

Updates From The Field

CONNECTION AND COLLABORATION

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U.S. Department of
Health and Human Services
Centers for Disease
Control and Prevention

DIVISION OF
**GLOBAL HEALTH
PROTECTION**
DGHP

Photo: RTI International

We Are All Connected



Photo: Sara Holcombe

On a large scale, we are connected by our humanity and our frailty – by our vulnerability to outbreaks and disasters, diseases that threaten our families, our communities, and our livelihoods.

We are also connected in very tangible, concrete ways: by trains, cars, and airplanes; by rivers and highways; by the elaborate patterns in which we rapidly crisscross the globe. We are connected by the goods we trade and the places we visit. Every day, more people congregate in bustling cities, while many others have daily contact with livestock or other animals.

And while we benefit from all of these connections, every one of them

presents a new path for diseases to travel—a potentially devastating link in the chain of transmission.

Because of this, our division must be connected across public health. For us, this means reaching across CDC, across governments, and to external partners and organizations, policymakers, and the public. We collaborate and share resources to reach our goals and maximize our results.

Through our work, we bring together the people and capabilities needed for protection. We create public health systems that rely on each other to function at their best, working hand-in-hand to safeguard and improve public health. At the core are surveillance systems, laboratories, emergency operations centers, and a skilled workforce that must all interact to effectively prevent, detect, and respond to threats.

We also connect science to action. We evaluate what works and put it into practice. We assess risks and close gaps to help meet global health security goals. We share our hard-earned knowledge and expertise with others to plan for sustainable progress.

Connection is the reason for DGHP's mission, and it is also our means to achieve it. As you read this issue of *Updates from the Field*, I encourage you to focus on the many examples of connection you'll find in its pages. Whether partnering with others, linking information to action, or reaching across borders to contain the spread of disease, we are always working toward our mission to protect America and create a healthier, safer world.





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Spotlight

Smartphones Connect Disease Data Faster

As our world becomes increasingly connected by smartphones, CDC experts are helping countries harness the power of technology. According to a report by Forrester Research, “the number of global smartphone unique subscribers will surpass 3 billion in 2018.” This presents an unprecedented opportunity to engage individuals in protecting our collective health. Across the globe, CDC experts are using smartphones to find and stop outbreaks at the source.

Photo: David Snyder, CDC Foundation



THAILAND Crowdsourcing to report and respond to zoonotic diseases

The DGHP-Farmer & Rabies smartphone app allows people who work with poultry and swine to report human and animal sicknesses or deaths with the click of a few buttons. Recognizing that those who are regularly in close contact with animals are often the first affected when a zoonotic disease strikes, the Thai Ministry of Public Health’s (MOPH) Bureau of Epidemiology partnered with CDC in 2017 to develop a new app and website for use by farmers, local health volunteers, and health officers. The reporting tool quickly informs the MOPH of increases in animal illness and deaths; illness in people possibly linked to animals; or other abnormal events. A provincial One Health team monitors the reports and initiates rapid response to control outbreaks. In its pilot year, the app led to successful investigations of potential *Streptococcus suis* infection and Japanese encephalitis. In 2018, the app expanded to include reporting of dog and cat bites to help catch rabies outbreaks. By putting surveillance into the hands of the community, the app helps contain zoonotic diseases before they spiral into epidemics.



DGHP-Farmer & Rabies App



SIERRA LEONE

Rolling out an improved surveillance app

In May 2018, the Western Area rural district of Sierra Leone rolled out a program that enables workers to report critical health information to the country’s surveillance network via a smartphone app. The rollout followed a period of pilot testing in the Port Loko district, after which the app underwent a series of updates and improvements for national release. Health workers use the app to submit weekly reports to the country’s electronic Integrated Disease Surveillance and Response system, which is designed to capture data on any device, including desktops, laptops, tablets, and smartphones. Most systems also have the capability to be used offline, which is especially helpful in rural areas with poor connectivity. Fast and accurate information from local health facilities can help get ahead of diseases and stop outbreaks.



ZAMBIA

 Successfully piloting a national mobile phone survey for NCD surveillance

Zambia is the first country to conduct a new mobile phone survey to track noncommunicable diseases (NCDs) and related risk factors by gathering information on topics like tobacco use, alcohol use, diet, hypertension, and diabetes. The NCD Mobile Phone Survey is a component of Bloomberg Philanthropies’ Data for Health initiative and was recently implemented by Zambia’s Ministry of Health with technical assistance from CDC’s Global NCD Branch, RTI International, InSTEDD, and other global partners. The platform uses an adaptable, open-source technology, allowing countries to carry out surveys on topics of interest. Zambia’s success offers a model for how to effectively roll out the program in other countries. In the next year, seven additional low- and middle-income countries or sites will conduct NCD Mobile Phone Surveys.



GUATEMALA

 Using smartphones to help track the spread of flu

In February 2018, thousands of Guatemalans received text messages asking for help in tracking potential outbreaks of flu. The message was sent by CDC and Guatemalan public health officials, with support from a leading telecom company. Message recipients were offered one of two rewards—a series of free health tips or a chance at a \$15 phone credit—in exchange for providing weekly reports on any symptoms of “Influenza-like illness” (ILI) they experience. The data was used to pinpoint when and where flu outbreaks might be occurring. To collect the information, CDC experts created an app called “Nuestra Gripe” (“Our Flu”) that allows Android phone users to complete a weekly report by answering a set of questions. Information was also collected using a mobile accessible web-based survey. A total of 1,594 reports from 1,075 participants were received between February and May, with over 500 reporting symptoms of ILI across nearly all country departments. Public participation in flu surveillance has the potential to strengthen limited and delayed information from hospital and laboratory-based surveillance across Latin America.



KENYA

 Rapidly detecting outbreaks in livestock and wildlife

A new mobile app called the Kenya Animal Biosurveillance System (KABS) allows veterinary practitioners to enter, transmit, and analyze surveillance data, right from the palm of their hand. Developed by Washington State University and supported by the Global Health Security Agenda, the app enables early detection of outbreaks in livestock and wildlife to prevent spillover of diseases into humans. The app is part of the recently launched Kenya Livestock and Wildlife Syndromic Surveillance system—the country’s first near real-time electronic surveillance and reporting system for zoonotic diseases. Data collected through KABS have already been used to detect outbreaks: in late 2017, a trainee from Nakuru County sent a report on sudden death syndrome in cattle through the KABS platform. The Zoonotic Disease Unit rapidly deployed to investigate, confirming an outbreak of anthrax in livestock, wildlife, and humans.

