

Halting an Infectious Disease Outbreak: Nigeria’s Centre for Disease Control Contains Lassa Fever and Sets a Prevention Plan, 2015 to 2017



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TABLE OF CONTENTS

Executive Summary 1
 Introduction 1
 Delivery Challenges..... 2
 Tracing the Implementation Process 3
 Lessons Learned 8
 References 10

PROJECT DATA

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SECTOR: Health care	LEAD PRACTITIONER: Chikwe Ihekweazu (Director-General, Nigeria Centre for Disease Control) and Elsie Ilori (Deputy Director of Surveillance, Nigeria Centre for Disease Control)
COUNTRY: Nigeria	

Executive Summary

In late 2015, an outbreak of Lassa fever—an acute hemorrhagic fever caused by a virus usually transmitted by rodents—threatened thousands of lives across Nigeria. By the end of December, the outbreak had spread to 14 states and the Federal Capital Territory, infecting more than 400 Nigerians and killing more than 40. The prevalence of cases forced the government to act quickly to diagnose and treat people before the outbreak became an epidemic. Learning from its experience containing the Ebola virus in 2014, the Nigerian government set up a response team, distributed essential supplies, monitored the outbreak, launched a public awareness campaign, and built public health capacity. By August 2017, the government had contained the outbreak and had begun rolling out a long-term plan to prevent future outbreaks.

Introduction

“In November 2015, a severe illness began to spread through several states across Nigeria,” recalled Elsie Ilori, the deputy director of surveillance at the Nigeria Centre for Disease Control (NCDC). “In Niger (Nigeria’s largest state), there were reports of 35 cases of a mystery ailment that had resulted in 15 deaths.”¹

This case study was authored by Kayode Ibrahim Awofe based on interviews conducted in Nigeria. The case study is part of a Global Delivery Initiative series produced in partnership with the Korea Development Institute School of Public Policy and Management.

1 Author interview with Elsie Ilori, Abuja, September 2018.

Ilori and other officials suspected a resurgence of Lassa fever, a hemorrhagic fever caused by the Lassa virus. The symptoms matched that disease: fluid in the lung cavity, bleeding from the nose or mouth, sore throat, diarrhea, low blood pressure, fever, headache, muscle and chest pain, general weakness, nausea, vomiting, and facial swelling. On November 15, tests confirmed a case of Lassa fever in Bauchi, a northeastern state of roughly 4.6 million inhabitants that soon became the outbreak's epicenter.

The NCDC, a government agency set up in 2011 by the Federal Ministry of Health, led the response to the outbreak. The agency had a mandate to operate independently of the ministry and had experience responding to other public health emergencies, including outbreaks of cholera, Ebola, meningitis, and monkeypox. The agency's responsibilities included stockpiling and pre-positioning supplies for outbreaks, developing guidelines and checklists for emergency preparedness, and providing guidance and support to state and local governments.

By the end of November, there were 430 suspected and 195 confirmed cases of Lassa fever among 37 local government areas² across 14 states (NCDC Disease Outbreak Dashboard). About 10 percent of those cases were fatal. Fresh memories of the deadly Ebola epidemic of 2014, which took the lives of more than 10,000 people in West Africa, spurred the NCDC to immediately send surveillance teams to locations with suspected cases of Lassa fever.

On January 19, 2016, the Federal Ministry of Health and the NCDC held an emergency meeting with the National Council on Health, the highest decision-making body in the Nigerian health sector. Attendees included representatives from government ministries, departments, and agencies as well as health commissioners from all 36 states; the secretary of health from the Federal Capital Territory; and international partners such as the United Nations Children's Fund, the World Bank, the US Centers for Disease Control and Prevention, and the World Health Organization.

At the meeting, attendees discussed the operational capacity of the NCDC and strategies for containing Lassa fever, delivering emergency supplies to priority areas,

and administering essential health supplies nationwide. The meeting, which was chaired by Oyewole Tomori, a virology professor, resulted in the creation of the Lassa Fever Eradication Committee.

After analyzing the historical dimensions of the disease and cross-examining records of unknown diseases, the committee concluded that Nigeria had experienced outbreaks of Lassa fever each year since 1969 (Nigeria Health Watch 2019). The 2015 outbreak received much more attention than previous outbreaks because of its fast spread and the high number of reported cases.

