

Perspective

Perspectives on Haiti Two Years after the Earthquake

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On January 12, 2010 at 4:53 PM the earth shook, and at latitude 19° 00' N, longitude 72° 25' W, a Caribbean island lying between the Caribbean Sea and the North Atlantic Ocean was struck by a 7.0 magnitude quake. When the earth settled, Haiti ranked 145th of 169 countries in the United Nations Human Development Index, the lowest in the Western Hemisphere; much of its capital, Port au Prince, was reduced to rubble and debris. It is estimated that 220,500 persons died, 500,000 were left homeless, and at its peak 2.3 million were displaced, including > 300,000 children.^{1,2} Before the earthquake, Haiti had more than 70% of its people living on < \$2 per day; 86% of the people in Port au Prince were living in slum conditions, mostly tightly-packed, poorly-built, concrete buildings. Half of the people in Port-au-Prince had no access to latrines and only one-third had access to tap water. After the quake there was an estimated 19 million cubic meters of rubble and debris in Port au Prince.

In the wake of the earthquake, governments, non-governmental organizations, medical relief organizations, and individual practitioners mobilized to provide assistance. The many reports and perspectives of the experiences in Haiti are too numerous to cite. On the first anniversary of the quake, a perspective piece in the *New England Journal of Medicine* devoted to Haiti noted the progress made in public health during the past year, but also the challenges that remained following the unprecedented disaster.³ Among the challenges to public health during that first year was a cholera epidemic that was declared in Haiti on October 20, 2010. The public health issues and lessons learned from the response to the cholera epidemic in Haiti are the subject of a “Theme Issue on Cholera in Haiti” in the November 2011 issue of *Emerging Infectious Diseases*.⁴

This issue of the *American Journal of Tropical Medicine and Hygiene*, published 2 years after the earthquake, contains a special section on Haiti that highlights some of the varied and ongoing activities related to the response to the disaster. The section includes eight articles that fall into three broad groups: 1) perspectives based on clinical care delivery in Haiti, 2) findings from surveillance activities in or related to travel to Haiti, and 3) reports of ill persons identified in the United States after travel to Haiti.

CLINICAL CARE PERSPECTIVES

Three articles^{5–7} describe experiences with delivering medical care. The first article⁵ reviews the diseases diagnosed during a 7-month period by the Israeli-based primary healthcare

clinic situated in Léogâne, Haiti. They found that 43% of persons presented with an infectious disease, most commonly respiratory tract infections, sexually transmitted diseases, and soft tissue infections. In addition, the article found that 30% of undifferentiated fevers were caused by falciparum malaria. Other vector-borne diseases including dengue fever were identified, consistent with the reports in this issue of malaria⁸ and dengue⁹ in travelers to Haiti. The authors note the need for large-scale preventive programs for infectious diseases to control disease in the Haitian population. Another report⁶ discusses potentially the first case of post-earthquake cholera in Haiti; the patient also had a severe untreated mental health disorder and developed acute fatal watery diarrhea after drinking from the local river. The authors use this case study as a basis to identify global health lessons relating the importance of mental health for overall health, the globalization of disease in small communities, and the importance of a comprehensive approach to the health of communities when planning services in resource-poor settings. The article by Ripp⁷ discusses the lessons learned by academic medical centers based on the Mount Sinai School of Medicine experience including preparation for response and deployment, the challenges faced, and efforts for sustainability. The authors make recommendations for future responses to natural disasters.

SURVEILLANCE REPORTS RELATED TO HAITI

Three articles^{10–12} are based on surveillance activities in or related to Haiti. Using data from the GeoSentinel Global Surveillance Network, one article¹⁰ describes patient characteristics and disease spectrum among foreign visitors to Haiti before and after the 2010 earthquake. Based on comparing 1 year post-earthquake to 3 years pre-earthquake, the work found that post-earthquake travelers were younger, predominantly from the United States, and were more frequently international assistance workers. Post-earthquake travelers were more likely to have received pre-departure medical counseling. The common infectious diseases post-disaster were similar to those present pre-disaster including acute diarrhea, dengue, and *Plasmodium falciparum* malaria. A major public health effort in Haiti was to establish disease surveillance. The report on malaria¹¹ documents the collaborative efforts between global partners working with Haiti's Ministry of Public Health and Population to enhance malaria surveillance in two disaster-affected areas. Between March 4 and April 9, 2011, of 1,629 suspected malaria patients 1,564 (96%) had malaria rapid diagnostic tests performed and 317 (20.3%) were positive, of which 90% got anti-malarial treatment. Post-disaster official reporting mechanisms could have been disrupted, which would have made it difficult to detect infectious disease outbreaks. Brownstein and others¹² report the use of informal media in near real time to provide

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earlier estimates of epidemic dynamics. They assessed the correlation of the volume of cholera-related HealthMap news media and other reports in the first 100 days of the cholera outbreak and found that the volume of informal sources significantly correlated in time with official case data and was available up to 2 weeks earlier.

