

Social Science in Epidemics: Cholera lessons learned

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This report¹ is the first instalment of the 'Social Science in Epidemics' series, commissioned by the USAID Office of U.S. Foreign Direct Assistance (OFDA). In this series, past outbreaks are reviewed in order to identify social science 'entry points' for emergency interventions and preparedness activities. The aim is to determine tangible ways to address the social, political and economic dynamics of epidemics and to ensure that interventions build on the social and cultural resources of the communities they aim to support. This report explores lessons about the social dimensions of past and recent Cholera epidemics.

How to read this report: this document provides an in-depth review of evidence on different aspects of Cholera epidemics. It is organised into the following categories, and readers with a specialist interest can skip to the relevant category:

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In each category, social science lessons learned are highlighted and followed by a series of recommendations. Recommendations are divided into those that are operational, i.e. they are immediately applicable in the event of an outbreak, and those that are orientated towards longer term capacity building. This report will provide the basis for a set of programme-oriented case studies and operational tools that will be published in 2019.

Cholera disease is caused by *Vibrio cholerae* (strains O1 or O139), with capacity to produce the cholera toxin responsible for acute watery diarrhoea. If untreated, severe dehydration can cause death. The water-borne disease is transmitted through the ingestion of contaminated water or food. Cholera is preventable through appropriate water and sanitation infrastructure and vaccines, and treatable through symptomatic therapeutic rehydration and antibiotics. Yet it is estimated that 2.9 million people a year contract the disease, and up to 95,000 die from it. Cholera is a tragic marker of both global and national inequalities in water and sanitation investments, and in access to basic healthcare.

This report focuses on the lessons learned primarily from countries affected by cholera outbreaks in the past four decades, in what is called the 7th Cholera pandemic. The most important case studies considered are the epidemics in Peru (1991), Haiti (2010), South Sudan (2016), India (endemic outbreaks), Mozambique (2014 and 2017) and Zimbabwe (2008 and ongoing outbreak), yet other countries' experiences are incorporated. Lessons are also integrated from literature around cultural responses to Oral Rehydration Therapy in the context of acute diarrhoeal disease.

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1. Emergence

Cholera has been endemic in the Bay of Bengal for centuries, and it is thought that the first pandemic spread across the world through pilgrimage and trade routes in the 1817². Five other pandemics of the serogroup O1 classical serotype followed, causing millions of deaths across the world, increasingly interconnected by globalisation, enhanced mobility and trade. Each of these pandemics retreated to Southern Asia (Morris, 2011).

The (current) seventh pandemic emerged in Sulawesi, Indonesia, in 1961, and unlike in the preceding pandemics in which the bacterium retreated to the Bay of Bengal, cholera has now become endemic in many countries. Cholera spread across Asian countries, and after a century free from the disease, cholera entered Africa in 1970 (WHO, 2003), taking hold and becoming endemic, with Africa accounting for 54 percent of reported cases in 2016. The disease entered Latin America in 1991 through Peru, and whilst it was almost eliminated in the continent over the following decade (Muyamboza, Kagoli, Chipeta, & Masuku, 2014), cholera cases in Hispaniola (Haiti and Dominican Republic) accounted for 32 percent of the global caseload in 2016 (WHO, 2018d). The seventh pandemic has been largely caused by the serogroup O1 biotype *El Tor* which replaced the classic biotype in the 1960s (Harris, LaRocque, Qadri, Ryan, & Calderwood, 2012). This emergence of *El Tor* biotype is interesting, as it can be read as an evolutionary adaptation of cholera to the immunological and public health responses that were undermining the transmission of the classic biotype (Echenberg, 2011; Joralemon, 1998). *El Tor* is less virulent, with fewer severe caseloads and up to 75 percent of asymptomatic cases, it has the capacity to survive longer outside the body in brackish waters, it generates no effective immunity and hence people can get re-infected in the same pandemic, and it has a higher likelihood of survival in food (Echenberg, 2011).

In 1992, a new serogroup, O139, emerged in Bangladesh and affected 11 countries in Asia, but has been contained in the continent and is only responsible for sporadic cases. There is no difference between the illness caused by O1 and O139 serogroups (WHO, 2018b) and existing cholera vaccines protect against both types. The new serogroup is under surveillance in case it increases in virulence through the transfer of genetic material and causes a new pandemic (WHO, 2003).

The emergence of a Cholera pandemic depends on the interaction of several influencing factors: 'a changing microecology of *V. cholerae*, vulnerability of people through exposure to health risk, resistance to infection through immunity and/or nutritional status, and environmental, socio-economic and behavioural changes.' (Collins, 2003: 1398)

V. cholerae's capacity to survive and become endemic in coastal areas and lakes means it can use these brackish waters as a refuge to re-emerge (Collins, 2003: 1400). Emergence of pandemics correlates to high heat and hurricane rains, as well as plankton blooms. These conditions are exacerbated by warm and wet El Nino years and climate change (Daniel, Marshall, & Shem, 2007; Mintz & Guerrant, 2009; Moore et al., 2017). The surveillance of these environmental conditions (air and sea temperatures, phytoplankton in coastal areas and precipitation) have been used to predict cholera emergence (NASA, 2018).

Yet cholera, after it becomes virulent, can only be transmitted when water and sanitation infrastructure is inadequate and drinking water is obtained from unsafe, contaminated sources (Mintz & Guerrant, 2009). Compromised or non-existent water and sewage systems mean drinking water sources (shallow wells, water cisterns, etc.) or food become contaminated with

² Dates of cholera pandemics: First, 1817–1824; Second, 1829–1837; Third, 1846–1860 (in which John Snow identified the mode of transmission); Fourth, 1863–1875; Fifth, 1881–1896 (during which Robert Koch identified the agent); Sixth, 1899–1923; Seventh, 1961- present time (Echenberg, 2011; The Lancet, 2017).

V. cholerae. This pressure is exacerbated by increased populations in urban areas, by migratory patterns (e.g. IDPs) and lack of public investment in water and sanitation (Echenberg, 2011). Further to this, the outbreaks become pandemic due to global interconnections: 'increased connectivity in the world through transport systems and increased mobility ensures that it is increasingly easy for epidemics to effect multiple locations where poor sanitation and vulnerable people occur, be they inland or coastal.' (Collins, 2003: 1400). This increased connectivity and movement of people around the world applies also to the humanitarian sector. For example, it was initially thought that the strain that entered Haiti in 2010 had originated from South America, whereas genetic and epidemiological research showed that the outbreak had been caused by an Asian strain and had originated from the Nepalese peacekeepers camp's overflowing latrines (Singer, 2016).

Emergence recommendations:

Building capacity

- Support multi-sectoral urban planning to enable local authorities to consider risks and trade-offs relating to disease transmission and patterns of urban growth, including the provision of sustainable WASH infrastructure investment.
- Incorporate the dynamics of the response itself into epidemiological studies, exploring the role that the deployment of aid workers may have in shaping the transmission of the disease.

2. Surveillance

In 2016, the WHO taskforce on Cholera Control conducted an assessment of the surveillance capacity of at-risk countries. Whilst they perceived a system in place for the detection and reporting of the disease, they highlighted that these systems only incorporated sources of information based on health care facilities and laboratories, and that they should include community-based surveillance for quicker detection (Nogareda, 2016). There are positive experiences in including diarrhoeal symptoms into community-based surveillance (IFRC, 2017). Health care facilities are quick to report cholera symptoms (e.g. diarrhoea, vomiting, and cramps), but these reports are not always followed with stool sampling for confirmation. This is often due to remoteness and lack of funding for deployment (Nogareda, 2016).

The taskforce also detected a lack of technical means and guidance for reporting the disease and the need to encourage reporting to the WHO. Whilst notifying the WHO is no longer compulsory under the International Health Regulations, affected countries would benefit from a global approach (WHO, 2003).

In order to prioritise resources, the WHO and the Global Taskforce are advocating a focus on most affected countries and 'cholera hotspots', as well as reacting to emerging outbreaks wherever they may occur. Firstly, countries are divided into groups depending on the presence of cholera and whether or not it is endemic (Ali, 2016):

- 'Presence of cholera: Predicted incidence $>0.010/100,000$ for a given year in a country
- Endemic country: Presence of cholera in at least three of the preceding five years
- Non-endemic country: Presence of cholera in one or two of the preceding five years
- Cholera-free country: No presence of cholera in any of the preceding five years
- Countries with more than 1,000 deaths annually are in the Sub-Saharan Africa Region except for India, Bangladesh, Haiti, and Sudan.' (Ali, 2016)

Cholera 'hotspots' have been identified by the Global Task Force on Cholera Control to avoid recurrence in endemic areas in order to maximise the impact and to avoid spillover to

neighbouring non-endemic countries. Resources are focused in 'specific and relatively small areas where the cholera burden is most concentrated' (Global Task Force on Cholera Control, 2017) and where weather patterns can help predict outbreaks. The strategy is partly based on the results of a study of cholera incidence and geography across Sub-Saharan Africa (Lessler et al., 2018). These focused efforts would work with a multi-sectoral approach, including WASH and vaccination. 'Hotspots' can be further narrowed geographically to city sections and villages (Azman et al., 2018; R. Piarroux & Faucher, 2012).