The health ministry financially supported the committee and provided the NCDC with additional staff for its frontline containment effort in the highly affected states of Bauchi and Edo. Earlier efforts in those states had fallen short because of shortages of staff and hospital beds to manage the high burden of Lassa fever.

Efforts to control the outbreak also faced technical constraints. Dr. Bot Choji, the senior registrar at Ahmadu Bello University Teaching Hospital, said that laboratory results when testing for the disease were inconsistent; some patients with Lassa fever symptoms initially tested negative but later tested positive for the virus.³ Ilori said the discrepancies in results could have been caused by technical improvements in Lassa fever detection rather than changes in the patients' condition.

In March 2016, the NCDC was still trying to figure out why the outbreak was escalating. Dr. Chikwe Ihekweazu, director-general of the NCDC, gave three possible reasons for the increase in cases: a change in the virus; a change in the carrier's ability to transmit the virus to humans; and an increase in detection as the technical capacity for testing improved.

Delivery Challenges

To stem the outbreak, the NCDC had to take the following actions: find hospital beds for patients; issue protective equipment to health workers; distribute Ribavirin, an antiviral medication; promote behavioral changes to stop the disease's spread; monitor active cases of Lassa fever; test patients' relatives and close contacts; and analyze suspected cases. In implementing its response, the NCDC had to overcome a formidable set of challenges.

² Local government areas are administrative political divisions or subdivisions within the 36 states of Nigeria. Each area is headed by a democratically elected chairperson.

³ Author interview with Bot Choji, Zaria, September 2018.

Organizational capacity

When the outbreak began, the Nigerian government did not have the organizational capacity to respond effectively. The only hospital equipped to analyze blood samples of suspected cases of Lassa fever was the Irrua Specialist Teaching Hospital in Edo state in southern Nigeria. The hospital was home to the Institute of Lassa Fever Research and Control, created in 2007 to control and manage Lassa fever nationwide. Test results took at least six hours to process. The hospital did not have enough bed space, staff, and equipment to cover all the incoming cases.

Skilled human resources

The NCDC prioritized Lassa fever case management on the basis of clusters of severe cases and fatalities. As Ilori said, “The majority of attention was centered on the three states of Edo, Ondo, and Ebonyi that have confirmed over 80 percent of Lassa fever suspected cases.”⁴ The NCDC needed to train personnel to resolve the case management crisis in the three most affected states before the outbreak extended to other states.

Another concern was contact tracing, the process of tracking relatives and other contacts of infected people and monitoring them for infection. Inadequate contact tracing for the first cases of the fever meant the NCDC had to quickly increase capacity.

Also, lapses by the surveillance team exposed a need for better oversight. Each member of the surveillance team responded to cases independently, rather than relaying such cases to the whole team for collective intelligence and a group response. Aderemi Josiah, a nurse anesthetist at Kogi State Specialist Hospital, said that “the issue with the surveillance team affected the program in its entirety.”⁵

Social and cultural

In addition to nationwide challenges, beliefs and cultural practices in some local communities hampered the outbreak response. For example, Ribavirin distribution was less successful in remote communities in the north, where infected individuals did not use the drug as prescribed because of traditional beliefs that the ailment was spiritual rather than viral in nature. Often,

communities used Ribavirin only once the ailment became critical, creating a fatal lag in treatment because Ribavirin was effective only if taken within six days of infection. Local factors such as poor sanitation and crowding because of large families sharing small living spaces also affected case management.

In the southeastern state of Enugu, the state government was unable to provide sufficient support for surveillance because of budget gaps and high recurrent expenditures. The state government only partly funded its contribution to the NCDC budget, which caused a shortage of ambulances to transport samples to the Irrua Specialist Teaching Hospital, roughly 250 kilometers away, for testing. Further delaying the NCDC intervention, communities in Enugu sometimes blocked surveillance teams’ access until the completion of a customary lamb sacrifice for every case of the disease. The resultant weeks of delay hindered case management efficiency.

Furthermore, dietary traditions in southern Nigeria increased the risk of infection. For example, many inhabitants of that region ate bushmeat from multimammates, the rats that carried the Lassa fever virus. In some areas, these multimammates also infested food processing sites. For example, the traditional practice of spreading wet cassava, a staple carbohydrate in West Africa, in an open field to dry increased risks of contamination by the droppings of infected rodents.

