

- Stop Stock-outs Campaign. 2010. *What are stock-outs?* <http://stopstockouts.org/stop-stock-out-scampaign/what-are-stock-outs/>. Accessed 28 Dec 2012.
- Stop TB Partnership. 2011. *Global drug facility annual report 2011*. [http://www.stoptb.org/assets/documents/gdf/whatis/GDF\\_Annual\\_Report\\_2011\\_web\\_lowres.pdf](http://www.stoptb.org/assets/documents/gdf/whatis/GDF_Annual_Report_2011_web_lowres.pdf). Accessed 28 Dec 2012.
- World Health Organization (WHO). 2009. *Global tuberculosis control 2009: Epidemiology, strategy, financing*, 37. Geneva: World Health Organization.
- World Health Organization (WHO). 2012. *Global tuberculosis report 2012: Executive summary*. [http://apps.who.int/iris/bitstream/10665/75938/1/9789241564502\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/75938/1/9789241564502_eng.pdf). Accessed 3 June 2015.
- World Health Organization (WHO). 2015. *Essential medicines*. [http://www.who.int/topics/essential\\_medicines/en/](http://www.who.int/topics/essential_medicines/en/). Accessed 24 June 2015.

## 8.9 Case 5: Transmitting Cholera to Haiti

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### 8.9.1 Background

Cholera is caused by infection with *Vibrio cholerae* bacteria, which colonize the small intestine and produce cholera toxin. The disease is characterized by sudden onset of severe, watery diarrhea and vomiting. Left untreated, cholera rapidly leads to dehydration and shock. Severe cholera can be fatal in more than 50 % of cases. Prompt treatment reduces the case fatality rate to less than 1 % (Boore et al. 2008). Treatment primarily addresses the loss of fluids: patients should be aggressively treated with oral rehydration solution or, if severely dehydrated, through intravenous fluids. Treatment with antibiotics shortens the course of the disease.

Cholera is transmitted through contaminated food or water. In developing countries, where most infections and deaths occur, inadequate sanitation is frequently the cause of the spread of *V. cholerae*, as untreated fecal matter from cholera sufferers leaks into the water supply. Each year, 3–5 million cases of cholera occur, leading to about 120,000 deaths (Harris et al. 2012).

Cholera is endemic in more than 50 countries. In many places, cholera outbreaks are seasonal—flaring up during the rainy season and dying down again during dry periods. Outbreaks can be prevented or contained by properly treating sewage, promoting rigorous hygiene practices, and sterilizing drinking water. Two oral cholera vaccines are commercially available but not included in most cholera control

programs, although the World Health Organization (WHO) recommends them for use in outbreaks and for high-risk populations (WHO 2010). Before 2010, Haiti had not experienced cholera for at least a century.

Haiti, a country of ten million people, occupies the western portion of the island of Hispaniola in the Caribbean. Although its per capita gross domestic product (GDP) is about \$1,200 (Central Intelligence Agency 2012),<sup>13</sup> a tiny elite controls most of the country's wealth. With 80 % of the population living below the poverty line, Haiti is the lowest-ranked country in the Americas on the United Nations (U.N.) Human Development Index (UNDP 2011). The economy depends heavily on remittances from Haitians working abroad and on foreign aid.

Life expectancy in Haiti is 62 years, while infant mortality is 52 per 1,000 live births (UNDP 2011). Sixty-four percent of Haitians have access to an improved water source (i.e., one that is protected from outside contamination), but just 26 % have access to improved sanitation (i.e., a facility that separates human excreta from human contact) (WHO/UNICEF 2013). Communicable diseases, including HIV/AIDS, tuberculosis, diarrheal diseases, and malaria remain substantial causes of disability and death. There are severe shortages of physicians, nurses, hospital beds, and essential medicines. About 6 % of GDP is spent on health, of which three-quarters is private expenditure. Out-of-pocket spending on health care is extremely high (UNDP 2011).

Haiti has a long history of political instability, characterized by multiple coups, foreign interference and occupation, and extended periods of dictatorship, notably under François Duvalier (Papa Doc) and his son Jean-Claude Duvalier (Baby Doc) between 1957 and 1986. Following a coup in 2004, the U.N. stationed peacekeepers in Haiti. The U.N. Stabilization Mission in Haiti (MINUSTAH) has been in Haiti ever since.

