



**Testimony before the Committee on
Appropriations Subcommittee on Labor,
Health and Human Services, Education and
Related Agencies
United States Senate**

**U.S. Public Health Response to the Ebola Outbreak
in the Democratic Republic of the Congo and Other
Emerging Health Threats**

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INTRODUCTION

Good morning Chairman Blunt, Ranking Member Murray, and members of the Subcommittee. I am Dr. Robert R. Redfield, Director of the Centers for Disease Control and Prevention (CDC). Thank you for the opportunity to testify before you on the Ebola outbreak in the Democratic Republic of the Congo (DRC) and our efforts to protect Americans here at home and eliminate emerging threats, like Ebola, overseas.

CDC is working, in collaboration with interagency and international partners, to end this outbreak and ensure the health and security of our country. We have comprehensive Ebola response capabilities developed over 40 years at the forefront of Ebola virus research and further refined by more than 20 Ebola outbreak responses. In the wake of the worst Ebola outbreak in history, the 2014—2016 West Africa outbreak that claimed over 11,000 lives, CDC has made significant advancements in Ebola science, surveillance, and response. For example, we confirmed that live Ebola virus can persist in specific body fluids, such as in seminal fluids, for over a year following infection. In response to the epidemic, we also trained epidemiologists and laboratory scientists and provided testing materials and support to African countries at greatest risk of Ebola outbreaks. In addition, in June 2015 we established CDC's Global Rapid Response Team, a cadre of over 500 highly-trained responders ready to deploy on short notice anywhere in the world to respond to global health emergencies.

In response to the current outbreak in the eastern DRC, CDC has deployed 133 expert disease detectives to the DRC, neighboring countries, and the World Health Organization (WHO) headquarters in Geneva to coordinate activities and provide expertise in surveillance, laboratory testing, vaccine administration, emergency management, infection prevention and control, health communications, and border health. Our operational expertise allows us to quickly and efficiently identify the unique scientific and social variables of outbreaks and address them with proven interventions. However, the unique challenges of the current outbreak mean this fight is even harder than past responses.

The complex situation in the DRC has limited CDC's direct participation at the outbreak's epicenter, which is located far from the capital city of Kinshasa in an area threatened by armed conflict, crime, and civil unrest, as

well as heavy cross-border movement. The DRC is also experiencing multiple infectious disease outbreaks such as cholera, vaccine-derived poliovirus, malaria, and measles. Disease control is challenging because of weak healthcare and hygienic infrastructure, including the lack of running water and safe waste disposal methods. In addition, the affected population has low levels of trust in the government and international responders. All of these factors make this an extremely challenging environment for an Ebola response. Furthermore, from late December 2018 until the end of January 2019, the U.S. Embassy in the DRC was in ordered-departure status with extremely limited CDC staff presence permitted.

In August 2018, before the security situation escalated, I was able to visit the DRC city of Beni to see first-hand the work being done. I heard directly from our international partners on the ground how valued and desired CDC's contribution is, with their greatest request being expanded CDC technical leadership and expertise in the field. My visit reinforced for me the essential role CDC can play in changing the trajectory of the Ebola outbreak. The current outbreak is the largest and longest single country Ebola outbreak to date, with case counts continuing to increase and key response indicators going in the wrong direction.

STATUS OF THE EPIDEMIC

On August 1, 2018, the DRC Ministry of Health and Population reported an outbreak of Ebola virus disease in North Kivu Province. It is now the largest Ebola outbreak in the DRC and the second largest ever since the virus was discovered there in a village near the Ebola River in 1976. As of March 7, 2019, 907 cases have been reported, including 569 deaths (63%). This includes 841 laboratory-confirmed cases and 66 probable cases. Due to challenges in detecting and reporting cases posed by the security situation, CDC suspects the true number of cases is much larger.

