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Overview
Cholera Elimination in Hispaniola

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A catastrophic confluence of factors contributed to the rapid spread of cholera in Haiti following its introduction in late 2010. The outbreak is now the largest in modern history to affect a single country[1]; cases from Haiti comprised nearly half of the cholera cases reported worldwide in 2012.[2] Although cases of cholera related to this outbreak have occurred in the Dominican Republic, the United States,[3] and possibly in Cuba and other countries,[4,5] spread in these other countries has been nil or limited. The factors responsible for rapid spread in Haiti include: long-standing water and sanitary inadequacies in Haiti; the further disruptions to water and sanitary systems imposed by the earthquake; above average rainfall; high water and ambient temperatures; and insufficient capacity of the government infrastructure to respond to the crisis.

In 2008, before the earthquake, 63% of Haitians had access to improved sources of drinking water, and only 17% of the population had access to improved sanitation.[6] To address these inadequacies, in January 2012 the Pan American Health Organization (PAHO), the United States Centers for Disease Control and Prevention (CDC), and the United Nations Children's Fund (UNICEF) put forward a call to action for international partners to support the governments of Haiti and the Dominican Republic with their long-term vision to strengthen water, sanitation, and hygiene (WASH) conditions in their respective countries.[7] The same group supported the development of national plans for the elimination of cholera transmission on the Island of Hispaniola. In Haiti, the National Plan outlined a 10-year strategy to strengthen and sustain broad efforts for prevention and control of cholera infection, including water and sanitation infrastructure, surveillance, health promotion, and treatment measures.[8] Plans in the Dominican Republic focused on bridging gaps in WASH access, and improving surveillance, health communication, and treatment. Partners were asked to assist the National governments to finance and implement these plans.

In follow-up to the call for action, the initial partnership was expanded to involve a much broader coalition of partners; more than 20 partners have signed a Declaration of Support.[9] One key partner, the American Society of Tropical Medicine and Hygiene (ASTMH), committed the use of its journal (through this issue) to document and explore important issues related to cholera transmission and the public health response in Haiti.

Despite the challenges faced by Haiti after the earthquake, investments in laboratory, surveillance, and response capacity made possible the rapid detection of the cholera outbreak[10]; a national surveillance system was established with remarkable speed and has provided essential information on cases and mortality ratios.[1] Critical augmentations of these systems are documented in this special issue. To facilitate urgent response to focal increases in case rates, an "alert and response" system was developed.[11] To complement reporting based on clinical syndromes, a laboratory-enhanced surveillance system was established and is providing information on the proportion of diarrhea attributable to cholera and other causes.[12] The outbreak strain in Hispaniola exhibits characteristics of both the El Tor and classical biotypes,[13] and it was difficult to anticipate overall attack rates or the overall proportion of *Vibrio cholerae* infections that might lead to severe disease in the immunologically naive population of Haiti. A sero-epidemiologic survey confirmed very high rates of infection—often subclinical.[14] This survey and evaluations of case series helped identify risk factors for disease. Although symptomatic cholera presented uniformly across all age groups in one large urban treatment setting with high human immunodeficiency virus (HIV) prevalence, disease severity was associated with older age, but not with HIV infection.[15]

Access to and use of safe drinking water, sanitation, and hygiene remain the cornerstone of the effort to prevent cholera and many other enteric diseases, which remain leading causes of childhood illness and death. Evaluation of access to water and sanitation services has identified the continuing and large unmet needs, and helped to inform efforts to improve these services.[16] Sustained efforts will be necessary to achieve long-term improvements.[9]

Early in the epidemic, oral cholera vaccine (OCV) was recognized as a potential additional intervention that could save lives rapidly in the short-run.[17] However, in the face of substantial global vaccine supply shortages and the realities of post-earthquake Haiti, more data were needed to make an informed policy decision about who to target for, and the feasibility of, vaccination.[18] To that end, two cholera vaccination projects documented the feasibility of such interventions in rural and urban conditions of Haiti.[19,20] This experience, and evidence from models,[21] suggests that in Haiti, combined WASH and OCV vaccination strategies are likely to be complementary and potentially synergistic.

An impressive package of technical cooperation, including the special studies and experiences documented in this issue of the *American Journal of Tropical Medicine and Hygiene*, has greatly contributed to the response to cholera in Haiti. Much more has to be done to ensure access to potable water and sanitation, and there is a need to use all available cost-effective tools to prevent, detect, and control cholera, to save lives more rapidly, and ultimately to end cholera transmission.

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