CASE STUDY: Public Health Emergency Management in Guinea—Before and After the 2014 Ebola Outbreak

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In 2016, Guinea was declared free from Ebola virus, having been the origin of the worst Ebola outbreak in history. Along with Liberia and Sierra Leone, Guinea was also one of the three countries most heavily impacted by the disease. The magnitude of the outbreak was compounded through the weak health systems in the affected countries, which have since led to significant international and multilateral efforts to build public health capacity in the region. One of the major areas of investment has been public health emergency management (EM) systems and structures, including emergency operations centers (EOCs) as a critical tool for rapidly and effectively responding to potential public health emergencies. The value of EOCs was recognized as early as the revised International Health Regulations (IHR) (2005), but has since further become enshrined as a core action package under the Global Health Security Agenda (GHSA), and forms one of the U.S. Centers for Disease Control and Prevention (CDC) "core four" areas for capacity building as part of the U.S. government's international commitment to GHSA. This case study uses the framework of EM to examine Guinea's health system before, during, and after the Ebola outbreak, and to highlight the evolution of EM as a tool and approach to public health preparedness and response.

Emergency Management in Guinea Pre-Ebola

Emergency management was not a widely recognized concept in the public health sphere in Guinea prior to the Ebola outbreak. Efforts to establish capabilities for public health preparedness and response were largely centered around implementation of IHR (2005) and the Integrated Disease Surveillance and Response (IDSR) framework. However, as of self-reporting to World Health Organization (WHO) in 2014, Guinea had only met 63% and 64% of the required indicators for the preparedness and response IHR core capacities, respectively, and a mere 22% for the zoonotic disease specific hazard.[1] The Ministry of Health did not possess an EOC. In 2011, Guinea developed a national implementation guide for IDSR, based on the revised technical guidelines produced by CDC and WHO-AFRO in 2010, which aligned IDSR to IHR (2005) at an operational level.[2] However, the guide was not extensively adapted to Guinea's specific health context or needs, and was exclusively implemented by the human health sector with no multisectoral input. The guide also provided little scope or direction for detection and reporting of diseases of unusual or unknown etiology, and the general lack of resources for surveillance activities, combined with Guinea's centralized government structure, resulted in limited education and awareness on IDSR in peripheral parts of the health system. All of these factors proved critical when Ebola emerged in late 2013.

Perhaps the only example of a specific, multisectoral public health preparedness and response planning document from the pre-Ebola era is the Avian Influenza Preparedness and Response Plan from 2006.[3] Funded by the World Bank as part of their global efforts to combat the emergence and spread of highly pathogenic H5N1 avian influenza, the document was developed jointly between the Ministry of Agriculture, Livestock, Water and Forests as well as the Ministry of Health, and with technical assistance from a number of other international and assistance organizations including the Food and Agriculture Organization (FAO), the World Organization for Animal Health (OIE), and U.S. Agency for International Development (USAID). The document provides a risk analysis for the introduction and transmission of avian influenza in Guinea and outlines a number of specific objectives for improved surveillance, diagnostics, case management, coordination between sectors, social mobilization and education, and research priorities. While well-conceived and an important step, the document unfortunately mostly fell short of achieving effective capacity building for zoonotic disease control, largely due to lack of sustained funding after the end of the project. Reorganization of government ministries, which included the separation of the Ministry of Agriculture, Livestock, Water and Forests into three entities, with the Ministry of Livestock now responsible for domestic animal health and veterinary services, but the Ministry of Livestock overseeing wildlife was a further challenge to ongoing coordination. Finally, Guinea never detected any avian influenza cases and only performed a handful of simulations (which ended in 2007), limiting the opportunities for exercising the plan and maintaining robust capabilities.

Outside of the health sphere, EM approaches are largely focused on natural disasters and disaster risk reduction, starting initially in 1990 from the formation of the National Guinean Committee for the International Decade on Prevention of National Hazards and leading to several legislative acts related to disaster management in the 1990s. These efforts are, on paper, multisectoral, with numerous government agencies implicated, though in practice technical ministries such as the Ministry of Health usually have little operational awareness of these acts. The National Service for Humanitarian Action (SENAH), an agency of the Ministry of Territorial Administration and Decentralization, is the lead agency for responses with humanitarian implication; their coordination with health authorities is usually focused at the level of the affected community.

