Epidemics and the Health of African Nations

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Section Two

Contending with Epidemics and Health Systems in South Africa

This section analyses the lessons that can be drawn from specific epidemical diseases that have struck, to variable degrees, in sub-Saharan Africa. At the core of this section is the importance of the state of a health system when disaster strikes, and how this determines the extent to which an outbreak will be contained. Multiple countries in sub-Saharan Africa have weak health systems. This is often as a result of social, economic, environmental, and political factors. It links to the notion of syndemics and the impact that the coexistence of a range of adverse socio-economic factors have on health outcomes.

Sunanda Ray, Farai Madzimbamuto and David Sanders present a chapter on the state of cholera in sub-Saharan Africa, which is endemic in 47 sub-Saharan African countries. The authors cite the 2008–2009 and 2018 cholera outbreaks in Zimbabwe to draw lessons on the social, economic, and political determinants of outbreaks of such a
preparable disease. Corruption and mismanagement of resources by local and central government led to water and sanitation infrastructure and delivery being neglected and medications and essential supplies in city clinics being in short supply. Ray and co-authors typify the issues faced by several African countries in addressing the weaknesses in their public health systems that lead to calamities. Despite a significant cholera outbreak occurring in 2017/2018 in Lusaka, in neighbouring country Zambia, public health authorities in Zimbabwe did not enhance surveillance nor carry out health education in preparation for a possible outbreak. The importance of surveillance systems in containing outbreaks is aptly explored in the next chapter by Kaka Mudambo. Mudambo offers an assessment of malaria in the SADC region and examines the factors that lead to an outbreak: environment and climate, politics, governance and demographics, and health systems. Mudambo shows that although malaria is still rampant in the region, multiple interventions implemented, including good surveillance systems, have helped SADC progress in containing malaria. The chapter also surveys the constraints on these interventions.

Finally, Nathaniel Umukoro’s chapter explores the successful containment of the Ebola outbreak in Nigeria. The efficient deployments of health care workers, as well as decisive and fast-acting leadership by political and medical authorities, are shown to have made the difference in containing the outbreak. Compared to Guinea, Sierra Leone, and Liberia, which suffered devastating outbreaks, Nigeria’s Ebola outbreak story is one that accentuates how an equipped health system and a timely response can limit the spread of an epidemic.
SUB-SAHARAN AFRICA has reported more than 90 per cent of the total global cholera cases since 2001, despite having only 12 per cent of the world’s population (Gaffga et al., 2007). Cholera is endemic in 47 countries of sub-Saharan Africa. There are an estimated 200 million people living in areas with some reported incidence (new cases) of cholera, ranging from those where cholera is endemic, to areas where high numbers of cases are reported every year or where there are large outbreaks, followed by periods of low activity (Lessler et al., 2018). Endemicity is defined as where confirmed cholera cases, resulting from local transmission, have been detected over the previous three years (GTFCC, 2017: 30). Between 2000 and 2015, 83 per cent of 63,658 cholera deaths reported to the World Health Organization (WHO) occurred in sub-Saharan Africa (Lessler et al., 2018).
This chapter provides an overview of the cholera situation in sub-Saharan Africa, the barriers to adequately addressing the pandemic, and some thoughts on innovative ways to move forward. The experiences from the outbreaks of 2008–2009 and 2018 in Zimbabwe are explored to exemplify the problems many countries in Africa face in addressing the failures in their public health systems that lead to such emergencies.

Cholera is transmitted through water or food contaminated with faecal material harbouring the causative bacteria Vibrio cholerae (V. cholerae), which, when ingested in a sufficient dose, infects the bowel and causes profuse watery diarrhoea with loss of water and salt. One in 20 infected persons suffers severe disease, while for others the infection can be mild or asymptomatic, with 70 per cent of infected persons continuing as carriers of the bacteria. Children are often worse affected in outbreaks because they have not been exposed to infection in the past and do not have immunity. Individuals with immune suppression, such as through HIV and some cancers, may also be at higher risk of becoming infected with cholera (Mushayabasa & Bhunu, 2012). In severe infections, dehydration is the main cause of rapid decline, with death occurring within hours. With appropriate treatment a case fatality rate (CFR) of less than 1 per cent is expected (Yates et al., 2017). Vigorous oral rehydration or intravenous fluid and electrolyte replacement are the main therapies, with recovery within days. The dose required to cause infection is high, so direct person-to-person transmission through shaking hands and so on is not common (Leibovici-Weissman et al., 2014). Outbreaks die down when individuals no longer come in contact with contaminated water or when they have developed immunity to the strain of bacteria.

Cholera is a disease said to symbolise inequity because people who live in poverty are disproportionately affected, despite this being a disease that is easy to prevent and treat. Ninety-two million people in Africa still drink water from unsafe sources (WHO, 2018a). Outbreaks occur when water and sanitation infrastructure is non-existent, inequitably distributed, or breaks down as a result of political or economic neglect, or during humanitarian crises. Nation states

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1 The case fatality rate (CFR) measures the proportion of deaths of all those diagnosed with the disease, and is an indicator of the quality of treatment and care.
in Africa have failed spectacularly to provide basic facilities, despite worsening outbreaks over the last 50 years, with accompanying mortalities and disruption to health systems, and despite signing up to the UN Sustainable Development Goals (SDGs) and various human rights declarations. The crisis of cholera and other water-borne diseases in Africa has generated a huge literature on the biomedical aspects of the infection, but little that overtly challenges the underlying socio-economic and political determinants of outbreaks. Some have argued that neglecting to address the political determinants of complex epidemics limits the integrity of these scientific publications (Cuneo et al., 2017).