As of March 7, 2019, cases have been reported in 19 health zones of North Kivu and Ituri provinces (Beni, Biena, Butembo, Kalunguta, Katwa, Kayina, Kyondo, Mabalako, Mangurujipa, Masereka, Musienene, Mutwanga, Oicha, and Vuhovi zones in North Kivu; Komanda, Mandima, Nyakunde, Rwampara, and Tchomia zones in Ituri). Past outbreaks of Ebola in the DRC typically occurred in sparsely-populated, rural areas. The current outbreak—like

the prior outbreak in West Africa—includes densely-populated urban areas, increasing the likelihood of human-to-human spread. Since the outbreak began, the greatest number of cases has been in Beni town (235 cases), which has a municipal population of 340,000 and a greater area population of about 1 million. North Kivu health zones of Katwa (260 cases) and Butembo (84 cases) are also heavily-affected, and encompass an urban area with a population of approximately 1 million. The affected region is about 780 miles away from Equateur province, where a prior Ebola outbreak was reported in May 2018 and declared over in late July. Although both outbreaks were caused by *Zaire ebolavirus*, genetic differences between the viruses suggest the two outbreaks are not linked.

STATUS OF RESPONSE EFFORTS

The DRC Ministry of Health and Population is leading the response, with strong assistance from WHO. CDC is providing technical guidance to the DRC government, bordering countries, and partners, bringing to bear decades of experience, global health investments, and lessons learned in the West Africa Ebola response. For example, CDC has updated ring vaccination protocols, which strategically focus vaccination efforts on the contacts of cases and people who are in close contact with those contacts. CDC has also updated vaccination training materials, trained 150 and deployed 127 Field Epidemiology Training Program (FETP) graduates, and developed two new Ebola databases for surveillance and vaccination tracking to replace a manual record-keeping system. All partners are working together toward one goal: to end this outbreak as soon as possible.

In August, CDC deployed Ebola experts to Beni, but they were removed due to security concerns. In December 2018, the DRC held a presidential election. Preceding the election, several areas of the country experienced a deterioration in the overall security situation, leading the U.S. State Department to reduce the number of U.S. government personnel in Kinshasa by issuing a departure order on December 17, 2018. During the ordered departure, CDC developed temporary infrastructure and capacity to deliver technical response support remotely. But this had its own challenges, as internet access and other communication modalities were disrupted in large areas of the DRC for extensive periods, limiting connectivity between CDC, WHO, and DRC

teams. CDC has also enhanced its work through local partners in the DRC and mobilized its locally-employed staff. Congolese graduates of the CDC-sponsored FETP have participated in operations in North Kivu, and plans are underway to augment and extend this technical support.

The departure order was lifted on January 31, 2019 following the peaceful completion of the electoral process. CDC's Country Director for the DRC has returned, and CDC has deployed five staff to Kinshasa. CDC is ready to deploy more teams to support the DRC and WHO and the integrated U.S. Disaster Assistance Response Team (DART) emergency outbreak response, as required. Specifically, CDC would apply its technical and scientific expertise to help strengthen contact tracing and infection control practices in the field, two critical factors affecting ongoing transmission in the area. We are working closely with other U.S. government agencies, such as Department of State, the U.S. Agency for International Development, Department of Defense, National Security Council, and others to consider all potential options for support and deployment. CDC is continuing to support contact tracing, infection prevention and control in healthcare settings, border health, risk communications and health education, and vaccine administration— key pillars of the Ebola outbreak response.

In addition to CDC's presence in the DRC, CDC also has deployed staff to augment our country offices in the neighboring countries of Uganda, Rwanda, and South Sudan, which are preparing for the possibility of imported cases arriving from the DRC. As of March 6, 2019, 133 CDC headquarters-based staff have participated in a combined 188 deployments: 42 to the DRC, 57 to support WHO in Geneva, 37 to Uganda, 32 to Rwanda, 19 to South Sudan, and 1 to Washington, D.C.

Contact Tracing

Contact tracing is finding everyone who comes in contact, either directly or through contaminated materials, with a sick Ebola patient. Contacts are watched for signs of illness and if ill, taken to a health facility before they can infect others. One missed contact can keep the outbreak going. When someone is not known to be a contact, they are usually only identified in a late stage of illness and have spread the infection to others already. As of March 7, 2019, a total of 4,265 out of 4,950 (86%) known contacts of people with Ebola were followed.