How Senegal is Tracking a Silent Killer

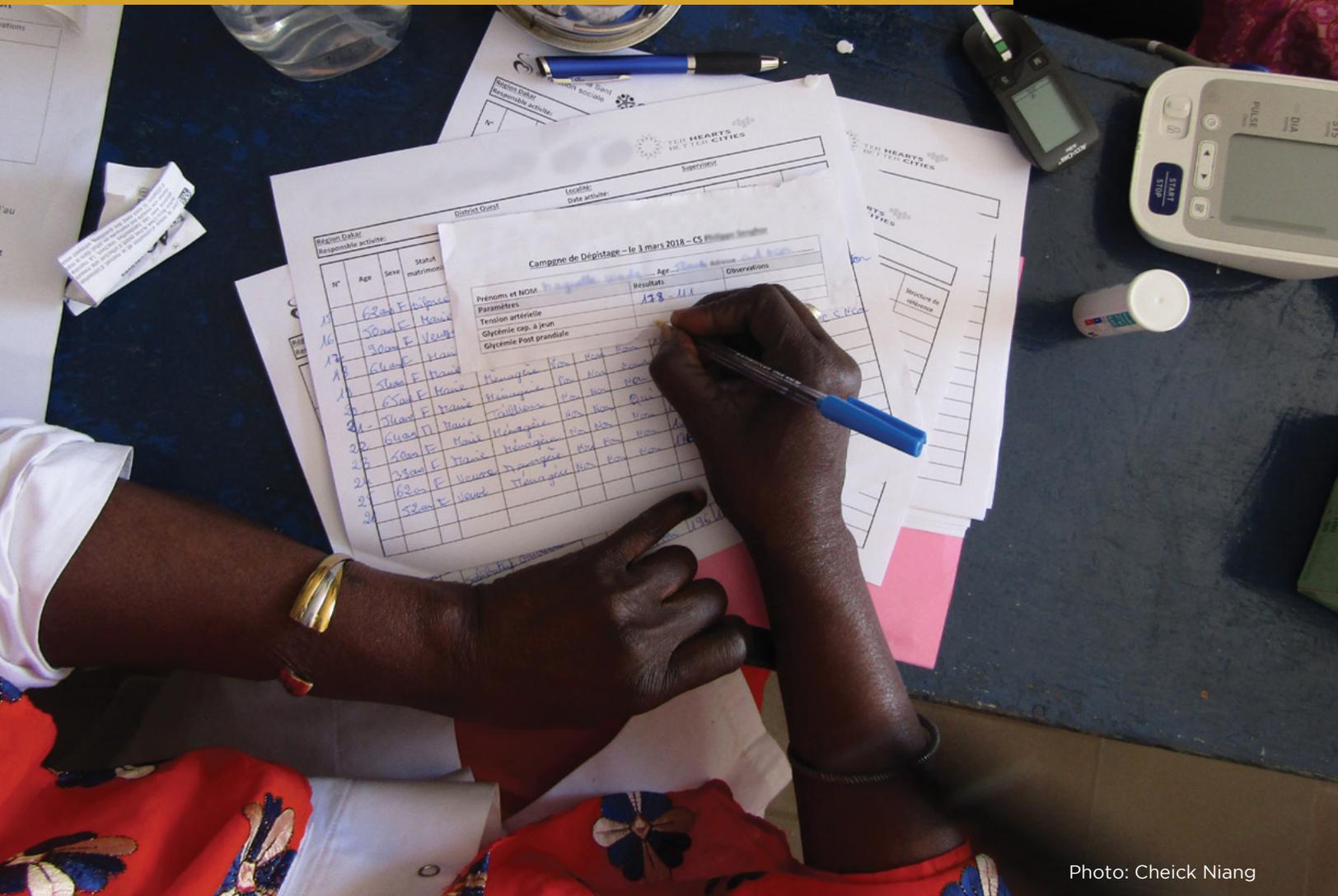


Photo: Cheick Niang

At a packed clinic in the middle of Dakar, Senegal, a busy nurse secures a blood pressure cuff around a patient’s arm. “After I take the blood pressure, I record it here,” the nurse says enthusiastically, showing a patient treatment card to Dr. Monica LaBelle, a CDC Foundation Evaluation Scientist.

Dr. LaBelle is in Dakar as part of the Better Hearts Better Cities initiative, which aims to address cardiovascular health in low-income urban settings across the globe. The patient information card is one component of an enhanced system for monitoring rates of high blood pressure (hypertension) in thirteen health facilities across Dakar.

A SILENT KILLER

Like many low- and middle-income countries (LMICs), Senegal is facing staggering rates of untreated hypertension. Although nearly 30% of the Senegalese population is estimated to be afflicted with hypertension, the control rate in Senegal is just 8% (compared to 53% in the United States).

THE HEART OF THE MATTER

CDC and other partners have teamed up with the World Health Organization (WHO) to launch the Global Hearts Initiative. Under the Initiative, CDC and WHO developed high-impact, evidence-based interventions, including six practical modules to help strengthen cardiovascular disease management in primary care. These modules, known as the HEARTS technical package, are being implemented globally.

In alignment with the HEARTS technical package, Better Hearts Better Cities seeks to improve the prevention, management, and care of high

blood pressure, as well as tackle key changeable risk factors through multi-sector partnerships. The initiative is led by the Novartis Foundation in partnership with CDC, CDC Foundation, and other global experts. In addition to Dakar, Better Hearts Better Cities is being implemented in Ulaanbaatar, Mongolia, and São Paulo, Brazil.

LEADING THE WAY IN DAKAR

Inside a meeting room in Dakar, Dr. LaBelle and local colleagues passionately discuss how they will integrate monitoring and evaluation strategies into the program. As the global evaluation partner, CDC is working alongside local partners to provide technical expertise, continuous feedback, and sound measurement for the Better Hearts Better Cities program.

“We’re working together to create feasible solutions that add value for clinic staff,” remarks Dr. LaBelle. Local partners have trained more than 80 doctors and health workers to screen, refer, and treat patients according to standard protocols.



A health worker screens a resident for hypertension. Photo: Cheick Niang

Meaningful Changes for Kenya's Moms-to-Be

As the saying goes, sometimes the little things mean the most. In the Kenyan sub-county of Kisumu East, where the infant mortality rate is three times the national average, mothers-to-be weren't receiving the recommended care. Dr. Lydia Kilowua wanted to understand why.

She began by conducting a community health assessment – a strategy she learned during her fellowship with CDC's Improving Public Health Management for Action (IMPACT) program.

IT ALL BEGINS WITH LISTENING

Through a series of focus group discussions, key informant interviews, and a qualitative questionnaire, Dr. Kilowua discovered that over 78% of women in Kisumu East did not complete all four recommended visits at antenatal clinics. However, she was surprised to find that the primary issue was not quality of care, but rather a setup that was not fully patient-centered.