SOCIAL, ECONOMIC, AND POLITICAL DETERMINANTS OF CHOLERA

Cholera is increasingly an urban problem in sub-Saharan Africa. In many large cities, migration from rural to urban areas and natural population growth have contributed to large peri-urban informal settlements, with overcrowding and increased demand on fragile water, sanitation, and hygiene (WASH) infrastructure. The proportion of people living in urban areas of Africa is predicted to increase from 36 per cent in 2010 to 50 per cent by 2030, with a corresponding increase in slum dwellers, who already make up 60 per cent of the urban population (GTFCC, 2017). Conflict and humanitarian crises also encourage migration to peri-urban and slum areas. Increasing affluence in other parts of cities and industrial development where there is economic growth increase private and public demand for water services, which also puts pressure on infrastructure. Despite exposing tremendous inequalities in access to safe drinking water and sanitation facilities, these injustices continue. Minimal opportunities for formal employment force young people into informal economic activities, such as vending in urban areas. Slum dwellings around unregulated mining sites without proper WASH facilities have been identified as hotspots for cholera transmission, especially since the crude gold ore may be washed in contaminated water (Hilson, 2002). Informal gold mining has historically been associated with the spread of cholera and has been associated with
outbreaks in Zimbabwe, Tanzania, Ghana, South Africa, and Sudan (APA, 2018; Isaäcson et al., 1974; Opare et al., 2012).

The year 2018 experienced a spike in cholera cases in sub-Saharan Africa, with eight countries reporting and struggling with outbreaks. In 2017, more than 150,000 cholera cases and more than 3,000 deaths were reported in 17 countries in Africa. Countries in sub-Saharan Africa are struggling with other humanitarian and public health crises. Civil conflict, displaced peoples, refugee camps, climate change, unmanaged urbanisation, and overcrowding in peri-urban areas that are poorly serviced by local government (WHO, 2018a) all contribute to cholera outbreaks. In Zambia, an outbreak of cholera began in October 2017 and resulted in 5,905 cases and 114 deaths, with a CFR of 1.9 per cent;ii 92 per cent of cases and 98 deaths were in Lusaka, the capital city (Sinyange et al., 2018). The highest risk of contagion was in the city’s high-density informal peri-urban settlements, where 70 per cent of the population live, which still rely on shallow wells and pit latrines (Bahadur, 2018).

The case of Zimbabwe

In 2008–2009, following the worst cholera outbreak in Zimbabwe’s history, with nearly 100,000 suspected cases, 4,282 deaths, and a CFR of five per cent (Ahmed et al., 2011), several commentators wrote critical analyses of the epidemic and the humanitarian crisis that precipitated it (Nyandoro, 2011; HRW, 2013; Sollom et al., 2009). A damning Human Rights Watch (HRW) report titled ‘Troubled Water: Burst Pipes, Contaminated Wells, and Open Defecation in Zimbabwe’s Capital’, released in November 2013, described how limited access to potable water and sanitation services was forcing citizens to resort to using water from unprotected sources and to other unhygienic practices, such as open defecation (HRW, 2013).

Amnesty International reported that the Zimbabwe government’s failure in 2008 to provide safe drinking water and to repair broken-down sanitation systems left residents surrounded by flowing raw

ii A CFR value of more than one per cent demonstrates the lack of access to basic health care facilities with shortages of oral rehydration therapy, oral zinc, antibiotics, and intravenous fluids.
Cholera in Africa in the 21st Century

sewage, which contaminated water supplies and resulted in the worst cholera outbreak in memory.

A decade later, the same failures caused a repeat outbreak, in 2018: broken-down sanitation infrastructure and poor sewerage management, worsened by shortages of drugs, intravenous fluids, and medical supplies (Amnesty International, 2018). As of April 2018, 107 cases and four deaths (CFR 3.8 per cent) had been notified in Zimbabwe, with 9 per cent of cases aged less than five years (McAteer et al., 2018). From September to November 2018, in the recent outbreak, 10,086 cumulative cases, including 163 laboratory-confirmed cases, and 61 deaths were reported (CFR 0.6 per cent) (Reliefweb, 2018). Ninety-eight per cent of these cases were reported from Harare, with the most affected suburbs being Glen View and Budiriro, which were similarly affected in 2008.

History shows that the massive investment by European cities in construction of safe water supplies and efficient sewerage systems as part of ‘sanitary reforms’ in the mid to late 19th century paved the way for the elimination of cholera and other water-borne diseases. Improved knowledge of bacteriology and the discovery of the causative agent of cholera in 1884 influenced public health legislation of the time, allowing for the quarantine and isolation of affected persons, the disinfection of premises, and mass public education on hygiene and prevention (Evans, 1992). Similarly, major investments in the 1990s in safe drinking water supplies and sanitation facilities, as well as local production and promotion of bleach for household treatment of water, hygienic water storage, and the implementation of oral rehydration led to the successful control of cholera outbreaks in Latin American countries (Gaffga et al., 2007).

Prior to Zimbabwe’s independence in 1980, urban population growth was tightly controlled by the colonial state through the regulation of where Africans could reside and own property. Concerns about hygiene among white ratepayers in Harare led to the introduction of new technologies in water and sanitation infrastructure in white residential areas. These were developed to the same standard as the cities of Europe. Meanwhile poorer and cheaper water and sanitation solutions were implemented in the segregated high-density areas reserved for the black population. At independence in 1980 the
new government diverted resources from the cities to rural water development. The rural areas had been the backbone of the liberation struggle and were to be maintained as the main political base of the ruling party. Young people from the rural areas migrated into the cities searching for work, often living in informal shanty dwelling settlements which were not serviced by either water or sewerage facilities. Harare’s sewerage system, designed for a small population, discharged its treated effluent into the very water source it drew from, creating a need for more intensive water treatment as increasingly poorly treated effluent was discharged (Musemwa, 2010).

