messages to comply with transmission mitigation behaviours. Similarly this will apply to internally displaced persons camps.

Throughout the Sahel, nomadic (usually pastoralist) populations are usually outside the traditional health and education sectors and the services they provide. These populations pose a challenge of access, communication and provision of services.¹⁰

Many traditional migration patterns (cross borders) exist in West Africa, often associated with seasonal labour for agricultural activities and distant from resident communities. Community-directed distributors (CDDs), who have been the backbone of the distribution of NTD medicines in rural communities, recognize these migratory patterns, having timed mass drug administration (MDA) to be undertaken to ensure maximum coverage, and

thus they can assist in providing the necessary information to the formal health sector.

The ‘double whammies’

COVID-19 is testing all countries. However, some LMICs will find it difficult to cope with what can be identified as the ‘double whammies’ the pandemic imposes. Already there are areas of conflict and insecurity. Ebola remains a problem in eastern Democratic Republic of the Congo, locust swarms are ravaging the Horn of Africa in east African countries and refugee camps and internally displaced people camps are present in several countries, where even before COVID-19 emerged, the challenge of providing adequate resources to provide for the populations was present. Donor and UN funding will be less easy to access given the global demand for the funds to cope with the pandemic.

Potential impact on NTD programmes

The World Health Organization (WHO) produced guideline recommendations regarding NTD activities as the pandemic developed¹¹ and countries will want to work within these guidelines, but also ensure, when appropriate, that there is a timely resumption of NTD activities, including MDA. It is essential that

programmes work through a robust risk mitigation strategy as part of the process to return to treatments at scale. The risk mitigation process may well bring a change to the usual approaches for MDA, which could lead to increased time being spent on the programme by the CDDs and programme staff.

However, NTD programmes have relied on volunteer CDDs and many thousands have been trained since the early 1990s.¹² While there has been some attrition in CDDs, those with past experience can be recruited back to assist in messaging and community response to COVID-19. There is a significant cadre of human resources at the periphery of the health system who are embedded in and have the confidence of their local communities. Their rapid mobilisation, if provided with COVID-19 information, could be an effective mitigating factor in reducing the spread and transmission of the virus. Mobilisation of CDDs will be essential if formal health staff are not available due to COVID-19, while the smartphone and cell phone network using the short message service have a key role to play as demonstrated by the Global Trachoma Mapping Project (GTMP) and for recording the locations of patients who have symptoms of lymphatic filariasis.

The key question is 'Can the information and materials be created and socially and culturally nuanced for those who need it and then be rapidly disseminated?' There will be a need to assess the reach of communications systems and cell phone usage while engaging rural FM radio and state radio broadcasts.

Due to the risks, surgery for trichiasis and hydrocele has been suspended. A future concern is that trichiasis, cataract surgeries and anaesthesia for hydrocele involving close contact with patients could be compromised in the medium term whilst there will be extra costs for future surgery due to the need for Personal Protective Equipment (PPE). This is because the extent of asymptomatic carriage in the population is, as yet, unknown. When an approved antibody detection test for COVID-19 becomes available, NTD stakeholders should define its deployment in relation to risk mitigation in surgical facilities/eye camps for protection of patients, surgeons and nursing staff.

NTD programmes are seeking to address the inclusion of people with disabilities in development programmes. There is an increasing recognition that COVID-19 will have specific impacts on this population group, both through lack of access, or even denial of access, to health services and also through social distancing, undermining the critical support services they require to secure even their basic needs and to benefit equally from COVID-19-focused programmes. The UN Secretary General developed a policy brief on the dimensions of disability and COVID-19 entitled 'A disability-inclusive response to COVID-19'.¹³ Within the context of 'leave no one behind' and 'equity', particularly access to services, this document emphasises the obligations of the NTD community and its aspirations to serve those with the diverse disabilities associated with NTDs, including their mental health.¹⁴

Hand, face and limb hygiene is a significant component of several NTD intervention strategies.¹⁵ COVID-19 provides an opportunity to maximise the impact of this strategy for NTD transmission control and morbidity management. However, the costs and availability of soap is a potential impediment to scaling up this critical activity. Expansion of the Water, Sanitation and Hygiene (WASH) program messaging provides an opportunity for the WASH, behaviour change and communication approaches (with an added impact on diarrhoeal diseases) to mitigate COVID-19 transmission as well as impacting NTDs. However, in many

settings the absence of safe water provision and the cost and availability of soap are constraints to this approach.