In January 2010, a magnitude 7.0 earthquake struck Haiti. Hundreds of thousands of people died and up to a million were left homeless. International aid agencies, donor governments, and nongovernmental organizations (NGOs) mobilized rapidly in response, and substantial amounts of money and aid were promised to assist in rebuilding.

### **8.9.2 Case Description**

In mid-October 2010, upstream of the Artibonite River, a sudden rush of people began presenting at the local hospital with acute diarrhea, signaling the first cholera cases. People living nearby use the river extensively for washing, bathing, and drinking water; farmers downstream use it for irrigation. Within days, the spread of cholera to the Artibonite River Delta and settlements on the coast had overwhelmed local clinics and hospitals. The facilities lacked cholera cots that allow patients to defecate hygienically from their beds, while insufficient space for all patients prevented isolation of cholera victims. For the thousands of sufferers, the supply of

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<sup>13</sup> Purchasing power parity in 2011 U.S. dollars.

doctors, nurses, and rehydration packs proved inadequate. The epidemic exploded across Haiti. Since cholera was not endemic, the population lacked immunity. Within months, thousands of people had died and hundreds of thousands had been sickened.

NGOs and some international donor agencies, including from the U.N., who were already in Haiti dealing with the aftermath of the earthquake, diverted resources to combat cholera. They distributed medical supplies, organized educational campaigns on cholera prevention, trucked clean drinking water and water purification tablets across the country, and worked with local hospitals to institute rigorous infection control measures.

The Haitian and international response to the cholera outbreak rapidly brought the case fatality rate from around 9 % to less than 1 %. Although the outbreak died down, the aid efforts failed to rectify the dire state of Haiti's water and sanitation infrastructure. During the rainy season, cases would spike again, exposing the difficulty of improving the Haitian health care system so that it could respond to new outbreaks without external assistance.

Haiti had been cholera-free for more than a century—so how had cholera got there? Almost as soon as the outbreak started, rumors circulated blaming U.N. peacekeepers. A contingent of soldiers from Nepal, where cholera is endemic, had arrived in October 2010. They were stationed at a camp on a tributary of the Artibonite River near where the outbreak began. Waste management at the base was rumored to be inadequate and had allowed sewage to flow into the river.

Initially, U.N. officials denied responsibility for bringing cholera to Haiti. But rumors and public protest persisted, fueled by independent investigations suggesting the camp as the source (Piarroux et al. 2011). Finally, the U.N. Secretary General convened an independent panel of experts charged with determining the source of the cholera outbreak. The panel completed its report in May 2011. It argued that the evidence from the Artibonite River's tributary system, the epidemiological timeline, and genetic analyses of Haitian *V. cholerae* bacteria indicated that the outbreak resulted from contamination of the river with feces carrying a strain of the current South Asian bacterium. Moreover, the report noted that the “haphazard” plumbing construction in the main toilet and showering area offered significant potential for cross-contamination, and that heavy rains could cause the open septic pit into which black water was deposited to overflow into the tributary (Cravioto et al. 2011).

The report offered a series of recommendations to prevent similar occurrences and concluded

The introduction of this cholera strain as a result of environmental contamination with feces could not have been the source of such an outbreak without simultaneous water and sanitation and health care system deficiencies. These deficiencies, coupled with conducive environmental and epidemiological conditions, allowed the spread of the *Vibrio cholerae* organism in the environment, from which a large number of people became infected.

The independent panel concludes that the Haiti cholera outbreak was caused by the confluence of circumstances as described above and was not the fault of, or deliberate action of, a group or individual (Cravioto et al. 2011).

Since the initial outbreak, more than 7,500 Haitians have died from cholera and more than 600,000 have been sickened. Subsequent independent genetic analysis

confirmed that the Haitian strain was almost identical with the strain currently circulating in South Asia (Hendriksen et al. 2011).

Many commentators believe that the systemic deficiencies that enabled the outbreak are partly the fault of the Haitian government. It failed to take appropriate measures to protect its population from disease, such as improving drinking water and sanitation, investing in health care infrastructure, and so forth. The Independent Panel concluded that the introduction of cholera by the U.N. mission was therefore not the fault of the U.N. An alternative view is that multiple actors were at fault for this tragedy, including the Haitian government, the U.N., and foreign governments whose policies affect Haiti.