Communication strategy

Another challenge the government faced was the spread of misinformation about the disease, including false cures such as natural herbs. The NCDC had to counter this misinformation to ensure that everyone infected received effective treatments such as Ribavirin rather than relying on incorrect guidance from friends and neighbors.

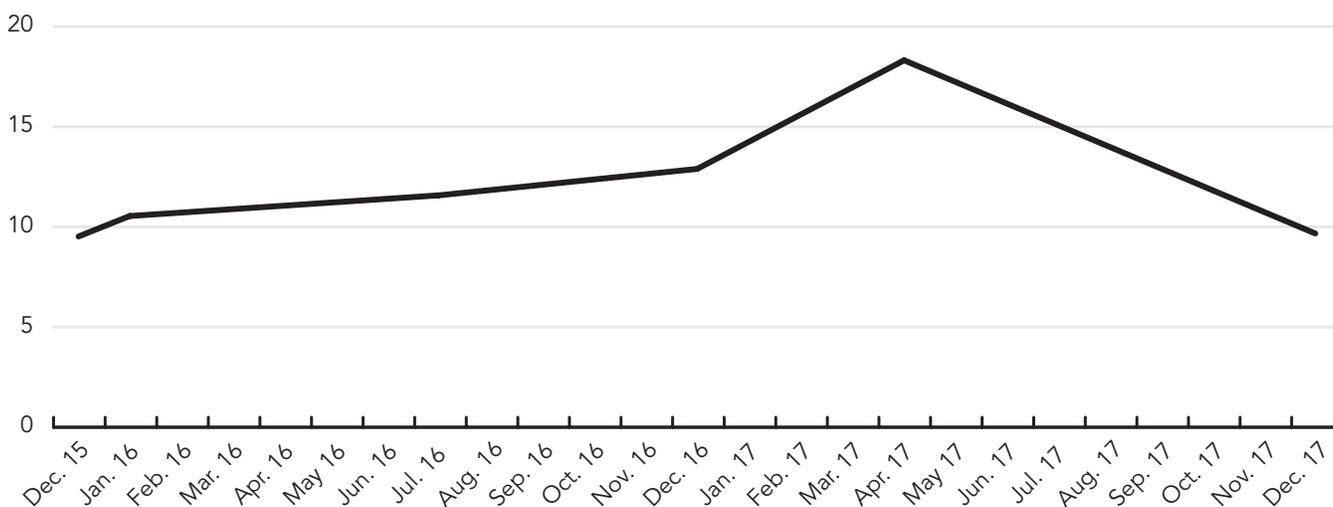
Tracing the Implementation Process

In the wake of the Bauchi outbreak in November 2015, the surveillance team of the NCDC’s Lassa fever department led Nigeria’s Lassa fever containment strategy, including emergency response, testing and research, and distribution of essential supplies. Beginning in January 2016, the Lassa Fever Eradication Committee coordinated efforts by the NCDC and other government

4 Author interview with Elsie Ilori, Abuja, September 2018.

5 Author interview with Aderemi Josiah, Lokoja, September 2018.

FIGURE 1. CASE FATALITY RATE FOR LASSA FEVER IN NIGERIA, 2015–17 (PERCENT)



Source: Author's secondary data (NCDC 2018).

agencies to raise awareness, build public health capacity, and prepare for future outbreaks.

Early actions by the surveillance team

The team implemented emergency response measures such as distributing personal protective equipment (including gloves, gowns, shoe covers, masks, and goggles) and Ribavirin tablets to Niger, Bauchi, and neighboring states. Team members placed hand sanitizer at the entrances of primary health care centers and advised patients' relatives and the community to ensure basic handwashing, avoid contact with the blood and body fluids of the sick, and use additional barriers during bed rest. The surveillance team kept a detailed log of daily happenings, assisted in case identification, and collected blood samples from suspected cases for diagnosis.