NTD programmes have been innovative in developing community-directed treatment¹⁶ and school-based distribution strategies¹⁷ to ensure the necessary treatment coverage. The introduction of the dose pole to avoid weighing patients, a means of providing the correct dosages of drugs and identifying those children not eligible for treatment, has been an innovative and emblematic symbol of MDA programmes throughout Africa.¹⁸ Using dose poles, which are approximately 2 m in length, to inform behaviours compatible with social distancing would be an effective way to provide health education. The thinking around how dose poles could be adapted for providing drugs, accepting that social distancing will need to be maintained into the foreseeable future, should be investigated. Communities should be engaged in considering the most appropriate ways to deliver drugs in the new scenario. This should also include the need for safely providing water for patients to swallow drugs and ensuring drugs are swallowed if house to housedistribution is the safest method of MDA. These challenges need to be addressed and considered immediately.

Drug expiry

Donor-funded NTD programmes can play a role in supporting country programmes with accurate and up-to-date drug inventories as requested by the WHO and European Society for Clinical Nutrition and Metabolism. The wider issues of drug supply, scaled back manufacturing and limited delivery options are potential constraints in the coming months. The engagement with the Supply Chain Forum will be an opportunity to be updated on global impacts. The potential problem of expiry of MDA drug stocks with MDA programme suspensions should be evaluated. The numbers of drugs that might expire given that MDA will be delayed for different periods of time (6 months, 1 y etc.) should be communicated by countries to the WHO and the pharmaceutical donors.

National coordination activities

The functioning of national-level coordination mechanisms (e.g. the national COVID-19 task forces and UN country coordinating teams) will play an essential role in monitoring the response to COVID-19. NTD programme managers are integral to the national response, as they can offer advice and perspectives. Emergency response regarding behaviour change and communication (BCC) messages, in particular, relating to WASH, communications with communities and mobilisation of the CDD resource, should be at the forefront of the national strategy if an effective COVID-19 response is to be achieved at scale. The NTD community communication experiences and systems can lead country responses in social distancing, surveillance, communication and information. These are mitigation activities that can be activated almost immediately.²

NTD elimination targets

Endorsement by the Executive Board of the WHO of the NTD Road Map 2020–2030 was expected to be confirmed by

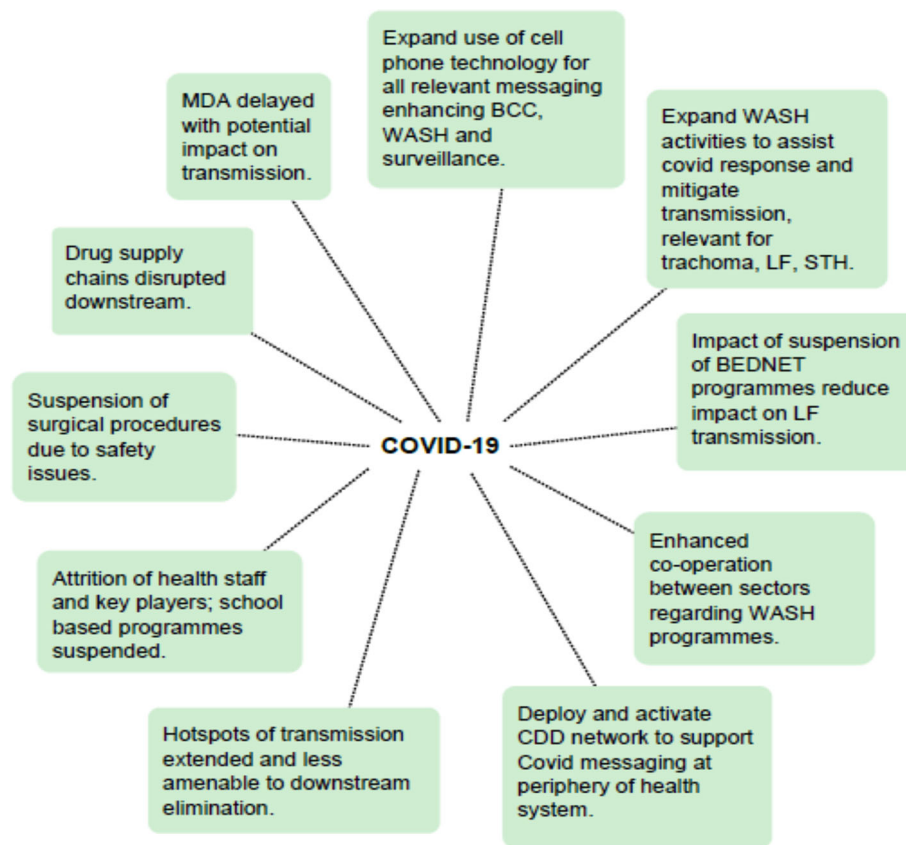


Figure 2. Summary of possible impacts on NTD programmes.