ILL PERSONS IDENTIFIED POST-TRAVEL TO HAITI

In addition to reports of cases of cholera reported in persons returning to the United States from Haiti,¹³ there were also cases of malaria⁸ and dengue.⁹ Cases of malaria were imported to the United States from Haiti after the earthquake. Unfortunately, the work found that although the number of severe cases of imported malaria has increased, non-compliance with malaria chemoprophylaxis remained high. A cluster of cases of dengue occurred in a group of travelers to Haiti after returning from a 1 week missionary trip. Infection was confirmed in seven (25%) travelers and viral sequencing revealed closest homology to a 2007 DENV-1 isolate from the Dominican Republic. As with malaria, although most travelers had a pre-travel health care visit, few knew that dengue is a risk in Haiti and compliance with protective measures was low.

Collectively, this special section highlights the important role of non-governmental and academic medical care teams in both delivering care and diagnosing endemic and new diseases post-disaster in a resource-poor setting. The successes and challenges identified will help to better prepare for future responses in similar settings. A major public health goal in Haiti was to establish disease surveillance for reportable conditions for internally displaced persons, and nationally, to establish burden of disease.^{14,15} This section outlines the role of traditional and novel approaches to surveillance to identify and track pre- and postdisaster infectious disease risk. The articles also highlight the risk of disease not only in the local population but also in travelers to post-disaster situations. This means that more needs to be done to make travelers and persons giving pre-travel medical advice aware of the risk inherent with travel to such destinations and the need to comply with appropriate prevention measures. As we mark this 2-year anniversary, and as the world faces a challenging economic climate, the impact of this earthquake continues and the tremendous needs of the Haitian people remain. The science, medical team, and aid communities can take the collective lessons offered from these experiences and use them to inform future disaster response and efforts to improve the public health infrastructure for both infectious and chronic disease in the Haitian population and those traveling to the country.

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REFERENCES

1. International Human Development Indicators, 2010. The 2010 Human Development Report. United Nations Development Program, published in print and online November 4, 2010. Available at: <http://hdr.undp.org/en/statistics/>. Accessed March 2, 2010.
2. United Nations General Assembly, 2011. Strengthening of the coordination of humanitarian and disaster relief assistance of the United Nations, including special economic assistance: strengthening of the coordination of emergency humanitarian assistance of the United Nations Humanitarian assistance, emergency relief, rehabilitation, recovery, and reconstruction in response to the humanitarian emergency in Haiti, including the devastating effects of the earthquake. Available at: http://reliefweb.int/sites/reliefweb.int/files/resources/RSG_A-66-332_EN.pdf. Accessed November 1, 2011.
3. Dowell SF, Tappero JW, Frieden TR, 2011. Public health in Haiti—challenges and progress. *N Engl J Med* 364: 300–301.
4. Tappero JW, Tauxe RV, 2011. Lessons learned during public health response to cholera epidemic in Haiti and the Dominican Republic. *Emerg Infect Dis* 17: 2105–2112.
5. Neuberger A, Tenenboim S, Golos M, Krakowsky Y, Urman M, Vernet S, Pex R, Schwartz E, 2012. Infectious diseases seen in a primary care clinic in Leogane, Haiti. *Am J Trop Med Hyg* 86: 11–15.
6. Ivers LC, Walton DA, 2012. The “first” case of cholera in Haiti: lessons for global health. *Am J Trop Med Hyg* 86: 36–38.
7. Ripp JA, Bork J, Koncicki H, Asgary R, 2012. The response of academic medical centers to the 2010 Haiti earthquake: the Mount Sinai School of Medicine experience. *Am J Trop Med Hyg* 86: 32–35.
8. Agarwal A, McMorrow M, Arguin PM, 2012. The increase of imported malaria acquired in Haiti among US travelers in 2010. *Am J Trop Med Hyg* 86: 9–10.
9. Sharp TM, Pillai P, Hunsperger E, Santiago GA, Anderson T, Vap T, Collinson J, Buss BF, Safranek TJ, Sotir MJ, Jentes ES, Munoz-Jordan JL, Arguello DF, 2012. A cluster of dengue cases in American missionaries returning from Haiti, 2010. *Am J Trop Med Hyg* 86: 16–22.
10. Esposito DE, Han PV, Kozarsky PE, Walker PF, Gkrania-Klotsas E, Barnett ED, Libman M, McCarthy AE, Field V, Connor BA, Schwartz E, MacDonald S, Sotir MJ, 2012. Characteristics and spectrum of disease among ill returned travelers from pre- and post-earthquake Haiti: the GeoSentinel experience. *Am J Trop Med Hyg* 86: 23–28.
11. Townes D, Existe A, Bony J, Magloire R, Vely JF, Amsalu R, De Tavernier M, Muigai J, Hoibak S, Albert M, McMorrow M, Slutsker L, Kachur SP, Chang M, 2012. Malaria survey in post-earthquake Haiti—2010. *Am J Trop Med Hyg* 86: 29–31.
12. Chunara R, Andrews JR, Brownstein JS, 2012. Social and news media enable estimation of epidemiological patterns early in the 2010 Haitian cholera outbreak. *Am J Trop Med Hyg* 86: 39–45.
13. CDC, 2010. Update on Cholera—Haiti, Dominican Republic, and Florida, 2010. *MMWR* 59: 1637–1641.
14. Centers for Disease Control and Prevention, 2010. Rapid establishment of an internally displaced persons disease surveillance system after an earthquake—Haiti, 2010. *MMWR* 59: 939–945.
15. Centers for Disease Control and Prevention, 2010. Launching a national surveillance system after an earthquake—Haiti. *MMWR* 59: 933–938.