However, of recent cases, only 65% were known contacts and only 38% were known contacts that were being followed at the time of symptom onset. The high proportion of cases that are not known contacts or lost to follow-up indicates that contact tracing must improve if the outbreak is to be contained. CDC designed “train-the-trainers” courses for frontline response workers, focusing on contact tracing methods. CDC also created an Ebola “Exposure Window Calculator” app for case investigators, which can be downloaded for free on smartphones.

Infection Prevention and Control in Healthcare Settings

Healthcare settings have played an important role in amplifying transmission in this and many prior outbreaks. Implementing proper infection control and prevention practices is critical to stopping the spread of the virus within the healthcare delivery system and to the community. Prompt identification and isolation of patients arriving at healthcare facilities with possible Ebola virus infection is essential so they may be safely evaluated and, if necessary, transported to an Ebola Treatment Unit for further care. CDC estimates that, as of February 27, 2019, approximately 42% of cases were still not being effectively identified and isolated to prevent transmission to others. Infected people who are not initially recognized to have Ebola may receive care at multiple facilities before Ebola is suspected, exposing numerous patients and healthcare workers to the virus. As of February 27, 2019, 73 local healthcare workers have contracted Ebola in the DRC.

CDC is providing assistance to response partners and surrounding countries to improve the capacity of healthcare facilities to rapidly identify and isolate suspected Ebola cases, train personnel, and improve infection prevention and control. At least 150 healthcare personnel have been trained by CDC in Uganda and Rwanda since October 2018. Using information from interviews conducted at border crossings, refugee transit centers, and district health offices, CDC identified clinics and hospitals in border districts of neighboring countries that would be most likely to receive an imported case of Ebola from the outbreak area. CDC assessed triage practices at these facilities, interviewed and informed staff about risks of imported Ebola, and prioritized facilities for additional training and support.

Border Health

The two DRC provinces affected by this outbreak, North Kivu and Ituri, border Uganda. North Kivu also borders Rwanda and Ituri province touches South Sudan. There is significant population movement across these country borders. The Mpondwe Border Crossing is the busiest official ground crossing on the border between Uganda and the DRC, with a peak of 19,000 travelers passing through each day. At the Rubavu District Point of Entry between Goma, DRC and Gisenyi/Rubavu City, Rwanda, 60,000 people cross daily. This high volume of movement, which includes pedestrian, commercial car, and truck traffic, poses significant concern for potential cross-border transmission of infectious diseases. The WHO assessment is that there is a very high risk of spread regionally.

Preparedness activities in bordering countries are ongoing and CDC is providing technical assistance on their border health security efforts. Building on collaborations from the earlier 2018 outbreak, CDC is working with the DRC Ministry of Health and Population and other partners to adapt and implement screening protocols at country-prioritized airports and ground crossings, and to map population movement into and out of the outbreak zone to determine where surveillance should be enhanced. As of March 3, 2019 about 40.4 million travelers have been screened at 80 priority ports and crossing points in the DRC since the outbreak began.

Risk Communications and Health Education

CDC social and behavioral scientists have deployed to WHO headquarters and several countries bordering the DRC to guide risk communication and community engagement strategies. Risk communication leads from CDC, WHO, International Red Cross, and UNICEF have set a strategic direction for risk communication activities and produced a framework that has been shared widely with response partners. CDC and the Red Cross are leveraging the unique strengths of each of their organizations to bring the perspectives of DRC residents to the attention of Ebola response teams. Red Cross volunteers engage with and educate DRC community members about Ebola and document individuals' beliefs, observations, questions, and suggestions about combating Ebola. Red Cross sends this information to CDC, where scientists analyze it and develop reports for all participating

partners to inform outreach efforts. Data are being collected and analyzed at regular intervals to monitor changes in knowledge, attitudes, and perceptions as the outbreak evolves and to assess the effectiveness of health communication messages.