Ambulances took these samples to the diagnostic laboratory at the Irrua Specialist Teaching Hospital. Some of the blood samples tested were uncategorized and required retesting. As a precaution, the associated patients were placed in intensive care units of hospitals and received follow-up treatment. Subsequent test results were mostly negative, but a few were positive, and those patients needed additional treatment.⁶

In response to the earlier uncategorized results, the surveillance team introduced a new comprehensive

diagnostic test and a general health diagnosis report for patients with suspected Lassa fever virus. The team also decided to cluster cases within the Irrua Specialist Teaching Hospital according to severity so that patients could receive proper medical attention. And to better understand the extent of the outbreak in Bauchi, the surveillance team tested all patients in the public hospitals of the seven local governments where Lassa fever was suspected.

In December, the surveillance team conducted several experiments using real-time virus sequencing technology, which revealed crucial details that contributed to the understanding and control of infectious disease outbreaks. This technology resolved chains of transmission to a level of detail previously unachievable by traditional testing methods. It also helped to actively locate cases in the host community and classify them by severity.

The response team used the new Lassa virus sequencing technology to conduct a review of the virus and submit a technical report to the NCDC on January 25, 2016. The report found that the fatality rate (the number of deaths divided by the number of suspected cases) had increased from 10.90 percent to 11.57 percent from late January to July 2016 (figure 1), while the number of confirmed cases had doubled, from 41 to 82 (NCDC Disease Outbreak Dashboard). More worrisome, the disease had spread from 14 to 20 states within the same period. In response to this news, the federal health ministry and the NCDC provided technical, logistical, and financial assistance to

6 Author interview with Elsie Ilori, Abuja, September 2018.

the response team, and they organized key stakeholder meetings to set containment objectives.

Distribution of essential supplies

Despite the response team's efforts, the death rate exceeded 12 percent among the 25 suspected cases recorded in 12 communities from March through April, according to Dr. Ibrahim Gamawa, the chairman of the State Primary Health Care Development Agency (Premium Times 2018). (Ten patients were admitted to the hospital, and three died.)

In response, the federal government provided immediate first-aid supply relief to all state governments and the Federal Capital Territory. Supplies provided by the health ministry included Ribavirin, personal protective equipment, and consumables such as food and water.

The strategy to contain this emergence of Lassa fever required a heavy financial commitment, and several of the affected states—such as Edo, Enugu, and Ondo—did not have sufficient resources available. This constraint meant these state governments relied heavily on the federal government for financial support. The only states able to provide financial support to the NCDC were those able to add Lassa fever intervention funds to their health budget, such as Akwa-Ibom, Delta, Kaduna, Kano, Lagos, Ogun, and Rivers.

The State Primary Health Care Development Agency, a planning and implementing agency with offices in all 36 states, supported the NCDC by reporting suspected cases to the center. It also assisted in monitoring the outbreak.

In May, the health ministry partnered with pharmacies across the nation to improve public access to Ribavirin and to track suspected cases of Lassa fever. Lead pharmacies in each state registered with the ministry, created a supply order chain solely for Ribavirin, and reported customers who purchased Ribavirin to the ministry. This communication channel helped the ministry track suspected cases of the virus. The ministry could then test or isolate individuals with suspected cases at primary health care centers.

In June, the ministry distributed two cartons of Ribavirin to each primary health care center. Ribavirin supplies in unaffected states were reallocated to the states of Ebonyi, Edo, and Ondo, where confirmed cases had increased and the case fatality rate averaged 40 percent

(well above those of other states, which were below 11 percent).

However, challenges in logistics, supply management, accountability, and surveillance team capacity persisted. For example, the hard-hit states of Ebonyi and Ondo did not have enough ambulances to move newly infected people and test samples to the Irrua Specialist Teaching Hospital.

Raising awareness

The Lassa fever technical working group of the NCDC, composed of the heads of the seven units of the Lassa fever department, met every Thursday to share progress and discuss the containment strategy.⁷ The working group initiated a large awareness campaign, which included erecting billboards, sponsoring radio programs dedicated to Lassa awareness, and placing precautionary posters in high-visibility public places such as hospitals, markets, and public transit vehicles and stations. The NCDC also distributed flyers to private banks, schools, and grocery stores. The flyers provided information on hand sanitizer, safe food storage, and healthy lifestyles.