At the political level, the relationship between central and local government changed when urban councils came under opposition party control after 2002 but were still dependent on central government funding. By 2005 the media were commenting on the increasing state of decay in some parts of the capital city of Harare, of litter dumping in open spaces, the mushrooming of squatter shacks, and raw sewage flowing in the streets (Musemwa, 2010). Water supplies became erratic in Harare’s northern more affluent suburbs. Foreign currency shortages were blamed for the lack of chemicals to treat the water supply and for the failure to repair water pipes that were leaking.

Shortly after the national general elections in 2005, the government launched Operation Murambatsvina (Move the Rubbish), although it was officially known as Operation Restore Order. This was a large-scale operation forcibly to clear slum areas across the country, thereby displacing more than 700,000 people. It was believed that the displaced were mainly opposition supporters who, having been rendered homeless, would now have to move back to the rural areas, where they would be under control of the ruling party political structures. Management of urban water supplies and sanitation was removed from local authorities and transferred to the Zimbabwe National Water Authority (ZINWA). This spiral of failure continued to worsen as the financial and technical problems mounted, and residents found their own solutions in sinking boreholes in the affluent areas and shallow wells in the poorer parts. At the same time, during the land occupations where farmers were forcibly displaced from their farms, people were encouraged to settle anywhere, including on peri-urban land. The
urban authorities expected that this would be temporary, so they neglected to extend urban infrastructure to these settlements (which would make them permanent). The result was what people called a ‘cholera time-bomb’. During March 2006, 26 cholera deaths occurred, presaging what was to come two years later (Cuneo et al., 2017).

The functions of ZINWA included advising the government on policy, standards, and the conservation of national water supplies, as well as promoting the equitable, efficient, and sustainable allocation and distribution of water resources. ZINWA was also meant to assist local authorities in the discharge of their functions with regard to the development and management of the water resources under their jurisdiction and, in particular, the provision of potable water. Commentators on the lead-up to the 2008 cholera crisis believe that the government nationalised municipal water authorities to provide additional revenue streams to fill its coffers and to deprive the opposition-run municipal councils of an important source of revenue (Musemwa, 2010; Sollom et al., 2009). The government was also credited with purposely using the water shortages to take back control of the cities from the opposition. The Bulawayo City Council resisted a ZINWA takeover and did not experience the same water shortages as Harare – and Bulawayo had very few cases of cholera both in 2008 and in 2018, with most cases that were reported there having been imported from elsewhere. They also managed to source chemicals with the help of local business communities. ZINWA received significant funding from the Reserve Bank to rehabilitate Harare’s waterworks, but had little to show for it (Musemwa, 2010). The government allowed outdated and damaged water systems to go unrepaired and water supplies to go untreated. A water systems engineer in Harare stated that ZINWA had not improved water service delivery; instead the parastatal agency had caused its ruin (Sollom et al., 2009).

Corruption and mismanagement were features of both local and central government. During 2014, through audits carried out by the Auditor General’s office on state enterprises and parastatals, it came to light that senior management in many of Zimbabwe’s parastatal organisations (the Public Service Medical Aid Society, the Zimbabwe Broadcasting Corporation, the national airline, the revenue authority,
the electricity supply authority, and others) were being paid hundreds of thousands of US dollars (USD) a month (Simpson & Hawkins, 2018: 350–351). Seven Harare City Council senior executives were paid monthly salaries and allowances in excess of USD 30,000 a month. With allowances for school fees, holidays, travel, on-call, and so on, their monthly pay was in the hundreds of thousands of USD. The seven executives included the Director of Water Services, the Director of Health Services, and the Director of Works in the City of Harare (Davies, 2016; Rusvingo, 2014). These salaries were being paid while general workers were stranded for over five months without being paid. It was in this context that repair work of facilities was left undone. When it came to health care infrastructure, city clinics were struggling with shortages of medications and essential supplies. Funding for water and sanitation infrastructure was not made available and fulfilling organisational obligations to ratepayers was not prioritised.

Many would wonder how senior civil servants would justify to themselves their entitlement to such huge sums of public money, clearly to the detriment of local services, to the extent that, in 2008, it directly caused the deaths of more than 4,000 people in Zimbabwe. Magaisa argues that Zimbabwe was and still is in the hands of a powerful clique of oligarchs, a small influential network of political, military, and business elites who control and run the country for their own benefit and without any concern for the welfare of its people (Magaisa, 2018). These elites are only interested in accumulation of private wealth. They do not pay taxes or utility bills, although they extract these payments from others. They use their economic power and military allegiances to never be held accountable for their misdeeds and to maintain political control. They also create a façade of democracy to keep international agencies still patching up the humanitarian consequences of their disastrous policies. A similar situation is likely to exist in other countries of Africa, to varying degrees, depending on the level of accountability governments have to their electorate.

**Sustainable Development Goals**

Most African countries did not meet the UN Millennium Development Goals’ safe water target, which was to reduce by half the proportion
of the population without sustainable access to safe drinking water from 1990 to 2015. Based on current trends, sub-Saharan Africa will not reach this target until 2040 (UNEP, 2010). As part of the UN Sustainable Development Goals (SDGs) adopted by the UN General Assembly in 2015 (UN, 2016), Goal Six states that by 2030 countries should aim to achieve universal and equitable access to safe and affordable drinking water for all and achieve access to adequate and equitable sanitation and hygiene. Performance against these targets will be measured by the proportion of the population using safely managed drinking water services, the proportion of the population using safely managed sanitation services (including a hand-washing facility with soap and water), and the amount of water- and sanitation-related official development assistance that is part of a government-coordinated spending plan. Despite supporting these ambitious targets, most African governments have not prioritised funding for their achievement, so progress is slow. The report on progress in line with the SDGs shows that 68 per cent of the population in sub-Saharan Africa had access to improved water sources in 2015, an increase from 55 per cent in 2000, but was still substantially lower than all four Asian regions (approximately 90 per cent) and Latin America (approximately 95 per cent). Some of these ‘improved’ water sources, such as borehole water, may still be contaminated with faecal matter. Only 30 per cent of Africans in sub-Saharan Africa had access to improved sanitation in 2015, having increased from 26 per cent in 2000, compared to over 70 per cent in most of Asia and Latin America (UN, 2016).

