

Eradicating polio in Nigeria

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The country's novel approach to disease control can offer lessons for other countries facing urgent public-health challenges.

Nigeria recently celebrated a full year and a half without a new case of wild poliovirus.¹ The World Health Organization (WHO) has certified there has been no evidence of wild polio in Nigeria for more than a year and removed it from the list of polio-endemic countries.² These are milestones both for Nigeria and for the global campaign to eradicate polio. Nonetheless, continued effort and vigilance will be critical over the next two years to declare the country and the rest of Africa completely free of the disease.

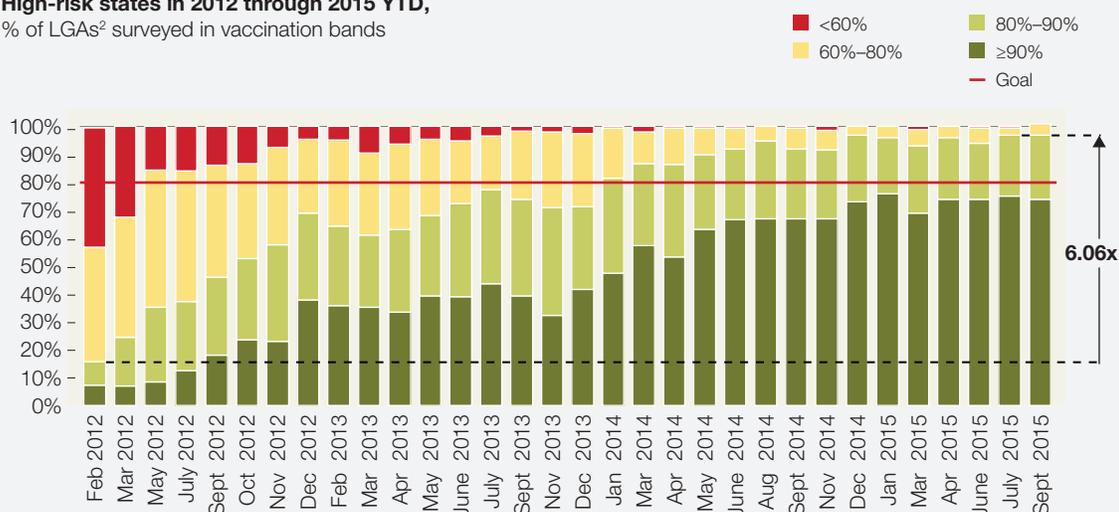
Toward these ends, Nigeria has significantly increased polio immunity among its population over the past three years. As recently as February 2012,

only 16 percent of local-government areas (LGAs) in high-risk states had achieved the target level of immunity coverage: vaccinating more than 80 percent of all children under the age of five. By September 2015, coverage had improved more than sixfold: 97 percent of LGAs in high-risk states had achieved the target (Exhibit 1). The success of Nigeria's federal and state governments, Global Polio Eradication Initiative partners, and the Bill & Melinda Gates Foundation is all the more impressive given the climate of disinformation, intimidation, and violence that peaked with the 2013 murder of 13 vaccinators by insurgents in Kano and Borno states.

Exhibit 1 Nigeria increased the number of high-risk state LGAs reaching target immunity coverage more than sixfold.

Vaccination campaign coverage, as indicated by LQAS,¹ has increased sharply since 2012.

High-risk states in 2012 through 2015 YTD,
% of LGAs² surveyed in vaccination bands



LQAS indicates that just 16% of LGAs sampled in high-risk states were achieving ≥80% coverage in Feb 2012, whereas 97% of LGAs sampled in high-risk states achieved ≥80% coverage in Sept 2015, representing more than a sixfold increase.

¹Lot quality-assurance sampling.

²Local-government areas.

This article reviews the steps that Nigeria and its partners took to eradicate polio, especially the introduction of a novel approach to disease control: emergency operations centers (EOCs). It also explores what the lessons learned from Nigeria's approach to polio might teach other countries about emergency health responses.