However, focusing on 'hotspots' may miss out on migration patterns (e.g. economic migration in India), which are crucial for disease transmission (Gupta et al., 2016; M. Piarroux, 2018). Whilst organisations such as UNICEF have incorporated this human mobility angle, there should be a greater effort by respondent agencies to triangulate 'hotspot' data with other surveillance mechanisms and to map out population movements in endemic and at-risk areas. There are positive experiences of retroactive modelling of cholera outbreaks using mobile phone tracking methods. This consisted of using mobile phone data to create models of what the geographical spread of the disease would be, and then checking if the disease actually spread that way (Farmer et al., 2011). These models tested in Haiti were successful, and hence they could potentially be used to track population movements and their contribution to the spread. The relevance of these models would depend on the mobile phone coverage as well as the use and practice among populations that are most mobile. Alternatively, understanding people's usual movements (pilgrimage, economic activities and so on) would be necessary (UNICEF, 2013) i.e. information that can be acquired through simple qualitative or participatory research.

The identification of 'cholera hotspots' and the direction of resources towards them enhance cost-efficiency and impact on cholera rates (Bwire et al., 2017; Lessler et al., 2018), yet there is no evidence yet on the social consequences of narrow and 'fine grained' geographical targeting. There is potential for mistrust and resistance both among targeted communities for being 'singled out' and among nearby non-hotspot communities for not receiving equivalent WASH investment. Humanitarians and public health workers will need to seek information about these social reactions and engage with communities accordingly.

Due to the resilience of the bacteria in water bodies such as rivers, lakes and shallow coastal areas and the movement of people across country borders, cholera hotspots may be situated in boundary areas e.g. the Democratic Republic of Congo (DRC) and Kenya and also, the internationally shared lakes and river Nile (Bwire et al., 2017). This requires international collaboration in tackling outbreaks and stopping pandemics.

Underreporting or misrepresentation of Cholera cases

WHO highlights that the global number of cholera cases is much higher than those reported, and that some countries are reluctant to report or do not report on time. This can be due to 'a lack of detection in remote areas', as many people who are infected, including those who have died of the disease, may not reach health centres (Collins, 2003: 1398). Yet, it is also due to the governments' embarrassment in the global arena or vis-a-vis their constituencies and the economic concern regarding the impact of trade restrictions or decline in tourism (Collins, 2003).

Cholera has become a symbol of backwardness undermining national efforts to project images of modernity or development, and as such it can be disturbing to governing and economic elites. This was the case of Latin American countries affected by the re-emergence of cholera in the 1990s. For example, Ecuador denied it was happening, and feared for the impact on the fishing and tourism industry. The government pressured the media to drop sensationalist headlines, claiming cholera was a disease of the poor and would not affect tourists (Joralemon, 1998). Similarly, Chile had racialized cholera as something that happened to 'poorer, tropical/darker countries to the North' and refused to initially recognise the epidemic.

Once it was clear it was unavoidable, it was played down as a common disease, and personal responsibility was emphasised (Joralemon, 1998; Trumper & Phillips, 1995). Similar experiences of 'playing down' cholera outbreaks took place in the Zimbabwe in 2008 (Chigudu, 2016, forthcoming) and in endemic contexts such as India (Gupta et al., 2016).

Cholera cases can also be misrepresented by labelling them as Acute Watery Disease (AWD) and not specifically Cholera. This can be justified because of insufficient rapid diagnostic kits at the level of clinics (Gupta et al., 2016), but it may also be used by authorities as a strategy for not recognising failures in their provision or having to address the situation (ibid.). These figures would not be accounted for in WHO reporting and do not have the political and media impact of cholera cases. The term AWD includes pathogens other than *V. Cholerae*, such as rotavirus or E.coli and it is a label that can downplay the importance of the disease and 'hide ineffective public health strategies' (Briggs & Mantini-Briggs, 2004). In the case of Somalia and Ethiopia, the use of AWD and the secrecy around new cholera cases downgraded the threat perceived by the communities (Carruth, 2011) and hindered knowledge sharing amongst response organisations (e.g. UN Agencies and the Ministry of Health) (Ripoll, 2017). See more below on the importance of language in cholera prevention.

Surveillance recommendations:

Operational

- Appraise and map population movements (through participatory mapping or mobile phone technology, amongst others) and incorporate into cholera hotspot targeting when necessary.
- When carrying out narrow targeting of cholera interventions, have a deep understanding of the social context to avoid stigmatisation of those who are targeted or feelings of neglect by nearby communities.
- Ensure that the communication of epidemiological results and subsequent messaging do not contribute to stigma or scapegoating of affected populations.
- The use of 'Acute Watery Disease' (AWD) rather than cholera may downplay risks when communities are informed of an outbreak. If AWD has to be used, convey the danger of this particular form of diarrhea.

Building capacity

- Scale up community-based surveillance within national surveillance systems' reporting.
- Incorporate active surveillance in remote areas to redress underreporting of cholera, relying whenever possible on community surveillance, particularly for early warning and during outbreaks.

3. Vulnerability

Factors that determine exposure to cholera infection

The exposure to the disease is shaped primarily by poverty and marginalisation, conflict, social position and gender roles, livelihoods and occupation, immunological naivety of the population, physical proximity to cholera patients and biological factors such as gastric acidity and O-blood type.

Cholera is a disease of poverty and marginalisation, often involving populations 'affected by conflict or natural disasters, who live in areas with unsafe water, sanitation and hygiene conditions' (Davis, Narra, & Mintz, 2018). Cholera was eliminated in the Global North due to the adequate provision of WASH infrastructure in the early twentieth century. These 'water

and sewage treatment systems assured safe drinking water and safe disposal for all, keeping contaminated sewage out of water, foods and the environment.' (Waldman, Mintz, & Papowitz, 2013), and eliminated cholera long before the advent of antibiotics or cholera vaccines (Joralemon, 1998). Other countries in Asia (e.g. Thailand) and much of Latin America had stopped the spread by the end of the twentieth century (Davis et al., 2018). Hence, a predictive measure for cholera outbreaks and transmission is the need for people to rely on surface water, unimproved or unsafe water sources, transport or storage, whilst also depending on open defecation due to inadequate sanitation facilities (Davis et al., 2018: 304; Wolfe, Kaur, Yates, Woodin, & Lantagne, 2018). Similarly, a lack of facilities such as safe water points or soap make hand washing hygiene more difficult (ibid.).

Joralemon emphasises how risk of cholera and other easily preventable diarrhoeal diseases now depends on socio-economic divisions *within* countries of the Global South. There is an 'epidemiological polarization' across wealth strata starting in the second half of the twentieth century, with public health investments (mainly WASH) distributed along class lines. The outcome was wealthier people were protected against cholera and poor people, with inadequate sanitation, were more at risk (Joralemon, 1998: 1). Indeed poverty, or proxy indicators (e.g. slum dwelling, no concrete floor) are correlated with cholera incidence (Saha et al., 2017). Urban dwellers in affected countries can be more likely to get cholera than rural people, particularly in cases where there is overcrowding and existing inadequate water and sanitation systems are overburdened (Kirby, 2001).

Conflict can play an important role in the spread of cholera, simultaneously destroying water and sanitation infrastructure, preventing people from accessing clean water sources if these are located in contested areas, and forcing people to seek refuge in crowded cities (putting extra pressures on already poor WASH infrastructure), in IDP or makeshift camps, which may have no access to safe water or appropriate WASH infrastructure (Joralemon, 1998; Ripoll, 2017). Yemen already had poor WASH coverage before the war started in 2015, and the years of bombing until today have destroyed water and sanitation and health infrastructure and supplies. Since October 2016, there have been over a million cholera cases and 2,300 deaths (Qadri, Islam, & Clemens, 2017; WHO, 2018c). In the case of the cholera outbreak in the Horn of Africa, water sources had dwindled due to drought and concentrated pathogens in the water that was available. Many people were displaced by the drought, the conflict and by privatisation of water resources to areas with unsafe water. People also joined overcrowded urban centres or IDP centres with inadequate sanitation (Ripoll, 2017). IDPs are populations that are particularly at risk. It is important to note that this vulnerability can be reversed when IDP camps are well serviced and invested in. This is the case in Haiti, where incidence in IDP camps has remained low. Whilst there is scope for better sanitation, the camps have made safe drinking water accessible to dwellers (Farmer et al., 2011).

Cholera does not biologically differentiate according to gender (with the exception of pregnant women, who are more susceptible) or age, both men and women, young and old are, from a biological perspective equally likely to get infected (Rancourt, 2013). Differences of age and gender can emerge in terms of exposure to the disease, as this is shaped by differences in social roles and behaviours. Whilst cholera rates in Zanzibar and South-Eastern DRC were not different according to age or gender, in Western Kenya, urban men were more likely to get the disease (Schaetti et al., 2013). Similarly, in Sierra Leone, rural women and girls have higher infection rates than rural men. This is because women are more likely to care for children and the sick, as well as travelling as petty traders to commercial centres. On the other hand, men in urban areas have higher infection rates than women. They are more likely to get infected than women as they spend much time in work or seeking work outside the house, eating and drinking in locations with poor sanitation (Rancourt, 2013). Identifying the gender and age distinctions of caring for children and the sick in addition to the gendered occupations that determine movement to areas with poor sanitation will help determine vulnerability in a

particular context. Breastfed babies are less likely to be infected as they would not be ingesting untreated water.