the World Health Assembly (WHA) in May.¹⁹ However, a virtual WHA was held with a COVID-19-only agenda. Clearly it is difficult to anticipate the potential COVID-19 impact on the aspirations of the new road map, but the WHO has planned regular appraisals of progress and recalibration; however, with the WHO guidelines and MDA activities suspended, this will create a window when transmission of infections could increase. This might be mitigated by increased impact of social messaging regarding WASH and BCC messaging if implemented during the early phase of the pandemic, thereby impacting transmission, in particular for trachoma, lymphatic filariasis and soil-transmitted helminths. The necessary maintenance of surveillance for guinea worm (GW) in those countries previously certified as free of transmission as well as activities in those countries that remain endemic (Angola, Chad, Ethiopia, Mali and South Sudan) might be impaired. However, the village health workers involved in GW active surveillance can be a valuable resource in expanding messages related to COVID-19.²⁰ Ironically, both COVID-19 and guinea worm require case containment and contact tracing.²¹

Figure 2 shows the potential negative impacts on NTD programmes in endemic countries and also demonstrates how adapting (flexing) can facilitate the overall impact of NTD activities on mitigating COVID-19.

Conclusion

This article seeks to identify the broader geopolitical and societal situation that the COVID-19 pandemic presents (Figure 1). The situation is evolving rapidly and NTD activities will need to adapt to a 'new normal'. However, the poorest countries and most vulnerable communities and individuals will be those least able to cope and mitigate transmission risk. NTD partners have an opportunity to react and provide support within the framework of adapting novel approaches in ways that assist the response to COVID-19 in practical ways. This emphasises the value of interventions beyond MDA and the existence of a vital volunteer resource. The CDDs providing onchocerciasis treatments reached communities 'beyond the end of the road' with health interventions such as vitamin A distribution, bed nets and family planning¹⁶—they could now embrace the COVID-19 health message. We suggest the following (see Figure 2):

- Immediately utilise existing NTD mobile cell/smartphone technology to act as a COVID-19 surveillance system for national authorities already deployed by NTD programmes.
- Upscale the existing and latent CDD volunteer network as an immediately available resource.
- Ramp up the WASH messaging as a part of the country response to send COVID-19 messages regarding hand

washing/hygiene; explore soap donations/subsidies via local actors and producers.

- Assess the risks of surgery, both in the short and longer term, to staff in close contact with patients and ensure downstream availability of necessary PPE; assess the feasibility of antibody testing to ensure surgery can take place as soon as it is safe to do so.
- Reassess elimination targets within national plans for NTDs if MDA is delayed.
- Explore the latent capacity for critical care support in post-Ebola countries and PPE availability.
- Seek to utilise the potential of antibody testing for staff and wider groups to reassess the post-acute phase spread, thus evaluating the risk to future activities.
- Countries should examine new approaches to MDA, such as house-to-house distribution, and ensure stocks of medicines are available in clinics for children <5 y of age and for school distribution when schools reopen.

COVID-19 has preoccupied the global community recently and will continue to do so. It should not impair the need for other essential health activities. This applies to NTDs in particular, where the commonality of interventions, systems and human resources (both formal and informal) will have a major impact both on the virus and diseases through mitigating impact and reducing transmission.

Authors' contributions: DHM, AA, SI and SB undertook all the duties of authorship and are guarantors of the paper.

Acknowledgements: We are grateful for the input of the members of the Ascend West and Central Technical Consultative Committee and Dr Adrian Hopkins, MBE and Prof Alan Fenwick, OBE and Russell Stothard for comments and advice on the manuscript.

Funding: DHM receives support as a consultant to Sightsavers. AA, SI and SB are employees of Sightsavers.

Competing interests: None declared.

Ethical approval: Not required.