Vaccine Administration

CDC conducted a clinical trial in Sierra Leone during the West Africa Ebola outbreak, enrolling and vaccinating nearly 8,000 healthcare and frontline workers. Although this and several other studies have shown that the investigational vaccine is safe and protective against the Ebola virus, more scientific research is needed before the vaccine can be licensed. Therefore, the investigational vaccine is being used in the current outbreak on a compassionate basis. WHO and the Ministries of Health lead the vaccination program, but CDC contributes expert technical support and our experience continues to be valued in each new country undertaking the process.

CDC has played a critical role in identifying and implementing preventive vaccination of high-risk healthcare and frontline workers in the DRC. In the field, CDC's Ebola vaccination implementation expert has provided supervision to national-level teams to ensure high-quality vaccination implementation. We have embedded CDC staff in the DRC Vaccine Commission within the Emergency Operations Center to assist with data analysis of vaccine indicators and improving the quality of the ring vaccination efforts.

As of March 7, 2019, the remaining number of vaccine doses in Beni was approximately 11,490. Our projections show that, depending on the vaccination strategies used and other contextual factors, demand for Ebola vaccine could exceed supply sometime between May and mid-September of 2019, indicating a need to augment the available vaccine supply. However, there are many uncertainties about the current outbreak in DRC. WHO and the government of DRC recently issued an updated Strategic Response Plan (SRP 3.0) for the next six months in the Ebola Response activities and plans. The SRP 3.0 includes expanded recommendations for vaccination of pregnant women (after their first trimester) and vaccination of infants, including newborns. Further, the SRP 3.0 includes the possibility of offering vaccination to all people at risk who reside in "satellite belts" (i.e. all the

places that the symptomatic person visited before being isolated or dying). Such a tactic could notably increase the rate of vaccine use. Actual vaccine use will vary depending upon availability, the vaccination strategy used, and conditions in the field. As of March 7, 2019, 85,877 individuals have been vaccinated.

CDC has also collaborated with WHO colleagues in Uganda, South Sudan, and Rwanda to translate ring vaccination concepts for Ebola preparedness, and has provided technical assistance to countries as they have considered the use of Ebola vaccine. In addition, we have applied our expertise to update Ebola vaccination protocols, operating procedures, and training and communications materials for use at national and local levels, and facilitated trainings for national staff. Our work across multiple countries has helped standardize procedures and facilitate dissemination of best practices.

OUTLOOK OF THE EPIDEMIC

Based on the lessons learned from the West Africa Ebola outbreak, transmission can be stopped and the outbreak terminated when at least 70% of cases are effectively isolated after becoming ill, that is, moved to an Ebola Treatment Unit before they have infected anyone else. This needs to be sustained for at least two to three months to end the outbreak. Without improving the current effective case isolation rate of 58%, our models indicate that the cumulative number of Ebola cases could reach an estimated 1,184 by late August of 2019, or worse with further deterioration of the fragile security situation. However, as noted above, there are many uncertainties about the current outbreak in the DRC. The WHO and the government of the DRC's SRP 3.0 includes recommendations to strengthen contact tracing and rapid identification and isolation of cases. CDC is committed to leveraging its resources and global health security expertise to help end the outbreak.

RISK TO THE UNITED STATES

CDC understands that an international outbreak of Ebola puts the United States at risk and we appreciate the trust placed in CDC to keep Americans safe from public health threats both domestically and abroad. At this time, we believe the direct risk to the United States remains extremely low based on the travel volume and patterns from the outbreak areas to the United States and the implementation of border screening measures at

key airports and ports in the DRC and neighboring countries. On average, of the approximately half a million air travelers arriving in the United States daily, about 43 travelers are from the DRC, largely from unaffected regions. CDC is implementing routine border health security measures at U.S. Ports of Entry and has issued a Level 2 (Practice Enhanced Precautions) travel notice for the DRC. Travel notices are designed to inform travelers and clinicians about current health issues related to specific international destinations, and range from Level 1 (Practice Usual Precautions) to Level 3 (Avoid Nonessential Travel). In addition, the U.S. Department of State has identified the outbreak area as a “do not travel” zone because of armed conflict, crime and civil unrest. Current CDC guidance for managing Ebola cases in U.S. healthcare settings has been reviewed and provided to healthcare facilities as part of domestic preparedness efforts. CDC’s Laboratory Response Network stands ready to perform testing on Ebola specimens should any need arise, with testing kits deployed across the United States.