Taking the fight to polio: Establishing EOCs

In 2012, Nigeria had a serious polio problem. It was Africa's only remaining polio-endemic country, and the number of confirmed new wild poliovirus cases was increasing, eventually reaching 122 that year. Indeed, Nigeria was considered the worst performing of all polio-endemic countries, with a majority of new cases throughout the world. Immunization coverage was declining, attributable to weak program performance, lack of accountability, significant levels of mistrust at the community level, poor engagement of the country's traditional structures, and little coordination between the government and its international partners working to eradicate the disease. In addition, the states with the highest risk for polio were all in northern areas plagued by weak health systems, poor health indicators, and challenging security conditions.

Nigeria created a presidential task force to lead the country's response to the eradication of polio. The plan was to work with national and international organizations, such as the National Primary Health Care Development Agency (NPHCDA), WHO, the US Centers for Disease Control and Prevention (CDC), the United Nations Children's Fund (UNICEF), the Bill & Melinda Gates Foundation, and Rotary International. With the support of the Gates Foundation and strategic assistance from McKinsey & Company (see sidebar "McKinsey's support for Nigeria's polio-eradication effort"), the Ministry of Health created EOCs to focus on the highest-priority interventions, to improve coordination, and to manage the program's

overall performance closely. EOCs are centralized command-and-control units responsible for disaster preparation and management. Other countries and cities have also used them to respond to emergencies.

Nigeria's National Polio EOC was established in the capital, Abuja, in October 2012. The EOC model requires national and international organizations to locate their leaders in the same place and to meet regularly to develop and execute eradication strategies, improve vaccination campaigns, and respond immediately to outbreaks. Each organization contributed people to support the collection, analysis, and reporting of eradication data. The NPHCDA provided local staff to gather data from LGAs, wards, and settlements in high-risk states.

The Minister of State for Health, Dr. Mohammad Ali Pate, asked the NPHCDA's Executive Director, Dr. Ado Jimada Gana Muhammad, to lead the creation of the national EOC. He appointed Dr. Andrew Etsano as EOC Incident Manager and Dr. Faisal Shuaib as Deputy Incident Manager, with direct reporting lines to the Executive Director and the Minister, respectively. They worked with the NPHCDA and the international partners to develop the required organizational structure, working committees, meeting routines, procedures, and data-analysis support. Besides establishing the national EOC in Abuja, the ministry oversaw the design and set up the first state EOC in Kano. This became the model for the successful EOCs opened in six other high-risk states in northern Nigeria.

The national EOC leadership and the international partners collaborated to train members of state teams in collecting and analyzing data, solving problems, and improving the execution and reporting of vaccination campaigns. Each EOC in the states most at risk for polio required a team of 10 to 15 people, including highly trained

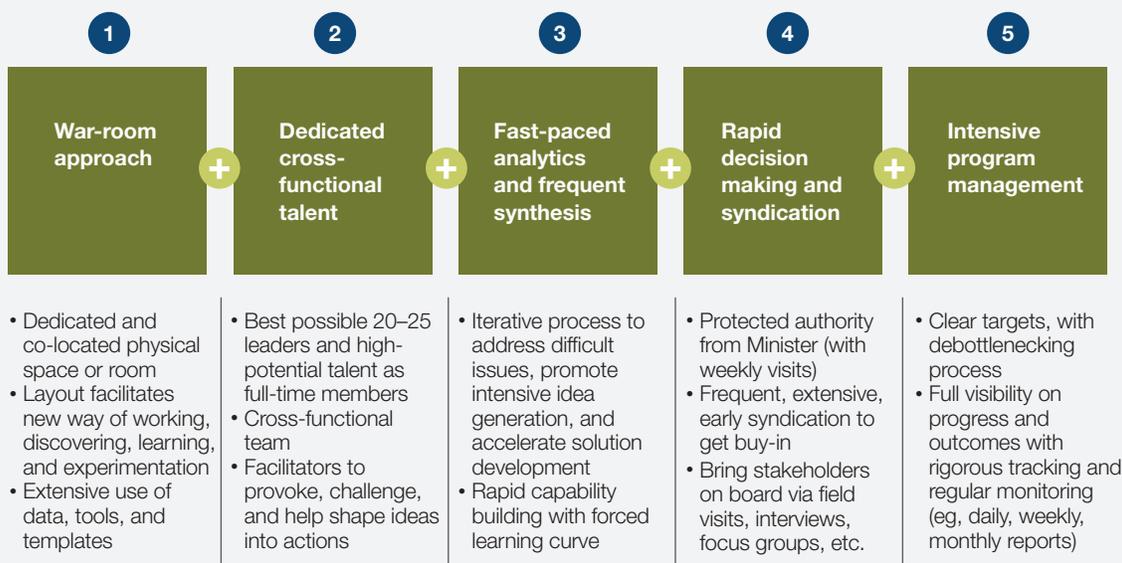
interagency public-health officials, epidemiologists, communication experts, data analysts, and support staff. Some operated in efficient modern facilities built to UN security standards; others (such as the EOC in Borno State) operated from buildings with infrastructure meeting US safety standards. Nigeria's polio EOCs employed the five components described in Exhibit 2 to focus their analyses and actions on the highest-priority problems, to improve accountability, and to ensure operational effectiveness.

