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Ebola Virus Disease Outbreak — West Africa, September 2014

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CDC is assisting ministries of health and working with other organizations to control and end the ongoing outbreak of Ebola virus disease (Ebola) in West Africa (*1*). The updated data in this report were compiled from ministry of health situation reports and World Health Organization (WHO) sources. Total case counts include all suspected, probable, and confirmed cases as defined by each country (*2*). These data reflect reported cases, which make up an unknown proportion of all actual cases. The data also reflect reporting delays that might vary from country to country.

According to the latest WHO update (*2*), a total of 6,574 Ebola cases had been reported as of September 23 from five West Africa countries (Guinea, Liberia, Nigeria, Senegal, and Sierra Leone) (Figure 1). The highest reported case counts were from Liberia (3,458 cases), Sierra Leone (2,021), and Guinea (1,074).

Geographic distribution of the number of Ebola cases reported during August 31–September 23 indicates that recent case counts continue to be high in the areas where Liberia, Sierra Leone, and Guinea meet (Figure 2).

Geographic distribution of the cumulative incidence of Ebola, as of September 23, indicates that the highest cumulative incidence (>100 cases per 100,000 population) was found in five districts in Guinea (Boffa, Dubreka, Gueckedou, Macenta, and Telimele), two districts in Liberia (Loffa and Margibi), and two districts in Sierra Leone (Kailahun and Kenema) (Figure 3).

The latest updates on the 2014 Ebola outbreak in West Africa, including case counts, are available at http://www.cdc.gov/vhf/ebola/outbreaks/guinea/index.html. The most up-to-date clinical guidelines on the 2014 Ebola outbreak in West Africa are available at http://www.cdc.gov/vhf/ebola/hcp/index.html.

Acknowledgments

Lagos and Rivers state governments, Nigeria. Nigeria Center for Disease Control. World Health Organization. CDC response teams in country. Geospatial Research, Analysis, and Services Program, CDC. Situational Awareness Team, Office of Public Health Preparedness and Response, CDC.

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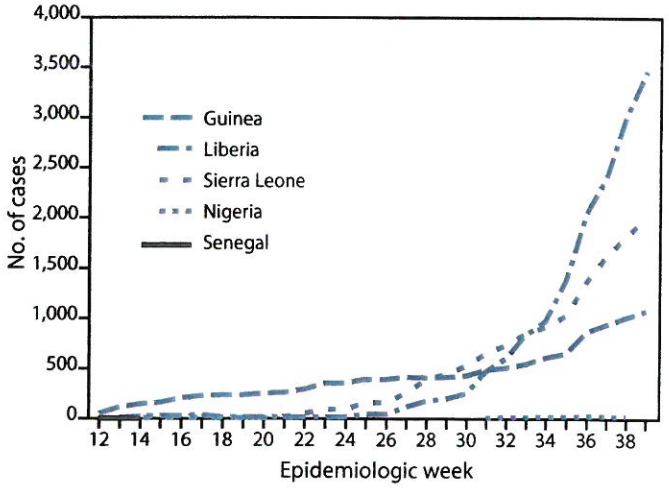
FIGURE 1. Cumulative number of Ebola virus disease cases reported — five countries, West Africa, March 29–September 20, 2014



Sources: Situation reports received from the ministries of health of Guinea, Liberia, Nigeria, Senegal, and Sierra Leone, and the World Health Organization.

