

# NIGERIA'S DISEASE DETECTIVE

*As leader of the nation's first public-health agency, Chikwe Ihekweazu might be all that stands in the way of the world's next deadly pandemic.*

BY AMY MAXMEN

**C**hikwe Ihekweazu tried to steel himself as he surveyed people writhing in pain beneath ramshackle tents in the deserts of northern Nigeria. A deadly epidemic of meningitis had swept through the region in 2017, debilitating so many people that clinics had run out of space.

The tragic scene laid bare the challenges ahead for Ihekweazu, who had just been appointed director of the nation's first agency tasked with tracking and responding to outbreaks, the Nigeria Centre for Disease Control (NCDC). Local health workers either didn't know to report cases, or reporting lagged behind because they lacked electricity to charge mobile phones and laptops. Samples of spinal fluid spoiled before they reached the NCDC's microbiology laboratory in Abuja, which made it impossible to confirm diagnoses — a requirement for unlocking access to international stockpiles of vaccines. As the agency struggled to count cases, the outbreak wore on, eventually infecting more than 14,000 people and killing almost 1,200. "That's when it became clear how quickly things can fail," says Ihekweazu.

Nigeria is Africa's most populous nation and its biggest economy, but it is also the world's poorest, as measured by the number of people living in extreme poverty. It is routinely battered by infectious diseases: meningitis, measles, cholera and newly emerging threats that plague communities and raise alarms around the world.

Ever since the Ebola crisis of 2014–16 — from which Nigeria was largely spared — global-health leaders have been fretting about the possibility of an epidemic exploding in Lagos and spreading to London, New York, Mumbai or Beijing. Many argue that the best hope of mitigating such a catastrophe will come from the capacity of African nations to catch outbreaks early and stem their spread. Ihekweazu had written about this necessity long before it was in vogue — but he never imagined leading the effort himself.

Yet just two years after his appointment, he has more than doubled the size of the NCDC staff, set up a network of molecular-biology labs

across the country and become the steward of multimillion-dollar grants intended to diffuse the threat that an epidemic in Nigeria poses for the rest of the world. On his watch, the nascent agency has battled about a dozen outbreaks, which have infected more than 70,000 people (see 'Keeping tabs'). "We are building the ship while we are sailing," Ihekweazu says. Now he has another two years to transform the NCDC into an organization that will operate successfully long after he's gone.

Many have faith that he can do so, because he's proved to be an agile leader in a fragile part of the world. Furthermore, they hope that his strategies in Nigeria might be repeated elsewhere on the African continent, such as in the Democratic Republic of the Congo. "Chikwe is showing that Africa can do what is needed, when it's needed," says David Heymann, an epidemiologist at the London School of Hygiene and Tropical Medicine. "He is leading the way in how things can be done."

## SHARED VISION

Ihekweazu was born in Igboland in southeastern Nigeria in 1971, a year after the region had lost the Biafran War for independence from the rest of the country. The war left the Igbo people malnourished, traumatized and persecuted. But inhabitants of the communal university town of Nsukka hoped for a better future. Ihekweazu's father was a Nigerian doctor there, and his mother, a German, was a professor at the university. "They had moved there to rebuild the community," Ihekweazu says. "Our home was a melting pot for all sorts — her students, his patients — we had a sense that whatever we have, we share."

After completing medical school at the University of Nigeria in Nsukka, Ihekweazu moved to Germany, where he received a master's degree in public health and then worked in the national health system. In 2002, he became an epidemiologist at what is now Public Health England in Bristol, UK. One of his mentors, James Stuart, a Bristol-based consultant for the World Health Organization (WHO), remembers Ihekweazu as highly skilled but utterly unassuming. When Ihekweazu





ANDREW ESTEBO

was assigned to investigate an outbreak of *Escherichia coli* in Cornwall, UK, for example, the local authorities resisted handing over the case. “Chikwe managed to listen to everyone, respected their contributions and made them feel as if they were leading it,” Stuart recalls. Together, the team found that cattle faeces had contaminated a stream, and that children playing near the water were getting infected (C. Ihekweazu *et al. Euro Surveill.* **11**, 613; 2006).

Others have noticed his knack for gliding between cultures and pushing people to cooperate for the common good. Ihekweazu attributes these skills to his upbringing and the frequent experience of being mistrusted initially for being Nigerian. “I have grown up with these tensions,” he says. “With more or less time, most people eventually get over it.”

