

## CDC's Response to the 2014–2016 Ebola Epidemic — West Africa and United States



**U.S. Department of Health and Human Services**  
Centers for Disease Control and Prevention

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## Foreword

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The 2014–2016 Ebola virus disease (Ebola) epidemic in West Africa required a massive international response by many partners to assist the affected countries and tested the world's readiness to respond to global health emergencies. The epidemic demonstrated the importance of improving readiness in at-risk countries and remaining prepared for Ebola and other health threats. The devastation caused by Ebola in Guinea, Liberia, and Sierra Leone is well recognized; what is less widely recognized is that in these countries more people probably died *because* of Ebola than from Ebola. The epidemic shut most health care systems and derailed programs to prevent and treat malaria, tuberculosis, vaccine-preventable diseases, and other conditions (1,2).

How close the world came to a global catastrophe is even less well recognized. If Ebola had not been rapidly contained in Lagos, Nigeria, a densely populated city with many international airline connections, the disease most likely would have spread to other parts of Nigeria, elsewhere in Africa, and possibly to other continents. Even more people would have died from Ebola, and the disruption of health care systems would have threatened a decade of progress in Africa in vaccine programs and prevention and control of human immunodeficiency virus, tuberculosis, malaria, maternal mortality, and other health conditions; changed the way ill travelers from all affected countries would be assessed; and undermined already fragile systems for health, social, and economic development. This catastrophe was averted through effective response in Lagos, led by Nigerian public health leaders, particularly the CDC-supported polio eradication staff and their implementation of CDC technical guidance for Ebola outbreak investigation, contact tracing, infection control, risk communication, border protection measures, and Ebola subject-matter expertise (3).

When CDC activated its Emergency Operations Center on July 9, 2014, the situation was ominous: Ebola cases in West Africa were increasing exponentially. Without a massive, well-organized global response, a devastating epidemic could have become a global catastrophe. No matter what steps CDC took, and no matter how quickly the world took action, the epidemic was not going to end quickly. At the end of July, CDC pledged to put an unprecedented 50 staff in the field within 30 days. The agency not only exceeded this goal, but as the epidemic intensified, launched the largest response in its history.

At the peak of the response, CDC maintained approximately 200 staff per day in West Africa and approximately 400 staff per day at its Atlanta headquarters dedicated to the response. Overall, approximately 1,897 CDC staff were deployed to international and U.S. locations, for approximately 110,000 total work days, and more than 4,000 CDC staff worked as part of the response. In 2016, CDC staff remain on the ground in Guinea, Liberia, and Sierra Leone in newly established CDC country offices to improve surveillance, response, and prevention for Ebola and other health threats.

In addition to their work in West Africa, CDC staff played a critical role protecting the United States by aiding state and local health departments in their preparedness activities and their response to the country's first imported Ebola cases. CDC helped international, federal, and state partners establish airport risk assessment of travelers departing and arriving from affected countries, monitored travelers and other potentially exposed persons for 21 days, and helped hospitals across the country prepare to manage a possible case of Ebola through intensive training and preparedness activities.

The response illustrated the need for speed and flexibility. The arrival in a Dallas, Texas, hospital of a traveler from Liberia with Ebola and its subsequent transmission to two nurses working there led to rapid changes in domestic preparedness and response recommendations and practices. The deployment of large numbers of CDC staff to West Africa emphasized the agency's response capacity. Longer and more repeat deployments would have improved effectiveness but were difficult to achieve because of the unprecedented need for large numbers of highly skilled staff, including French speakers to work in Guinea. At times, responders faced health, safety, and security risks while overseas, and after returning to the United States responders and their families were sometimes irrationally stigmatized.

Through CDC's collaboration with national and international partners, surveillance, contact tracing, diagnostic testing, community engagement and ownership, infection prevention and control, border health, emergency management, and vaccine evaluation all improved steadily. The implications of sporadic cases during the epidemic tail are still being assessed. Above all, this epidemic underscored the need for the new Global Health Security Agenda, a program designed to build stronger national and global capacities to prevent, detect, and respond to health threats (4).