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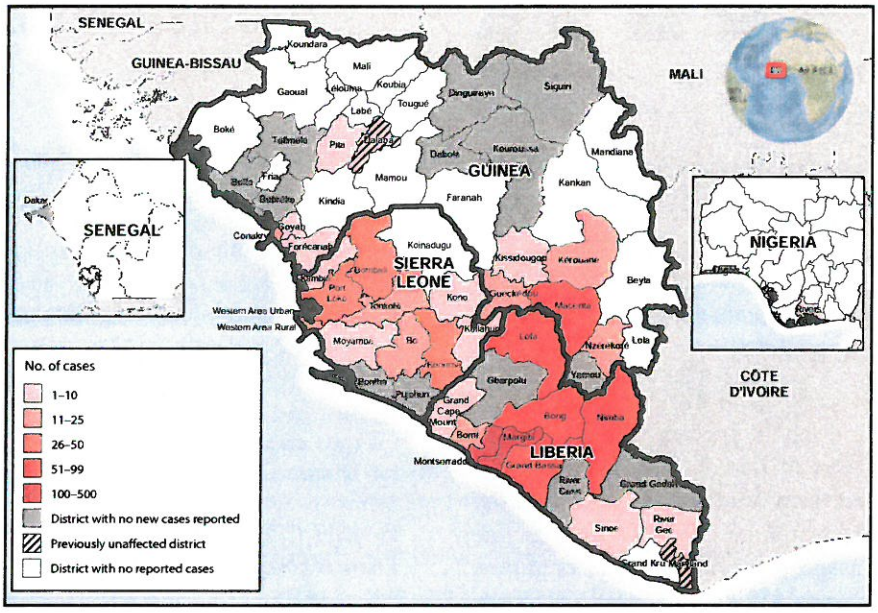
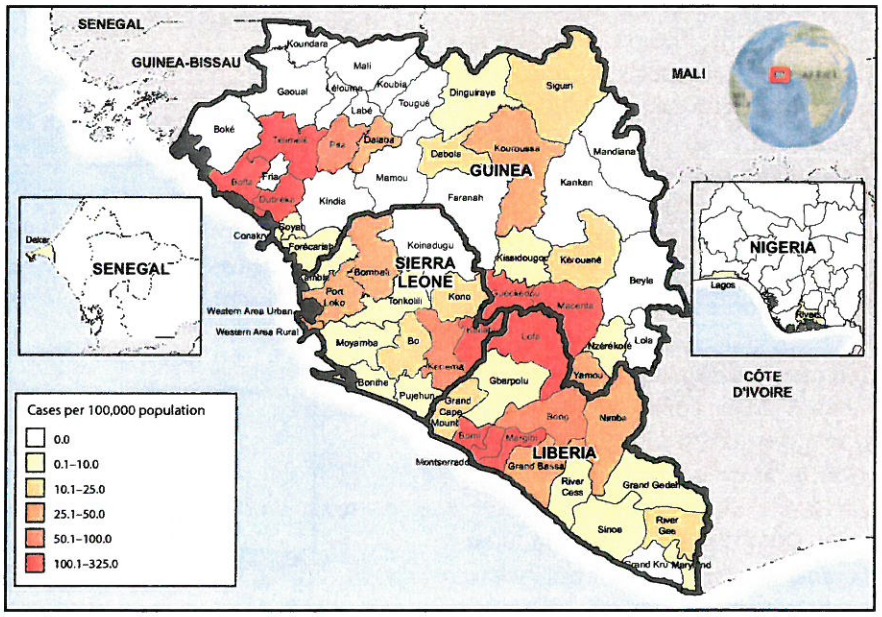
FIGURE 2. Number of new cases of Ebola virus disease reported — West Africa, August 31–September 20, 2014