**Human rights**

Walsh and Johnson state that unless emergency responses include a recognition of what individuals are entitled to simply by virtue of being human, there is a risk of dehumanising them, of perceiving people as data to be analysed or as vectors of infection (Walsh & Johnson, 2018). These rights are embedded in several international declarations and charters. The United Nations General Assembly, through Resolution 64/292 in 2010, explicitly recognises the human right to water and sanitation and acknowledges that clean drinking water and sanitation are essential to the realisation of all human rights. The African Charter
on Human and Peoples' Rights similarly includes the right to ‘a general satisfactory environment’ favourable to peoples’ ‘development’, which is unattainable without access to water and sanitation. The Convention on the Elimination of All Forms of Discrimination against Women states that rural women have a right to ‘adequate living conditions, particularly in relation to ... water supply’. The Convention on the Rights of the Child states that all children have a right to the highest attainable standard of health guaranteed, including ‘through the provision of adequate ... clean drinking water’. The Convention on the Rights of Persons with Disabilities recognises ‘the right of persons with disabilities to social protection ... including measures to ensure equal access by persons with disabilities to clean water’ (HRW, 2013).

Although they voted for UN Resolution 64/292, most African countries do not have enshrined in their national constitutions any statement regarding the constitutional right to safe water and sanitation, although several mention the right to a healthy environment (Higuet, 2014). Some legislative frameworks are weaker than they might be, making it challenging for individuals and civil society to advocate for the realisation of their rights. The Ethiopian constitution states, ‘To the extent the country’s resources permit, policies shall aim to provide all Ethiopians access to public health and education, clean water, housing, food and social security.’ The Gambia, Egypt, Djibouti, Morocco, Niger, Somalia, South Africa, South Sudan, Uganda, and Zambia also have statements in their constitutions that citizens have a right to water or clean water. The Kenyan constitution states that ‘Every person has the right to accessible and adequate housing, and to reasonable standards of sanitation and to clean and safe water in adequate quantities’ (Higuet, 2014).

In Zimbabwe, the new constitution adopted in 2013 clearly places an obligation on the state to guarantee the rights of persons to a clean environment (section 73), the right to health care (section 76), and the right to safe, clean, and potable water (section 77) (GoZ, 2013). In addition, the newly revised Public Health Act of 2018 directs every local authority ‘to provide and maintain, or cause to be provided and maintained as far as may be reasonably possible, a sufficient supply of wholesome water for drinking and domestic purposes’ (GoZ, 2018).
AFRICAN AND GLOBAL INITIATIVES FOR CHOLERA PREVENTION AND CONTROL

African health ministers in August 2018 adopted the Regional Framework for Implementation of the Global Strategy for Cholera Prevention and Control, pledging to reduce by 90 per cent the magnitude of cholera outbreaks, particularly among vulnerable populations and in humanitarian crises. They agreed to take evidence-based actions to achieve this by 2030. These include increasing investments in clean water and sanitation infrastructure to avoid contamination of water supplies, enhancing epidemiological and laboratory surveillance, mapping cholera hotspots, improving access to timely treatment, strengthening cross-border surveillance, promoting community engagement, and the use of the oral cholera vaccine (OCV).

The Global Task Force on Cholera Control (GTFCC), set up in 2017 by the WHO and partners, has proposed a three-pronged strategic approach to eradicating cholera. The first axis is one of emergency preparedness, having a rapid targeted response to outbreaks using enhanced early warning surveillance, followed by rapid delivery of cholera control kits, OCV, and WASH supplies. A functioning health system that can anticipate outbreaks and respond rapidly to alerts is essential for this approach. The second axis involves a focus on hotspots of endemic cholera, using a multisectoral approach. Use of OCVs can reduce transmission in the short term during outbreaks (effective for three to five years), thereby reducing the disease burden and mortality while longer-term repairs to the WASH infrastructure are made. The third axis is the coordination of operational support, local and global resourcing, and technical expertise delivered by GTFCC. Strong community partnerships will be essential for all interventions to stop transmission. The plan is for the task force to support six to eight countries to develop cholera control plans, develop an investment case on cholera, and create operational guidance on integrated prevention strategies (GTFCC, 2017).

Emergency preparedness
To be effective, response to cholera outbreaks must be urgent and rapid, with active anticipatory public health and laboratory surveillance and
leadership from key players in the health sector and related agencies. Governments in sub-Saharan Africa need to act on the lessons from past outbreaks. One problem is that these outbreaks are relatively uncommon in each country, so health agencies may not retain institutional memory of what actions to take. There were several warnings ahead of the 2018 Harare outbreak, but they did not trigger preparedness for another major outbreak in Harare. With substantial movement of people and trade across borders in southern Africa, there is always the potential for the spread of infections from one area to another. There is evidence that the strains that caused the 2008 outbreak in Zimbabwe were related to cross-border transmission from Zambia and Mozambique, and were originally from Bangladesh, suggesting that the same strain was spreading globally (Islam et al., 2011). There was a significant cholera outbreak in Lusaka which lasted from October 2017 to May 2018 (Sinyange et al., 2018) which should have alerted public health authorities in Zimbabwe to enhance surveillance and to carry out presumptive health education. Similarly, in January 2018 an outbreak of approximately 60 cases of cholera occurred in Chegutu, a small town 100 km from Harare, with a possible link to the Lusaka outbreak. Water quality monitoring at water points and boreholes in high-density areas of Harare revealed several water sources to be heavily contaminated with faecal bacteria, while sporadic cases of cholera and typhoid were notified all over the country (Machamire, 2017). Broken sewer pipes have been implicated repeatedly in outbreaks of typhoid and other water-borne diseases in Harare (Davis et al., 2018; Muti et al., 2014). The response to these red flags appears to have been limited to the mobilisation of volunteers to give hygiene education and to hand out disinfection tablets and buckets, mainly by non-governmental organisations (NGOs). Beyond this there has been little sustained activity from the relevant government ministries to prevent the escalation of another outbreak.