Ihekweazu had always imagined that he’d return to Nigeria one day, but the idea caught fire when he attended a TED conference in Tanzania in 2007, where African speakers talked about how fulfilled they felt to be improving their home countries. One speaker, Kenyan lawyer Ory Okolloh, lamented the way in which the West frames Africa as a place to be pitied, rather than as one that is rich with people who succeed despite the odds. After the presentations, Ihekweazu said to his closest friend, Ike Anya, a fellow Nigerian public-health specialist in the United Kingdom, “It is time to go home.”

Their first move was to launch a blog commenting on health issues in Nigeria. During the 2009–10 H1N1 influenza pandemic, Ihekweazu criticized the country for being unprepared. “Nigeria needs a central, well-resourced centre for infectious disease prevention and control,” he wrote in 2010, “or one day we will pay the price the hard way.” Out of the blue, he says, Nigeria’s health minister wrote to him to say that he was in London and wanted to meet. They talked at a coffee shop about fighting flu.

In 2011, Ihekweazu and his family moved to South Africa, where he became co-director of the national tuberculosis centre. He and Anya also launched EpiAfric, a health-care company that consults for

organizations across Africa. When it came to their home country, however, working within a government that had long disappointed them was furthest from their minds. Anya says, “We had seen how the Nigerian bureaucracy would eat up and spit out the best intentions.”

But one July evening in 2016, Ihekweazu got a call from an official in Nigeria, telling him that in the morning, Nigerian President Muhammadu Buhari would appoint him head of the fledgling NCDC. He hadn’t applied for the job, nor did he particularly want it. By the next day, his inbox was overflowing with congratulatory messages. He switched off his phone and walked through the cool, damp streets of Durban, South Africa, pondering the long list of problems troubling Nigeria: poverty, conflict, corruption, dirty water, population growth. He realized that it would be hypocritical to have complained about the government’s approach and then reject an opportunity to fix it. He was going home.

### STEP CHANGE

Ihekweazu would be moving from nations with established public institutions to a country where government agencies were comparatively young. After Nigeria won independence from Britain in 1960, it was left with vanishingly few doctors, scientists or leaders to serve the massive population. Academics who might have built up national health agencies in the decades following independence left Nigeria in waves as the nation was shaken by civil war, nine military coups and erupting tensions among some 200 different ethnic groups. And, unlike more-authoritarian nations that have advanced unified health systems, such as Rwanda and Ethiopia, Nigeria’s 36 states operate rather autonomously. “We have had to build a country within boundaries drawn by Europe, among people who didn’t live together,” Ihekweazu says. “So it’s always a struggle.”

**Chikwe Ihekweazu aims to build a public-health agency that will stand the test of time.**

Without strong national institutions, decades of outside aid and research projects have failed to increase the average life expectancy of Nigerians beyond age 53. Piecemeal programmes that deliver HIV drugs or that analyse patterns of viral transmission can be helpful. But these projects do not build a nationwide system capable of figuring out why a community falls ill, helping people recover and preventing future crises. When Ebola ripped through Sierra Leone, Guinea and Liberia from 2014 to 2016, it showed that systemic failures pose a risk not only to those directly affected, but also to other countries. Mitigating that risk is costly: donors spent around US\$3.3 billion to end the outbreak in West Africa. World health officials pointed out that it would have been much better if hard-hit countries had been able to stop it themselves early on.

Richard Garfield, an epidemiologist at the US Centers for Disease Control and Prevention (CDC) in Atlanta, Georgia, says that revelation fuelled a drive to shore up global health-security, in part by creating national public-health institutes. This agenda has become “the next big thing after HIV”, says Garfield. By 2016, the US government was contributing both finances and expertise to the effort, as were the United Kingdom, the World Bank and the Bill & Melinda Gates Foundation in Seattle, Washington, among others. But the task is monumental. So-called ‘vertical’ approaches that target specific diseases, such as polio, can ignore problems that are outside the scope of the project. To address multiple underlying causes of illnesses, nations need a ‘horizontal’ system of labs, clinics and staff that stretch across a country. “Vertical programmes are simple,” says Garfield. “This is much broader,” he explains. It now falls to leaders such as Ihekweazu to turn donor dollars into institutions that last.