War-room approach. Nigeria's national EOC is structured around a war room where the walls are covered with regularly updated wild poliovirus maps, data and analysis on polio cases, and polio immunity coverage in the country's 11 high-risk states. The war room's digital screens not only depict up-to-date polio-performance indicators but are also used for videoconferences with state EOCs and external experts. The complete EOC meets twice a week in the war room to assess the performance of

vaccination campaigns, outbreak response, efforts to extend access to hard-to-reach populations, and activities in insecure areas. The EOC also holds meetings of its strategy, operations, outbreak, and communications committees in this room.

Dedicated cross-functional talent. Nigeria's government and its international partners posted experienced polio experts and emergency health professionals to work closely together. The Federal Ministry of Health/NPHCDA provided a strong leadership team, including Dr. Etsano, Dr. Shuaib, and several of the agency's highest-qualified experts on health programs and data analysis. WHO and the CDC placed epidemiologists in the EOCs to ensure that regular house-to-house vaccination programs did not miss the hardest-to-reach children. UNICEF's experts addressed the challenges of communication, social mobilization, and noncompliance to support traditional, religious, and opinion leaders, and to educate Nigerians to overcome misinformed arguments

Exhibit 2 Emergency operations centers have five primary components.



McKinsey's support for Nigeria's polio-eradication effort

Under the leadership of Nigeria's Ministry of Health, supported by the Bill & Melinda Gates Foundation and the Global Polio Eradication Initiative, McKinsey's Lagos office and global Public Health Practice assisted the National Primary Health Care Development Agency to design and deploy polio emergency operations centers, or EOCs. The firm supported the national EOC Incident Manager, Deputy Incident Manager, and international partners to develop the EOC's organizational structure, working committees, meeting routines, procedures, and approach to data analysis.

After helping establish the national EOC in the capital city of Abuja, McKinsey's team also helped design and set up the first state EOC in Kano; this

became the model for the successful EOCs opened in six other high-risk states in northern Nigeria. The team worked with the national EOC leadership to train state EOC team members and staff to collect and analyze data, solve problems, and improve vaccination campaign execution, accountability, and reporting.

Under guidance from the Incident Managers and the Gates Foundation, the firm's role transitioned from responsibility for EOC administration and management to support for the EOC's polio-eradication efforts on specific concerns. From 2014 to mid-2015, the firm focused primarily on helping to develop the national EOC's data team and analytical capabilities.

against vaccination. WHO deployed experts and thousands of "boots on the ground," including immunization professionals, vaccination-program supervisors, trainers, and polio-surveillance experts. The national EOC data team—the engine room of Nigeria's polio-eradication program— included members from all of the EOC partners.

Fast-paced analytics and frequent synthesis.

The EOC leadership and the strategy and operations committees work closely with the data team to analyze vaccination campaign performance during and immediately after all campaigns, to develop interventions to reduce the number of missed children, and to increase the level of polio immunity in high-risk states, LGAs, and wards. For example, one analysis assessed the impact of directly observed polio vaccination

(DOPV), an intervention introduced in priority LGAs in September 2014. The DOPV effort placed vaccination teams in open areas outside homes (for example, markets, schools, and streets) to reduce the number of missed children generally and the number of children missed specifically because of absence or noncompliance. Preliminary findings showed the following:

- The number of children vaccinated in LGAs that implemented DOPV increased by 7.8 percent, compared with a 1.6 percent increase in LGAs that did not.
- In LGAs that implemented DOPV, the proportion of missed children fell by 24 percent from the previous month, compared with a 13 percent decrease in LGAs that did not.