The emergency response to the cholera threat is often hampered by a lack of resources, inadequately staffed hospitals, limited health awareness activities, and unclean water. In the Zimbabwe outbreak of 2008–2009, two-thirds of the deaths were reported from communities with poor access to treatment facilities (Ahmed et al., 2011). Often international agencies take a leading role because they have more experience of
emergency responses. They are geared to quickly organise medical supplies, protective clothing, raise funds and so on. At the request of the WHO Global Outbreak Alert and Response Network (GOARN), the International Centre for Diarrhoeal Disease Research (ICDDR) from Bangladesh sent a six-member team to Zimbabwe in 2008 to provide technical expertise to the Ministry of Health and Child Care. The review team reported that there was inadequate monitoring of patients, overuse of intravenous fluids on their own rather than combined with oral rehydration therapy, that antibiotic use did not follow guidelines, that laboratory facilities were limited, and staffing levels were low (Ahmed et al., 2011). Despite many warnings of persistent water contamination, especially of borehole water, preparedness was low and pre-emptive actions such as running drills for frontline health staff were not carried out. Many of the solutions implemented, such as training health professionals in case management, especially using computer-based interactive training, appeared not to endure to the next major outbreak ten years later.

The role of international partners
International partners have an important role in supporting communities in sub-Saharan Africa, especially when they are most vulnerable, such as during humanitarian crises and emergencies. However, their intervention often masks the inaction of governments. It is governments who are responsible for the long-term infrastructure requirements of communities. Funds become available to resolve the immediate crisis, rather than being made routinely available for investment in the medium- or long-term development of WASH infrastructure. As an example, the declaration of a state of emergency over the cholera outbreak in Harare on 11 September 2018 was followed by an appeal from the Zimbabwean government for USD 60 million to address life-saving, short- and medium-term needs in WASH infrastructure. The UN Resident Coordinator made an allocation of USD 3 million from the UN Central Emergency Response Fund (CERF) in response to the cholera outbreak, to be administered by UNICEF, WHO, and the World Food Programme (WFP). Ten hotspot areas in Harare, including Glen View, Budiriro, and Mbare, were identified: the funds were used to provide health care, WASH, and food aid interventions.
for 600,000 people at risk of infection. The fund allowed for the immediate rapid scale-up of cholera outbreak response activities while alternative resource mobilisation efforts continued. The UN strategic support to development in Zimbabwe is guided by the 2016–2020 Zimbabwe United Nations Development Assistance Framework (ZUNDAF), which aims to contribute to six result areas: Social Services and Protection; Food and Nutrition Security; HIV and AIDS; Gender Equality; Poverty Reduction and Value Addition; and Public Administration and Governance. As of 30 June 2018, the mid-point of the ZUNDAF implementation cycle, the UN delivered USD 1.1 billion in the form of various development projects, accounting for 70 per cent of the total USD 1.6 billion planned to be mobilised over a period of five years. A sustainable urban plan for medium-to long-term renovation and renewal of WASH infrastructure, as well as sustainable waste disposal management, is desperately needed. UN System also facilitated the deployment of an inter-agency Capacity for Disaster Reduction Initiative (CADRI) to assess the country’s disaster preparedness. The actions taken up to that point, however, did not manage to prevent the 2018 cholera outbreak in Harare – despite numerous warnings.

Médecins Sans Frontières (MSF), also known as Doctors Without Borders, is an international humanitarian NGO of French origin. In 2017, MSF teams treated 143,100 people for cholera in 13 countries, compared with 20,600 people in 2016. MSF responded to cholera outbreaks in Nigeria, Chad, Kenya, and South Sudan. In Yemen, MSF treated more than 100,000 people in 37 treatment centres and at oral rehydration points. They similarly managed to treat half the reported cases in one of the worst cholera outbreaks in 20 years in the Democratic Republic of Congo (DRC), where around 55,000 people were reported as cases in 24 provinces, with more than 1,000 deaths (MSF, 2017). These are often people in crisis situations, in camps for displaced people, or in war or conflict zones. In Zimbabwe, MSF has brought safe, clean water to vulnerable communities in high-density suburbs in Harare, including drilling new boreholes and rehabilitating existing ones. They also provided logistical and technical support to the Ministry of Health and Child Care during the 2018 outbreak; they provided nurses, water and sanitation expertise, and logisticians to support the technical capacity of local authorities and government (MSF, 2018).
Treatment for cholera

With vigorous rehydration, mortality – expressed as the case fatality rate (CFR) – can be reduced to less than 1 per cent, even in makeshift tent treatment centres (Gaffga et al., 2007). Antibiotic treatment for cholera was introduced in 1964 and found to limit the duration of bacteria shedding and the diarrhoeal episode, as well as reducing diarrhoeal volume (CDC, 2015). Antibiotics were used for moderately to severely ill patients together with aggressive fluid therapy (Leibovici-Weissman et al., 2014). Antibiotic sensitivity is tested in each outbreak to guide treatment and to track the evolution of the organism for epidemiological purposes.