## FREE REIN

On 13 November last year, President Buhari made the NCDC an independent agency, granting Ihekweazu authority over how he reports data, how he spends the budget and whom he hires. The move infused his team with energy, and a week later, people were still buzzing at the NCDC’s modest, concrete compound in Nigeria’s capital city of Abuja. In a single-room structure called the Incident Coordination Centre, wall-mounted monitors displayed updates on epidemics, sent in from satellite centres across the country. Next door, a young NCDC employee monitored a hotline and social media for outbreak indicators. They call the system Tatafo, using the Yoruba word for gossip.

Ihekweazu and his team were preparing for a spike in Lassa fever, a viral haemorrhagic disease that, like Ebola, can swiftly cause death through internal bleeding. Cases of Lassa fever typically surge in Nigeria between December and March, and it caused a record 184 deaths last year. During the peak of that outbreak in early 2018, Ihekweazu had travelled to a hard-hit hospital in Abakaliki in the southeastern state of Ebonyi. The hospital’s virology centre was almost barren, with hardly any electricity or treated water. The team there had run out of antiviral drugs and protective gear for health workers. And people were dying as they waited for the results of diagnostic tests that had to be conducted outside the state. Although the lab had a PCR machine that could be used to identify the disease, it sat broken on a shelf. A group of researchers from Japan had brought it as part of a research project, but when they left, no one knew how to use or maintain it.

To curb the number of deaths, Ihekweazu has spent the past year supplying hospitals in Ebonyi and other states, and organizing training sessions for staff so that they can detect and report Lassa fever rapidly. When he returned last November, a chief doctor and the head of the virology lab greeted him outside. Freshly installed solar panels glinted in the morning sun, and dust from construction hung in the air — workers were building a new ward for patients with Lassa fever and an incinerator for infectious material. Inside the lab was a new biohazard

hood, where technicians could deactivate live viruses in blood samples. The broken PCR machine remained in another room, but it had been joined by two new ones given by the NCDC. Ihekweazu told the team that he had sent one of his staff to Japan to learn to repair and maintain such technology. “Across Nigeria, you’ll find millions of dollars’ worth of equipment not running for some small reason,” he said.

Walking around the grounds, the group discussed how to grapple with Lassa fever beyond the hospital gates. Ihekweazu asked them to help brainstorm studies that would reveal how people were catching the virus from its host, the African rodent *Mastomys natalensis*, so that this mode of transfer could be prevented. The chief doctor expressed his concern that infected people were arriving at the hospital too late to be saved by treatments. The NCDC had been running radio advertisements urging people to seek medical care rapidly. But the Ebonyi state epidemiologist said it wasn’t enough. They needed feet on the ground: community members who could spread the word and call him when they spotted someone who might be infected. Such volunteers needed petrol to get to remote towns, and credit on their mobile phones to make calls. “Amazing how something like airtime can stop a response,” Ihekweazu said, adding that the NCDC lacked funds for this but that he’d think of a solution.

Later that evening, Ihekweazu confessed that he remained anxious. “Lassa starts with a little trickle,” he said, “and then sometimes it goes boom.”

## CASH FLOW

Money is always short. In 2018, the NCDC hobbled along on a government budget that was less than \$4 million (for comparison, the US CDC’s budget last year was \$11 billion). That comes to less than 0.02 cents per Nigerian per year (compared with the CDC’s \$33 per American). Nigeria’s health system, as a whole, is one of the most poorly funded in the world. The government allotted just 0.6% of gross domestic product to health in 2015, compared with 4.4% in South Africa and around 8% in the United States and the United Kingdom.

“One of my biggest responsibilities is to fight for more money within the government budget,” Ihekweazu says. But it’s a difficult ask, because health investments rarely result in things that people see, such as airports or roads, he explains. “Politicians can’t say ‘look at the meningitis outbreak that didn’t happen’ and have it win them votes.”

So Ihekweazu is also appealing to Nigeria’s thriving private sector, explaining how a fast-moving outbreak of Ebola could bankrupt their companies. He says that businessman Aliko Dangote, the richest man in Africa, has expressed an interest in supporting the agency. “We are discussing something

around laboratory networks, since his companies’ biggest strengths are in logistics and manufacturing,” Ihekweazu says.