Livelihoods and occupation can shape people's exposure to other infected people's faeces, when people congregate in particular areas with inadequate WASH. For example, in Somalia, pastoralists, who would have been otherwise protected by their mobility and remoteness, were forced to congregate in reduced spaces around water sources and would therefore become exposed, and transmit the disease (Ripoll, 2017). In times of drought, riverine farmers relied on surface water, which, particularly after the rains, carried contaminated faeces (ibid.). Fisherfolk have also been singled out in particular contexts for being at risk of cholera infection, particularly those who live for long periods of time in the water (e.g. boat houses in lakes) (Munier et al., 2017). This is the case of fisherfolk in lake Malawi which have untreated water supplies, and dispose of untreated waste into the water sources. (Msyamboza et al., 2014). Other poor fishing communities who fish in areas where untreated sanitary waste is disposed of, or where floods can block sewage systems are also more at risk of contamination. (Bwire et al., 2017; Oguttu, Okullo, Bwire, Nsubuga, & Ario, 2017).

Those who are immunologically naïve will be less resilient against the disease. This was the case of Haiti, where cholera had never been reported before (Farmer et al., 2011). Note that 'immunological naivety' is not a sufficient cause for major epidemics. The explosion of cholera cases in Haiti was due to its failed WASH infrastructure. Indeed, the disease entered the bordering country, Dominican Republic and only resulted in local, not widespread transmission. They were equally 'immunologically naïve', but 'were protected from exposure by physical and chemical barriers, the infrastructure for water treatment and distribution and for the collection and treatment of faecal waste that effectively prevented contamination of food and drinking water by enteric pathogens.' (Dowell & Braden, 2011: 1219). Note that previous infection and resolutions of the disease confers only residual immunity.

People living in a household with a cholera patient will be greater risk of contracting the disease, as will neighbours who live close by to a household with a cholera patient, as they are more likely to share both inadequate waste systems and water sources (Davis et al., 2018). People with gastric hyper-acidity will be more likely to get infected, and, although the reasons are unclear, so are people with O blood type (Echenberg, 2011).

Differences in severity of the disease and mortality

Severity of the disease and Case Fatality Rates (deaths amongst cases) will be shaped by the immunocompetence and nutritional status of the population, the strain of the *V.cholerae* and, most importantly, people's access to health services.

Immunocompromised patients are more likely to develop symptoms and die of the disease i.e. children under five, particularly those who are malnourished, the elderly and people living with HIV (Singer, 2016: 143; Ujah et al., 2015).

Mortality rates will be shaped by the virulence of the strain of *V. Cholerae* and its Cholera toxin, the immunocompetence of the affected population, and most importantly, the access that people have to treatment, either in the form of Oral Rehydration Solutions (ORS) (homemade or purchased) in the milder and moderate cases, and intravenous rehydration in the more severe cases, combined with antibiotics (Davis et al., 2018; Kirby, 2001). The discovery of rehydration therapy has reduced the Case Fatality Rate (CFR- number of people who are diagnosed with a disease and subsequently die of it) from 50% to under 1% (Davis et al., 2018). In extreme cases, such as the outbreak in Haiti (2010-ongoing), where the population was immunologically naïve and both the WASH and health services were inadequate at the onset, the CFR reached 7% in the first weeks (Farmer et al., 2011), whereas in 2017 it was 1.1% (PAHO/WHO, 2018). People's access to health services will be shaped by remoteness, poverty (Davis et al., 2018), and by conflict, as violence and bombing often

destroys health infrastructure, disrupts medical supplies and prevents people from reaching vital emergency care (Joralemon, 1998).

As mentioned above, incidence rates have traditionally been higher in urban areas than in rural areas. Yet recently, in East and Southern Africa, more cases are rural than urban (Ida Marie Ameda-personal communication). The balance can also shift in terms of mortality. For example, in the Peruvian epidemic (1991), the likelihood of infection was much lower in the inland rural areas compared to the coastal cities. However, when people in rural areas were infected they were 12 times more likely to die from the disease than an urban dweller, who had more ready access to health care (Joralemon, 1998: 30). Even in urban areas, particular populations will have less access to health care (e.g. slum dwellers), increasing their mortality rates. As will be shown below, the importance of access to quality healthcare is crucial to respond to cholera outbreaks.

Vulnerability recommendations:

Operational

- Conduct ethnographic rapid surveys that identify differences in social roles and responsibilities to assess differential vulnerabilities (both to infection and mortality) in terms of gender, age, class, rural/urban, etc.
- Assess how different livelihood groups and/or occupations are likely to come in contact with contaminated water or food, and the factors that shape their vulnerability: mobility, access to safe WASH facilities, physical contact with coastal or lake waters, role in conflict, etc.
- In the rapid assessment indicated above, identify how social difference shapes access to health services.
- Encourage decentralisation of healthcare, with the provision of rehydration therapy (homemade or purchased Oral Rehydration Solutions) at the level of the household or the community whenever possible.

Building capacity

- Advocate for improved urban planning to decongest urban slums and address their WASH needs.
- Ensure the provision of basic safe water and sanitation for IDP camps.

4. Transmission

Biomedical explanations

The main mode of cholera spread is through secondary transmission, through the ingestion of water or occasionally food contaminated with faeces. There can be primary transmission when direct contact is made between the permanent aquatic reservoir and humans (Williams, Collins, Bauaze, & Edgeworth, 2010). Direct human-to-human transmission rarely occurs. This explains why medical staff are rarely infected whilst treating patients (Echenberg, 2011: 6). Support staff who clean vomit and stool may be more exposed, but unlikely to get infected if they follow basic hygiene precautions. Transmission through food occurs when the hands of the person handling it have cholera bacteria from contact with contaminated water, the *Vibrio* multiplies in the food and, if the food is served undercooked or raw (as heat kills the bacteria). Food-related transmission is hence less frequent, but may occur in contexts of poverty where fuel is scarce and food is thus insufficiently cooked, or through dishes that are consumed raw (Collins, 2003). Alkaline dishes are more likely to be contaminated, as acidity kills the bacteria (Sack, Sack, Nair, & Siddique, 2004).

Less frequent transmission pathways are the contamination of seafood by the dumping of sewage from coastal cities and its subsequent ingestion by humans. Contaminated coastal waters and the ingestion of raw fish (*ceviche*) are thought to be the origin of the outbreak in Peru in 1991³. Yet it is important to emphasise that the *further spread* did not occur due to seafood, but rather through the ingestion of water containing faeces of cholera patients due to 'Peru's inadequate and seriously deteriorated municipal water and sewage systems, always strained to the breaking point during the hot summer months when water supplies dry up' (Joralemon, 1998: 29). In Trujillo, 'water was available in much of the city for only one or two hours a day, which encouraged household storage in tanks that promote bacterial growth' (ibid.). After an epidemic starts, if the sanitation is poor, the bacteria can remain in the ecosystem, particularly in estuaries, without the need for human infection. (Sack, 2011).

Focusing messaging on seafood as a means of transmission can create confusion amongst the general population and, on occasions, can discriminate against fisherfolk or consumers. This was the case in Venezuela in 1992, in which cholera messaging at the onset, emphasised the role of crabs in spreading cholera, and banned their sale. There is a symbolic significance of crabs in the lives of the Warao indigenous people in the Orinoco basin who consume them and use them in ceremonies. This had two impacts: it confused the indigenous population, who could see people eating crabs and not falling sick with the disease and who thus started questioning the veracity of messages; and amongst the white *criollo* population, it reinforced racist ideas of cholera as being spread by ignorant *indigenas* (Briggs & Mantini-Briggs, 2004).

A similar problem of misguided focus occurs with street food vendors. Whilst it is clear that street food consumption and cholera incidence is linked, for example in Latin America (Estrada-Garcia, 1997) or South Sudan (T.A. Ujjiga et al., 2015), only focussing the response on this, may result in scapegoating vendors, while disguising the fact that the disease is linked to safety of water sources, and that hygiene requirements (e.g. handwashing, fruit washing) are applicable to all. In Vietnam in 2007, female petty traders were accused of spreading the disease by the State, as a way of disguising the lack of investments in public health (Lincoln, 2014). Further to this, banning street vending and the subsequent loss of livelihoods during cholera epidemics has generated resistance and violence in the current cholera response in Zimbabwe and in Zambia (2018).