Resistance of *V. cholerae* to most antibiotics is increasing; this may have emerged from prophylaxis of household contacts of patients with severe cholera in past epidemics (Okeke et al., 2007). During the 2008–2009 outbreak in Zimbabwe, *V. cholerae* strains showed variable sensitivity to commonly used antibiotics. Specimens from the Zambia outbreak in 2017 similarly showed variable sensitivity to the main antibiotics recommended (Sinyange et al., 2018). The Bangladesh ICDDR team suggested that the limited availability of laboratory services led to uninformed antibiotic use, which may have contributed to poor treatment outcomes (Ahmed et al., 2011), and that experience from Bangladesh indicated that cholera caused by strains with reduced sensitivity to ciprofloxacin was associated with therapy failure (Islam et al., 2011). In the 2018 outbreak, however, the strain circulating showed multi-drug resistance (WHO, 2018b). Antibiotic stewardship to decrease irrational antibiotic prescribing generally, but especially in management of diarrhoeal diseases, requires more emphasis in the region. Alternative approaches to antibiotic treatment are being explored, including drugs that could counter the severe diarrhoeal effects of the *V. cholerae*. The use of bacteriophages, viruses that infect bacteria, in treatment and in environmental management of water sources, remains to be explored (Nelson et al., 2009). Originally studied in India from 1928–1934, they were found to be useful in cholera outbreaks, but were overtaken by the development and effectiveness of fluid-based therapies and antibiotics.

In resource-limited settings the outcome of therapy depends on the time it takes for patients to seek and receive care, as well as the response
time of the emergency system to manage the outbreak. When patients begin therapy after a significant delay, their fluid losses have become severe and intravenous (IV) therapy is essential (Ahmed et al., 2011). Oral fluids are used in all patients, with IV fluids added in severe cases to achieve rapid rehydration, especially when patients are vomiting. Huge quantities of IV fluids are necessary to resuscitate patients with severe dehydration. All the IV fluids used for rehydration in the last ten years, including for the cholera outbreaks, were imported from South Africa and other manufacturing countries. Ghana is a major producer for the West African market. The market in Africa for IV fluids is expected to reach a billion dollars in value because of growth in medical care and epidemics, with South Africa as the largest producer (Srivastava & Jaiswal, 2018). Large volumes of IV fluids brought into the countries by donors have had a deleterious impact on local suppliers. The pharmaceutical manufacturing sector in Africa is very weak. Local markets are not big enough to sustain manufacture and they do not keep sufficient stockpiles for emergency situations. A local company in Zimbabwe (Datlabs) used to manufacture IV fluid packs but, having failed to secure investment, it has been non-functional for 15 years. In the wake of the 2018 cholera outbreak the government of Zimbabwe has now pledged to assist the company to rehabilitate its IV fluids manufacturing plant (Equity-axis, 2018).

**Mapping of cholera hotspots in Africa**

Cholera incidence is thought to be concentrated in high-burden hotspots. Mapping of incidence of cholera between 2000 and 2016 in Africa was used to identify high-risk populations that could be targeted for specific interventions, to prevent and control outbreaks (Lessler et al., 2018). Areas with previous outbreaks were divided into 20 km square grids and data about the incidence, location of outbreaks within the grid, population, and water and sanitation coverage were used to generate maps of cholera incidence throughout sub-Saharan Africa. Based on this model, almost 90 million people in 150 districts were identified as having high risk for cholera; they could be targeted with interventions such as oral cholera vaccine or water and sanitation measures to prevent or reduce infections. By targeting districts in order
of their cholera incidence (from highest to lowest), an effective cholera intervention (e.g. vaccination campaigns combined with improved water and sanitation) could eliminate 50 per cent of reported cholera cases in the region by covering less than 4 per cent of the population (35 million people). More than 168 million doses of OCV would be needed to vaccinate all eligible individuals living in these high-risk districts, which is substantially more vaccine than has been stockpiled. However, by concentrating on a small proportion (< 5%) of districts, better value for resources can be gained.

Immunity to cholera has been known for over a hundred years, when survivors of cholera in India were observed to develop resistance to the disease that lasted several months. The first oral vaccine was tested in Bangladesh in 1980, the forerunner of vaccines in current use. The OCV, given as a single dose, confers protection for six months, while the two-dose vaccine gives 50–80 per cent protection at three years. Modelling results suggest that vaccinating twice the number of people with a single dose will save more lives than using the two-dose regimen in a smaller population during an outbreak, which may be necessary if vaccine supplies are limited (Azman et al., 2016). The single-dose vaccination was successfully implemented in an outbreak in South Sudan in 2015, and the two-dose vaccination was deployed during the Zambia outbreak in 2018 (Azman et al., 2016; Sinyange et al., 2018). Vaccines sourced from the global stockpile funded by Gavi, the Vaccine Alliance, were allocated and administered by the Ministry of Health and Child Care in Zimbabwe, with support from WHO and other partners, to protect over a million people in cholera hotspots (WHO, 2018c). The use of OCV is a temporary bridging strategy, however. It cannot be the mainstay of cholera prevention, since it relies on donor support and does not prevent the acquisition of other water-borne infections. There is agreement that provision and maintenance of WASH infrastructure (safe sustainable water, sanitation, and hygiene facilities) are essential for the long-term cessation of transmission of cholera, typhoid, and other diarrhoeal diseases (GTFCC, 2017; Ivers, 2017). Universal access to clean water and improved sanitation provision, apart from conferring dignity, encompasses far wider social and health benefits for communities than a single short-term intervention like the vaccine can provide.
Community engagement

A key lesson from the Ebola outbreak in West Africa in 2014 (see Chapter 5), which applies to any outbreak or emergency situation, was that community engagement is critical from the outset of the response and must be prioritised (Walsh & Johnson, 2018). Listening to communities that are affected is essential to understand the challenges they face and what they feel needs to be done to enable them to protect themselves. When interventions are potentially stigmatising, such as mandatory supervision of funerals, getting traditional and religious leaders and community organisers on board is crucial for success. NGOs can be mediators who assist communities to mobilise, to develop, and to implement and monitor their own action plans. Social, economic, and political relationships determine how epidemic diseases spread, what their impact on populations will be, and to what degree this impact will be manifested. The way communities cope and respond has been described as ‘a test of social cohesion’ where the interaction and cooperation between different layers of society may be stressed to their limits (Evans, 1992). In Zimbabwe, community engagement has taken two major forms: local action for prevention, and advocacy for protection of human rights.

