COVID-19: Africa’s relation with epidemics and some imperative ethics considerations of the moment

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Abstract
COVID-19 is a very complex pandemic. It has affected individuals, different countries and regions of the world equally in some senses and differently in other senses. While sub-Saharan Africa has weathered a range of outbreaks of emerging and re-emerging infectious diseases, the manner in which the COVID-19 pandemic has evolved necessitates some observations, remarks and conclusions from our own situated observation point. Compared to previous epidemics/pandemics, many African countries have displayed a sense of solidarity in the face of COVID-19 that convincingly demonstrates that an Ubuntu ethic is viable and globalizable. The African continent seems, at last, to have realized that ethics dumping must be avoided and has made strides in defining its COVID-19 research agenda and strengthening its epidemic response for both public health and health research. More needs to be done in terms of public engagement, funding and technical support for research on potential therapies/candidate vaccines that are a product of scientific studies on the continent.

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Introduction
In the last 10 years, sub-Saharan Africa has weathered a range of epidemics or outbreaks of emerging and re-emerging infectious diseases, including cholera, the Ebola virus disease, Lassa fever, monkeypox, chikungunya fever (Fenollar and Mediannikov, 2018) and more recently, COVID-19. However, there are certain peculiarities worth mentioning. Regarding COVID-19, it is noteworthy, first, that it did not originate in Africa where most deadly epidemics seem to have established their origin and headquarters. Secondly, it has been very wide in its global spread, sparing very few countries. Thirdly, its trajectory of spread has been unusual in that it started from the land of a superpower, China (Huang et al., 2020) and first spread through high-income countries (Wang et al., 2020) before ‘remembering’ lower income countries. Because of that, perhaps, it has not been as stigmatizing as previous epidemics such as Ebola or HIV/AIDS for instance. Testing positive for a virus for which the Prince of Wales and heir to the British throne, several celebrities/social media influencers and the British Prime Minister had also tested positive, appears to leave less room for feelings of embarrassment or shame. On the other hand, this did not stop Black people of African descent from being targeted for unbelievable discrimination, for instance, in China (Human Rights Watch, 2020). Fourthly, so far, the greatest number of deaths from the epidemic have been recorded in countries with the most advanced health systems (CDC COVID-19 Response Team, 2020; Yuan et al., 2020).

Africa’s response to the pandemic
The African continent was a bit tardy in catching the COVID-19 pandemic, leading to false speculative claims on social media that Black people are particularly resistant to the virus or that the hot temperatures of the African region are not conducive to the survival of the virus. This was despite expert advice that the virus would quickly spread in Africa (Nkengasong and Mankoula, 2020). However, the epidemic was only biding time in its march to the African continent. In the USA and Europe, the virus quickly revealed itself as particularly lethal for old people of all races and Blacks of all ages. It was just a matter of time before it was realized that COVID-19 does not discriminate in terms of race, social class or geographic area. The first case in Africa was reported in Egypt on the 14th of February (Aljazeera News, 2020). Following the announcement, the World Health Organization’s (WHO’s) Regional Director for Africa expressed fears that ‘The window of opportunity the continent has had to prepare for the coronavirus is closing’. (Moeti, 2020: np). The virus has since spread to all 54 African countries, Lesotho being the last which recorded its first case on 13 May 2020.
At the continental level, the African Centre for Disease Control (CDC) supported many African countries with technical assistance, training, health promotion materials and medical supplies to facilitate testing and care for persons with COVID-19.\textsuperscript{1} Senegal engaged in the development of rapid tests, and Ethiopian Airlines was on standby to deliver medical supplies across Africa. It is, therefore, not surprising that onlookers familiar with Africa’s epidemic history have been quick to comment that the world would have to learn from Africa when it comes to epidemic preparedness and response.

Challenges have come with the response measures and the African continent has had to remind itself about its fragile health systems. Prescription of frequent handwashing, for example, is challenged by the hard fact that tap water is a scarce commodity in many communities; physical distancing is challenged by the fact that crowding and mass gatherings are a way of life in Africa. As the number of cases began to rise, many African countries, following the approaches of Western countries, announced national lockdowns. However, this proved undoable and, in just a couple of days, under the pretext of resuming economic activities, many African countries eased the partially effective lockdowns.