Alternative explanations of cholera transmission

Across several contexts, biomedical explanations of cholera diarrhoea and its transmission, are often dominant in surveyed populations. For example, in a study of three endemic African contexts (DRC, Kenya and Zanzibar), the 'predominance of environmental and sanitation-related factors and ingestion of contaminated water or food hygiene as perceived causes points to interventions needed in infrastructure' (Schaetti et al., 2013). Similar results were obtained in other DRC contexts (Merten et al., 2013), Nigeria (Ujah et al., 2015), Mozambique (Démolis et al., 2017), and Cameroon (Amaah, 2014). Other non-biomedical narratives do indeed coexist, for example in DRC, the outbreak is thought to be a result of God's will, soil-eating, or caused by witchcraft or sorcery (Merten et al., 2013), yet these are significantly less common. In South Africa, some Christian groups thought prayer had the power to clean water in the 2000-2001 outbreak (Echenberg, 2011). Appeals to witchcraft or sorcery may be more likely to arise when the community has no living memory of the disease. This was the case of the people of Haiti and the indigenous populations of Venezuela, who were shocked and terrified by the severity of the illness and the mortality rate at the onset. In both cases, some people in affected communities blamed the disease on sorcery (Briggs & Mantini-Briggs, 2004; Farmer et al., 2011), and in Haiti, some people were reported to be lynched by mobs accusing them of witchcraft (Farmer et al., 2011). There are also particular socio-political contexts which

³ A prevailing theory is that the strain that produced the Latin America pandemic that started in Peru in 1991 had come to the coastal waters from the shipping ballast of a transatlantic commercial ship (Lam, Octavia, Reeves, Wang, & Lan, 2010).

may make alternative explanations, e.g. conspiracies about deliberate spread, more plausible and common (see the next section).

Diarrhoeal symptoms can be understood in different ways. Particular kinds of diarrhoea may be perceived as normal or non-pathological (e.g. dentition in children, a reaction to temperature changes). When perceived as pathological, diarrhoeas are often attributed to natural causes, particularly so in the case of cholera diarrhoea, as is the case in the Somali region of Ethiopia. In South Africa, for example, three types of diarrhoea are locally differentiated: (i) diarrhoeas that are of natural and physiological causation such as teething, (ii) green diarrhoeas followed by bloody diarrhoea in children that can be attributed supernatural causes (mother stepping over 'evil tracks', breaking taboos or displeasing ancestors); and (iii) diarrhoeas caused by germs or inadequate diets, including cholera diarrhoea (Kauchali, Rollins, & Van Den Broeck, 2004).

Similarly in Mozambique, some diarrhoeas are traditionally attributed to a *nyoka*, a snake in the stomach that may be disturbed by parents' socially unacceptable behaviour (Echenberg, 2011). We will explore in detail the importance of how people speak of and explain the causes of diarrhoea in section 6. As we shall see below, even if a non-natural explanation is articulated, often recourse to clinical treatment and demanding vaccination is most common (Merten et al., 2013). In Merten's view, the repeated experiences in endemic settings of the disease raised people's awareness of the aetiology and transmission of the disease (ibid.).

Notions of 'dirt' as a form of transmission are common, based on pervasive ideas of contamination. People are more likely to react to perceived visual risks, soiled waters, flies, dirt, etc. These ideas of dirt and contamination have been successfully used by WASH and cholera programmes to trigger hygiene practices and other forms of social mobilisation (e.g. community clearing of drainage, use of latrines and so on) (Williams et al., 2010).

Depictions of cholera transmission and stigmatisation

Briggs and Briggs (2004) in their description of the 1992-93 epidemic in Venezuela, Nations and Monte (1996) in their study of Brazil's 1993 epidemic, and Chigudu (forthcoming) on the 2008 epidemic in Zimbabwe, all highlight how there are different narratives of a cholera epidemic, subjective ways of understanding causes, events and relationships and the meanings assigned to them. An indigenous person, a slum dweller, a traditional healer, a doctor, an officer of the Ministry of Health, and so on, will have different stories of what happened. What these authors highlight is that certain stories will become dominant, will be reproduced by media, and other narratives, particularly those of less powerful actors, will be downplayed and forgotten.

This was the case of modernising narratives that emerged both in Latin America and Africa, in which people are accused of causing the outbreak by being backward and unhygienic (Joralemon, 1998). Public messaging focused on personal behaviour change, and poor people were 'othered' as dirty or filthy (Briggs, 2004; M. Nations & C. Monte, 1996). Class was compounded by racism and discrimination. Alternative explanations that contemplate the longstanding marginalisation of indigenous peoples, severe health inequalities, structural adjustment, the lack of State investment or maintenance in water treatment and sewage systems, widespread privatisation of services and corruption were kept outside mainstream discourse. It is worth noting that even well-intentioned response workers can play a role in this stigmatisation of particular groups (Briggs & Mantini-Briggs, 2004), and hence 'earmarking of specific communities or persons as foci of disease transmission' should be avoided (M. Nations & C. Monte, 1996: 1021). These mainstream stigmatising depictions of cholera-affected communities have generated significant distrust of the authorities and have led to resistance to the response, reluctance to follow recommendations and water treatment, and in some cases violent attacks against health or WASH staff.

Under these circumstance of longstanding distrust towards State authorities, adversarial theories on cholera not being 'real' or being the result of neglect or purposeful contamination of the water supply are likely to emerge. For example, in Mozambique, the Ministry of Health was accused of spraying cholera in the water (Démolis et al., 2017). In the townships of Harare, similar stories of systematic contamination by the State or political parties arose, particularly so as a first-hand reaction to the rapid spread (Chigudu, forthcoming; Cuneo, Sollom, & Beyrer, 2017). Similarly in Brazil, poor communities thought the state, representing the wealthy classes, didn't want to remove the disease, but the *diseased* themselves (M. Nations & C. Monte, 1996). In South Africa, some saw cholera as a conspiracy of whites to depopulate black communities or as a strategy to make them submit to water commercialisation (Echenberg, 2011). Conspiracy theories can be understood as a form of everyday resistance (M. Nations & C. Monte, 1996), but they only thrive when they are 'socially conceivable', and what is conceivable is determined by the historical relationships with the State and the health services (Chigudu, forthcoming). The Zimbabwean government had already employed violence in the townships: mass contamination with cholera was an unlikely explanation, but was deemed conceivable. The Brazilian government had a history of military repression of the poor, and South African blacks had suffered the Apartheid regime, thus State-staged cholera outbreaks were 'socially conceivable'. An understanding of the historical and current political differences between State institutions (or those in power) and the social groups affected by cholera will help predict resistance to cholera interventions and explain the salience of particular explanations. Démolis et al. (2017) emphasises the importance of engaging with communities before an intervention to mitigate resistance.

People often have very nuanced understandings of the chain of responsibilities that lead to the provision (or not) of healthy water and sanitation. Therefore, understanding the 'chain of human and non-human actors' of service delivery and how they link to political structures (Chigudu, forthcoming). Cholera outbreaks play out (and respond to) the micropolitics in which they occur. For example, in Zimbabwe in 2008, there were tensions between the opposition MDC-run municipality of Harare, and the central ZANU(PF) government, and the latter is believed to have taken over the State water company to wrestle over power and embezzle funds, and thus explained the underinvestment in WASH services in the townships (Chigudu, forthcoming). Such tensions between the central State and the city of Harare arose again in the current cholera outbreak, in which the Minister of Health accused the city of Harare of not repairing blocked sewers (Mavhunga, 2018). Similar political dynamics occurred in the Mozambique outbreak. The Frelimo government controls the national and provincial governments, whereas the Mozambican democratic movement (MDM) runs the municipal government of cities like Nampula. Nampula was hit by a cholera outbreak in 2009, and accusations of 'cholera poisoning' were directed at local representatives of the government, or alternatively members of the opposition. Accusations also were directed at wealthier classes and at health workers, the latter being accused of bringing the disease (for example with the distribution of chlorine for the water) (Démolis et al., 2017).

In Haiti, some people accused foreigners of having brought cholera to the country in the aftermath of the earthquake. This turned out to be true, with the Nepalese contingent bringing the disease into the island, which undermined the credibility of the hygiene promotion campaigns in the communities (Farmer et al., 2011). There were also protests against the establishment of cholera treatment centres (Ujah et al., 2015).

Cholera blame narratives can also serve to pit social groups against each other. For example, in the cholera outbreak in 1994 amongst Rwandan refugees in Goma, DRC, the Hutu *genocidaires*, the ideologues of the genocide, 'perpetuated ethnic stereotyping and hatred by encouraging the belief that Tutsis caused the cholera by poisoning the water' (Echenberg, 2011: 132).

Transmission recommendations:

Operational

- Avoid banning the sale and consumption of seafood or any kind of food, instead advise consumers to follow hygiene procedures and adequately cook the food.
- Rather than banning street food vending, engage with street vendors and roll out training on basic food safety procedures.
- Ensure the communication campaign does not focus unduly on food, but also on water quality and the importance of good hygiene practices and water treatment.
- Engage with the affected communities to hear their narratives of the disease and work with local representatives to design appropriate response measures and risk-prevention messages.
- Communication messages about transmission pathways should not single out particular social groups (slum dwellers, indigenous people, pastoralists, fishermen, petty food traders, etc.) to avoid stigma and scapegoating.
- Messages need not focus on countering alternative causal explanations, but rather emphasise the importance of immediate rehydration and accessing care at health facilities as early as possible.