Why? Wait times at clinics averaged more than two hours. The total cost for blood work, ultrasounds, and transportation was prohibitive for more than half the women surveyed. Close to 60% of women felt that the trek to their nearest clinic was too arduous and not worth the effort. A rotating staff of care providers at the clinic made it difficult for the women to establish relationships with individual doctors and nurses.

INVOLVING THE COMMUNITY IN SOLUTIONS THAT WORK

Looking at the data led Dr. Kilowua to question how she could make the antenatal clinic a more

welcoming place for women. She found the answer in Traditional Birth Attendants (TBAs). Skillful and well-trained by the government, TBAs stay with the mother throughout the pregnancy and delivery. They meet women's needs for someone familiar, secure, and responsive. TBAs also often accept non-cash payment such as goats or chickens, making them affordable.

Dr. Kilowua found that TBAs were in good supply in the sub-county. While they are not as prepared as doctors and nurses to handle complicated births, TBAs represent a cost-effective use of a health system's resources, making care more accessible and reducing the load on midwives and doctors.

Dr. Kilowua proposed that Kisumu East harmonize the efforts of the antenatal clinics and the TBAs to better support the women by making TBAs part of all outreach activities. An important component of this process is ensuring that solutions are community-led, or in this case, clinic- and TBA-led.

USING DATA TO DRIVE POSITIVE CHANGE

Dr. Kilowua suggested other solutions based on the data she collected, such as offering water, Wi-Fi, and TV in clinic waiting areas, as well as working long-term to build more facilities in remote locations. Maintaining strong relationships within Kisumu East's communities will ensure support for these and other grassroots solutions.

The IMPACT fellowship teaches public health officials in low-resource countries how to think deeply to solve problems. Dr. Kilowua's work is an example of how taking time to assess the current state of affairs can lead to straightforward, effective, and affordable strategies that solve challenges. And how, if we have the skills to find the right approach, even small changes can make a big difference.



WHAT IS IMPACT?

Improving Public Health Management for Action (IMPACT) is a fellowship program that aims to build a cadre of highly trained public health managers throughout the world. The program is founded on the understanding that strong management will help IMPACT countries more effectively translate research, theory, and scientific innovation into successful public health action.

A mother and child in Kenya.
Photo: David Snyder, CDC Foundation

Innovation in the Field: The Measles-Rubella Box

What if you could put a laboratory into a box small enough to carry with you to the most remote corners of the world? What if that box contained cutting-edge diagnostic technology and required only a laptop battery for power?

And what if you could then use that box to detect a child's immunity to vaccine-preventable diseases like measles and rubella, or even to confirm clinical cases in reported outbreaks, all in less than an hour?

Such a box actually exists, and it's called the Measles-Rubella Box (MR Box). While the technology is new and still developing, it was recently tested in Kenya and the Democratic Republic of the Congo (DRC) to see how well it works in real-life situations.

TESTING TECHNOLOGY IN THE FIELD

The first tests of the MR Box took place in a Kenyan refugee camp in summer 2016, where CDC emergency response and recovery experts Dr. Aimee Summers, Dr. Eugene Lam, and Dr. Alaine Knipes, along with a team from the University of Toronto's Wheeler Laboratory, used the boxes to check people for immunity to measles and rubella. Last September, Dr. Summers and Dr. Knipes arrived in Kinshasa, DRC, to lead a second set of field tests.

They again traveled with scientists from the University of Toronto, who designed and developed the innovative technology. They had come to DRC to figure out if the MR Boxes could be used to confirm active measles and rubella infections to help stop outbreaks faster.

"In DRC, all the measles and rubella tests currently have to be sent to the national laboratory in Kinshasa. It's a big country, and transporting blood samples can be difficult. Even the fastest results take a minimum of a week to get back," says Dr. Summers.

The new test has the potential to solve this issue. It's portable, easy to use and—at less than a dollar per chip—affordable. It's also compact, weighing less than 11 pounds. The technology inside each box, called digital microfluidics-enzyme-linked immunosorbent assay (DMF-ELISA), or "ELISA on a Chip," has some distinct advantages over other technologies used to detect measles and rubella. It can test samples from up to four people at the same time and yields results in less than an hour—much more efficient than transporting blood samples to the national lab and waiting several days for laboratory results.

"Measles spreads very rapidly, meaning that every minute counts," says Dr. Summers. "Having a technology that can give us immediate answers in the field is definitely a game changer." Because measles is highly infectious,



Dr. Aimee Summers preparing whole blood samples for DMF-ELISA at a Health Center in Biyela, Kinshasa Province, DRC. Photo: Alaine Knipes

delaying public health response by several days can lead to significant expansion of outbreaks. Fast, accurate testing through this technology now leads to swift action and containment of measles in the field.