More than anything, Ihekweazu struggles to afford the staff he requires. He’s managed to grow the agency from 90 people to 213. Nearly half of NCDC employees are under 30 years of age. That’s partly due to the low salaries he has to offer, but Ihekweazu loves their willingness to learn and their energy. Nanpring Dawn Williams, a microbiology graduate working one night in the Incident Coordination Centre, described how Ihekweazu recognized her skill at managing data. “Now he’s always asking what new papers I’ve read,” she says. “He expects me to publish a manuscript.” With a smirk, her colleague Anwar Abubakar says, “He knows we are single and no one expects us to come home at the end of the day.” But he adds that his boss pushes himself even harder, and drives his team by conveying the importance of their mission. “He tells us we are the future of the organization.”

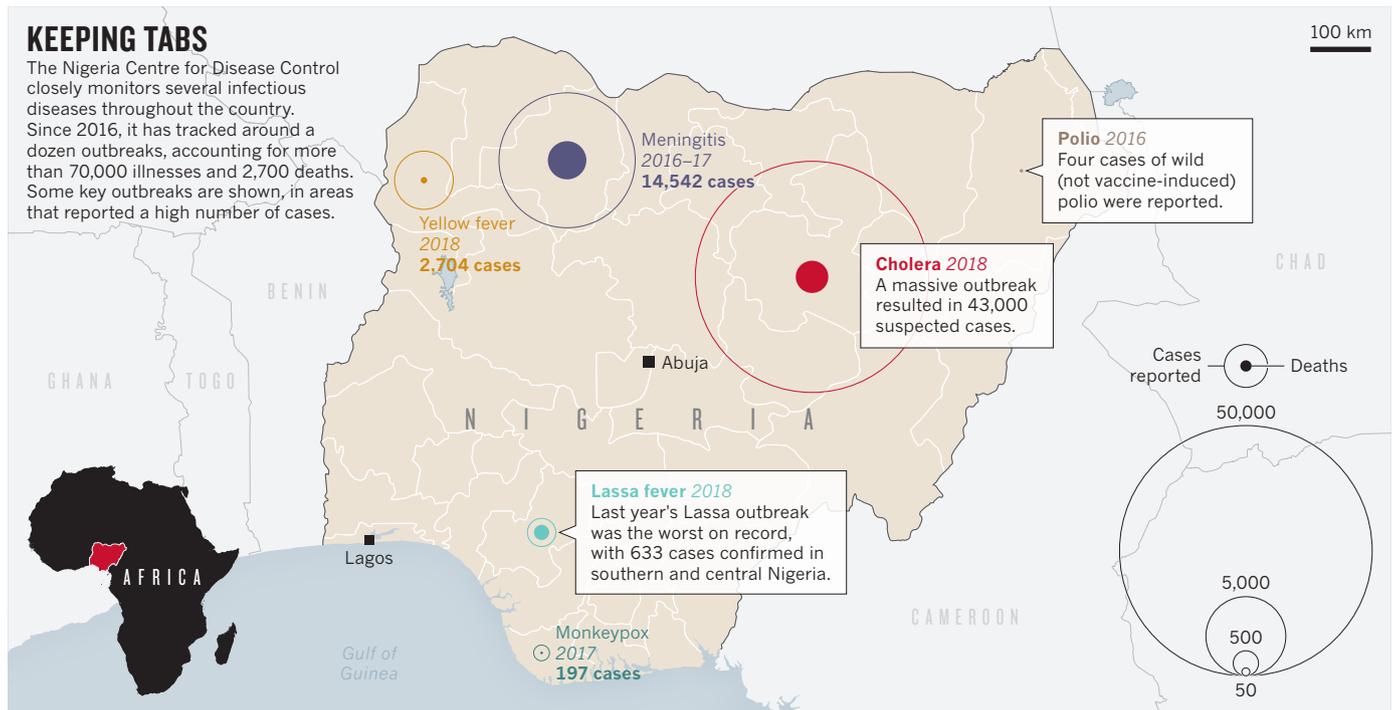
Still, the agency has too few experienced epidemiologists and molecular biologists. To hire them, Ihekweazu must convince outstanding Nigerian scientists to work for much less than they would earn in the

**“THIS IS AN EXPERIMENT IN BRAIN GAIN. WE ARE TRYING TO CREATE A SYSTEM WHERE NONE EXISTS.”**

SOURCE: NCDC

## KEEPING TABS

The Nigeria Centre for Disease Control closely monitors several infectious diseases throughout the country. Since 2016, it has tracked around a dozen outbreaks, accounting for more than 70,000 illnesses and 2,700 deaths. Some key outbreaks are shown, in areas that reported a high number of cases.



private sector or at aid organizations. Anthony Ahumibe, the laboratory adviser at the NCDC, explained how Ihekweazu poached him from a well-paid job at AFENET, a non-profit public-health organization funded by the US CDC. After they met in 2017, Ihekweazu called him at 10 p.m. every few weeks. “He said, ‘I cannot pay you as well, but depending on how hard you work, and how focused you are, there will be so many opportunities,’” Ahumibe recalls.