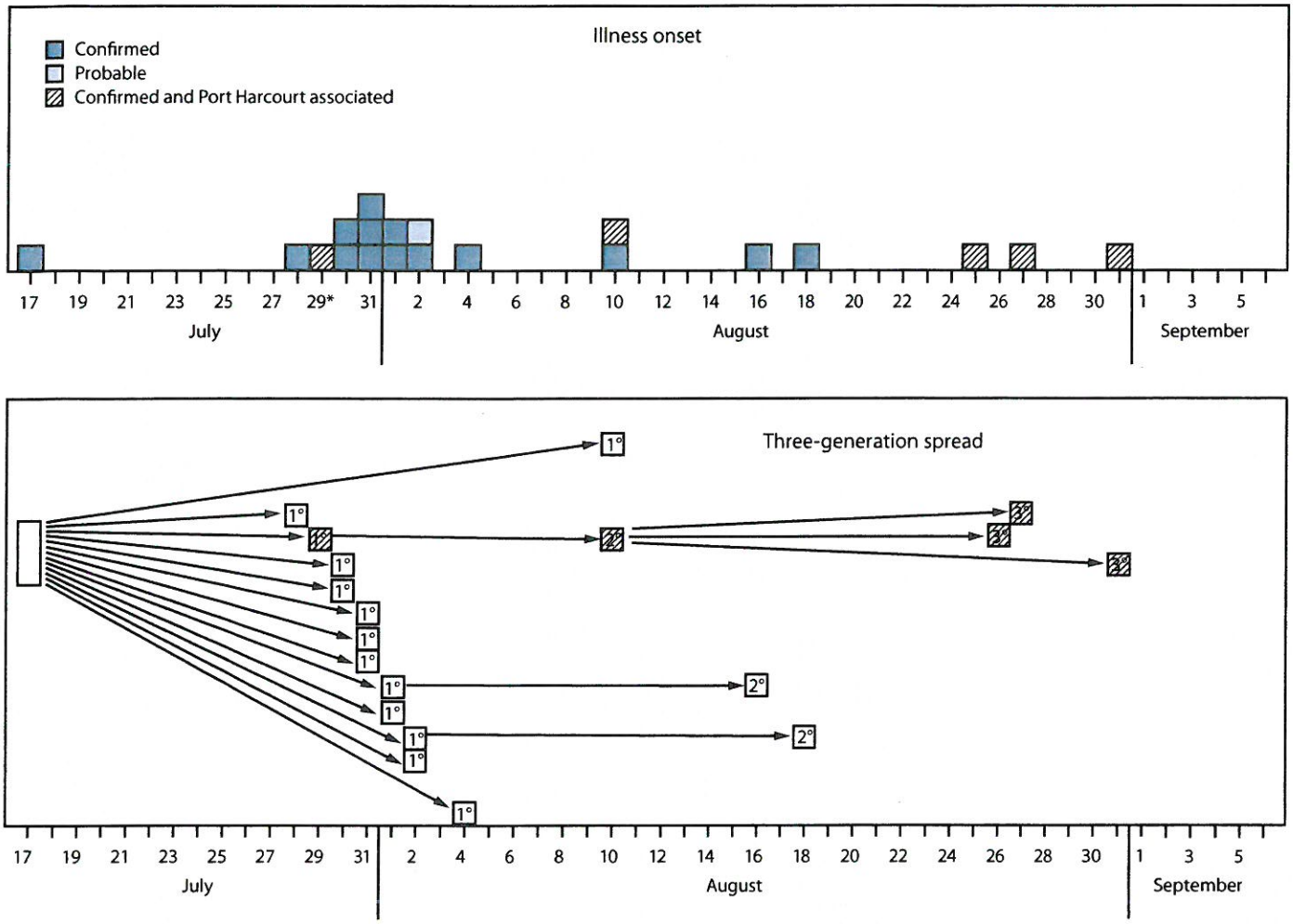
Sources: Situation reports received from the ministries of health of Guinea, Liberia, Nigeria, Senegal, and Sierra Leone, and the World Health Organization.

FIGURE 3. Ebola virus disease cumulative incidence* — West Africa, September 20, 2014



* Cumulative number of reported Ebola virus disease cases per 100,000 persons since December 22, 2013.

FIGURE 1. Number of cases of confirmed (n = 19) and probable (n = 1) Ebola virus disease, by date of illness onset and three-generation spread — Nigeria, July–August 2014