Mass media communications by radio, television, and print media included advocacy for personal and household hygiene and information on basic Lassa fever symptoms and precautions. The NCDC provided updates on the outbreak through online social media platforms, including Twitter, Facebook, and WhatsApp. For instance, the NCDC media team managed a WhatsApp number dedicated to reporting suspected cases, recognizing signs and symptoms, and receiving public inquiries and complaints. Prompt, around-the-clock responses on the social media platform ensured immediate feedback from the public and helped with efficient and timely emergency communications, according to Olayinka Fabiyi, a clinical chemist at Ahmadu Bello University Teaching Hospital.⁸

By mid-2016, universities had started a campaign to raise awareness among students and public health practitioners through seminars on Lassa fever's causes, symptoms, prevention, and treatment. Lecturers took the opportunity in classrooms to disseminate vital information on causes, symptoms, and prevention of Lassa fever.

⁷ The seven units were surveillance, data management, risk communication, infection prevention and control, case management, laboratory, and research.

⁸ Author interview with Olayinka Fabiyi, Zaria, September 2018.

Promoting collaboration and accountability

In August 2016, the federal government partnered with state governments to reduce bureaucracy at the NCDC and share financial support, joint health policy frameworks, and supplies of Ribavirin and other essentials. The partnership also included an advisory role with a long-term strategic plan for constructing infectious disease hospitals to address future Lassa fever outbreaks.

State ministries agreed to routine federal oversight. The federal ministry of health instituted a daily reporting logbook managed by the health commissioner that clearly defined responsibilities and expectations for the state ministries's senior health practitioners.

The health ministry, through the NCDC, also delineated the chain of command to encourage instant communication with the appropriate personnel. For instance, the ministry encouraged copying the NCDC director-general on staff emails and relaying critical or urgent verbal communication within the department to the director-general by email. "This communication strategy kept all staff abreast of responsibilities, which helped in efficient case management," said Ilori.⁹

The accountability strategy helped to identify instances in which members of the ministry had neglected their responsibilities, which were investigated and dealt with through suspension and other penalties as necessary. It also helped to integrate and encourage collaboration among personnel within the Lassa fever department, the ministry, and the NCDC. Directly involving the NCDC director-general in communications amplified communication from the NCDC staff.

Building capacity

In the final quarter of 2016, universities supported the NCDC's capacity-building initiative through structured training and seminars for public health practitioners. Trainees received certification after completing the training. One seminar led by the Nigerian Institute of Medical Research included training on material handling, active contact tracing, and outbreak response designed to equip personnel with the skills to use laboratory equipment and an awareness of the ethical implications of their work. A seminar on field epidemiology and laboratory training, which aimed to strengthen the

emergency response capacity of public health experts, was held at Ahmadu Bello University in October 2016.¹⁰

From April to December 2016, case numbers remained relatively low (figure 2). However, in week 52 of the crisis, the number of confirmed cases rose to 16 from an average of 2 during weeks 13 to 51. Fabiyi noted that outbreaks often occurred at the year's end because of mass travel among indigenous communities for traditional festivals. "The numbers of settlers, those who migrated for festivals plus the indigenous people, in this period outweighs the response team capacity, which undermines the efficacy of case management," he said.¹¹

In January 2017, after identifying inefficient case management and front-line capacity building as priority issues, the NCDC deployed more experienced staff from other departments to hot spots. The US Centers for Disease Control and Prevention assisted with the provision of personal protective equipment for diagnosis and treatment, on-demand technical support, capacity building for the NCDC staff in line with global best practices, and additional resources and staff training in the diagnostic laboratory of the Irrua Specialist Teaching Hospital. The NCDC's American counterparts helped develop case management protocols and train six people in each of the state health ministries on coordinated outbreak response.

The NCDC also solicited support from private health providers. To address capacity gaps, the NCDC offered short-term contract jobs of three to six months to virologists and senior health practitioners at private hospitals.