This *MMWR* supplement presents reports that chronicle major aspects of CDC's unprecedented response to the Ebola epidemic. Written by CDC staff who played key roles, these reports summarize the agency's work, primarily during the first year and a half of the epidemic. From the start, CDC focused on providing proven public health measures to assist affected countries to defeat Ebola. Some of these key activities included:

- Supporting the incident management systems of Guinea, Liberia, and Sierra Leone to permit effective action to stop Ebola.
- Establishing CDC teams in Guinea, Liberia, and Sierra Leone, which have transitioned into permanent CDC country offices.
- Improving case detection and contact tracing to stop Ebola transmission.
- Strengthening surveillance and response capacities in surrounding countries to reduce the risk for further spread.
- Improving infection control in Ebola treatment units and general health care facilities to stop spread of Ebola. This effort included training tens of thousands of health care workers in Guinea, Liberia, and Sierra Leone to safely care for Ebola patients and working to ensure the provision and correct use of personal protective equipment.
- Promoting the use of safe and dignified burial services to stop spread of Ebola.
- Conducting detailed epidemiologic analyses of Ebola trends and transmission patterns in communities and health care facilities to target and optimize epidemic control.
- Supporting laboratory needs at CDC's Viral Special Pathogens Branch (Division of High-Consequence Pathogens and Pathology, National Center for Emerging and Zoonotic Infectious Diseases) in Atlanta and transferring CDC laboratory expertise to the field (e.g., establishing an Ebola laboratory in Bo, Sierra Leone).
- Reducing the likelihood of spread of Ebola through travel, including working with international partners and federal and state health officials to establish exit and entry risk assessment and management procedures, as well as helping establish protocols to track travelers arriving in the United States from affected countries until 21 days after their last potential exposure.
- Disseminating risk communication materials designed to help change behavior, decrease rates of transmission, and confront stigma, both in West Africa and the United States.
- Assisting state health departments in responding to domestic Ebola concerns, including the response in Dallas after the first U.S. case of Ebola imported in a traveler from Liberia.

- Establishing trained and ready hospitals in the United States capable of safely assessing, managing, and caring for possible Ebola patients.
- Modeling, in real time, predictions for the course of the epidemic, which helped galvanize international support and enabled CDC to act on and align global action to reach goals for control to quickly shift the course of the epidemic.
- Providing logistic support for the most ambitious CDC deployment in history.
- Fostering hope for a long-term solution for Ebola, including rollout of Sierra Leone Trial to Introduce a Vaccine against Ebola (STRIVE).

Although this supplement tells the story of CDC's contributions to the Ebola response, partnerships have been, and remain, indispensable to CDC's activities (<http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/partners.html>). Throughout the response, CDC assisted the governments of affected countries and worked closely with key international partners, including the World Health Organization, Médecins Sans Frontières, the African Union, other nations, and many local and international nongovernment and nonprofit organizations, including the CDC Foundation. Partnerships with many U.S. government agencies, particularly the Office of Foreign Disaster Assistance of the U.S. Agency for International Development, the U.S. Department of Defense, the Customs and Border Protection service of the U.S. Department of Homeland Security, and ambassadors from affected countries, as well as state and local health departments and hospitals and health care workers, were critical. Achieving zero new Ebola cases in West Africa can be understood only in light of these effective collaborations with international partners, as well as collaborations from throughout the U.S. government and substantial emergency funding from the U.S. Congress.

At the time this supplement went to press, widespread transmission of Ebola had ended. On March 29, 2016, the World Health Organization declared that Ebola in West Africa was no longer a Public Health Emergency of International Concern, and the CDC Ebola Response was deactivated on March 31, 2016. This deactivation does not mean support from the international community will end. CDC and partners remain in the region and CDC staff continue to be deployed internationally to support ongoing efforts to improve detection, response, and prevention through the Global Health Security Agenda (4). Even though the 2014–2016 Ebola epidemic has been declared over in Guinea, Liberia, and Sierra Leone, much important work remains to be done, and CDC staff will continue to address a wide range of issues, including resuming and strengthening core public health and health

care services, particularly vaccination programs and malaria prevention, treatment, and control initiatives in the aftermath of the largest Ebola outbreak in history.

Future progress requires renewed international focus on global health security to ensure that another preventable epidemic—whether of Ebola or another health threat—does not again get out of control. Documenting CDC's experiences in responding to the Ebola epidemic is intended to promote understanding and action on the valuable global experience gained to improve the prevention, detection, and response to the next health crisis.

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