- DOPV improved coverage: 26 percent of LGAs implementing it improved by at least one lot quality-assurance sampling (LQAS) coverage category, compared with 12 percent of LGAs that did not implement DOPV.

While the impact of these innovative DOPV efforts require further analysis, lessons learned were used to improve the program to reach more children and further increase polio immunity coverage.

Rapid decision making and syndication. Nigeria’s polio EOCs ensure that all relevant decision makers and experts are co-located and can review performance challenges with data from the field in real time. By design, the EOC helps the team to make and review decisions rapidly, using more than 50 monitoring and accountability officers with direct connection to the most vulnerable LGAs and wards. Every day, the EOCs take up interventions and challenges in high-priority LGAs—for example, by developing, executing, and actively following responses to new polio cases and by taking specific education and communication measures in targeted high-risk communities where an anti-oral polio vaccine video had been circulating. The EOC has well-developed procedures, honed over three years, to ensure that it records and immediately disseminates discussions and decisions throughout the entire EOC community.

Intensive program management. The EOCs’ program-management capabilities are an essential element of Nigeria’s progress in eradicating polio. The detailed collection and analysis of key performance indicators across all of the country’s high-risk states, LGAs, and wards improved the quality and rigor of monthly polio vaccination campaigns.

Collecting and verifying data from field staff using mobile phones in remote northern areas is a challenge. Monitoring and accountability officers

working in the polio EOCs are in constant contact with the field, collecting data and following issues specific to each LGA and ward. However, while training and tools to simplify the process have been provided, mobile networks do not extend far beyond major population centers and are frequently out of service.

Vigorous program management allowed EOCs to identify issues and to overcome specific challenges—for example, by launching “hit and run” campaigns and “firewalling” efforts to vaccinate children in the face of insecure conditions caused by insurgents, as well as by using polio survivors, community clowns, and drummers to mobilize house-to-house vaccinations. The EOC also spearheaded the creation of health camps that address noncompliance by offering a package of healthcare services and extras, such as candy and soaps.

How the EOCs focus efforts on top-priority challenges

With increasingly effective vaccination campaigns, heightened public awareness and education, and results-focused performance management, Nigeria began to see solid improvements in the level of polio immunity and fewer wild poliovirus cases in high-risk states. The country was able to interrupt transmission of wild poliovirus Type 3 (WPV3) in November 2013³ and cut the number of genetic clusters of the remaining wild poliovirus Type 1 (WPV1) to a single cluster by early 2014 from the six genetic WPV1 clusters circulating in 2012.

Once the national EOC was up and running, the focus shifted to addressing the country’s biggest challenges and developing practical solutions to the problems of vaccination teams in high-risk locations. During the second half of 2014 and into 2015, the EOC developed innovative strategies to improve the vaccination effort in Kano State (where five of Nigeria’s six polio cases occurred in 2014) and to

address security issues blocking effective campaigns in parts of Borno and Yobe states, where insurgent activities limited access to communities and children. These strategies included the following:

1. Health camps were set up across Kano to provide not only vaccination against polio but also other health services and medicines. In an analysis of the impact of the health camps, the national and Kano State EOCs found the following:

- Between May and September 2014, 1.1 million children were vaccinated with oral polio vaccine (OPV).
- The camps appeared to help reduce the proportion of missed children, but noncompliance remained an issue.

2. The analysis helped to improve drug-administration policies and the selection of sites for health camps. It also suggested a need to emphasize communication with traditional emirs and chiefs, religious leaders, and supporting organizations (such as the local Rotary polio-survivors group) to reduce the level of noncompliance. The national EOC also decided to place more health camps in the wards with the highest incidence of missed children. These actions—along with line-listing all missed children and then working with traditional, religious, and opinion leaders to resolve them—helped to improve vaccination campaign performance and polio immunity coverage in Kano.