BIG PICTURE: GLOBAL HEALTH SECURITY

The ongoing response to Ebola in the DRC demonstrates CDC’s commitment to strengthening global health security. CDC has been engaged in global health security work for over seven decades and is able to leverage the essential public health assets developed by notable initiatives like the U.S. President's Emergency Plan for AIDS Relief (PEPFAR), the President’s Malaria Initiative, and global polio eradication to support core global health security programs and ensure the safety of Americans. With an understanding of the increasing threats posed by infectious disease globally and in the context of the West Africa Ebola outbreak, CDC received \$582 million in supplemental funding for a five-year effort in support of the Global Health Security Agenda (GHSA). GHSA was launched by a growing partnership of nations, international organizations, and non-governmental stakeholders in 2014 with a stated vision of a world safe and secure from global health threats posed by infectious diseases. Since GHSA’s launch, CDC’s global health protection work has helped contain meningitis in Liberia, Marburg virus in Uganda, multidrug-resistant tuberculosis in India, and vaccine-preventable diseases including measles and pertussis in Pakistan and diphtheria in Vietnam, among other threats across the globe. CDC, in collaboration

with our country partners, stopped these outbreaks at their source, saving lives and reducing the amount of time it takes to effectively respond.

We appreciate the continued commitment of Congress to global health security, as demonstrated by the funding provided to CDC for global health security in FY 2018 and 2019. This support enables CDC to continue work that protects Americans by detecting and preventing infectious disease threats before they reach our borders. We are seeing progress in the 17 priority countries where we have invested our global health security resources: all 17 have improved rapid response to disease threats through established or expanded public health workforce training of field-based epidemiologists, 13 have improved prevention of vaccine-preventable diseases through increased community immunization coverage, 15 have ensured effective public health emergency operation centers through training of emergency management officials, and 9 have increased their ability to identify country-prioritized pathogens through improved national laboratory testing capacity.

The DRC serves as an example of a country where CDC investments have built capacity since program operations began in 2002, including activities specifically to prepare for an Ebola outbreak. These efforts have also fostered strong relationships with the DRC and surrounding countries' ministries of health that have proved critical in times of crisis. In May 2018, an outbreak of Ebola in the Equateur province of the DRC raised international concern due to its size, logistical challenges caused by the remote area, and early spread to more populated cities. That outbreak was limited to 53 cases and 29 deaths. The swift response ensured it was quickly controlled, and on July 25, 2018 WHO and the DRC officially declared that the outbreak was over. Without a doubt, our global health security activities in the DRC enabled a faster, more effective and successful response to the May 2018 outbreak, and have made a difference even considering the complex security situation of the current outbreak.

The DRC Field Epidemiology Training Program (FETP), developed with assistance from CDC and modeled after CDC's own training programs, has trained around 150 disease detectives who are crucial to accurately detecting and identifying outbreaks. The DRC graduated its first cohort of FETP residents in 2015. These are the disease

detectives who are supporting the current Ebola outbreak and serve as an example of how CDC supports sustainable capacity development of countries to respond to outbreaks within their own borders. Training programs like these work effectively because they are complemented by decades of field experience that CDC experts bring, teaching new detectives how to not only respond to issues after they have occurred, but rapidly identify diseases and prevent spread. CDC maintains long-standing collaborations in the DRC for priority diseases, including monkeypox virus response and prevention, building capacity and skills that have been beneficial for Ebola response. Sustainable investments, such as resources and expertise to train laboratory technicians, renovate and upgrade two laboratories, and establish a National Emergency Operations Center in the DRC, are all being leveraged in the current Ebola response.