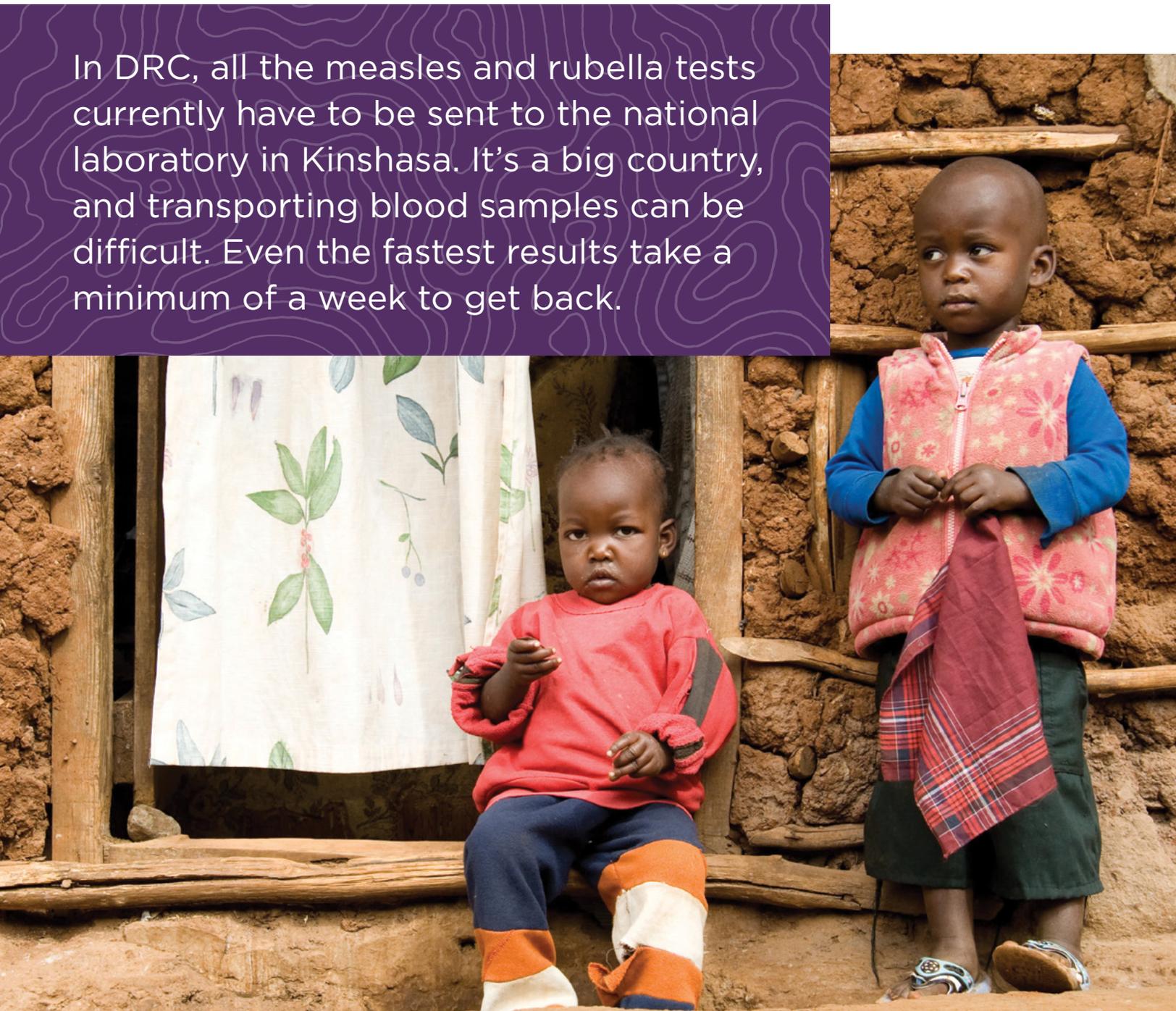
AN INNOVATIVE PARTNERSHIP

Disease detectives from DRC's CDC-supported Field Epidemiology Training Program (FETP) were integral to the testing process, which involved long days going from house-to-house

in Kinshasa. "The FETP residents and graduates tirelessly knocked on doors, getting up early and working late, taking time away from their 'day jobs' to navigate to households using GPS, collect blood samples, and fill out electronic data forms," notes Dr. Knipes.

The research partnership also included collaboration with the CDC office in DRC, as well as CDC's Global Immunization Division (GID) and Division of Viral Diseases (DVD). The project received support from a CDC Innovation Fund award and from GID research funds.

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Children in a refugee camp in Kenya. Photo: David Snyder, CDC Foundation

Disease Detectives Target Polio Eradication in the Democratic Republic of the Congo

As the last embers of polio smolder across the world, countries are contributing to the global effort to eradicate the disease once and for all. With CDC support, the Democratic Republic of the Congo (DRC) has made enormous strides towards polio eradication in the last 10 years.

With its last case of wild poliovirus (WPV) detected in December 2011, DRC was declared “free of wild poliovirus” in 2015 by the African Regional Polio Certification Committee.

However, in 2017, outbreaks of vaccine-derived poliovirus (VDPV) occurred in Haut Lomami, Maniema, and Tanganyika provinces, with transmission continuing in 2018. Notification of these outbreaks led to an immediate need to intensify polio surveillance in the affected provinces. Surveillance for polio is conducted through finding and reporting cases of Acute Flaccid Paralysis (AFP).



Dr. Aissata Diaha from CDC’s Global Immunization Division administering the oral polio vaccine to a child in a remote area of Lubumbashi. Photo: Louie Rosencrans

WHY TRACK ACUTE FLACCID PARALYSIS?

Polio, or poliomyelitis, is a crippling and potentially deadly infectious disease caused by the poliovirus. The highly contagious virus spreads from person to person and can invade an infected person’s central nervous system, often resulting in paralysis.

Acute Flaccid Paralysis (AFP), a type of paralysis with sudden loss of muscle tone, can be a sign of infection with polio. Stool samples from AFP cases are collected and analyzed for the presence of polioviruses in specialized laboratories. AFP cases can only be confirmed as polio through these laboratory analyses.

DISEASE DETECTIVES ON THE FRONTLINES

In response to the ongoing outbreaks, DRC called upon its skilled workforce of CDC-supported disease detectives at the Ministry of Health. Disease detectives serve as “boots on the ground” in the fight against disease, helping to prevent, track, contain, or eliminate the transmission of diseases before they cause large epidemics. They are often first on the scene to investigate potential outbreaks, as they were in 2017 when Ebola threatened the country’s Bas Uélé province.

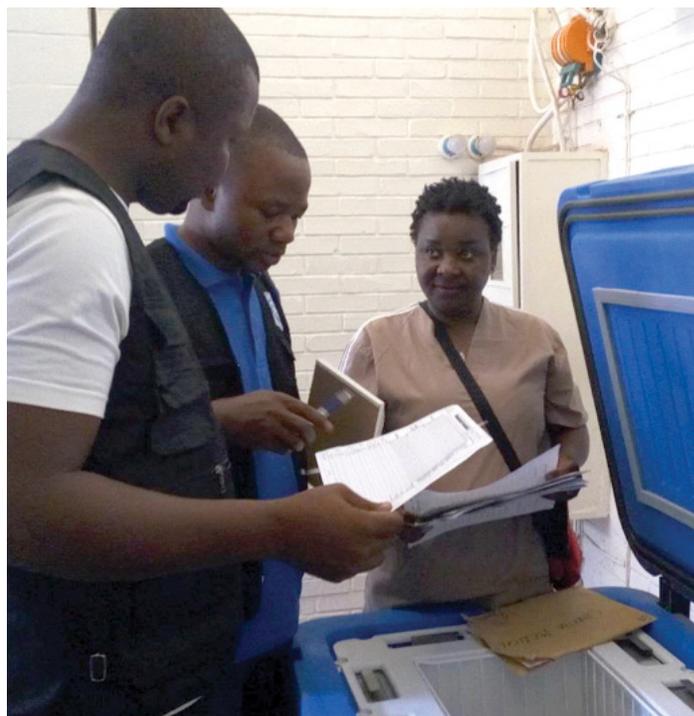
In October 2017, DRC’s disease detectives underwent a seven-day training led by polio experts from CDC’s Global Immunization Division. The training participants learned how to identify, investigate, and report AFP cases and how to help prepare for and conduct polio vaccination campaigns in response to outbreaks.