A distinct issue is whether and how the victims of the outbreak should be compensated. One option is to make compensation the responsibility of those at fault, although the difficulties in assigning fault may make this option challenging. An alternative is to establish a no-fault scheme that would compensate anyone affected, but determining who must pay is also problematic. Donors working on earthquake relief in Haiti, for example, arguably should not have to divert funds to remedy a problem they did not create. In November 2011, a legal suit was brought against the U.N. seeking compensation for the victims of the cholera outbreak (Sontag 2012). In February 2013, the U.N. invoked legal immunity against such suits and refused to provide compensation.

### ***8.9.3 Discussion Questions***

1. Which parties' interests are affected by the cholera outbreak? Which parties might have some responsibility to respond to the outbreak?
2. The U.N.'s Independent Panel of Experts concluded that "the Haiti cholera outbreak was caused by the confluence of circumstances ... and was not the fault of, or deliberate action of, a group or individual." Assume that they are correct about the facts. Does it follow that no one is morally at fault? Explain why or why not.
3. Imagine that you are providing recommendations for compensating the victims of infectious disease outbreaks, like Haiti's. Should individual actors be held accountable, or should a no-fault compensation scheme be put in place? If the latter, who should provide compensation? Explain the reasons for your responses. (Douglas 2009 discusses "no-fault" compensation in another context.)
4. If the Haitian government has neglected its responsibilities to its citizens, does this make any difference to the help that international aid agencies should provide to Haiti? Explain why or why not.
5. One possible concern with seeking compensation for the people who contracted cholera is that it may have a "chilling effect" on international assistance. For example, if aid agencies believe they are at risk of being sued for unintentionally transmitting disease, they may be deterred from working in a country in the first place. Should the Haitian government or the lawyers representing the victims take this concern into account? Why or why not?

## References

- Boore, A., M. Iwamoto, E. Mintz, and P. Yu. 2008. Cholera and other vibrioses. In *Control of communicable diseases manual*, 19th ed, ed. D.L. Heymann, 113–127. Washington, DC: American Public Health Association.
- Central Intelligence Agency. 2012. *The world factbook*. <https://www.cia.gov/library/publications/the-world-factbook/>. Accessed 29 May 2013.
- Cravioto, A., C.F. Lanata, D.S. Lantagne, and G.B. Nair. 2011. *Final report of the independent panel of experts on the cholera outbreak in Haiti*. <http://www.un.org/News/dh/infocus/haiti/UN-cholera-report-final.pdf>. Accessed 29 May 2013.
- Douglas, T. 2009. Medical injury compensation: Beyond ‘no fault’. *Medical Law Review* 17(1): 30–51. doi:10.1093/medlaw/fwn022.
- Harris, J.B., R.C. LaRocque, F. Qadri, E.T. Ryan, and S.B. Calderwood. 2012. Cholera. *Lancet* 379(9835): 2466–2476. doi:10.1016/S0140-6736(12)60436-X.
- Hendriksen, R.S., L.B. Price, J.M. Schupp, et al. 2011. Population genetics of *Vibrio cholerae* from Nepal in 2010: Evidence on the origin of the Haitian outbreak. *mBio* 2(4): e00157–e001511. doi:10.1128/mBio.00157-11. <http://mbio.asm.org/content/2/4/e00157-11.full.pdf+html>. Accessed 29 May 2013.
- Piarroux, R., R. Barrais, B. Faucher, et al. 2011. Understanding the cholera epidemic, Haiti. *Emerging Infectious Diseases* 17(7): 1161–1168.
- Sontag, D. 2012. *In Haiti, global failures on a cholera epidemic*. New York Times, March 31.
- United Nations Development Programme (UNDP). 2011. *Human development report 2011: Sustainability and equity: A better future for all*. <http://hdr.undp.org/en/content/humandevelopment-report-2011>. Accessed 29 May 2013.
- WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation. 2013. *Data and estimates*. <http://www.wssinfo.org/data-estimates/table/>. Accessed 29 May 2013.
- World Health Organization (WHO). 2010. Cholera vaccines: WHO position paper. *Weekly Epidemiological Record* 85(13): 117–128. <http://www.who.int/wer/2010/wer8513.pdf?ua=1>. Accessed 11 June 2015.

## 8.10 Case 6: Perilous Path to Middle East Peace: The Sanctions Dilemma

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