In addition to faster, more robust responses to Ebola, our global health security work is enhancing the world's ability to respond to other emerging health threats. More than 70 countries have participated in FETP, resulting in more than 11,000 graduates around the world. In Liberia, improved laboratories, epidemiology training, surveillance, and surge capacity resulted in the identification of an April 2017 meningitis outbreak within one day of the first discovery of a case. By comparison, it took 90 days for the country to respond equally to Ebola in 2014. The Uganda Virus Research Institute has emerged as a regional reference laboratory for viral hemorrhagic fevers thanks to collaboration with CDC and its subject matter expertise. In addition, Uganda's Public Health Emergency Operations Center, established with CDC support in 2013, is a model for other global health security program countries. This center has been activated for over 75 outbreaks and public health events. Due to improved capacity, Uganda has detected 16 viral hemorrhagic fever outbreaks as of July 2018, and responded quickly to keep outbreaks small and contained. They also detected a yellow fever outbreak in spring of 2016 in only four days, compared to over 40 days that it took to identify the yellow fever outbreak of 2010.

Another important component of CDC's global health work is the agency's ability to monitor threats globally and to provide rapid response through deployment of staff from across the agency. CDC's Global Emergency Alert and Response Service (GEARS) closely monitors 35 to 45 outbreaks a day through event-based surveillance and supports emergency deployments to respond to selected outbreaks. GEARS brings together the Global Disease

Detection Operations Center (CDC's electronic surveillance and analysis system for global threats) and the Global Rapid Response Team (GRRT). Since its inception, the GRRT has rostered and trained over 500 CDC deployers that have provided nearly 17,000 person-days of response support.

CDC is also promoting a safer world by strengthening interagency collaborations. Following the West Africa Ebola Response, CDC and USAID signed a memorandum of understanding outlining areas for future collaboration. Through one component of this agreement, CDC will continue to provide technical assistance to USAID's Office of Foreign Disaster Assistance (OFDA) while OFDA supports the placement of a Humanitarian Advisor at CDC's Atlanta headquarters.

As we saw during the West Africa Ebola epidemic, current measles outbreak, and the ongoing Middle East Respiratory Syndrome (MERS) outbreak, infectious disease threats do not respect borders. An outbreak that starts in another country could hit our shores in a matter of hours; this is why CDC works globally to stop health threats before they do. CDC is unique in our public health approach, working side-by-side with partners to secure global health and America's preparedness.

CONCLUSION

CDC's number one priority during any public health emergency is to save lives. CDC never loses sight of its primary mission to protect the health and safety of the American people, and we know that global health security is national security. In order to effectively protect the American people, CDC works overseas to ensure health threats do not reach U.S. borders, most importantly by working to stop these threat outbreaks where they start. CDC works to protect the United States from direct health threats, protect U.S. interests in global economic security, and ensure that lessons learned overseas can be applied here to increase the strength of the U.S. public health system. While significant progress has been made, we know that we will continue to see the emergence of both known and unknown threats that will require the laboratory and surveillance infrastructure that CDC continues to support. Our long-term investments in public health infrastructure and health systems in Africa continue to help us rapidly respond to Ebola outbreaks in the region. CDC's global health programs have

allowed us to build strong relationships with the DRC and surrounding countries' ministries of health. This has resulted in ministries being both ready to take actions themselves and directly requesting assistance when they need it, demonstrating confidence in CDC's ability to provide technical and on-the-ground support quickly during an outbreak.

The ability to rapidly detect and effectively respond to threats to the public's health is a top priority for CDC, the Department of Health and Human Services, and the nation. CDC works around the clock to not only ensure its readiness but the readiness of those on the front lines. CDC remains vigilant, because at any given moment, thousands of infectious diseases are circulating in the world. We don't know exactly which outbreak is coming next, but we know it is coming. The work we do now ensures that, when the next major outbreak does come, we are able to protect the health of Americans and save lives.