

## Book Review

Frerichs RR. (2016). *Deadly River: Cholera and Cover-Up in Post-Earthquake Haiti*. Ithaca, NY: ILR Press, an Imprint of Cornell University Press: ILR Press, 320 pages, ISBN-10: 1501702300.

**Reviewed by:** Laura Price, USA

In October 2010, 9 months after the devastating earthquake in Haiti, a massive cholera epidemic erupted suddenly. There had been no cholera in Haiti previously. Improper sewage disposal at an encampment of UN soldiers who had arrived from Nepal a few days previously was the source of the epidemic. The quantity of cholera organisms discharged into a stream was enormous; a deadly plume of cholera-carrying water flowed into one of Haiti's major rivers, the Artibonite. Thousands of people who depend on the river for drinking water were infected in the first few days of the epidemic and hundreds died. It was a massive simultaneous outbreak—unlike the more typical cholera epidemic, which spreads gradually. In this case, the river itself was deadly initially; in the following days and weeks, cholera spread to the whole country—more gradually, but producing a country-wide epidemic as people moved about and fled from the affected area.

The source of the epidemic is now generally acknowledged, but there were high level attempts to cover up UN involvement for a long time. This book is the story of a scientific investigation that established the source and of the political attempts to obscure and deny UN responsibility.

Haiti is one of the poorest countries in the world; a high percentage of the population drinks surface water and defecates in the open, on the ground. Despite this, cholera was previously unknown in Haiti. Perhaps, Haiti had been protected by its poverty; it was relatively isolated from the rest of the world because it has little to offer immigrants. After these events, cholera has now become endemic in the country, with epidemics recurring in the rainy season each year, as the rain promotes flow of fecal material into water sources.

*Deadly River* was authored by Ralph Frerichs, in collaboration with Renaud Piarroux. Frerichs is a retired epidemiologist and professor emeritus at UCLA. He was interested in the cholera outbreak in Haiti from the start and followed reports closely. Piarroux is a French epidemiologist and expert on cholera who has investigated many other cholera epidemics and was invited by the Haitian government to investigate this one. His goal was to identify the source of the outbreak and to recommend ways to control it, with the hope of eliminating cholera from the country. (He had successfully led a program that eliminated cholera from Comoros, an island near

Madagascar.) Frerichs became aware of Piarroux's work in Haiti and his then-controversial findings in December 2010. They began a correspondence and became friends. As events continued to unfold, they decided a book was needed that would reach a wide audience and tell the inside story of Piarroux's experiences during the first 4 years of the epidemic. *Deadly River* is the result.

All public health students should read this book for two reasons: first, for the in-depth story of the scientific investigation of the source of the epidemic; and second, for the story of the political resistance and barriers, both powerful and subtle, that Piarroux encountered. The evidence is only a part of the story; the attitudes toward the evidence, the arguments against it, the fear of social unrest if the UN soldiers were to be found responsible, and even the abandonment of basic epidemiological principles by international health organizations such as WHO and the CDC comprise the greater part of the book. It is not enough to be right; there were immense political pressures to cover up the UN's involvement. For instance, spokespersons from both WHO and the CDC said early in the epidemic that it was not important to discover its cause, that efforts should be focused on treating patients.

The description of Piarroux's investigation is fascinating. There had already been newspaper reports that the UN base was the source of the cholera, but there had been no scientific substantiation. Piarroux was not convinced that these rumors were true but proceeded with his investigation with an open mind, gathering evidence and drawing conclusions. He and his colleagues met with local health officials, looked at the data that had been gathered, established where the first cases had appeared, and visited the hospitals where the first patients had been treated. They made maps showing the progression of cases over time and space. They observed the sewage disposal pond near the UN base, and the nearby stream that flowed into the Artibonite River, and were told that sewage had been dumped into the overflowing pond. They knew from the data that the first cases were near the UN base, and later ones farther downstream. They estimated the flow of the river, how many organisms would have to be carried in order to infect people, and how large the initial discharge would have to be. They were not allowed to investigate at the UN base but were told that none of the soldiers newly arrived from Nepal had diarrhea, and that they had all been screened for cholera, which was flaring up in Kathmandu just before they left for Haiti. Nevertheless, they concluded that the only way so many people could have been infected so severely and simultaneously was with

a large discharge of feces loaded with cholera into the stream that flowed into the river. Later investigations confirmed that the cholera in Haiti was the same subtype that was present in Kathmandu when the UN soldiers departed.

But a competing theory of how cholera had come to Haiti was put forward. There are non-pathogenic cholera organisms living in brackish water throughout the world. Many experts argued that some of these organisms had become pathogenic, perhaps because of disruption caused by the earthquake, perhaps because of a hurricane that struck a month after the start of the epidemic. The epidemic was an act of nature, no one's responsibility. An important implication of this theory was that cholera could erupt at any time in Haiti and could never be eliminated, only controlled. The method of control would have to be better sanitation and safe drinking water for the whole country, which is of course a laudable goal that would reduce the disease burden not just of cholera but of many other diseases. The problem is that this could not conceivably be achieved in less than a decade, and then only with huge amounts of money and resources from international donors, which was not forthcoming.

The motivation for supporting the local environment or spontaneous transformation theory was to avoid blaming the UN, which was already disliked and distrusted by many Haitians, who saw the UN forces as occupiers, not as peacekeepers. The situation was complicated by the imminence of a presidential election, and by fears of demonstrations, riots, and general political instability.

If Piarroux's analysis is correct, as is now generally accepted, even by the UN, Haiti was not necessarily doomed to have cholera forever. Piarroux suggested

providing intensive interventions such as chlorine tablets and information about transmission to affected areas in the dry season, when there was less transmission anyway. This requires good surveillance for cases, and then both information and resources for people at risk. In 2014, he found villages with recent cholera cases where people knew drinking water was dangerous but did not have and could not afford to buy chlorine tablets and other villages that had not been reached by the national educational program on water chlorination.

The author's five-page introduction is an excellent summary of his book, and I will quote one of the last paragraphs, which succinctly captures the importance of the book.

What this book offers is an in-depth portrait of how scientific investigation is conducted when it is done right. It explores a quest for scientific truth and dissects a scientific disagreement involving world-renowned cholera experts who find themselves embroiled in turmoil in a poverty-stricken country. It describes the impact of political maneuvering by powerful organizations such as the United Nations and its peacekeeping troops in Haiti, as well as by the World Health Organization (WHO) and the US Centers for Disease Control and Prevention (CDC). In so doing, it raises issues about how the world's wealthy nations and international institutions respond when their interests clash with the needs of the world's most vulnerable people. In an era when there is more focus than ever before on global and population health, the story poses critical questions and offers insights not only about how to eliminate cholera in Haiti but about how nations and international organizations such as the UN, WHO, and CDC deal with deadly emerging infectious diseases.