TRAINING LEADS TO ACTION

The trained disease detectives immediately took their new knowledge into the field. They collaborated with DRC’s Ministry of Health and the World Health Organization to actively search

DID YOU KNOW?

Disease detectives in DRC have been instrumental in the timely containment of outbreaks, including Ebola. In recent years, DRC has partnered with CDC to establish two programs that train disease detectives: the two-year Field Epidemiology and Laboratory Training Program (FETP-Advanced) in 2010, and an accelerated FETP-Frontline program in 2016. As of January 2018, DRC has had 62 FETP-Advanced graduates, with 38 graduating from DRC FETP and 24 graduating from Central Africa Regional Program; DRC’s Frontline has had 86 graduates, all of whom have critical training, skills, and experience that have been used to prepare for and respond to public health threats and emergencies.



Verifying cold chain procedures for the correct conservation of polio vaccines.

for and investigate cases of AFP in the three provinces affected by the VDPV outbreaks. Cumulatively, during November 2017 and February-March 2018, disease detectives visited 1,832 surveillance sites in the provinces. They searched clinical registers for cases of AFP and reviewed all available AFP surveillance documentation. Through their efforts, 99 AFP cases not previously reported to the surveillance system were identified and investigated. The disease detectives also taught more than 7,000 healthcare workers, traditional healers, community leaders, and community members how to identify and report AFP cases and provided local health facilities with needed surveillance tools.

CLOSER THAN EVER TO ERADICATION

Polio eradication is an important priority for CDC, which is why CDC’s Division of Global Health Protection and Global Immunization Division are working together to strengthen polio surveillance and outbreak response—including improving polio vaccination coverage—in polio-endemic and outbreak countries and other high-risk areas. Thanks to partnership from all corners of the globe, our world is closer than ever to having zero cases of this crippling and deadly disease.

How Connection Equals Detection in Tanzania's Cholera Outbreak

November, 2017: A responder in Tanzania's emergency operations center spots something alarming on a weekly laboratory report.

One of the country's labs identified a resurgence of cholera in the Kigoma region. Although other surveillance systems had not yet picked up the new cases, the lab report was clear, and the information triggers immediate action.

YOU CAN'T FIGHT WHAT YOU CAN'T SEE

Undetected, cholera can spread like wildfire in a community. Like many of the world's most frightening diseases, confirming cases quickly and responding right away is key.

Tanzania has been battling a widespread outbreak of cholera since August 2015. It isn't the first for the country, which has suffered periodic outbreaks since 1974, costing thousands of lives. At the time the current outbreak began, Tanzania had no emergency operations center to coordinate a response, limited electronic nationwide surveillance system to monitor diseases, and few laboratories with the ability to confirm and report suspected cases.

It was around this time that the world took a big step forward in stopping infectious diseases through the Global Health Security Agenda (GHSA). Against a backdrop of real

and present danger, with the momentum of the GHSA, Tanzania began working with global partners to strengthen its ability to respond. With the outbreak growing, Tanzania fought back by using the nationwide Integrated Disease Surveillance and Response (IDSR) system and creating a Public Health Emergency Operations Center (PHEOC) to coordinate response efforts. Importantly, Tanzania also began improving the ability of its laboratories to accurately diagnose and report new cases.

BOOSTING LABS TO SAVE LIVES

Particularly at the local and regional levels, Tanzania's laboratory workers had very limited access to the training and supplies needed to detect cholera. Many suspected cases were not being confirmed, and underreporting remained an urgent challenge. In partnership with CDC and the American Society for Microbiology (ASM), Tanzania's Ministry of Health, Community Development, Gender, Elderly, and Children embarked on a program to boost the capacity of the country's labs.

Experts conducted on-site training in basic microbiology, enabling lab workers to test for cholera and other priority diseases. Detailed checklists helped uncover and address critical gaps in processes, while master lists of standard operating procedures and supplies ensured that quality standards were being met. By June 2017, through GHSA funding, 69 laboratory scientists and technologists had been trained in basic microbiology, with 11 certified through a Training of Trainers (ToT) program and another 16 deployed as full-time mentors to support the country's regional and zonal laboratories.

 **69**

laboratory scientists and technologists trained in basic microbiology

 **11**

scientists certified through a **Training of Trainers (ToT)** program

 **26**

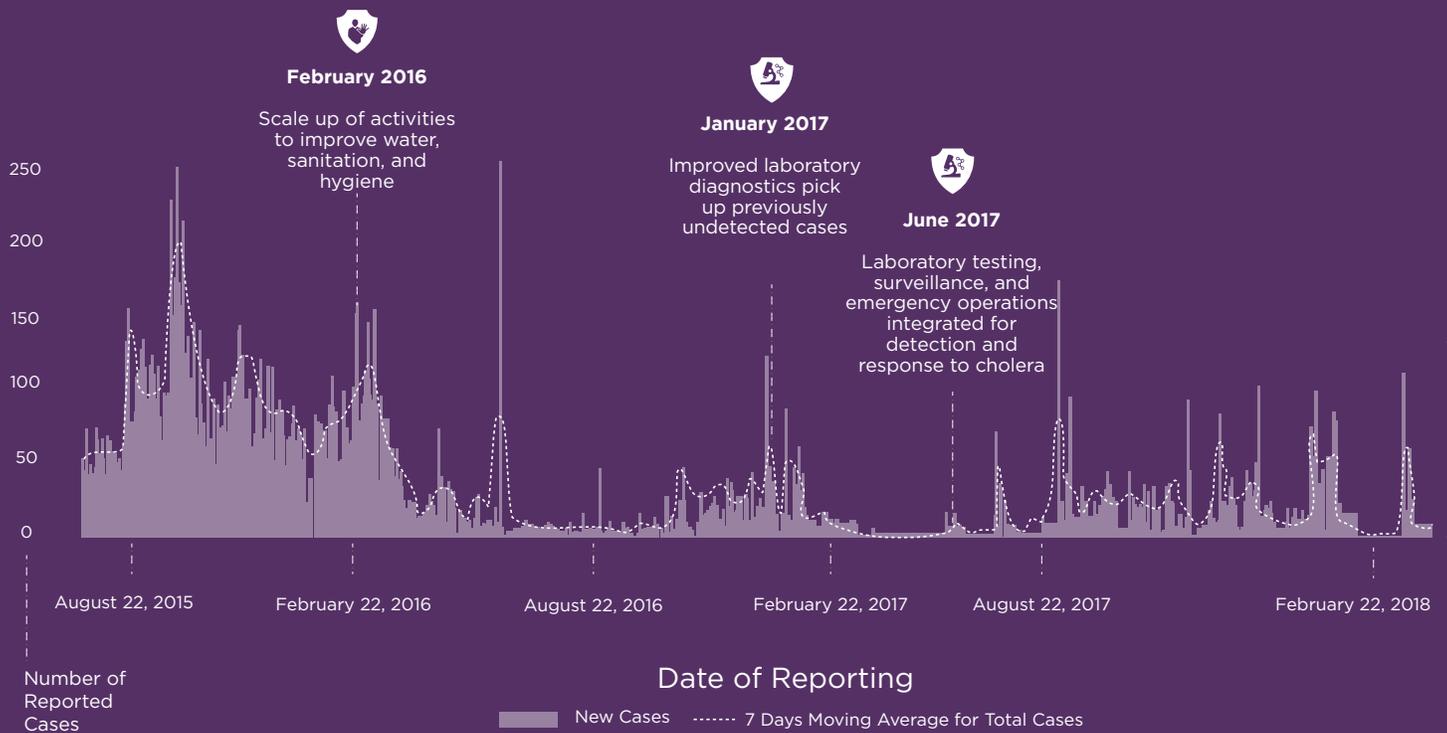
mainland regions of Tanzania had cholera as of March 2018 affecting 34,000 people