Building capacity

- Whilst it is useful to focus on positive behaviours to prevent cholera spread, there needs to be an acknowledgement of the different State institutions' responsibility over the provision of WASH services. Mechanisms to enhance the accountability of these institutions should be established.
- Understand the historic and political dynamics at different levels (national, provincial, local), and through the different institutions in charge of different elements of WASH (e.g. water authority, municipality, electricity, engineering, health services and so on).

5. Prevention

Hygiene measures

Cholera campaigns often focus on modifying hygiene practices and household water treatment. For example, Oxfam GB's cholera toolkit envisages:

ensuring access to chlorinated drinking water in sufficient quantity; promoting and facilitating hygienic practices, especially hand washing before anything is placed in the mouth; rehydration and early health-seeking behaviour at health facilities; mobilising different community groups and households to take action, based on the resources at their disposal. (Oxfam GB, 2012).

Other toolkits take similar approaches e.g. hygiene promotion measures (promoting water treatment and hand washing) have been useful to contain the spread of cholera in particular contexts. Yet it is important to highlight that behaviours are a product of structural vulnerabilities, namely access to appropriate water and sanitation infrastructure and health services (Loewenberg, 2014; Ripoll, 2017). For example, Somaliland and Puntland had better outcomes in terms of cholera prevention and containment in relation to other Somali regions mostly due to relatively better infrastructure such as more piped water and sanitation (KAP 2017). The experience in the cholera outbreak in Somalia is that people do engage in healthy practices when the infrastructure is available e.g. drinking from safe water sources, washing hands with soap, and using latrines (Biran et al., 2012; Ripoll, 2017). Hygiene promotion activities are activities that are 'doable' and have some impact, but this is secondary to the

impact that could be achieved if appropriate WASH infrastructure was put in place. Further these activities, whilst necessary, may risk victim-blaming.

This prioritisation of 'soft' interventions is most obvious in the context of rapid emergency response hygiene promotion programmes, often combined with the distribution of 'cholera kits', including ORS solutions, soap and Aquatabs. Hygiene promotion activities are found to have a positive effect on awareness of the disease and some studies point towards positive behaviours such as boiling, chlorination, and purification of water⁴ (Taylor et al., 2015). Hygiene programmes, particularly when carried out in a widespread fashion, have succeeded in curtailing transmission (Mintz & Guerrant, 2009). South Africa's resource-intensive response that involved military provision of trucked water, and widespread community engagement and education activities, distribution of ORS and makeshift hospitals for the treatment of patients, is a case in which health promotion gave good results (Echenberg, 2011; Sack et al., 2004). On a more modest scale, personal hygiene promotion programmes in South Sudan changed people's knowledge and motivations for hygiene habits, however, the means by which to put this knowledge into practice is extremely limited due to scarcity of resources (IOM 2011: 21). In Malawi, despite gains made by hygiene promotion and the provision of safe drinking water, cholera outbreaks persisted due to 'poor sanitation, salty borehole water and frequent breakdown of piped water supply and boreholes' (Msymboza et al., 2014: 724).

This risk of persistence is what the Global Taskforce for Cholera Prevention and Control aims to address by combining the emergency response with a bridge to development, i.e. investing in rolling out basic WASH packages after the emergency response is over. A basic WASH package would include access to safe drinking water sources, access to improved sanitation facilities, access to hand washing station with soap and water, and a community hygiene promotion programme (Global Task Force on Cholera Control, 2017). Eventually long-term investment in sustainable safe piped water and systems of sewage removal and treatment will be necessary, as there is evidence that in some cases of successful Community Led Total Sanitation (CLTS) programmes, the use of latrines may be discontinued in subsequent years if support is also discontinued (Gill & Pattanayak, 2018). Similarly, behavioural changes in household water filtering, purification and chlorination are sometimes discontinued in the following months or years of an intervention (Huq et al., 2010; Taylor et al., 2015). The challenge will be for the Task Force to mobilise funding due to insufficient commitment by donors (M. Piarroux, 2018).

Hygiene prevention activities can work with local frameworks of hygiene. As mentioned above, ideas of dirt and pollution are common in different cultures. Notions of 'dirt' can play a pivotal role in community and individual responses to disease risk and avoidance (Williams et al., 2010). Hygiene prevention exercises that combine visually appealing methods – when things are seen and smelt (ibid: 178) and that appeal to these (sometimes emotional) reactions towards dirt can be successfully used (Chambers & Myers, 2016).

First-hand empirical experience is crucial for behavioural change. If people are perceived to carry out so-called 'risky behaviours' with no consequence to them, this decreases the community perception of risk (Williams et al., 2010). This is particularly problematic in diseases such as cholera, in which up to 80 percent of cases can be asymptomatic, but can still transmit the disease. Similarly, for behaviour to change, people need to have a feeling of control and collective responsibility. Initiatives were less successful when people felt that other community members or local institutions were not doing what was required of them to decrease the transmission (e.g. unblocking drainage canals, clearing yards and rubbish). Strong community

⁴ The unpleasant taste of chlorine or Aquatabs may mean some look for 'sweeter' surface water in rivers after the rains, as was the case in Somalia, with some people needing reminder that the initial rains wash the runoff of faecal matter into the streams (Ripoll, 2017). It is common for people to discontinue use of water chlorination due to bad taste (Taylor, Kahawita, Cairncross, & Ensink, 2015).

networks and accountable local institutions make behavioural change programmes such as Open Defecation Free (ODF), Community Led Total Sanitation (CLTS) and Participatory Hygiene and Sanitation Transformation (PHAST) more successful (ibid.).

Messaging has to be pragmatic and positive. Rather than focusing on negative behaviours, it should focus on positive behaviours, for instance, cholera campaigns 'need to empower and build people's capacity and confidence to manage risk' (Williams et al., 2010). Enabling communities to manage risk would involve understanding how people want to manage risk, what are reasonable and feasible expectations from citizens and how they can be supported. (Ida Marie Ameda- personal communication). As indicated in the sections above, targeting particular cholera affected communities for hygiene promotion may contribute to their stigmatisation. To address this, M. Nations and C. Monte (1996) suggest applying preventative measures 'across-the-board to all economic classes and all persons in endemic regions' (1996:1021). This is a challenge, since due to lack of donor commitment, there is limited funding for cholera preparedness and response in endemic settings.

As part of household prevention activities, in houses where a case has occurred, disinfection is recommended. Household disinfection kits that normally include a bucket, bleach, soap, cloth and scrubbing brush can be delivered as part of the response. It is important to avoid singling out households with cholera patients to avoid stigma (Taylor et al., 2015). Nations and Monte have indicated that targeting households at risk in health promotion can also lead to stigma as people may feel singled out. As an alternative, they suggest that the promotion of healthy hygienic practices (hand washing, faeces disposal, in-home water treatment) are 'delivered as an integral part of people's daily life routine rather than an extraordinary cholera-linked measure' (M. K. Nations & C. M. Monte, 1996: 1020-1).

Trade restrictions

The fear of cholera epidemics has led countries in the past to undertake travel and trade restrictions. These restrictions however, have often been counterproductive as many people are carriers of the disease but asymptomatic. Trade and movement restrictions have mostly failed to meet their objectives. For example, when the Latin American epidemic started in Peru in 1991, Chile had imposed travel restrictions yet failed to prevent the disease from entering the country (Joralemon, 1998). WHO highlights how these restrictions are have been costly and ineffective, and that there is no evidence of cholera outbreaks occurring as a result of food commercially imported into a country. The few isolated cases of cholera transported by food has been carried by individual travellers crossing borders (WHO, 2018e).

Vaccination

Oral cholera vaccination has proved a very powerful tool to stop the further transmission of outbreaks. Currently three vaccines, Dukoral, Euvichol and Shanchol, are readily available and approved by the WHO. Before 2010, the WHO was initially reticent to recommend vaccines during outbreaks, as they might distract efforts towards the most effective way of dealing with symptoms, rehydration therapy. Vaccination was to be used as a pre-emptive strategy (Lena Lopez, 2017). Yet vaccination is now recommended, and a global stockpile is available to respond to outbreaks.

The oral cholera vaccines are protective almost immediately, providing protection for at least three years, they also have a 76% effectiveness (although this is lower in under-5s) (Global Task Force on Cholera Control, 2017). This lack of 100% effectiveness is common across all vaccines, and requires adequate explanation to the population, as they may witness first-hand, people who are vaccinated yet still get cholera, and thus may lead to mistrust in the vaccine. (Heyerdahl et al., 2017). Mistrust can arise from people getting infected before or during vaccination before the immunity is produced, therefore contracting cholera despite having received the vaccine (ibid.). This is important as vaccines are meant to be delivered as part of a comprehensive package including WASH interventions.