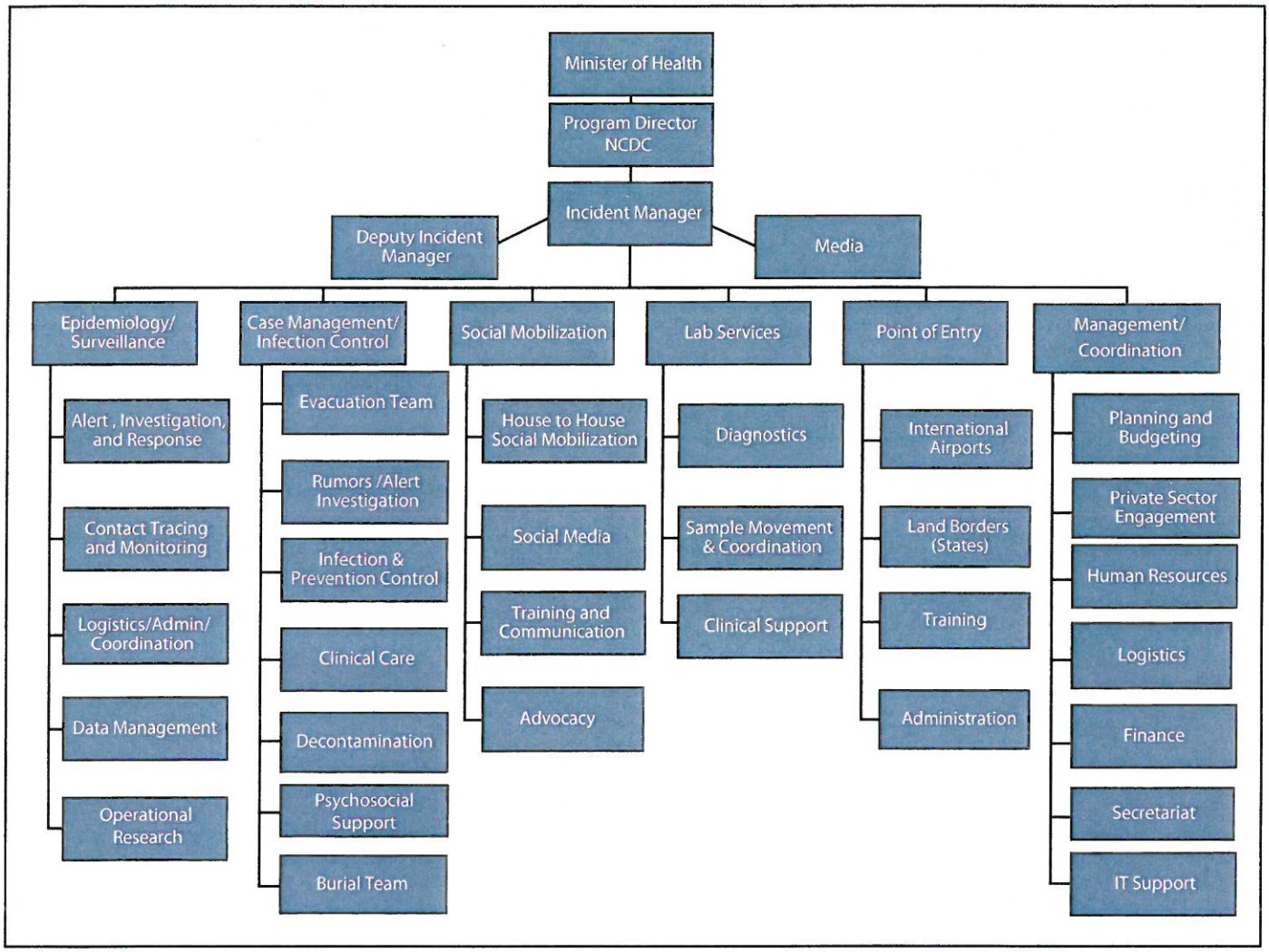
* The patient with July 29 illness onset was exposed in Lagos, traveled to Port Harcourt for treatment and initiated the Port Harcourt case cluster.

The implementation of a rapid response that made use of the available public health assets was the highest priority at the onset of the outbreak, as was organizing the response using proven structures for the delivery of public health in Nigeria. To effectively address Ebola in this complex environment, the response was mounted quickly and used an IMS; both actions are largely credited with helping contain the outbreak early.

Initially, NCDC and the Lagos State Ministry of Health established an Incident Management Center, which served as the overall implementing arm of the national response. The initial Incident Management Center was subsequently recast as the national EOC, in line with IMS nomenclature and national structures aimed at emergency response. The EOC expanded its operations to Rivers State when cases emerged there, and oversaw the monitoring of contacts in Enugu State with state health officials as part of the early outbreak response. There was a stated expectation that all partner organizations, donors, and response teams would work through the EOC structure, reporting to an Incident Manager (IM). In turn, the IM would be responsible to deliver accountable and transparent results to the NCDC and the federal Ministry of Health (Figure 2). The IM, responsible for oversight of the response, was selected based on IMS experience and competency rather than rank in government or public service.