 **16**

trained scientists deployed as full-time mentors to support the country's regional and zonal laboratories

Trend of reported cholera cases in mainland Tanzania

22nd August 2015 - 18th August 2018

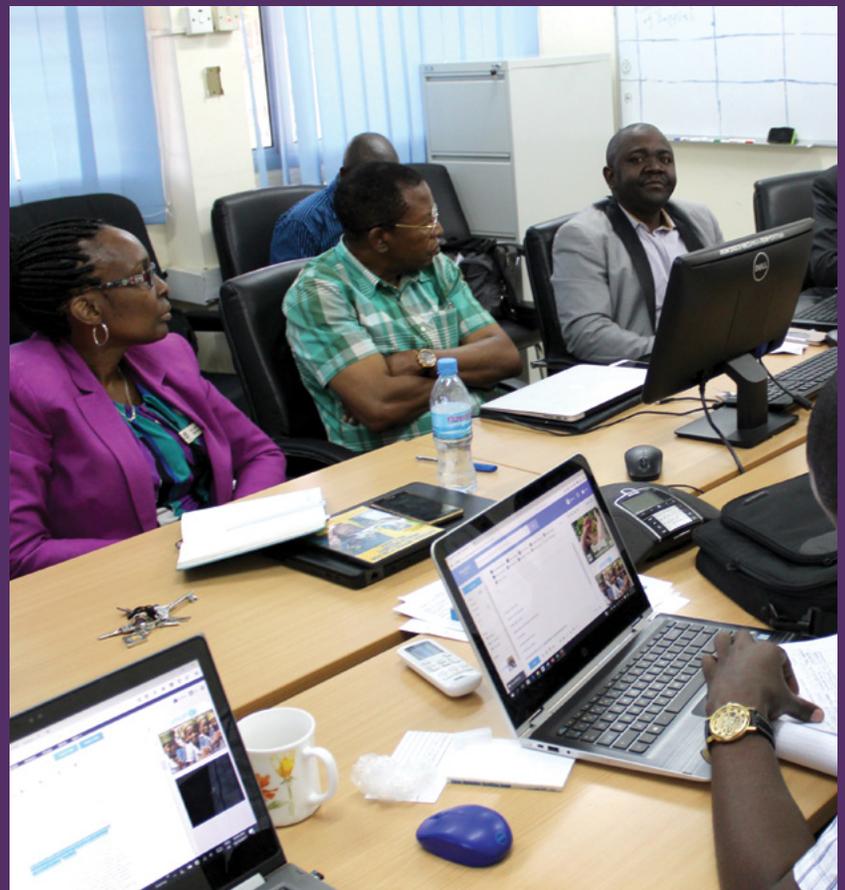


“THAT’S WHERE THE LAB DATA BECAME CRITICAL”

Thanks to these trainings, Tanzania’s labs are now able to accurately gather and report lifesaving outbreak information to the PHEOC. Between September and December 2017, the PHEOC’s review of laboratory data led to early identification of cholera in Kigoma, Dodoma, Mbeya, Rukwa, and Dar es Salaam, before it was captured by syndromic surveillance systems.

“That’s where the lab data became critical,” says Wangeci Gatei, a Health Scientist supporting lab systems in Tanzania. “Cholera cases are now being identified in the labs, complimenting IDSR and enhancing real time biosurveillance. The PHEOC is able to get the information and quickly mobilize control measures.”

As of March 2018, cholera had flared across all 26 geographic regions in Tanzania and affected more than 34,000 people. But the country’s global health security efforts are helping to stem the epidemic’s tide by creating systems that equal faster, smarter response.



Dr. Janneth Mghamba (left), Dr. Mohammed Mohammed (far right), and others discuss strategies to control cholera.

One Responder's Call to Action: Fighting Ebola in the Democratic Republic of the Congo



CDC Emergency Management Specialist Luis Hernandez conducts IMS and EOC training for organizations involved with the 2018 DRC Ebola response.

Luis Hernandez stuffed a large suitcase with camping gear. Among other things, the bag carried multiple flashlights, waterproof clothes, and other items that make sense for a tour of undetermined length in a remote area of the Democratic Republic of the Congo (DRC).

Despite the hard conditions, Hernandez was ready. The World Health Organization's (WHO) Department of Emergency Operations (DEO) requested him by name to help fight the May 2018 Ebola outbreak in the Bikoro area of Equateur Province in Northwest DRC.

As an Emergency Management Specialist at CDC, Hernandez understands what it takes to coordinate an efficient and effective response directed by an emergency operations center (EOC). WHO needed Hernandez and his skills to manage an EOC that had been set up to serve the three regions in where the outbreak took place. Hernandez was an advisor to WHO's Global Outbreak Alert and Response Network (GOARN). GOARN ensures that the right technical expertise and skills are on the ground and available during outbreaks.

EXPECTING THE UNEXPECTED

As an outbreak response veteran, Hernandez knows that the only "expected" is the "unexpected." That was true this time when his destination changed from a tent to be a hotel room in Mbandaka.

The second thing he did not expect is that he would immediately take over as the WHO EOC lead. Upon his arrival, he found himself at the helm of a makeshift facility that had been set up to control the outbreak. "We had just three flat-screen monitors and a couple of donated laptops from WHO," he says. "There were a few tables and plastic chairs, no phones, and nine empty, non-air-conditioned rooms where the various teams and commissions working on the response could gather."