Potential side effects (e.g. vomiting, nausea), are unusual, often mild and short-lived. Despite this, they need to be explained, as witnessing people with negative side effects has allowed for stories of the vaccine causing the disease, to flourish in particular contexts (Porta et al., 2014). Despite this, oral cholera vaccines have high levels of acceptance across different contexts, for example, Bangladesh (Saha et al., 2017), South Sudan (Abubakar et al., 2015) and DRC, Zanzibar and Kenya (Schaetti et al., 2013). As mentioned above, even if there are discrepancies in the causal explanations of cholera, this does not preclude those people seeking vaccination (Merten et al., 2013). Exceptionally Merten highlights that those who are negatively affected in a social context by the cholera response were less likely to seek vaccination, such as fishermen in Malawi, who had had been singled out as transmitters of the disease (Merten et al., 2013). Other reticence by a minority of respondents (and not particular to cholera) are fears of the vaccine having negative side effects, its incompatibility with alcohol, or that they may be too busy to seek the second dose (that confers higher levels of immunity).

Type of preferred provision will depend on the social group, so a rapid survey with an ethnographic component before vaccination exploring knowledge and attitudes towards the disease, its transmission, treatment and prevention is valuable. For example, in South Sudan camp dwellers preferred a vaccine outpost, a fixed site to seek vaccine, whereas host populations preferred mobile vaccination (Porta et al., 2014). In the case of pastoralist communities in South Sudan, vaccinations for children taking place in the same geographical locations as livestock vaccinations, increased participation, as did cross-border mobile clinics, to adapt to the mobility of these groups (Ripoll, 2017).

The cholera vaccine has the capacity to confer herd immunity, so even unvaccinated individuals within vaccinated communities are protected against cholera (Saha et al., 2017). Further to this, the vaccine can be so effective that it can redress the socioeconomic vulnerability to the disease. Without vaccination, poor people and those living in crowded quarters are more likely to get the disease, yet these variables no longer shape incidence in vaccinated communities (ibid.). That said, cholera will not be eliminated unless appropriate sanitation is in place, hence vaccination can help 'provide protection for a population while sustainable WASH interventions are being implemented' (M. Piarroux, 2018).

The oral cholera vaccine has also been successfully used in a preventative fashion. The South Sudan Ministry of health predicted that a combination of crowding in refugee camps, poor water and sanitation, malnutrition, high incidence of diarrhoeal illnesses and the coming of rains would make a cholera outbreak very likely. South Sudan applied to the WHO and the Oral Cholera Vaccine stockpile to obtain enough doses for a preventative vaccination campaign in the camps. The result of the campaign was very positive, with little or no transmission in the camps (Abubakar et al., 2015; Taylor et al., 2015). This pre-emptive strategy has been successful in other contexts, for example in refugee camps in Tanzania and amongst fisherfolk communities in Malawi (Ida Marie Abeda, personal communication).

Prevention recommendations:

Operational

- Work with local understandings of hygiene, e.g. building on ideas of dirt and pollution to shape hygiene messaging. Use positive measures that convey a feeling of control, appealing to visual and emotional triggers.
- Work with community leaders and trusted individuals to mobilise the population in hygiene prevention measures.
- Assess the populations' previous historical experience with vaccination, and clearly explain the side effects and protection rates of the vaccine. Explain that as with other

vaccines, 100% protection is not possible and the importance of other risk-prevention measures. Tailor messaging particularly to people affected by cholera stigma (e.g. fishermen) as they may have added reservations towards the vaccine.

- Use KAP and rapid ethnographic survey to assess people's attitudes to the vaccine and different social groups' preferences in delivery; door-to-door, mobile clinics, centres, etc. Use transboundary vaccination and link to other service provision (e.g. animal vaccination in the case of pastoralists) when appropriate.
- Acknowledge in messaging that the cause of the outbreak is inadequate sanitation, not breaches in personal hygiene, yet conveying that water treatment and hygiene are the available activities to pursue whilst rebuilding the WASH system.
- Integrate hygiene messages into longer term non-cholera specific hygiene prevention campaigns to avoid discontinuation of positive behaviours.

Building capacity

- As cholera control measures can be a way of singling out the poor and the marginalised, ensure funding is available in order to implement control measures that are applied across-the-board to all economic classes and all persons in endemic regions.
- Basic WASH infrastructure must be put into place at the same time that hygiene promotion programmes are rolled out.
- Ensure linkages between humanitarian and development programmes in the development of sustainable WASH infrastructure in endemic cholera settings

6. Local understandings of cholera and health-seeking practices

Local typologies and explanations of diarrhoea, and of cholera diarrhoea

For an adequate cholera response and successful engagement with communities, there is a need to ascertain what Bentley et al (Bentley et al., 1988) call a 'folk taxonomy of diarrhoea'. Identifying the local types of diarrhoea, the local causal explanation and the treatment for each one, proved successful in treating diarrhoeal infections with Oral Rehydration treatment in Honduras (1988). This knowledge can be achieved by means of a rapid ethnographic assessment.

Please note that in many contexts (particularly those in which cholera is endemic) lay people understand the different types of diarrhoea (including cholera diarrhoea), and will react differently depending on the diarrhoea, with different perceptions of risk or urgency, therefore, seeking treatment from different providers.

For example in Somalia, the main local typologies of diarrhoea are (Carruth, 2011; Food Security Analysis Unit, 2007):

- *Shuban* – normal diarrhoea
- *Shuban biyoot* – literally watery diarrhoea. It is a merely descriptive term, it does not carry the emergency connotations that AWD carries in humanitarian agencies.
- *Shuban Dhiig* – dysentery, literally bloody diarrhoea
- *Daacuun* or *Kaloraa* – cholera diarrhoea, whitish like the colour of water after boiling rice.

When encountering *shuban* or *shuban biyoot* diarrhoea, carers will initially treat with prayers combined with homemade or purchased ORS, and if it does not resolve, they might seek help from biomedical or traditional healers, in which herbal and prayer treatments will be used. If the traditional treatment fails, the child is brought to the health facility. With *shuban dhiig*, traditional remedies (including the use of ghee, soups, watermelon juice, fermented milk and roots) are used, and if these fail, a biomedical doctor is approached. In the case of *daacuun*,

cholera diarrhoea, carers often perceive the urgency and take the child or adult immediately to the clinic (Carruth, 2011: 218), without the preliminary steps of homemade remedies or herbal treatment. It is only when clinics are inaccessible that patients will be offered home-made or purchased ORS. Often in different contexts there is a rural-urban divide, with urban dwellers more likely to appeal to biomedical treatment across all diarrhoea types (ibid.).

As mentioned above, it is crucial to use local wording in cholera communication so it is in line with local typologies of diarrhoea symptoms and the connotations of risk that they convey. Carruth witnessed how the use of the phrase 'acute watery diarrhoea' (AWD) rather than the label 'cholera' in messaging (i.e. using *shuban biyoot* rather than *daacuun*) in radio broadcasts failed to convey the importance of the cholera outbreak.

Because aid and governmental agencies resisted publicly defining AWD as 'cholera' or even suggesting a connection between the two, the translation of AWD into *shuban biyoot* elided the potential urgency of a cholera epidemic among the local populations involved, and left unexplained to them the rationale behind such dramatic media attention and dramatic changes in humanitarian programming (Carruth, 2011: 219).

A similar misrepresentation of risk through inadequate use of language occurred in Pakistan, where the generic Urdu word for diarrhoea (*daast*) had been used by ORS planners, mothers had not perceived the situation as threatening. This is because the word *daast* does not include severe diarrhoeal diseases such as dysentery or cholera. Cholera diarrhoea in Urdu is called *hehza*, and should be the word used for cholera messaging (Mull & Mull, 1988).

It is likely that each context will have different taxonomies of diarrhoea, and they will relate differently to the models of health/disease that is articulated, and will elicit different patterns of health-seeking and specific treatments (Weiss, 1988). For example, amongst the Quechua, the generic term for diarrhoea is *ishpuy*, with two major types established, green diarrhoea (*verde ishpuy*) and yellow diarrhoea (*jarwash ishpuy*). Diarrhoea can have very different causes, ranging from imbalances in the 'hot/cold system, to spiritual causes (such as *susto* and evil eye), to "developmental aetiologies" (such as teething and lactation) to dietary imbalance and infection (*infection*).' (Bentley et al., 1988). Different herbal remedies or allopathic remedies were administered depending on the diarrhoea and aetiology, including ritual cures for spiritual causes (ibid.). Bentley does not lay out what treatment applies to each kind (or several kinds) of diarrhoea, the treatment sought depending on the aetiology and the different providers that would be sought if treatment was not 'working'. These would need to be ascertained to best understand local understandings of diarrhoeal disease and the space that cholera occupies in the system.

In Bangladesh, *dasto* in Bangla (like *daast* above) includes (i) undifferentiated diarrhoea (ii) diarrhoea with vomiting or weakness (which some call cholera using the English word) (iii) *amasaya*, dysentery or bloody diarrhoea and (iv) *buniaga*, greenish or yellowish diarrhoea with mucus. People perceive bloody diarrhoea and 'vomiting diarrhoea'/cholera as requiring immediate treatment (Edward C Green, 1986). As in other contexts, aetiological explanations range from natural to spiritual causes, the consumption of spoilt food, dirty water, increases in heat in the body or the environment, evil spirits, evil eye, bad air or God's will and spoilt breastmilk (ibid.). Bangladesh incorporated community understandings of diarrhoea to adapt their ORS campaigns, and they are a success model in scaling up uptake (with over 80 of children with diarrhoea treated with rehydration solutions) (Huda, 2017; Wilson et al., 2013).