Nigeria's response benefited from the rapid use of its national public institution (i.e., NCDC), previous outbreak responses such as a major lead poisoning response in 2010, and its recent experience with polio eradication. In October 2012, responding to the declaration by the World Health Organization of polio eradication as a global public health emergency, and to improve

FIGURE 2. Organizational structure of the Ebola Response Incident Management Center — Nigeria, July–September 2014



its national response, the Government of Nigeria used the IMS to establish a national EOC as part of a new national emergency plan for the global polio eradication initiative (*3*). The use of IMS through the EOC changed the operational tempo, accountability measures, and programmatic success of the polio program. Indicators and dashboards (electronic displays of high level indicators for each response team monitored at the EOC) were developed to increase accountability of the program staff and spending. Through the EOC and the Nigeria Field Epidemiology and Laboratory Training Program (NFELTP) polio activities, state health system strengthening and preparedness was prioritized (*4–6*).

With the emerging Ebola outbreak, the Nigerian government moved quickly to enforce coordination of the national and state Ebola response efforts using the IMS/EOC structures and drew from its successful experiences. Specifically, the Ebola EOC IM was the polio EOC Deputy IM, and seeded the Ebola EOC with several secretariat and technical staff members from the National Polio EOC. Critical to demonstrating both national and state commitment, the Deputy IM was a senior member of the Lagos State Ministry of Health (Ebola was imported to Lagos State), with access to human and financial resources within the state health system. Immediately, the EOC developed a functional staff rhythm that facilitated information sharing, team accountability, and resource mobilization while attempting to minimize the distraction of teams from their highest priorities. An "Action Tracker" was developed that included specific tasks arising from each meeting, the person responsible, and the due date.

The overall design of the response rested within a senior strategy team made up of the IM, Deputy IM, and primary partner agencies (Doctors Without Borders, the United

What is already known on this topic?

The ongoing Ebola virus disease (Ebola) outbreak in West Africa has had an enormous negative impact on civil and public health systems in Liberia, Sierra Leone, and Guinea. Nigeria's public health system includes a national public health institute (NCDC) and an Emergency Operations Center (EOC) and Incident Management System (IMS), created in 2012 when Nigeria declared polio a public health emergency and restructured its national polio program.

What is added by this report?

Applying lessons from its NCDC and successful polio EOC, Nigeria quickly established a National Ebola EOC after importation of the disease on July 20, 2014. The early use of the EOC/IMS system enabled the country to streamline a coordinated and effective response in Lagos, (pop. 21 million) and to expand that response to Port Harcourt, another large city. As of September 24, a total of 894 contacts in three states had been monitored, and 20 confirmed or probable Ebola cases identified, of whom eight died. No new cases had occurred since August 31, suggesting that the Ebola outbreak in Nigeria might have been contained.

What are the implications for public health practice?

African nations need to rapidly assess their readiness to manage the importation of Ebola. Preparedness activities could include planning EOC/IMS structures that can guide a coordinated and effective response to Ebola or any other public health threat. Where EOC already exists for other diseases like polio, such structures should be strengthened and used to mount effective responses to new threats like Ebola.

Nations Children's Fund, the World Health Organization, and CDC). Six response teams were developed within the EOC specific to an Ebola response, including: 1) Epidemiology/Surveillance, 2) Case Management/Infection Control, 3) Social Mobilization, 4) Laboratory Services, 5) Point of Entry, and 6) Management/Coordination (Figure 2). Terms of reference and priority activities were developed by the strategy team to guide each operational team's work; operational teams developed their own staffing, lists of material and financial needs, and a goal-oriented operational plan. The strategy group reviewed and approved all of the teams' work and needed resources. Technical partners assigned staff throughout the operational teams in technical advisory roles aimed at building the capacity of the local teams and ensuring quality work.

As an example of work planning efforts, the EOC Point of Entry team, led and staffed heavily from the Port Health Service, was responsible for identifying, listing, documenting, and risk-ranking of all the contacts of the index patient at the airport, including those on aircraft and those exposed during airport transit/handling of the index patient. Early in the response, this team mobilized to identify and track the index patient's contacts in the airport and outside Nigeria. Port Health Service worked with airline and airport authorities and other stakeholders to gather information about contact passengers, decontaminate affected areas of the airport, and send a notice through the World Health Organization-International Health Regulations system to avoid possible spread of the disease. The Point of Entry team also established entry and exit screening at ports, which is being rolled out at additional ports and will continue for the duration of the regional outbreak to minimize the likelihood of either further importation or exportation of Ebola.