Ihekweazu’s dedication also attracts Nigerians who live abroad. “This is an experiment in brain gain,” explains Emmanuel Agogo, who had been a UK physician before joining the NCDC. “We are trying to create a system where none exists.” For this reason, Ihekweazu convinced the Bill & Melinda Gates Foundation to help fund salaries for management-training consultants, a feature typical of wealthy corporations. It might sound like a luxury in a country where clinics lack gloves, but Ihekweazu explains that it stems from decades of watching well-intentioned projects evaporate because donors invest in things, but not people.

### CAREFUL CHOICES

When Ihekweazu is not travelling, he can be found in his office in Abuja, with his large frame hunched over a laptop or intercom, rubbing his forehead between his thumb and his forefinger. From there, he corresponds with donors and researchers in rich countries who wish to conduct projects and experiments in Nigeria. Each grant comes with requests that Ihekweazu navigates carefully. “We need the expertise and collaborations,” he says, “but we want a real partnership, not a master-servant relationship.”

His largest programme to oversee is a 5-year, \$90-million global health-security project from the World Bank to strengthen Nigeria’s national surveillance system. And in January, two international consortia announced that they will collaborate with the NCDC to develop diagnostic tests and vaccines for Lassa fever. Dhamari Naidoo, a WHO technical officer based in Nigeria, says: “Researchers wanting to do clinical trials are now lining up to work with [Ihekweazu] because he pushes his people to deliver like you cannot believe.”

But Ihekweazu knows that the international focus on pandemic preparedness will eventually wane — as all fads do. So he is trying to ensure that the supply chains and lab networks he’s building to monitor pathogens will last. John Nkengasong, director of the Africa Centres for

Disease Control and Prevention in Addis Ababa, hopes that the NCDC will soon have the power to help outbreak responses across West Africa. “We can’t ensure the safety and security of our continent while relying on someone else’s goodwill,” Nkengasong says.

Ihekweazu takes heart in seeing Africans such as WHO director-general Tedros Adhanom Ghebreyesus step onto the global stage. Sipping on a cheap beer during a quiet moment one night, Ihekweazu says he could imagine working at a multinational health agency when his appointment at the NCDC ends in 2020. “As Africans, we need to be stronger participants in the organizations leading the responses to challenges concentrated in our part of the world,” he says.

But the following evening, the bags under his eyes seem deeper as his phone blinks with texts about problems ranging from the major to the mundane. He pictures a future tucked away in a university lab. “Some days I feel we are at the beginning of something huge and exciting, and sometimes I feel like this is too hard a job. It’s 24 hours a day. The generators don’t work. A vehicle is stuck.” His lab adviser Ahumibe excuses himself from the table as if he cannot breathe without the oxygen of Ihekweazu’s optimism.

“‘Look after your health’ is the last thing I always say to him before I hang up,” says Anya, Ihekweazu’s close friend. And Sola Aruna, one of his public-health colleagues in Nigeria, says she worries that political events might prompt Ihekweazu’s premature replacement. “I am fearful since a very good thing has happened with him here,” she says. “Now the negative side is that people are sitting up, they see the NCDC in the news, and some people may think that what he’s doing is easy.”

Those who understand public health have been impressed by Ihekweazu’s progress in building the foundation of the agency, but demonstrating its power to Nigerians could take time. A perverse twist to bolstering surveillance is that problems look worse before they can get better. During Ihekweazu’s tenure, the NCDC has announced the worst outbreaks of Lassa fever, yellow fever and cholera in a decade, and detected the first cases of monkeypox in 40 years. But Ihekweazu knows that the only way to fight these diseases is to bring them to the surface. “I can give up and say this problem is bigger than me,” Ihekweazu says. “Or I can buckle down and push.” ■ [SEE EDITORIAL P.295](#)

**Amy Maxmen** is a senior reporter at Nature, based in San Francisco.