A flurry of activity was already taking place in the region: disease detectives in the field conducting contact tracing; teams racing to outpace the spread of the virus with vaccines; screeners checking the health of people moving in boats along the Congo River. Experts from organizations across the globe—WHO, Médecins Sans Frontières (MSF), Red Cross, the Alliance for International Medical Action (ALIMA), the United Nations Office for the Coordination of Humanitarian Affairs (OCHA), and the United Nations Children's Fund (UNICEF)—all brought critical knowledge and skills to help eliminate the outbreak.

His mission, however, did not change. Hernandez's job was to bring all the local and international partners on the ground supporting the response into the EOC and give them tools to share information and make correct, timely decisions. Everyone needed to stay aware of all aspects of the response by informing each other and the Ministry of Health (MOH) daily.

With support from the United Nations Peacekeeping Mission, Hernandez worked to establish basic systems, setting up generators and internet access. He also improved safety and security in the EOC, including getting urgently needed supplies like fire extinguishers. "We had a short circuit and almost burned the generator," he says.

A SYSTEM FOR THE FUTURE

He also began teaching responders how to create and apply an Incident Management System (IMS), which they can use to manage future emergencies. In a crisis, an IMS offers a set structure that outlines the specific roles and responsibilities of responders. Hernandez knew that an IMS could provide a common framework for the many partners fighting the outbreak to work seamlessly together.

“The advantage of using an IMS is that it brings all the different commissions together and also ties in operations aspects like finance, planning, operations, and logistics. It brings people out of their silos,” says Hernandez.

“The most important thing in any emergency is having skilled responders who know what to do.”

The EOC offered a way to manage the many resources and people involved and, ultimately, played an important role in eliminating the outbreak. And now, with a new Ebola outbreak in DRC’s province of North Kivu in Eastern DRC, the “muscle memory” left behind as a result of the work Hernandez and others did will help.



Luis Hernandez’s gear in front of the Congo River.

Especially in the most remote areas of the world, having people who understand how to coordinate a response is key to saving lives. After all, Hernandez always says, “The most important thing in any emergency is having skilled responders who know what to do.”

RAPID ACTION SAVES LIVES

The early 2018 Ebola outbreak in DRC posed a grave threat, demanding rapid action from many partners to contain it. The WHO declared an end on July 24th, 2018. The outbreak resulted in 54 cases (38 cases laboratory confirmed and 16 deemed probable) and 33 deaths.



Experts Team Up to Tackle Deadly Anthrax Across Uganda



Village in Arua District, Uganda. Photo: Dr. Bao-Ping Zhu

In May 2017, two children in Uganda’s northern Arua District fell ill after eating the meat of an animal that was found dead.

Weeks later, in the same district, a 35-year-old man at the Rhino Camp refugee settlement became sick and died. Health workers noticed a large lesion on the man’s skin—a sign of anthrax. Word of more cases soon reached public health officials. In August 2017, dozens of people became sick in the southwestern Isingiro

District after eating infected meat. Then, in the spring of 2018, news of anthrax outbreaks arrived from both Kirihura in the west and Kween in the east; additional case reports continued to come in from Arua. With outbreaks occurring in multiple regions across the country, public health experts needed to escalate the response.

BRINGING EXPERTISE TOGETHER

All of the outbreak reports were from places where people commonly keep cattle, which creates an increased risk that anthrax will spread to people. Anthrax is among Uganda's seven priority zoonotic diseases, and stopping its transmission requires an all-hands-on-deck One Health approach that brings together experts in animal and human health.

Teams from CDC Uganda, CDC Atlanta, Uganda's Ministry of Health (MOH), and the Ministry of Agriculture, Animal Industry, and Fisheries (MAAIF) joined together to address the growing challenge. The combined effort marked the first full-fledged collaboration between the animal and human public health sectors to tackle outbreaks of a priority zoonotic disease in Uganda.

BETTER PREPARED FOR EMERGENCIES

With Uganda's history of high-profile disease outbreaks, CDC has been supporting Uganda's government in strengthening its ability to respond to infectious disease threats. These global health security activities have resulted in better communication and information systems; more capable surveillance and laboratory

networks; a workforce of trained disease detectives; and a functioning Public Health Emergency Operations Center (PHEOC), helping the country rapidly respond to outbreaks and other emergencies.

Laboratory tests at the CDC-supported Uganda Virus Research Institute (UVRI) were able to quickly confirm the cause of the outbreak as anthrax. Uganda's disease detectives, trained through the CDC-supported Advanced Field Epidemiology Training Program (FETP), swung into action to investigate the initial outbreak clusters in Arua and search for additional cases in the district. Their investigation found that the vast majority of the cases were associated with eating, processing, or handling meat from animals that had died suddenly.

COORDINATED RESPONSE TO SAVE LIVES

As the crisis spread, Uganda drew upon its improved capabilities to scale up the response. The Uganda National Task Force for public health emergencies set up a Rapid Response Team (RRT) under a One Health platform. The response team set out to establish the scope of the outbreak, determine how people were being exposed, and use evidence to recommend control measures.



FETP fellow Dativia Aliddeki investigates anthrax outbreak. Photo: Dr. Bao-Ping Zhu



Samples being collected from a suspect cattle carcass in Kiruhura, Uganda. Photo: Dr. Bao-Ping Zhu

Members of the RRT came from both animal and human health sectors, including the MOH, MAAIF, the Uganda Wildlife Authority, FETP, UVRI, Makerere University College of Veterinary Medicine, the Infectious Disease Institute, the Food and Agriculture Organization, and a field response team from CDC's Bacterial Special Pathogens Branch in Atlanta.

The RRT was dispatched to the Kween, Kiruhura, and Arua districts to search for human cases and exposures. They worked to educate the community and its healthcare workers about how to prevent and identify cases of anthrax. They also provided recommendations on antibiotic treatment, post-exposure prophylaxis of human cases and exposures, and outbreak control measures such as vaccinating livestock and properly disposing of dead animals.

All identified human cases have been associated with direct contact with dead animals through slaughtering, skinning, handling, or through consumption of meat and products from suspected anthrax-infected livestock. In Kiruhura District alone, teams identified 1,050 people

exposed to anthrax-infected livestock carcasses. All were given preventative courses of antibiotics.

AN ONGOING THREAT TO UGANDA

As of June 2018, the RRT had identified 715 cattle deaths due to suspected anthrax in the three affected districts. In total, 186 probable human cases of anthrax were identified across Uganda between January and June 2018.

“Human cases of anthrax have continued to be reported, indicating ongoing outbreaks. The two most important measures to control this outbreak are livestock vaccination and safe animal carcass disposal,” says Dr. Bao-Ping Zhu, CDC Uganda Resident Advisor for FETP.