MSF works with local communities to enable them to manage and maintain water points through trained community health clubs (MSF, 2018). Committee members oversee the provision of clean water to members who contribute a small monthly fee to pay for chlorine and maintenance of the points. Over 70 rehabilitated boreholes are now managed by more than 60 community health clubs in 13 high-density residential suburbs in Harare. Members trained in water and hygiene safety responded to the outbreak in September 2018 by conducting house-to-house awareness campaigns, especially those in the hardest hit areas (Glen View, Budiriro, Mbare). An initial survey conducted by MSF of 16 community health clubs covering more than 8,000 people in the four most affected suburbs found only four suspected cholera cases. As the outbreak progressed a significant number of new community members signed up to receive clean water, as they became convinced of the benefits of such clubs. Harare City relied heavily on volunteers to provide health and hygiene education (especially on treating water
and hand-washing) to households in its high-density areas. More than a thousand Red Cross volunteers went door-to-door, handing out bleach, water purification tablets, and buckets for storing water.

Civil society organisations have campaigned for the government to be held accountable for the breakdown of WASH infrastructure yet again, and to be held accountable for the impact on families and people who became infected through contaminated water, notwithstanding a lower CFR because of a more rapid reaction to the numbers of people pouring into the Beatrice Road Infectious Diseases Hospital and into the cholera treatment centres in Glen View and Budiriro. In 2018 the Civil Society Health Emergency Response Coordinating Committee (CSHERCC) made a statement (Chibamu, 2018) that the government, and through it the local authorities and ZINWA, were accountable for the deaths of people, since they had failed to provide basic health services, medical treatment and services, clean running water, and a sanitary environment for people so as to contain the spread of the water-borne disease. CSHERCC reminded the government of the human right to health enshrined in the country’s constitution and the human rights instruments to which the government was a signatory. It called on the relevant ministries to work collaboratively and swiftly together with communities and non-state actors, and to take corrective measures to prevent further deaths from cholera, contain the epidemic, and prevent further outbreaks, and to provide clean running water and sanitary environs to all affected communities. All local government (municipal) authorities were included in the call, as well as specifically relevant ministries: Health and Child Care; Lands, Agriculture, Water, Climate and Rural Resettlement; Environment, Tourism and Hospitality Industry; Local Government, Public Works and National Housing. CSHERCC also called on the Zimbabwe Human Rights Commission swiftly to investigate the violation of people’s constitutional right to life, health, and clean water. The Ministry of Finance was called on to increase the budget allocation for water, sanitation, and hygiene, and to achieve the 15 per cent budgetary allocation to health as provided in the Abuja Declaration. Local authorities were reminded that they had a duty to account for funds raised from ratepayers for water and sewerage in order progressively to contribute towards the realisation of the right to health and water.
The CSHERCC statement was endorsed by several civil society organisations, including the Zimbabwe Association of Doctors for Human Rights, the Community Water Alliance, the Community Working Group on Health, Zimbabwe Lawyers for Human Rights, and the Vendors Initiative for Social and Economic Transformation (VISET) (Kubatana, 2018).

VISET is a group that advocates for the rights of vendors, who were particularly targeted and harassed by the municipality’s police during the attempted clearing of the Harare Central Business District in the name of cholera prevention in 2018. In reality, there was no evidence that vending was a risk factor in cholera transmission, even when fruit was being sold.

The focus of much of the response to the alerts on other outbreaks and reports on water quality was to emphasise personal hygiene rather than allocating expenditure for repairs to the WASH infrastructure. Government officials tend to focus on individual responsibility and scold communities for not practising good hygiene, instead of paying attention to the sewage pouring through the gutters from broken sewer pipes, as was the case in Harare in 2018. This was despite good evidence that person-to-person contact was not the main source of transmission. Restrictions placed on public gatherings and banning vendors from the city centre is suspected of having a political basis, as vendors are often forced into informal occupation due to high levels of unemployment. In many countries vendors are vocal critics of government policies.

In the 2017–2018 cholera outbreak in Lusaka, Zambia, riots broke out, leading to arrests, following the clampdown on vendors. The Lusaka Water and Sewerage Company, wholly owned by the Lusaka City Council, was accused of prioritising water connections for formal households and business, while neglecting peri-urban areas where the majority of the poor resided. Water was sold as a commodity through kiosks (private intermediaries) as part of a World Bank-funded project (2007–2013) but the bank was unable to sustain the technical and commercial efficiency of operations. In 2015, 10 per cent of the kiosks were not functioning. As with the Harare situation, there was poor coordination between local government and central government structures and activities (Bahadur, 2018).
Financing the prevention and control of cholera

The UNDP Human Development Report (2006) advises that governments should be spending about 1 per cent of GDP on WASH provision, with funding from taxes and tariffs, but also with international aid assistance (UNEP, 2010). The finance minister of Zimbabwe sparked public outrage during the 2018 outbreak when he launched an online crowdfunding appeal for donations to pay for commodities required for the outbreak, especially IV fluids and antibiotics. The move was considered hypocritical in light of reports that the government was spending money on new vehicles for cabinet members, but not budgeting for funds to repair the ageing water infrastructure. The government subsequently pledged USD 1 million to enable Harare City authorities to contain the further spread of cholera.