Weiss (1988: 9) reviewed explanatory models of diarrhoea that recurred across different cultures:

- (1) Foods that are fatty, not cooked adequately, heavy, etc.

- (2) Imbalance of heat and cold that may be associated with foods, exposure to drafts or seasonal changes
- (3) Normal or poor quality breast milk
- (4) Physical factors, such as a fall or poor caretaking
- (5) Supernatural causes, including possession, sorcery or evil eye
- (6) Pollution from exposure to or inauspicious contact with ritually impure persons or things
- (7) Moral misbehaviour, including deeds of the sick person or the sick child's parents, especially promiscuous sex and sexual intercourse or pregnancy while breastfeeding
- (8) Natural consequence of milestones, especially teething, crawling and walking
- (9) Infection, which can be associated with hygiene and sanitation (but which may be difficult to distinguish from ideas about pollution)

As we have seen in the sections above, in many contexts cholera diarrhoea would be identified as (9) with infection and hygiene deficiencies, although this may not be the case in all contexts. In some countries or social demographics within countries, alternative explanation may occur. In some areas of Mozambique, cholera was identified as provoking 'vomiting and diarrhoea and perhaps by pain and "heat in the stomach." Its cause was said to be spirits bringing bad luck or perhaps revenge. Its treatment is similar to that for other diarrhoeas and involves cutting roots, boiling them in water, and giving the decoction to drink' (Edward C. Green, Jurg, & Djedje, 1994: 12).

In some systems, like the Bangladeshi diarrhoea *dasto*, or the Mozambican *manyoka*, there is no terminology for the biomedical syndrome of 'dehydration', although when asked, people can identify the symptoms (Weiss, 1988). For example in Mozambique, mothers identify the symptoms of diarrhoea related dehydration, such as the depressed fontanelle, sunken eyes, or skin that has lost elasticity (Edward C. Green et al., 1994). In Mozambique there is a specific illness identified with a sunken fontanelle (a symptom of dehydration) *nhoua* or *chipande* (Colvin et al., 2013: 69). In Tanzania, mothers would speak of children looking like 'wizened old beings' or having 'sunken eyes', although not necessarily linking these to the diarrhoea (Mabilia, 2000). Whilst the causality is on occasions reversed, the sunken fontanelle can be believed to be the cause of the diarrhoea rather than the other way round, the implication is that local language can be used to elicit responses to both particular symptoms of diarrhoea and dehydration.

In cholera epidemics, the use of local language and simple terms has proven to have a positive impact, for example, in cholera communication in Mozambique (Démolis et al., 2017). When conducting a rapid ethnographic assessment of diarrhoeal illnesses in the context of a cholera outbreak, it is important to know that there will likely be some discrepancies amongst respondents in the terms used and the aetiologies assigned as they are not set in stone (Weiss, 1988).

Care and treatment-seeking

Biomedical

As we have seen above, cholera is a disease that can generate fear and stigma, and this can translate into different patterns of treatment-seeking. Amaah reported people in Cameroon who refused to carry their family members to the medical centre due to fear of getting infected, and affected individuals and households would refuse to seek help due to fear of stigma (Amaah, 2014). Similarly, Nations and Monte report of people 'hiding' their symptoms from health authorities in Northeast Brazil, as some downplayed the risk or even the existence of the disease, and they perceived being treated like 'dogs' by the health authorities. They also showed 'marked resistance and delay in seeking biomedical services' (M. K. Nations & C. M. Monte, 1996: 1020).

In many contexts, cholera deaths are underreported because people do not reach a hospital in time (Farmer et al., 2011: 1145). Timely treatment with Oral or IV Rehydration Therapy and,

if necessary, antibiotics should reduce the Case Fatality rate to zero. Even when people wish to seek treatment for cholera in a biomedical clinic, it can be curtailed by the remoteness and 'perceived quality care, competing obligations, recognition of a need for a treatment and so on' (Schaetti et al., 2013: 206). The distance to the nearest health centre determine peoples access to health, as does the available transport, the cost of transport and healthcare, which explained, together with the conflict, the high mortality of the cholera pandemic in Western Kenya (Shikanga et al., 2009).

When the cholera response is underway, the majority of costs to communities are indirect, as the cholera treatment units and NGO-led health clinics usually offer free care. Yet these indirect costs (food, loss of income due to absence from work, transport, accommodation of family members and so on), have an important impact on families of cholera patients and their social networks (Schaetti et al., 2013). Households with higher income and higher education are more likely to seek treatment and are expected to have lower case fatality rates (Kirby, 2001).

Other factors can affect access, for example conflict or riots can prevent people reaching the clinics as was the case in Somalia (Ripoll, 2017), Haiti (Farmer et al., 2011), Kenya (Shikanga et al., 2009) and Zimbabwe after the 2008 elections (Youde, 2010). The disruption can go beyond curtailing peoples movement, for example, in the Nyanza Province in Kenya, ethnic conflict meant health staff of rival ethnic groups had to leave their posts, and the health facilities had shortages of rehydration solutions for both oral and intravenous treatment due to disruptions in supplies (Shikanga et al., 2009).

Household decision-making will determine if and when treatment is sought for diarrhoea, which can have important consequences in outcomes. For example, in Zimbabwe and Tanzania, 'mothers [needed] to get permission from their husbands to seek care outside of the home, and in particular, spend money in the course of that care. (...) When fathers were not available women still often had to get permission from the fathers' parents or other elders to treat children resulting in even greater delay (...)' (Colvin et al., 2013: 70). Colvin et al.'s work, however, was under normal conditions rather than a Cholera outbreak, in which treatment-seeking behaviours might change significantly and the study does not account for social differences within countries. In other contexts, these traditional patriarchal mechanisms may no longer apply, for example, in Sierra Leone women do indeed consult their husbands, but they would never be prevented from seeking treatment for herself or a family member in a serious situation like cholera (Rancourt, 2013). In particular contexts, gendered norms may translate into carers seeking diarrhoea treatment and providing ORS more readily for boys than for girls, although these gendered norms (Pandey et al., 2002) may have evolved since then and the study does not take place during a cholera outbreak, in which these preferences may differ.

Cholera treatment Centres (CTC), Cholera treatment units (CTU) and Oral Rehydration Points

Cholera treatment centres (CTC) and cholera treatment units (CTU) have been used in cholera epidemics to reach more remote locations to enhance access to treatment and to separate cholera patients to prevent transmission in healthcare facilities. Coupled with community awareness of cholera symptoms, the establishment of treatment centres with adequately trained staff in communities have the potential to 'improve early detection and prompt proper treatment of cases and thereby reducing [mortality]' (Msyamboza et al., 2014: 724-5). The treatment that has brought case fatality rates from 50% to under 1% has been the use of Oral Rehydration Therapy, in oral solution in milder and moderate cases and IV in severe cases of dehydration. Antibiotics are also administered in severe cases, as they reduce the 'purging' time, hence reduce the time in which a patient is transmitting the disease, less IV fluid will be necessary per patient, and less time of use of hospital bed will be necessary, these are all scarce resources in an epidemic (Farmer et al., 2011; Sack, 2011). The overuse

of antibiotics in normal times and the rise of antimicrobial resistance is alarmingly limiting the range of antibiotics available for use during outbreaks, as was the case in Zimbabwe in 2018 (WHO, 2018a).

CTC are specialised centres normally of around 100-400 beds. CTUs are smaller, have 15-20 beds and are often attached to existing health clinics. Oral Rehydration Points (ORP) treat people with milder symptoms, providing Oral Rehydration Solutions. ORPs are used for people's first port of call when experiencing watery diarrhoea, and will be treated there for dehydration, or in the case of severe cases, patients would be referred to Cholera Treatment Units/Centres.

This decentralised provision of care has been largely successful, although in some cases the reach has varied regionally and some people have still had problems accessing these treatment centres, such as in Zimbabwe during the 2008-9 outbreak (Morof et al., 2013) or rural Haiti in the aftermath of the earthquake (Farmer et al., 2011). People may have, however, an ambivalent feeling towards these decentralised health posts. For example, they are satisfied to have easier access, but they may question if staff are skilled enough to perform core tasks, such as providing intravenous fluids and preventing infection between patients (Msyamboza et al., 2014; Ujah et al., 2015). It is the responsibility of the response to ensure these volunteers are appropriately trained and to communicate this via messaging, explaining where treatment can be sought, and reassuring people of staff capabilities and stocks of rehydration solutions. In Haiti in 2011-12, some rumours circulated about people not being treated correctly in the treatment units, and of people having to pay for treatment when it was supposed to be free (British Red Cross, 2016). Whilst the decision of administering fluids orally or intravenous is based on the degree of dehydration of the patient, communities on occasions see IV as 'more effective', even thinking they have not received 'real' treatment if it is not by IV. The fact that primary treatment is ORS and IV treatment is for severe cases may need to be emphasised in messaging (Ida Marie Abeda, personal communication).