**Epidemic preparedness: research and research ethics**

Africa’s history with epidemics seems to have worked to its advantage in the COVID-19 pandemic. It is not surprising that many African countries responded swiftly and fervently to the WHO recommendation to ramp up preparedness even before the pandemic was declared a public health emergency of international concern. From the Cape to Cairo, control measures were being put in place. Nigeria and Cameroon rapidly repurposed some football stadia to serve as makeshift hospitals and isolation centres; Lesotho launched a COVID-19 fund even before it recorded its first case; South Africa assembled its finest scientific minds to advise the government in its response; Sierra Leone, a country devastated by the 2014 Ebola epidemic, closed its borders even before recording a single case; and the Democratic Republic of the Congo (DRC), barely recovering from an Ebola outbreak and completion of Ebola vaccine trials, was not going to fold its arms and was ready, once more, to implement strict research and public health measures.

**Research priority setting**

A major ethical issue in global health and regarding the outbreak of infectious diseases relates to research priority setting. The Ebola outbreak in West Africa saw an upsurge in health research on the Ebola virus disease. It remains unclear whether the different studies carried out at the time aligned with local needs (Tangwa et al.,
2018), but Africa has made major strides in defining its research priorities for COVID-19. For example, the African Academy of Sciences (AAS) hosted a consultative webinar to discuss Africa’s COVID-19 priorities and later launched an online survey with the goal of defining Africa’s COVID-19 research agenda. The outcome of both procedures highlighted an interest in prioritizing research that would inform preventive and primary healthcare measures (African Academy of Sciences, 2020). In terms of clinical trials, the priority seems to lie more in developing capacity for drug and vaccine trials than in informing preventive and primary healthcare measures. In research ethics, the priority seems to be the development of processes for accelerated review of COVID-19 studies.

**Africa’s active search for a COVID-19 therapy – a flurry of herbal treatments**

Not surprisingly for an epidemic disease with no known cure, different countries have tried different possible local cures for COVID-19 and African countries seem to have taken the lead. Notable among these active searches for a treatment or local cures are the cases of Madagascar and Cameroon. In April 2020, Madagascar, led by its president, officially launched a herbal medicine, COVID Organics (CVO), which is alleged to reduce and eliminate symptoms of COVID-19 (Africa News, 2020). CVO is prepared from the *Artemisia* plant, well known for its antimalarial properties. Several African countries have been enthusiastic in placing orders for CVO. Social media users across Africa have been pressuring their governments to accept and make orders for CVO. Similarly, a Catholic Archbishop in Cameroon announced the successful treatment of COVID-19 patients with a herbal mixture which principally targets the respiratory problems associated with the disease (Kindzeka, 2020; Sina, 2020). The mixture which is administered free of charge at designated Catholic health centres in Cameroon upon presentation of a COVID-19-positive test result, is reported to have cured dozens of COVID-19 patients. If science is evidence based, then the scientific merit of these treatments should not be simply dismissed; locally favoured treatments should be awarded equal opportunities similar to new therapeutic targets or repurposed pharmaceutical drugs such as hydroxychloroquine and ivermectin, when it comes to testing in clinical trials. This is important given that herbal medicines are the main source of healthcare for millions of people around the world (WHO, 2013).

Setting up clinical trials for herbal treatment may be challenging for many African countries, both from an ethical and a regulatory standpoint, but also in terms of capacity and funding (Monera-Penduka et al., 2017; Willcox et al., 2012). A very small number of herbal medicine studies in Africa have led to licensed products (Siegfried and Hughes, 2012). This is not an encouraging scenario for the testing of herbal medicines alleged to be effective for treating COVID-19
symptoms. South Africa has expressed an interest in supporting Madagascar in scientific analysis of CVO (Finnan, 2020b) and the WHO has expressed support for carrying out confirmatory scientific analysis (Vaughan, 2020). However, the apparent hesitancy by pharmaceutical and funding agencies to support scientific research and clinical testing of herbal medicines, compared to the enthusiasm to fund hydroxychloroquine trials, is a further indication that Africa’s research priorities will continue to be sidelined in global priorities for drug and vaccine development. However, a group of African researchers have launched a crowdfunding initiative to raise funds that will be used to test *Artemisia*-based treatments against SARS-CoV-2 (Finnan, 2020a). In the meantime, those leading the initiatives for the two herbal treatments have expressed the view and hope that the treatment will be offered free of charge to residents in the respective countries, a sentiment very much in line with the ethics of traditional African medicine. In summary, Africa’s eagerness in the midst of this pandemic is to seek alternative healthcare approaches that are different from those of the industrialized world system, which is often trapped in the unholy marriage between medicine and the capitalist open market (Callahan and Wasunna, 2006).