The Epidemiology/Surveillance team was responsible for contact tracing, operational research, management of alerts and rumors, and implementing community-based surveillance. For successful contact tracing, the Epidemiology/Surveillance management team included over a dozen trained, dedicated NFELTP, WHO, and CDC epidemiologists and was provided the target of listing all contacts of the index and subsequent Ebola cases in the response, and monitoring them in person daily to measure body temperature and check for the presence of other Ebola signs and symptoms (e.g., vomiting, diarrhea, and hemorrhage). In response, the team developed a staffing plan for Lagos that included over 150 contact tracers, vehicles, telephones, and mobile data platforms that the contact tracers could use to administer their questionnaires and report contact responses. In addition, the operational research arm of the Epidemiology/Surveillance team conducted a community Ebola assessment that informed training and communication efforts.

Directly linked to the contact tracing was the Social Mobilization strategy. This included teams of three social mobilizers who were trained and deployed to conduct house-to-house, in-person visits within specific radii of the homes of the Ebola contacts. For high-density areas, house-to-house teams covered a 500m radius, 1km in medium density areas and 2km for low density (*7*). As of September 24, approximately 26,000 households of persons living around Ebola contacts had been reached with house-to-house visits in Lagos and Rivers states.

Several issues were observed by the response team during Nigeria's Ebola outbreak that could, in retrospect, have been mitigated through additional preparedness planning for public health emergencies. First, financial resources were slow to arrive at the EOC, a delay that threatened to impede the rapid expansion of containment activities across the response. Early activities were funded by the Lagos State government, international partners, and nongovernmental organizations. National preparedness efforts should consider how resources can be quickly accessible to fund the early stage of the response. Second, there were discrepancies among the levels of political leadership in fully appreciating the enormous consequences that even a small Ebola outbreak could have on civil institutions such as hospitals, airports, and public gatherings. Targeted

education about the urgent need to fund, staff, and supply a response effort was provided to political leadership and should be considered for preparedness efforts elsewhere. Similarly, the Nigerian public did not have specific information about Ebola, and early information provided by the press, in advance of official information from the health authorities, was sometimes inaccurate and created a nationwide scare. This scare resulted in some persons resorting to extreme and sometimes harmful and ineffective measures to avoid infection such as consuming large quantities of salt water, even in places distant from the outbreak. Both issues could have been addressed through preparedness activities that focused on education and planning, as well as explaining Ebola to the public and describing how to respond should Ebola arrive in Nigeria. The Case Management team indicated that early efforts to establish an isolation ward were delayed due to a lack of Nigerian health care workers willing to care for patients with Ebola because of a lack of information and training about how to care for Ebola patients, and because care providers had been disproportionately impacted by Ebola in other affected countries. Preparedness activities should include orientation and training of physicians, nurses, and attendants to safely provide services with attention to infection control procedures and quality Ebola treatment at an appropriately designed facility. Another challenge was ensuring appropriate coordination of private sector engagement. The EOC system facilitated improved coordination through the designation of the Management and Coordination Team Lead as the private sector point of contact. Finally, some partners and parts of government were unfamiliar with the EOC/IMS system and its use as a means of streamlining coordination and response elements into one unified approach. The government-led EOC process could define opportunities for partners to place staff strategically in the national and local response efforts and could encourage this through the EOC response teams and management system. Further, EOC mechanisms should be tested through strategic exercises and use in non-Ebola responses.

Even with these identified challenges, Nigeria's decision to use EOC/IMS to respond to Ebola resulted in a rapid, effective, and coordinated outbreak response. As of September 24, the Nigeria response had successfully limited the outbreak to 20 laboratory confirmed and probable cases (in two states) with the last cases occurring on August 18 and August 31 in Lagos and Port Harcourt, respectively. This limited spread and the rapid scale-up against the backdrop of the large, dense, urban environments of Lagos and Port Harcourt suggest early response efforts were successful; this is likely directly attributable to the Nigerian government's strategic use of its public health institutions and the EOC/IMS structure to manage the response. The EOC/IMS approach should be a central part of national and subnational preparedness efforts for public health threats. EOC/IMS is a key component of the global health security agenda, along with Integrated Disease Surveillance and Response/International Health Regulations (IHR 2005).

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