Cholera treatment units and centres can be a potent symbol of the response, and when there is community resistance, attacks can be directed at these premises, as was the case in Haiti or Mozambique. Similarly, in particular contexts, these treatment units can play a role in symbolically 'othering' the victims of cholera, contributing to their marginalisation. Nations and Monte show this is how cholera patients felt:

'when health authorities target endemic cholera enclaves, implement door-to-door disease surveillance, erect highly visible cholera treatment tents in town centres, and set up barricades to contain the disease's transmission, she feels like a huge dog collar is being tightened around the rabid, *choleric* community' (M. Nations & C. Monte, 1996: 1019)

Nations and Monte's recommendations in these contexts of resistance is to further decentralise, as much as possible, to household treatment, and to 'avoid "high visibility" control interventions such as community "cholera tents" and community wide testing in public places: private, discrete face-to-face instructions will probably more effective' (M. Nations & C. Monte, 1996: 1020).

Alternative health providers

In many contexts in which cholera may emerge there is a multitude of health providers. Therapeutic options can range from home remedies, herbalists, traditional healers, private and public biomedical clinics, community health workers and drug sellers. These therapeutic options often coexist. For example in India, traditional medicine, ayurvedic healers, homeopathy, home remedies, private providers, drug vendors, are all sought for in the treatment of diarrhoeal diseases (Simanjuntak et al., 2004; Sur et al., 2004).

As mentioned above, people will resort to these different providers depending on the kind of diarrhoea and other symptomatology that they see, and the causal explanation that they attribute to it. Urban dwellers are more likely to seek treatment in biomedical centres than rural people, although that may vary across context.

What is important is that when people articulate alternative aetiologies of the disease and receive treatment from healers or other alternative health providers, this does not mean they may not also simultaneously or subsequently seek help from biomedical clinics or pursue allopathic therapy such as ORS or antibiotics. Depending on the symptoms and the disease identified, the pathways of treatment-seeking will differ: in the case of urgent illness such as cholera, which are recognised as needing immediate treatment, families may go directly to the health clinic. This was the case of cholera in Somalia: when mothers identified the *daacuun* rice water diarrhoea, they sought immediate biomedical treatment, whereas would pursue alternative pathways for other diarrhoeas (Carruth, 2011; Food Security Analysis Unit, 2007; Ripoll, 2017). Below is a non-exhaustive list of alternative health providers:

- **Home remedies and use of herbal remedies.**

In DR Congo, Zanzibar and Kenya, households prioritised the use of homemade or purchased Oral Rehydration Solutions and rehydration in general. In Zanzibar, particularly in rural areas, herbal treatment was also sought. In parallel to these treatments, prayer was also used (Schaetti et al., 2013). Oral rehydration therapy can be used in a preventative fashion. In Peru, in 1990, epidemiological data had predicted a bad year for diarrhoeal disease, and 1.3 million household rehydration kits were delivered, as well as supplies of IV fluid to hospitals. Coupled with a communication campaign, the mortality rate when the cholera outbreak occurred was lower than expected (Joralemon, 1998: 30).

- **Drug vendors**

In many contexts in Sub-Saharan Africa, drug sellers are trusted advisors for initial treatment of diarrhoeal illness and are seen as 'more flexible and more responsive' than health clinics (Colvin et al., 2013: 72). They may also be cheaper and more readily available than formal health care (ibid). In response to mild cholera, people will, on top of the home-consumption of ORS, purchase antibiotics (Schaetti et al., 2013).

- **Traditional healers**

These are perceived to be more attuned with people's needs, and they are appreciated for 'taking time to listen to caregiver, for taking their concerns and perspectives seriously and for offering detailed and understandable explanations of illness episodes' (Colvin et al., 2013: 72).

- **Faith healers**

In many contexts, religious authorities can practice rituals and prayers, on occasions combined with herbal or allopathic treatments to treat disease. This is the case of Islamic healing in Somalia (Ripoll, 2017) and faith healers in Zimbabwe (Morof et al., 2013).

It is important to note that during past cholera outbreaks it has not necessarily been the case that the biomedical response competes with alternative providers. In the cholera outbreak in KwaZulu Natal in South Africa, preachers and healers generally cooperated with efforts to treat cholera in line with the response (Echenberg, 2011: 148). Similarly, in Zambesia province in Mozambique, healers learnt from the local health services the importance of hydration and started recommending fresh coconut milk (which works well as a disinfected ORS solution) (ibid: 138). In some cases, like in Mozambique (as above), the traditional treatment for cholera was boiling roots, a process which can be adapted to meet rehydration goals (Echenberg,

2011; Edward C. Green et al., 1994). Briggs also reported in Venezuela how healers incorporated biomedical treatments in their work, and confirmed the effectiveness of biomedical treatment for cholera (Briggs, 2004: 172)

The use of rehydration therapy, particularly in the case of treating severe patients, has an important effect in appealing to people's first-hand experience. People are literally brought back from the dead when they are applied intravenous rehydration, an effect that no other non-biomedical treatments could achieve (Briggs, 2004). This perceived effectiveness of rehydration therapy underscores the high acceptability of the treatment across many contexts.

Local understandings and health-seeking recommendations:

Operational

- Define in each context the different taxonomies of diarrhoea, how they relate to different models of health/disease, patterns of health-seeking and specific treatments.
- Use the local word for cholera in messaging in an epidemic. If AWD is to be used, then it is important to convey the urgency of outbreak.
- Whenever possible, outsource management of dehydration to households in the form of purchased or homemade ORS.
- Understand if there are any social (e.g. gender, age) factors that determine household and community health-seeking practices (in general and in the context of cholera) and address through messaging and community engagement
- Ascertain the symbolic importance of 'white tents' and treatment units/camps in the cholera outbreak, and if they may exacerbate feelings of social exclusion of patients. If so, seek less visible places of treatment.
- Communicate where treatment is available, but also convey the quality of treatment-how cholera cannot be transmitted there, the training of staff and the availability of supplies.
- Identify and work with alternative health providers, helping them identify the symptoms of cholera, and work with them to refer severe cases to hospitals or cholera treatment centres, and to treat mild and moderate cases with purchased or homemade ORS.
- When promoting ORS, where possible, work using the local disease frameworks and recommend variations on traditional treatments that serve as rehydration solutions.

7. Burial practices

Burial practices may contribute to the transmission of cholera. The bodily fluids emitted by deceased people's bodies contain large amounts of the bacteria and are highly infectious. Public health recommendations directed at avoiding contagion may contrast with the needs of mourners and communities. UNICEF guidelines discourage mourners touching or kissing the body, discourage the preparation of the body by family members (including the emptying of the intestines), recommend the disinfection of the body and the burial in a body bag (UNICEF, 2013). This contrasts with the customary rites of washing the bodies, which exist, for example in Somalia and other Islamic countries, in which *adar* is practiced. Women family members wash women's bodies and men wash men's bodies, with a small cloth whilst performing prayers in the presence of an Imam (Venhorst, Vanbrux, & Quartier, 2011). Bodies are also washed in other contexts such as certain social groups in Zimbabwe. There are experiences of conducting these rituals with family members using disinfectant and gloves in the funeral rites amongst Somali migrants in the US and Netherlands. The cholera response needs to be aware of the needs of communities and adequately inform family members. For example, in Zimbabwe people could not understand why they were not allowed to touch the bodies, and

why they were put in body bags and families could not take them home for burial (Chigudu, forthcoming).

Another vehicle of transmission of cholera surrounding a death would be funeral feasts, although it is not particularly common. In the contexts in which cholera is endemic, such as in the Ganges delta, this form of transmission is not found. In other contexts, such as Sub-Saharan Africa, funeral feasts immediately after death are not as usual (Sack et al., 2004) and vary according to context, for example they do exist in Anglophone West Cameroon (Jindra, 2011). In West Papua, where traditionally every attendant would touch the body of the deceased and funeral feasts can occur, the cholera response engaged with key celebrants, encouraging people to wash their hands after touching the body with the provision of hygiene kits (bucket, soap, etc.) (Oxfam GB, 2012). Attention would focus on promoting hygiene amongst those engaged in cooking, particularly if they have been involved in preparing the body.

The choice of burial location is important, as it is important for bodies to be buried in places that are culturally appropriate yet not in places that can contaminate water beds (Farmer et al., 2011). Farmer also reports of the importance of working with funeral parlours and other individuals involved in treating and burying bodies, as there might be stigma, and on occasions in Haiti, funeral workers have refused to take in bodies of people who died of cholera (ibid.).

Burial practice recommendations:

Operational

- Engage with communities to seek burial sites that do not contaminate aquifers or other water sources.
- Work with community and faith leaders to incorporate public health activities e.g. disinfection with gloves) into rituals whilst maintaining their cultural and emotional significance. Similarly, ensure that if clothes are to be kept or shared, these need to be washed/disinfected beforehand.
- Work with key organisers of funeral feasts to ensure hand washing, with the provision of hygiene kits if necessary. Also ensure that those who wash bodies do not prepare food.

Building capacity

- Public authorities must engage with funeral parlours and individuals in charge of preparing and burying bodies, and roll out training in safe techniques for preparing bodies of people who died of cholera (e.g. not emptying the intestines).

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