**Public engagement**

Information about COVID-19 spread around the globe with immediacy, thanks to the internet and particularly to social media channels. Information via social media, however, has proved to be a double-edged sword, spreading both true and false information in equal measure. There have also been several conspiracy theories about what is going on. These conspiracy theories cannot be merely dismissed offhand but should be considered as competing theories to the true theory, whatever it is, and each should stand or fall on its supporting evidence. In this sense, between the science, the ethics and the politics, every theory should be considered a conspiracy theory and subjected to critical scrutiny, taking into consideration not only our present aspirations but also our past experiences.

If one had never, for instance, read the so-called Kissinger Report (Kissinger and Council, 2019) or those portions of the South African Truth and Reconciliation Commission’s report (South Africa TRC and Tutu, 1998) dealing with the chemical and biological weapons projects of the Apartheid regime’s army, then some conspiracy theories would appear like works of pure insanity. On the other hand, in the face of an epidemic, too much attention on conspiracy theories may distract from saving lives. While these theories should not outrightly be dismissed with contempt, it is important that public health officials focus on engaging the public with the goal of promoting public health measures, improving public understanding of the disease and addressing possible misinformation about health research and potential or existing therapies.
Many African countries appear to have learned lessons from the West Africa Ebola outbreak which, like the COVID-19 pandemic, was swarmed with conspiracy theories about its origin and possible cures. In the Ebola outbreak, public engagement to address these different issues was minimal. This seems to have improved with COVID-19. Many African health ministries, as well as African-led public health and research initiatives, have embraced communication technologies to engage the public on a host of issues where people hold conflicting views. For example, several African ministers of health now use social media regularly, not only to give updates on the number of cases but also to dismiss or confirm stories that are widely circulated via social communication platforms in Africa. In like manner, the Global Emerging Pathogens Treatment (GET) Consortium, through its Public Learning and Understanding of Science (PLUS) sub-faculty, is hosting a webinar series on the theme “public understanding of science, fake news and misinformation.” So far they have covered topics such as COVID-19 vaccine trials, risk communication and repurposed therapies. These are topics that have been slow to take off outside of scientific circles in Africa. However, they have recently generated interest among the general public as evidenced by the attendance and questions during these webinars.

Vaccine trials: ethics, misinformation and preparedness

It seems obvious that the ultimate solution for COVID-19 will be an effective vaccine. There are said to be about 100 possible candidate vaccines for COVID-19 (WHO, 2020a). However, there is a question about objective and transparent procedures for shortlisting and selecting candidate vaccines to be tested. Moreover, controlled human infection studies, otherwise known as human challenge studies, are being proposed for testing potential coronavirus vaccine candidates. Interestingly, thousands of volunteers are said to be willing and ready to join such studies as research participants (Kuznia, 2020). For example, an online initiative (https://1daysooner.org/) launched a web portal whereby volunteers can express their interest in participating in COVID-19 human challenge studies and by 25 May 2020, the online site had already registered about 25,000 volunteers across 102 countries. It is not known to us whether any of these volunteers are from African countries and, if so, what proportion. However, talk of potential vaccine trials in Africa saw a huge social media outcry with the hashtags #AfricansAreNotGuineaPigs and #AfricansAreNotLabRats, reminiscent of historical research exploitation of African populations. In a number of these social media posts, suggestions have been made that for COVID-19 vaccine trials to take place in Africa, the first volunteers should be drawn from funders, scientists or government officials. This may sound absurd, but it is not surprising, given the continent’s history with
clinical trials and research during epidemics. The 21st-century debate of ethics dumping, that is the export of unethical research practices from high-income to lower income settings, is relevant here, as an Ebola vaccine case study has previously shown (Tangwa et al., 2018).

If Africa is to participate in COVID-19 vaccine trials, successful implementation of these trials will require both scientific and ethical rigour. The WHO has already articulated criteria for ‘ethical acceptability of human challenge studies’ for COVID-19 (WHO, 2020b). Meanwhile, a group of researchers have expressed what would likely be the ethical challenges for conducting such trials and have provided recommendations (Shah et al., 2020). Reasonable risk–benefit profiles, context-specific stakeholder engagement, suitable site selection, fair participant selection, robust informed consent and proportionate payment are the main recommendations from Shah et al. (2020) to ensure ethical human challenge studies for COVID-19.