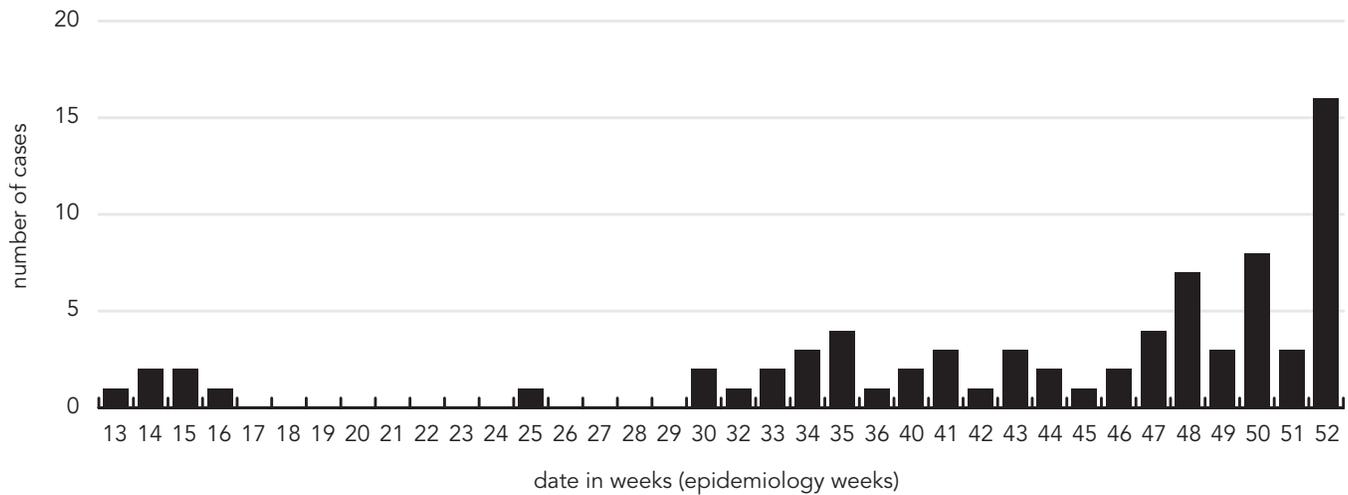
By the end of March, the ministry equipped four additional hospital laboratories to support the Irrua Specialist Teaching Hospital: the Federal Medical Centre in Owo, Lagos University Teaching Hospital, the National Public Health Reference Laboratory in Abuja, and the Virology Centre at the Federal Teaching Hospital in Abakaliki, Ebonyi. These renovations helped the Owo medical center meet a critical capacity challenge caused by a spike in cases from the fourth quarter of 2016 through the first quarter of 2017 (figure 3). Also, the Ondo state government and the NCDC opened a 38-bed isolation center in November 2017. Other emergency operations centers opened in Abuja, Ebonyi, and Ondo.

¹⁰ A similar seminar was also held at the University of Ibadan Teaching Hospital in November 2017 to train epidemiologists, laboratory scientists, and veterinarians on case handling and leadership positions concerning viral diseases.

¹¹ Author interview with Olayinka Fabiyi, Zaria, September 2018.

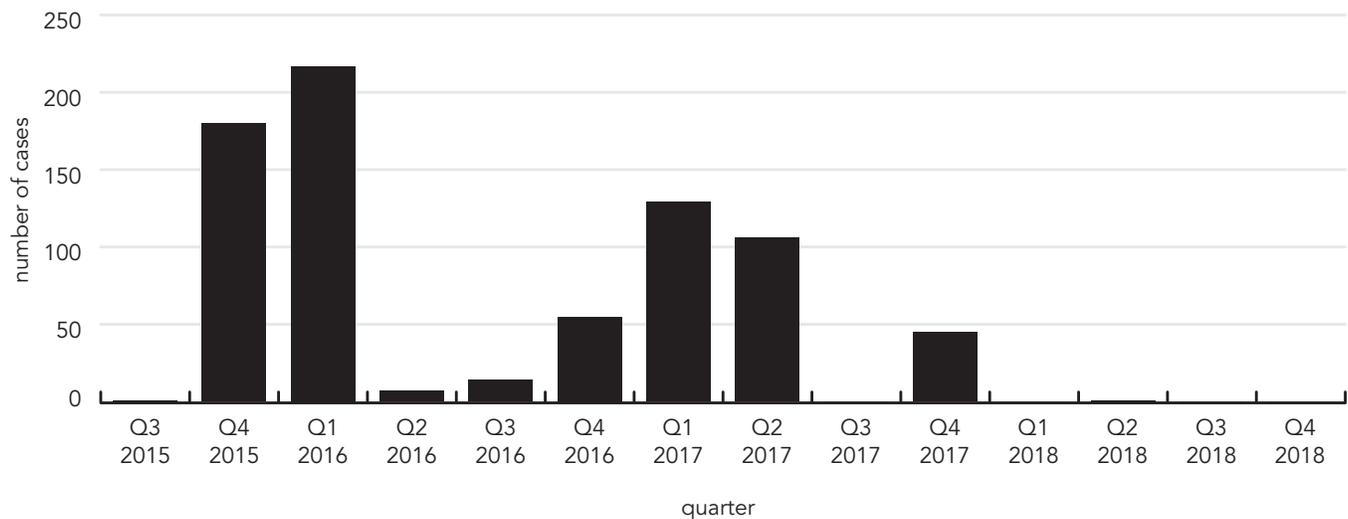
⁹ Author interview with Elsie Ilori, Abuja, September 2018.