References

- 1 Global Burden of Disease 2016 Disease and Injury Incidence and Prevalence Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet*. 2017;390(10100):1211–59.
- 2 Rosenthal P, Breman J, Djimde AA, et al. COVID-19: shining the light on Africa. *Am J Trop Med Hyg*. 2020;102(6):1145–8.
- 3 Sightsavers. New report shows how NTD programme could help fight COVID-19 in Africa. Available from: <https://www.sightsavers.org/news/2020/04/report-ntd-programmes-fight-covid-19-africa/>.
- 4 Bell L, Noursadeghi M. Pathogenesis of HIV-1 and Mycobacterium tuberculosis co-infection. *Nat Rev Microbiol*. 2018;16(2):80–90.
- 5 International Multidisciplinary Programme to Address Lung Health & TB in Africa. Information sheet on the NIHR Global Health Research Unit on Lung Health & TB in Africa. Available from: https://www.lstmed.ac.uk/sites/default/files/centre/02.05.2019%20Lung%20Health%20Info%20Sheet_final.pdf (accessed 31 May 2020).
- 6 Vearey J, Luginaah I, Magitta NF, et al. Urban health in Africa: a critical global public health priority. *BMC Public Health*. 2019;19:340.
- 7 World Population Review. Available from: <https://worldpopulationreview.com/countries/> (accessed 7 July 2020).
- 8 International Monetary Fund. The IMF and COVID-19 (Coronavirus). Available from: <https://www.imf.org/en/Topics/imf-and-covid19> (accessed 31 May 2020).
- 9 Piot P, Soka, Spencer J, et al. Emergent threats: lessons learnt from Ebola. *Int Health*. 2019;11(5):334–7.
- 10 Abakar ME, Schelling FE, Béchir M, et al. Trends in health surveillance and joint service delivery for pastoralists in West and Central Africa. *Rev Sci Tech*. 2016;35(2):683–91.
- 11 World Health Organization. COVID-19: WHO issues interim guidance for implementation of NTD programmes. Available from: https://www.who.int/neglected_diseases/news/COVID19-WHO-interim-guidance-implementation-NTD-programmes/en/ (accessed 15 May 2020).
- 12 Dissak-Delon FN, Kamga G-R, Humblet PC, et al. Adherence to ivermectin is more associated with perceptions of community directed treatment with ivermectin organization than with onchocerciasis beliefs. *PLoS Negl Trop Dis*. 2017;11(8):e0005849.
- 13 United Nations. Policy brief: a disability-inclusive response to COVID-19. Available from: <https://unsdg.un.org/sites/default/files/2020-05/Policy-Brief-A-Disability-Inclusive-Response-to-COVID-19.pdf> (accessed 27 May 2020).
- 14 Bailey F, Eaton J, Jidda M, et al. Neglected tropical diseases and mental health: progress, partnerships and integration. *Trends Parasitol*. 2019;35(1):23–31.
- 15 World Health Organization. WHO water, sanitation and hygiene strategy 2018–2025. Available from: https://www.who.int/water_sanitation_health/publications/wash-strategy-2018-2025/en/ (accessed 31 May 2020).
- 16 Homeida M, Braide E, Elhassan E, et al. APOC's strategy of community-directed treatment with ivermectin (CDTI) and its potential for providing additional health services to the poorest populations. *African Programme for Onchocerciasis Control. Ann Trop Med Parasitol*. 2002;96(Suppl 1):S93–104.
- 17 Mwandawiro C, Okoyo C, Kihara J, et al. Results of a national school-based deworming programme on soil-transmitted helminths infections and schistosomiasis in Kenya: 2012–2017. *Parasit Vectors*. 2019;12(1):76.
- 18 Molyneux DH. Neglected tropical diseases: now more than just 'other diseases'—the post-2015 agenda. *Int Health*. 2014;6(3):172–80.
- 19 World Health Organization. WHO revises new road map documentation for consideration by World Health Assembly. Available from: https://www.who.int/neglected_diseases/WHONTD-roadmap-2030/en/ (accessed 1 May 2020).
- 20 WHO Collaborating Center for Dracunculiasis Eradication, Center for Global Health, Centers for Disease Control and Prevention. Guinea worm wrap up #268. Available from: https://www.cartercenter.org/resources/pdfs/news/health_publications/guinea_worm/wrap-up/268.pdf (accessed 27 May 2020).
- 21 Royal Society of Tropical Medicine and Hygiene. Guinea worm – the last mile. Blog, 4 May 2020. Available from: <https://rstmh.org/news-blog/blog/guinea-worm--the-last-mile>.