The success of these trials in sub-Saharan Africa will indeed require a robust public engagement plan. When the deliberate infection of a human being with a pathogen becomes accepted without any questions, we can only say that medical ethics, founded and grounded on the maxim **primum non nocere**, has transcended itself. Human challenge studies in Africa, as elsewhere in the world, will require wide public discussions and debates. And a simple question to ponder is: What can possibly motivate a rational and competent human being to accept being deliberately infected with a life-threatening pathogen?

Heroic altruism could be one possible answer. And there are seemingly thousands of such heroic altruists in our world today as we know it, ready to put their health and lives at stake to save others who may also be altruists but lacking only heroism. In the global South, a good proportion of potential volunteers will likely be desperately poor people gambling their lives for the irresistible sums of money/gifts offered as compensation for human challenge studies. There are already a number of controlled human infection model studies in African countries (Hodgson et al., 2015; Shekalaghe et al., 2014) and there are fears of undue inducement of study participants/communities if they are offered irresistible amounts of cash (especially in the present context of many African countries).²

From a purely scientific point of view, the convenience of human challenge studies, especially for emerging and re-emerging deadly epidemics, is not in doubt. After all, it is a scientific approach that has been successfully employed to demonstrate proof of concept in vaccine and drug development for several infectious diseases (Stanisic et al., 2017). However, this does not automatically prove its appropriateness, ethically, or otherwise, for use in vaccine development for all infectious diseases. Ruth Macklin has elaborated the ethical quandaries for human challenge studies for COVID-19 (Macklin, 2020). For Macklin, the bottom line is the consideration as to whether it is ethically permissible to intentionally inflict
serious harm on a few for a possible benefit to many, especially when there is no existing treatment for the disease. With several COVID-19 candidate vaccines in the pipeline, her conclusion is that a rush to begin human challenge studies for a grave disease lacking an effective treatment is ethically unjustifiable. This suggests the need for broad stakeholder engagement to focus upon how the ethical quandaries may be addressed.

At the core of any discussion about clinical trials for potential COVID-19 therapeutics or preventives (new or repurposed) should be issues of access to effective vaccines or therapies by the global poor. This has, in fact, been a major, yet easily waved aside, feature of debate around clinical trials conducted in so-called low- and middle-income countries (LMICs) during epidemics. It was a major point of disagreement between the Indonesian government and the WHO (Fidler, 2007; Hammond, 2009) and more recently for Ebola vaccine trials. In the DRC, Médecins sans Frontiers (MSF) raised an alarm alleging that the WHO was withholding supplies of the proven, though unlicensed, vaccines without giving reasons for the restrictions (Medicine Sans Frontiers, 2019). There was also a parallel claim that the WHO was pushing for the introduction of a second vaccine by another pharmaceutical company. The WHO strongly rejected both accusations and emphasized their commitment to end the Ebola virus disease outbreak in the DRC (Zialcita, 2019). These are scenarios that should be avoided at all cost in the event of COVID-19 vaccine trials in Africa. Otherwise, there is a risk of fuelling existing fears of exploitation of study populations in Africa, potentially leading to a reluctance to engage with medical research that is directly relevant to African health needs.

**Conclusion**

Africa is no stranger to epidemics but never has sub-Saharan Africa been more united in its fight against epidemics as it has been for COVID-19. African leaders have held virtual meetings to discuss the continent’s response to the epidemic. The private sector in many African countries has donated generously to COVID-19 solidarity funds and the African CDC has shown leadership in supporting the African continent’s response.

It is time for African countries to assume responsibility and assert their total decolonization, bringing an end to heavy reliance on the Western world for infectious disease control. African countries have started to support each other towards this goal and these varied indicative displays of solidarity demonstrate convincingly that an Ubuntu ethic (Metz, 2007; Mkhiize, 2008; Ramose, 1999; Tangwa, 2019) is viable and globalizable. For this, COVID-19 has offered as good an occasion and opportunity as could ever be hoped for.
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Notes
1. By the time the first case of COVID 19 was reported in Africa, only two countries had the capacity to test for the virus.
2. It is worth noting that the increasing importance of human challenge studies is not unconnected with the great success of the work of Peter Singer on animal liberation (Singer, 2015) and that of other animal rights campaigners and activists. As a consequence of their work, biomedical scientists have had to search for alternatives to animal use in medical research and drug/vaccine testing. The ethical and philosophical reasoning that underpins this evolution is sketched in broad strokes in ‘Betraying Animals’ by Steve Cooke (Cooke, 2019).