FIGURE 2. WEEKLY CONFIRMED CASES OF LASSA FEVER IN NIGERIA, APRIL–DECEMBER 2016



Source: Author's secondary data (NCDC Disease Outbreak Dashboard).
 Note: Reported weeks with no bars in figure 2 are weeks with no confirmed cases.

FIGURE 3. QUARTERLY CONFIRMED CASES OF LASSA FEVER IN NIGERIA, 2015–18



Source: Author's secondary data (NCDC Disease Outbreak Dashboard).

From June through October 2017, the NCDC initiated compulsory health education for all staff and rehabilitated treatment centers in states affected by Lassa fever. For instance, the NCDC worked with the US Centers for Disease Control and Prevention to train all employees of the Federal Teaching Hospital in Abakaliki, with intensive training for the Lassa fever committee. Also, the hospital’s virology center was rehabilitated with regard to case management procedures after the

outbreak took the lives of physicians who treated Lassa fever patients.

Preparing for future outbreaks

In June 2017, Nigeria became one of 52 countries globally and the 15th in Africa to carry out a joint external evaluation by international experts to assess state capacity to prevent, detect, and respond to public health threats and to adhere to international health regulations.

Nigeria's designated international health regulation desk, the NCDC Surveillance and Epidemiology Directorate, coordinated the joint external evaluation process, which was led by the World Health Organization, the US Centers for Disease Control and Prevention, the World Bank, and other partners. The weeklong evaluation illuminated Nigeria's shortcomings and left the country better prepared to respond to health emergencies.

At the same time, the Lassa fever technical working group agreed to develop software to merge and simplify the data on Lassa fever patients across various departments, hospitals, and states. Previously, the data set had redundant, incorrect, and incoherent entries, which had impeded data analysis.

The NCDC also launched a two-year training program in epidemiology case management and virology for experts in public health. The program was supported by a weekly meeting of the technical working group, chaired by the director-general or the deputy director of surveillance, with a mandate to improve the Lassa fever case management and containment strategy.

Because Lassa fever spread in the country primarily through contaminated food and unhygienic environments that attracted multimammates, the NCDC partnered with the Ministry of Agriculture and Environment to teach farmers about proper sanitation, the harmful effects of multimammates on produce, immediate processing and proper handling of produce after harvest, and safe methods of open-air produce storage under thick polyethylene.

The ministry, in conjunction with the NCDC, also initiated an annual public health and epidemiology conference. "The annual conferences were a low-cost way to spread knowledge about important sanitation procedures," Minister of Health Isaac Adewole later explained. "Surveys conducted by NCDC researchers found that those who attended the conferences were more likely to implement sanitation procedures and less likely to contract diseases."¹²

Outcomes

Ultimately, the NCDC curtailed the outbreak of Lassa fever. The number of confirmed cases and the fatality rate declined from August 2017 onward, and in 2018, only one confirmed case was reported nationwide (NCDC

Disease Outbreak Dashboard). "The young agency responded promptly to the new disease irrespective of location, constraints, and challenges," said Ilori. "Lassa fever confirmed cases were brought to a single digit with [a] near-zero fatality rate."¹³

In 2018, Choji, the hospital registrar, said, "While this year is the most challenging in the history of Lassa fever concerning increasing suspected cases, the case fatality rate [has] been drastically improved and the media stories have been on yellow fever and monkeypox. Thus, I can say it's a success."¹⁴

The increase in capacity through improved human resources, new hospitals, and a better-equipped diagnostic laboratory meant the NCDC ended this period better prepared to detect and respond to future outbreaks. "We now have the technical capacity to respond to more cases compared to when we embarked on the containment strategy process," said Ilori.¹⁵

Nigeria had very few cases of Lassa fever throughout 2018 and 2019, an encouraging sign. But in 2020, Nigeria experienced its largest-ever outbreak of Lassa fever—and that outbreak occurred at the same time as the greatest public health crisis of the 21st century, the global COVID-19 pandemic. The new Lassa fever outbreak suggested that further efforts were necessary to enhance the country's preparedness to respond to Lassa and other viruses.