3. The insurgency affecting parts of northern Nigeria has displaced millions of families and disrupted the healthcare networks, which were already weak, required for effective vaccination programs—in addition to the direct threats against and murder of vaccinators. The biggest impact was in Borno and Yobe. The national EOC, working with colleagues in the field, intervened to

address these security challenges—for example, by introducing inactivated polio vaccine (IPV). While more costly and difficult to administer than its oral counterpart, IPV confers a higher degree of per-contact immunogenicity for difficult-to-access children than oral polio vaccine does. IPV given to a child already primed with OPV will provide a higher immunity boost than giving that same child an extra dose of OPV. In June and August 2014, IPV campaigns based in health camps covered areas of Borno and Yobe. They reached places that were difficult to access through traditional house-to-house campaigns because of the insurgency and therefore had lower population immunity. An analysis of this approach found the following:

- Across Borno, 2,214 health camps were used to administer about 1.4 million doses of IPV (91 percent coverage of the target population) in 256 wards (82 percent); insecurity prevented implementation in other wards.
- Across Yobe, 889 health camps were used to vaccinate 880,566 children with IPV (105 percent coverage of the target population) in 69 (39 percent) of the wards. (Estimates of the target population were not always accurate—coverage was more than 100 percent in certain cases.) Some areas were not included in this IPV program, because they did not suffer from Borno's security and accessibility challenges.

4. The analysis helped clarify the reach and impact of the IPV campaigns and allowed the EOC leadership to plan next steps for covering other challenging areas in Borno and Yobe. For example, in November 2014 the government undertook another campaign, this time to cover areas of Yobe the previous IPV effort had not reached. Analysis also demonstrated that estimates of the size of the target population were not always accurate, because of movement in the face of the insurgency.

Using the EOC model to combat Ebola

When Nigeria experienced its first known Ebola case, on July 20, 2014, the Ministry of Health immediately employed the tools it had used in the fight against polio. The Minister of Health asked the National Polio EOC's Deputy Incident Manager, Dr. Faisal Shuaib, to establish and lead an Ebola emergency operations center in Lagos. Medical experts and professionals from Lagos State and the federal government, along with international partners from the CDC, WHO, UNICEF, and Médecins Sans Frontières, were quickly refocused to fight Ebola. The polio EOC data team was relocated to Lagos to create Ebola EOC dashboards, which provided up-to-date information

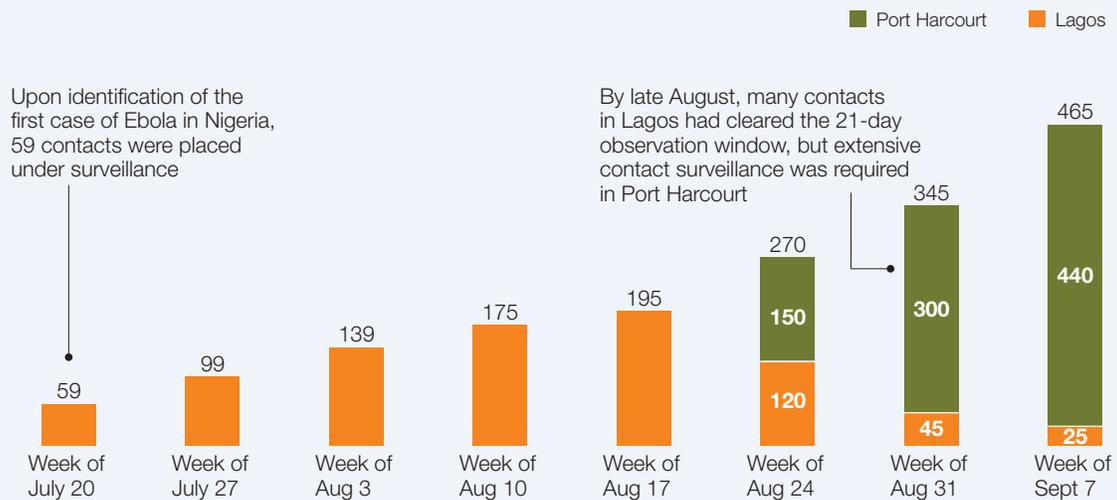
on key performance and risk-mitigation metrics the EOC would require to effectively manage and control the Ebola outbreak (exhibit).

Nigeria's Ebola emergency operations center ran on the polio EOC principles, particularly bringing together international organizations under the strong leadership of the national government to improve coordination and accountability, focusing on evolving high-priority initiatives, and using data-driven analysis. Nigeria's Ebola EOC, working nonstop, contributed greatly to the epidemic's containment and management. As the nerve center for emergency operations, the Ebola EOC ensured

Exhibit

Nigeria's Ebola emergency operations centers led extensive contact surveillance in Port Harcourt and Lagos to track potential cases and completion of the 21-day observation period.