References
African Academy of Sciences (2020) Research and development goals for COVID-19 in Africa. Available at: https://www.aasciences.africa/sites/default/files/2020-04/Research%20and%20Development%20Goals%20for%20COVID-19%20in%20Africa.pdf (accessed 5 June 2020).

Africa News (2020) Madagascar’s Coronavirus cure hits the Shelves. Available at: https://africa.com/madagascars-coronavirus-cure-hits-the-shelves/ (accessed 26 May 2020).

Aljazeera News (2020) Egypt confirms coronavirus case, the first in Africa. Available at: https://www.aljazeera.com/news/2020/02/egypt-confirms-coronavirus-case-africa-200214190840134.html (accessed 26 May 2020).

Callahan D and Wasunna AA (2006) Medicine and the Market: Equity v. Choice. Baltimore: Johns Hopkins University Press.

Centre for Disease Control (CDC) COVID-19 Response Team (2020) Severe outcomes among patients with coronavirus disease 2019 (COVID-19). Morbidity and Mortality Weekly Report 69(12): 343–346. DOI: 10.15585/mmwr.mm6912e2

Fenollar F and Mediannikov O (2018) Emerging infectious diseases in Africa in the 21st century. New Microbes and New Infections 26: S10–S18.
Fidler DP (2007) Indonesia’s decision to withhold influenza virus samples from the World Health Organization: implications for international law. *Insights* 11(4). Available at: https://www.asil.org/insights/volume/11/issue/4/indonesias-decision-withhold-influenza-virus-samples-world-health (accessed 5 June 2020).

Finnan D (2020a) African scientists launch crowdfunding for clinical trials on herbal treatment for coronavirus. *Radio France Internationale*, 22 May. Available at: http://www.rfi.fr/en/africa/20200522-african-scientists-launch-crowdfunding-for-clinical-trials-on-herbal-treatment-for-coronavirus (accessed 5 June 2020).

Finnan D (2020b) South Africa steps up to help Madagascar test herbal cure for Covid-19. *Radio France Internationale*, 8 May. Available at: http://www.rfi.fr/en/africa/20200508-south-africa-steps-up-to-help-madagascar-test-herbal-cure-for-covid-19 (accessed 5 June 2020).

Hammond E (2009) Indonesia fights to change WHO rules on flu vaccines. *Seedling*, 18 April. Available at: https://www.grain.org/es/article/entries/761-indonesia-fights-to-change-who-rules-on-flu-vaccines?c=true (accessed 02 April 2020).

Hodgson SH, Juma E, Salim A, et al. (2015) Lessons learnt from the first controlled human malaria infection study conducted in Nairobi, Kenya. *Malaria Journal* 14(1): 182.

Human Rights Watch (2020) China: Covid-19 discrimination against Africans-forced quarantines, evictions, refused services in Guangzhou. Available at: https://www.hrw.org/news/2020/05/05/china-covid-19-discrimination-against-africans (accessed 5 June 2020).

Huang C, Wang Y, Li X, et al. (2020) Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The Lancet* 395(10223): 497–506.

Kindzeka ME (2020) Hundreds rush for popular cleric’s Herbal COVID ‘Cure’ in Cameroon. Available at: https://www.voanews.com/covid-19-pandemic/hundreds-rush-popular-clerics-herbal-covid-cure-cameroon (accessed 5 June 2020).

Kissinger H and Council for National Security (2019) *The Kissinger Report: Nssm-200 Implications of Worldwide Population Growth for U. S. Security Interests*. New York: Cosimo Incorporated.

Kuznia R (2020) Thousands of people want to be exposed to Covid-19 for science. Available at: https://edition.cnn.com/2020/05/13/us/coronavirus-human-challenge-study-invs/index.html (accessed 25 May 2020).

Macklin R (2020) Human challenge studies for a COVID-19 vaccine: ethical quandaries. Available at: http://blogs.einstein.yu.edu/human-challenge-studies-for-a-covid-19-vaccine-ethical-quandaries/ (accessed 25 May 2020).

Metz T (2007) Toward an African moral theory. *Journal of Political Philosophy* 15(3): 321–341.

Mkhize N (2008) Ubuntu and harmony: an African approach to morality and ethics. In: Nicolson R (ed.) *Persons in Community: African Ethics in a Global Culture*. Pietermaritzburg: University of Kwazulu-Natal Press, 25–44.