In mid-2020, the NCDC was stepping up those efforts. "As of 2020, controlling Lassa-carrying rodents becomes the major priority of the NCDC to breaking the Lassa virus chain of transmission, said Ilori. "We are working on policies to depopulate Lassa-carrying rodents in the country. Besides, the drug to cure Lassa fever is undergoing clinical trial. We expect a positive result and, hopefully, to make it readily available to the public."¹⁶

Lessons Learned

Partnering with the private sector boosted capacity and improved coordination.

One factor in the success of Nigeria's effort to control Lassa fever was the NCDC's partnership with private health practitioners. These highly experienced

¹² Honorable minister of health briefing with state commissioner of health at a symposium held in Abuja, September 2018.

¹³ Author interview with Elsie Ilori, Abuja, September 2018.

¹⁴ Author interview with Bot Choji, Zaria, September 2018.

¹⁵ Author interview with Elsie Ilori, Abuja, September 2018.

¹⁶ Author interview with Elsie Ilori, Abuja, July 2020.

professionals had a noticeable effect on the development of structures and processes in the emergency response to the outbreaks. The NCDC benefited from the expertise and efficiency of private health practitioners at the diagnostic hospital.

The partnership with pharmacies helped the NCDC manage cases and contact tracing efficiently, which in turn helped ensure prompt, coordinated responses to suspected cases and contributed to the reduction in fatalities. Also, the partnership with private banks and other businesses helped raise mass awareness of the Lassa fever virus, its symptoms, and precautions against it.

Increasing capacity quickly contributed to developing strength, resilience, and procedures for active case management.

The NCDC's training of six members in each state served as a key strategy to build and mobilize capacity. Newly trained graduates of the Field Epidemiology and Laboratory Workshop could help fight sporadic outbreaks. Staff from other NCDC departments complemented the limited human resources of the Lassa fever unit. The NCDC director-general credited the tenacity and commitment of staff with eradicating Lassa fever.

Furthermore, the successful rehabilitation of hospitals and creation of three more diagnostic centers helped combat outbreaks. The federal and state governments provided significant financial incentives and support for these efforts. The certification of recruits and experienced staff through platforms such as seminars, symposiums, and short courses reduced the workload of overstretched NCDC staff.

Coordination among different units facilitated collective action.

All units in the NCDC's Lassa fever department were integrated under the motto "Collective effort, healthy Nigerian." Responsibilities such as setting deadlines, subgoals, strategies, and feedback mechanisms for entire units were shared as part of the overall objective of Lassa fever eradication, which helped with coordination and management. "A unit challenge becomes several units' challenges, upon which the problem is dissected and a panacea is collectively agreed upon," said Ilori.¹⁷

Local partnerships with the Ministry of Environment and Agriculture also proved instrumental in enhancing case management and in mitigating outbreaks.

Flexible communication aided case management, strengthened partnerships, and encouraged engagement.

The ministry's initial top-down communication strategy caused difficulties, and unnecessary bureaucratic processes hindered efficient case management. After the ministry delegated responsibility to the NCDC, however, the agency used its new mandate to streamline processes and speed up the response. The Lassa fever department worked with other NCDC units to strengthen its response efforts. Also, the staff from other departments who temporarily joined the Lassa fever department contributed technical knowledge that helped the NCDC deal with the rise in cases of the virus.

Host communities in affected locations were taught the importance of early notification of symptoms, which could be accomplished by communicating directly to local authorities, by reporting to the local hospital, or by using email and social platforms. As Choji said, "This timely report or the provision of resources helped enhance active case search, boost the efficacy of the use of Ribavirin, enhance the effective case management process, and ensure transparency amongst partners."¹⁸

¹⁷ Author interview with Elsie Ilori, Abuja, September 2018.

¹⁸ Author interview with Bot Choji, Zaria, September 2018.

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