Average number of contacts under surveillance, as of Sept 12, 2014



More extensive contact surveillance was required in Port Harcourt as Ebola was not immediately detected there and one of the first infected, a doctor, continued to see patients for several days after infection.

that people who had contracted the illness were isolated and that both they and their families received care. Anyone who came in contact with an Ebola-infected person, before or after the case had been confirmed, was kept under rigorous surveillance. The EOC worked hard to educate Nigerians about the disease, collaborating with local mobile-phone operators and banks to send millions of text messages, along with frequent updates and other information on radio and television.

Nigeria met the WHO requirement of no new Ebola cases over a 42-day period in just three months and was declared free of Ebola transmission on October 20, 2014. The WHO praised the Nigerian government's leadership and outstanding coordination in response to the Ebola outbreak, specifically mentioning the Ebola EOC. In fact, a number of countries at risk for Ebola have deployed EOCs, and their earlier use in the affected countries would likely have improved the response.

Applying the lessons learned

The success of Nigeria's EOCs in combating polio provides interesting lessons, especially in view of the country's previous approaches to emergency public-health challenges. Before establishing the polio EOCs, Nigeria's federal government and its international partners relied on incremental improvement targets, annual budgeting, and fragmented donor projects and funding. The overall effort lacked focus and immediacy. Polio had the upper hand, exploiting every opportunity to increase the number of wild poliovirus cases.

Nigeria's polio EOCs changed that dynamic. First, requiring the Ministry of Health, state and local health agencies in the north, and all international partners to collaborate through the EOCs brought the best minds and resources to bear on the critical issues. Second, an emergency posture with strong leadership—rather than the traditional incremental approaches—forced a search for immediate solutions and results. The only objectives were raising the level of immunity above the threshold targets in all states and LGAs, stopping the

transmission of polio, and eliminating new cases of the disease. Step-by-step annual targets would never get the job done.

Last, using data to assess the performance of polio vaccination teams and of local health agency support, before, during, and after each campaign, enabled the EOCs to shift focus to the highest-risk locations and issues. Improved data collection from the field and satellite imagery to identify communities being missed for immunization activities allowed the EOCs to adapt new approaches rapidly and to experiment with interventions to solve complex vaccination and surveillance problems.

Developing countries can consider applying these lessons to respond more effectively to other health challenges, both emergencies and long-standing medical issues. Applying them more rapidly and completely could, for example, have improved West Africa's response to the Ebola outbreak dramatically (see sidebar "Using the EOC model to combat Ebola"). The core issue is to adopt a war

footing and take the fight directly to the challenges. Using EOCs to improve the coordination of resources, to focus the best minds, and to carry out intensive local data analysis could help control future outbreaks of disease and improve the health of entire communities.



While significant work remains to rid Nigeria of polio in the next year and a half, the country deserves full credit for halting its transmission and eradicating Ebola. The effective use of emergency operating centers provides an excellent example of how national governments and their international partners can fight the world's most dangerous diseases through strong leadership, intense collaboration, data analytics and performance management focusing on results. An important remaining question is where and how countries and international organizations can best deploy EOCs to overcome other emergency health crises. ■

¹ The Global Polio Eradication Initiative states: "Wild polioviruses are those that occur naturally. Very rarely, vaccine-derived poliovirus can cause paralysis. Vaccine-associated paralytic poliomyelitis occurs in an estimated 1 in 2.7 million children receiving their first dose of oral polio vaccine."

² At the Polio Oversight Board meeting during the United Nations General Assembly in September 2015.

³ Nigeria reported its last case of wild poliovirus Type 3 (WPV3) in November 2012 and had already eliminated wild poliovirus Type 2 (WPV2); the country's last WPV2 case was recorded in February 1998. Given certification is done by region, not by country, the WHO Africa region would be certified polio-free by the fall of 2017 only if the region has no further cases and meets required surveillance standards.

Since November 2012, more than 25 consultants from McKinsey's offices in Lagos and around the world have supported Nigeria's efforts to eradicate polio. The author wishes to thank each of them for their commitment and passion.

Scott Desmarais is a principal in McKinsey's Lagos office.