Developments During the Outbreak: 2014–2016

The events that led to the emergence and spread of the outbreak have been well characterized.[4,5] The index case is thought to be a young boy from a rural village in Guéckédou Prefecture, in the remote southeastern forest region of Guinea, who was originally exposed to the virus via contact with a bat. He became ill and spread the disease to several family members, who in turn passed the disease on to healthcare workers at the prefectural hospital. Additional members of the extended family moved the virus further afield. By the beginning of February 2014, a case had been transported to the capital city, Conakry, but the etiology of the disease was still unknown. Although local health workers reported the cases to prefectural authorities at the end of January 2014 and a small investigation was conducted (though Ebola was not identified as the causative agent; in fact, cholera was suspected at the time), the process of investigation, assessment, and confirmation were woefully slow. Indeed, from the very beginning, outside entities were intrinsically and extensively involved in the response effort, starting from the initial investigation of the outbreak by Médecins Sans Frontières in January 2014, and continued to play a major role throughout the outbreak.

The Guinean Ebola response was overseen by the Ebola Coordination Cell (Cellule de Coordination de la riposte contre la maladie à virus Ebola, or CNLEB), created in September 2014 by presidential decree. The structure of the CNLEB was formed of a coordinator and a deputy (both Ministry of Health officials) overseeing a number of technical and operational sections and covering surveillance, case management, communication, security, logistics, etc. Execution of several of these operational areas were delegated to different international or nongovernmental organizations (NGO). For example, WHO was the entity in charge of conducting surveillance and epidemiological functions, including contact tracing and collating data for daily situation reports. The Red Cross was responsible for transport of patients to Ebola treatment units as well as safe and dignified burials. The World Food Program (WFP) played a major role in coordinating logistics. U.N. Children's Fund (UNICEF) was the lead for social mobilization and awareness-raising.

Many agencies and organizations also provided direct support to the CNLEB during the response, through provision of technical, financial, and material assistance. The U.S. CDC (e.g., via funding from the CDC Foundation) renovated several floors of an existing Ministry of Health building into an EOC, to house the CNLEB and affiliated response entities. Concurrently, USAID's Office of Foreign Disaster Assistance (OFDA) provided funding to the International Organization for Migration (IOM) to renovate structures in 28 prefectural and communal health departments to serve as local-level EOCs. CDC partnered with the Public Health Agency of Canada (PHAC) to embed EM experts within the national EOC and provide support and training to members of the CNLEB, mainly on basic managerial and administrative functions such as meeting management, information management, and communications. Finally, CDC and OFDA combined efforts and brought together IOM with George Washington University, to develop and implement a training program on basic EM concepts, targeting prefectural and communal health officials, as a first step toward operationalizing the local-level EOCs.[6] In June 2015, the French government launched its PREPARE project, which included an effort to train multidisciplinary rapid response teams in each of Guinea's eight administrative regions.

In December 2015, Guinea was declared free from Ebola virus for the first time. Success in stemming the number of cases was largely due to extensive social mobilization relating to reporting new cases and community deaths, education on preventing transmission, large-scale contact tracing (including across borders, in coordination with authorities in Sierra Leone and Liberia), and concerted efforts to limit transmission in communities through efforts such as safe and dignified burials. Technological advances, such as the development and deployment of rapid diagnostic tests for point of care testing, and the very promising vaccine candidate trial in Guinea during the latter stages of the outbreak, also likely contributed significantly. In addition to the thousands of Guinean professionals and volunteers, the response involved a vast number of external actors, including international organizations, foreign bilateral donors, foundations, and NGOs.

Sustaining Zero Cases: The Aftermath of the Outbreak

As early as April 2015, the World Bank had begun assisting the three most heavily affected countries with the development of economic recovery plans, acknowledging the severe financial toll the outbreak would take in terms of lost trade and tourism, not to mention the tragic loss of human capital.[7] However, starting from December 2015, Guinea entered "Phase III" of the response, which focused on enhanced surveillance and preparedness for new cases. This included initial plans for future capacity building, with a strong emphasis on the base of the health "pyramid," through strengthening community and prefectural level surveillance, diagnostics, and response efforts. In addition, many of the efforts initiated during the outbreak, which had been intended to focus on the response itself, had been delayed during the height of the crisis, and so were continued during this post-response phase of operations as support for Phase III.