Following its successful contribution to supporting the response to the Ebola outbreak in West Africa, mobile phone company Econet Zimbabwe donated USD 10 million towards resolving the cholera crisis in Harare. It pledged to repair the sewer systems in cholera-affected areas, including pipe replacement of sewerage and water infrastructure in Budiriro and Glen View. It agreed to complement Harare City Council’s refuse collection efforts by removing dumpsites in Mufakose, Glen View, Budiriro, Glen Norah, and the city centre (Kadirire, 2018). By rescuing the local government in its failure to provide safe water and sanitation facilities, yet again Econet, along with other international agencies, was providing a short-term solution to a chronic problem. Other industries made contributions too. Zimplats, for example, donated to the ministries of Finance and Economic Development and Health and Child Care antibiotics for 1,000 patients, 1,350 litres of IV fluids, and water treatment chemicals for up to 4,000 households (Zimplats, 2018).

International structures are in place to address epidemic, pandemic, and humanitarian crises such as cholera and Ebola. The United Nations Inter-Agency Standing Committee (UN-IASC) was established in 1992 in response to UN General Assembly Resolution 46/182 on the strengthening of humanitarian assistance. The IASC is a unique inter-agency forum for coordination, policy development, and decision-making involving key UN and non-UN humanitarian partners. It has
specified the immediate deployment of qualified personnel, supplies, and the automatic release of funds from the Central Emergencies Relief Fund to prevent outbreaks escalating out of control. The World Bank has also launched a Pandemic Emergency Financing Facility, an insurance facility that should enable a more rapid response in emergency situations (Walsh & Johnson, 2018). What is missing are structures and plans to raise funds for sufficient WASH infrastructure and technology, particularly in cholera hotspots, which have been demonstrated to be the most sustainable long-term solutions.

Sub-Saharan Africa is the region with the lowest per-capita expenditure on health (USD 199 purchasing power parity in 2015 compared to South Asia at USD 212 and the World at USD 1,300), with the highest under-five mortality (78 per 1,000 live births in 2016, compared to 48 in South Asia and 41 for the World), and lowest life expectancy at birth (60 years compared to 69 in South Asia and 72 for the World) (Darvas et al., 2018). The richer the country, the more it spends on health in both the public and private sectors, whereas out-of-pocket expenditures are highest in poorer countries, especially those in sub-Saharan Africa. Some have argued that investing in health significantly contributes to economic development, so high-income countries should be urged to contribute through financial aid to achieve this purpose (Sanders, 2004). According to this thinking, in the instance of cholera prevention and control, investment in WASH infrastructure to prevent diarrhoeal diseases such as cholera and others would in itself lead to healthier, more economically thriving communities.

This line of argument avoids scrutiny of currently dominant macro-economic policies and structures that perpetuate financial disadvantage in medium- and low-income (MLI) countries. Poverty Reduction Strategy Papers are recommended as a mechanism to direct development assistance towards strengthening health systems and are an integral part of global economic governance regimes. However, often these international strategies result in reduced national public sector health expenditure. This leads to greater inequalities in income, and from this to inequities in access to health services and health outcomes (Sanders, 2004).

The regulation of trade and intellectual property, for example in relation to transnational pharmaceutical corporations, has been
dominated by rich countries, and places many essential drugs beyond the economic reach of poor people in MLI countries. An example with the cholera outbreaks in Africa is where the mainstay of treatment is IV fluids with back-up use of antibiotics for severe cases. None of these is manufactured in the affected countries, so they have to be imported – the financial benefit remains in the manufacturing countries – which increases dependence on donors and reliance on international agencies to swoop in to rescue countries during outbreaks. The time delay between the start of the outbreak and importation of commodities is when most of the deaths occur. An alternative could be investment in regional manufacturing hubs for essential commodities, but this is slow in coming. Oral rehydration salts that are put into sachets and distributed through UN agencies are perceived as medicines, whereas the alternative of salt and sugar solutions are home remedies, but are not promoted or not available when families cannot afford to buy these basics.

CONCLUSIONS

Sub-Saharan Africa in 2018 carried the largest burden of cholera compared to other global regions. Progress towards the various WASH targets on the continent is slow, resulting from the very complex political and socio-economic context in which cholera thrives.

Squalid urbanisation is growing as a consequence of poverty, neglect by local and central government structures, poor leadership, rural underdevelopment, and inequitable distribution of resources. The growing population living in underserved and marginalised communities as a result of urban in-migration is not prioritised for basic services in most African countries. Poor economic growth and misgovernance have resulted in the failure to provide urban infrastructure, and have led to increased vulnerability to environmental threats. Corruption and the lack of accountability of central and local government structures, as well as dependency on international partners coming to the rescue during outbreaks, means that long-term solutions to the underlying causes of cholera outbreaks are hard to come by. Weakened health services, carrying the legacy of structural adjustment from the 1990s and the austerity policies that followed, are unable to respond adequately, resulting in high
CFRs. Biomedical and technical solutions include mapping of hotspot areas and providing cholera vaccination and intensive hygiene education to high-risk communities when alerts are raised of potential outbreaks, and for rapid response when an outbreak starts.

Repairing and upgrading water and sanitation infrastructure is the mainstay of prevention and must be prioritised. The impact of this investment was demonstrated in Latin America and historically in Europe in the 19th century as bringing to a halt outbreaks of this nature. However, resolving the major underlying causes of cholera outbreaks and preventable mortality will require radical changes in macroeconomic arrangements between rich countries and Africa, and within African countries. These changes are unlikely without broad social and political mobilisation at national and global levels.

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