Moeti M (2020) Quoted by World Health Organization, Africa: A second COVID-19 case is confirmed in Africa. Available at: https://www.afro.who.int/pt/node/12312 (accessed 5 June 2020).

Monera-Penduka TG, Maponga CC, Morse GD, et al. (2017) Capacity for ethical and regulatory review of herbal trials in developing countries: a case study of Moringa oleifera research in HIV-infected patients. *Journal of Pharmaceutical Policy and Practice* 10(1): 9.

Medicine Sans Frontiers (2019) WHO rationing Ebola vaccines as outbreak still not under control in Democratic Republic of Congo. Available at: https://www.doctorswithoutborders.org/what-we-do/news-stories/news/who-rationing-ebola-vaccines-outbreak-still-not-under-control (accessed 31 May 2020).
Nkengasong JN and Mankoula W (2020) Looming threat of COVID-19 infection in Africa: act collectively, and fast. *The Lancet* 395(10227): 841–842.

Ramose MB (1999) *African Philosophy Through Ubuntu*. Harare: Mond Books

Shah SK, Miller FG, Darton TC, et al. (2020) Ethics of controlled human infection to address COVID-19. *Science* 368(6493): 832.

Shekalaghe S, Rutaihwa M, Billingsley PF, et al. (2014) Controlled human malaria infection of Tanzanians by intradermal injection of aseptic, purified, cryopreserved Plasmodium falciparum sporozoites. *American Journal of Tropical Medicine and Hygiene* 91(3): 471–480.

Siegfried N and Hughes G (2012) Herbal medicine, randomised controlled trials and global core competencies. *South African Medical Journal* 102(12): 912–913.

Sina NK (2020) COVID-19: Archbishop Samuel Kleda proposes a herbal remedy. Available at: http://www.crtv.cm/2020/04/covid-19-archbishop-samuel-kleda-proposes-a-herbal-remedy/ (accessed 5 June 2020).

Stanisic DI, McCarthy JS and Good MF (2017) Controlled human Malaria infection: applications, advances, and challenges. *Infection and Immunity* 86(1): e00479–00417.

Tangwa GB (2019) Bioethics and Ubuntu, The transformative global potential of an African concept. In: Lauer H and Yitah H (eds) *The Tenacity of Truthfulness: Philosophical Essays in Honour of Mogobe Bernard Ramose*. Pretoria: EARS Publishing Company, 239–249.

Tangwa GB, Browne K and Schroeder D (2018) Ebola vaccine trials. In: Schroeder D, Cook J, Hirsch F, et al. (eds) *Ethics Dumping: Case Studies from North-South Research Collaborations*. Cham: Springer International Publishing, 49–60.

Tutu D (1998) Truth and reconciliation commission of South Africa report. Available at: https://www.justice.gov.za/trc/report/finalreport/Volume%201.pdf (accessed 5 June 2020).

Vaughan A (2020) No evidence ‘Madagascar cure’ for covid-19 works, says WHO. *New Scientist*, 15 May.

Wang C, Horby PW, Hayden FG, et al. (2020) A novel coronavirus outbreak of global health concern. *The Lancet* 395(10223): 470–473.

WHO (2013) WHO traditional medicine strategy 2014–2023. Available at: https://www.who.int/medicine/publications/traditional/trm_strategy14_23/en/ (accessed 5 June 2020).

WHO (2020a) Draft landscape of COVID-19 candidate vaccines. Available at: https://www.who.int/publications/m/item/draft-landscape-of-covid-19-candidate-vaccines (accessed 27 May 2020).

WHO (2020b) Key criteria for the ethical acceptability of COVID-19 human challenge studies. *WHO Working Group for Guidance on Human Challenge Studies in COVID-19*. Available at: https://www.who.int/ethics/publications/key-criteria-ethical-acceptability-of-covid-19-human-challenge/en/ (accessed 5 June 2020).

Willcox M, Siegfried N and Johnson Q (2012) Capacity for clinical research on herbal medicines in Africa. *The Journal of Alternative and Complementary Medicine* 18(6): 622–628.

Yuan J, Li M, Lv G, et al. (2020) Monitoring transmissibility and mortality of COVID-19 in Europe. *International Journal of Infectious Diseases* 95: 311–315.

Zialcita H (2019) Doctors Without Borders calls for more transparency in distribution of Ebola vaccine. Available at: https://www.npr.org/2019/09/23/763410795/doctors-without-borders-calls-for-more-transparency-in-distribution-of-ebola-vac (accessed 27 May 2020).