The end of active transmission also emphasized the social recovery that would be needed in the aftermath of the outbreak. In some cases, these efforts coincided with the concern of disease reemergence—for example, survivor monitoring. It had been observed during the outbreak that the Ebola virus can persist for weeks or even months in apparently recovered individuals, and can remain capable of transmitting the disease, meaning that the large numbers of recovered Ebola patients could serve as reservoirs for the virus and be a risk for new cases. Moreover, these survivors

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faced social stigma and continuing health problems, requiring psychosocial and medical support, and assistance with reintegration into their communities. The SA-CEINT endeavor was launched in 2016 to monitor survivors and offer frequent testing of key bodily fluids, such as semen, blood, and breast milk, in an effort to prevent new cases. Despite these efforts, in February 2016, a new case emerged in Koropara, again in southeastern forest region of Guinea. Despite the CNLEB's vigilance and the continued presence of many of the key response partners, it took the Ministry of Health almost 3 weeks to confirm the cases and report the flare up to WHO.[8]

Preventing Future Infectious Disease Emergencies

Throughout the outbreak and its aftermath, a key concern of the Guinean government has been to ensure that a public health emergency of the scale and scope of the 2014–2016 Ebola epidemic never occurs again. Working with partners, a number of efforts are now underway to better understand the epidemiological dynamics of Ebola, in order to prevent future spillover events. For example, several groups, including USAID's PREDICT program and the Institut de recherche pour le développement (IRD), are surveying wild and domestic animal populations to identify possible reservoir species for the virus. As mentioned previously, another outcome of the outbreak was to rapidly develop and test new technological tools to support response efforts. Results from the vaccine trial in Guinea have been extremely positive, with data from over 5000 vaccinated individuals demonstrating protection from the virus even after possible exposure, adding a powerful new tool to the arsenal for preventing, or at least mitigating, future outbreaks.[9]

With respect specifically to EM, CDC is continuing to support EM training and capacity building in Guinea, in collaboration with IOM, PHAC, and other partners. The national public health EOC has now been placed under the jurisdiction of a new Ministry of Health–affiliated agency, the National Health Security Agency (Agence National de Securité Sanitaire, or ANSS), which will be the lead for outbreak preparedness and response efforts. An EOC manager has been appointed, staff are being trained, and efforts are underway to develop key systems and documents to support future activities, such as a concept of operations (CONOPs), strategic plan, and standard operation procedures (SOPs).

Learning lessons from the past is also a key facet of EM. In addition to the numerous global review processes related to the outbreak as a whole (and WHO's role in particular), there have also been initiatives at the national level in Guinea related to reviewing performance during the outbreak. After the flare-up in Koropara in February–March 2016, a number of stakeholders led by CNLEB, including U.N. Development Programme (UNDP), IOM, WHO, and CDC, planned an after-action review process to determine the causes and consequences of the delayed response, focusing on identifying opportunities for future improvement. More generally, the Ministry of Health has recognized the urgent need to review and update many of the key documents related to disease control; a new National Plan for Health System Development (Plan National de Développement Sanitaire) was released in 2015, for implementation through 2024. In addition, the national IDSR guide is being updated to take into account the developments and enhanced capacity put into place as a result of the Ebola crisis. Crucially, these efforts are not being carried out solely by the Ministry of Health. Another outcome of the outbreak has been a far greater awareness of the importance, and impact, of multisectoral approaches to preparedness and response, even when dealing with a public health emergency. The ANSS, for example, will be guided by an administrative council comprised of representatives from at least six different ministries, as well as the offices of the president and prime minister. These developments suggest that a more holistic, and integrated, approach to infectious disease control is being established, and hopefully sustained even once the funds associated with the Ebola outbreak are no longer available.

Conclusion

Prior to the Ebola outbreak, EM was not widely understood in Guinea, let alone practiced, and was entirely absent as an approach within the health sector. The Ebola outbreak highlighted the benefits of including EM principles, as well as infrastructure such as EOCs, as part of the response effort. Guinea has benefitted from numerous internationally funded efforts to build EM capacity during and after the Ebola outbreak, and is now embarking on expanding and sustaining those capabilities within an explicitly multisectoral framework.

Discussion Questions

1. To what extent does this case study reflect the four distinct stages of the emergency management cycle (preparedness, response, recovery, and mitigation)? Can you provide at least one example of each stage? Are there overlaps between any of the stages?
2. Guinea's experience with emergency management was largely shaped by external actors and international assistance, and was catalyzed by the Ebola outbreak. Compare and contrast this experience with the U.S. domestic experience with developing public health preparedness and response systems. (*Hint: Think about 2001 as a catalyst year for U.S. infectious disease preparedness and response.*)