Recent global health security efforts have made Uganda better prepared to handle outbreaks like this one, as well as to prevent, detect, and respond to future emergencies. While progress is being made, Zhu stresses the importance of remaining vigilant. “If we continue looking, chances are that we will find more cases and outbreaks.”

January - June 2018 Uganda Anthrax Outbreaks

By the conclusion of CDC response on 1st June 2018

Date
first
reported

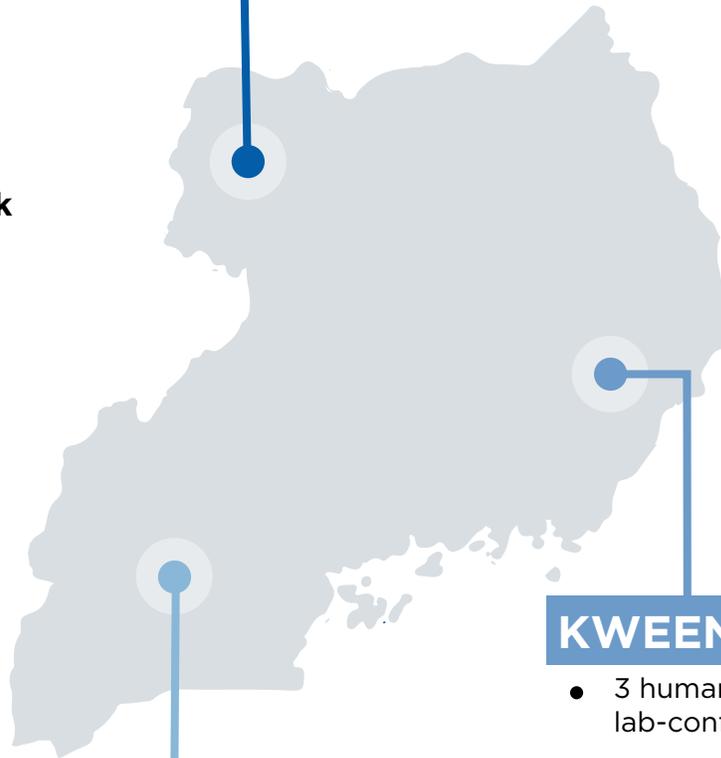
ARUA

- 4 of 5 livestock carcasses show signs indicating anthrax

-  **84 Human Cases**

-  **672 Livestock Deaths**

9th February



KWEEN

- 3 human cases are lab-confirmed

-  **76 Human Cases**

-  **14 Livestock Deaths**

11th April

KIRUHURA

- 8 of 9 livestock carcasses tested are lab-confirmed

-  **26 Human Cases**

-  **35 Livestock Deaths**

13th May

Thailand Partnership Puts the Pieces Together for Emergency Response



A series of training courses and knowledge transfer were offered by visiting CDC experts.

When emergencies strike, countries need systems and people in place to quickly put all the pieces together. The expanded capabilities offered by the emergency operations center (EOC) yield faster, smarter response to any emergency.

Since the opening of Thailand’s EOC in 2016, experts within its walls have efficiently and effectively coordinated responses to two outbreaks of Zika virus—in 2017 and 2018—and helped the country manage and maintain

safety at a mass gathering of hundreds of thousands of people.

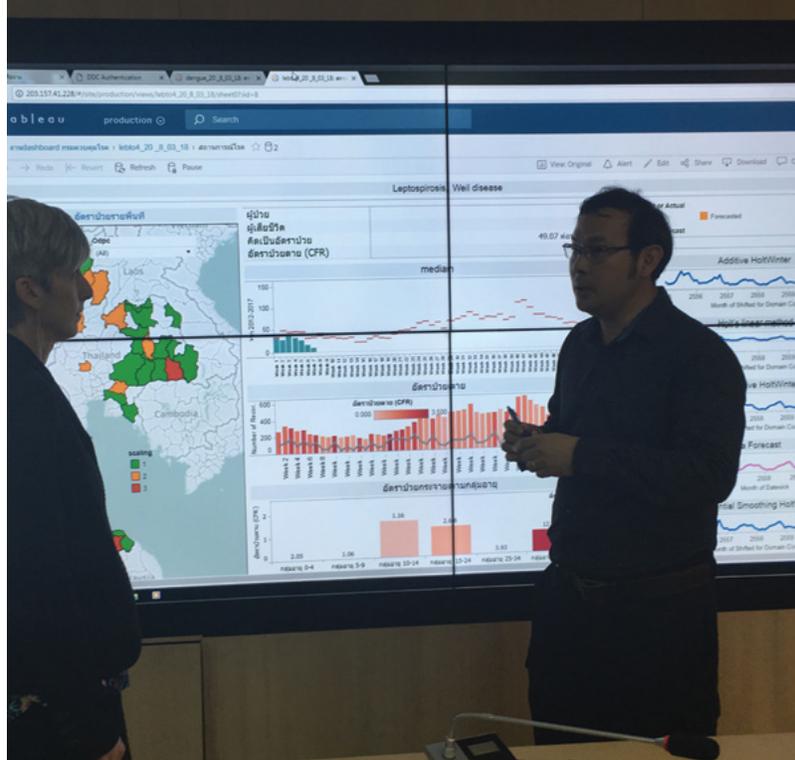
Inside the EOC, a “control room” serves as a one-stop shop to handle incoming alerts about potential and real public health threats. This centralizes the response effort and allows key government officials, particularly the Ministry of Public Health (MOPH) Permanent Secretary, to obtain information about a specific outbreak without having to call a variety of departments

and cobble together answers to understand the extent of the health threat.

A LONGSTANDING PARTNERSHIP GETS RESULTS

Before the EOC's opening, Thailand faced challenges in managing health threats. Though they had some critical pieces in place—like a strong workforce of disease detectives and a national rapid response team—parts were still missing. They needed a more efficient system, more modern infrastructure, more manpower, and resources to handle emergencies.

To achieve that, Thailand's MOPH drew upon its longstanding partnership with CDC—a close collaboration that dates back to the establishment of the first Field Epidemiology Training Program (FETP) outside of North America more than 35 years ago. CDC support for Thailand's rapid response capabilities began in 2007, when the Thai Sentinel Rapid Response Team first received funding and technical assistance. In the past decade, CDC's Division



Ministry of Public Health staff explaining some of the computer software used at the EOC in Bangkok.

of Global Health Protection in Thailand (DGHP Thailand) has been working with the MOPH to establish and develop the EOC.

In recent years, over 20 MOPH staff have traveled to CDC's Atlanta headquarters to observe CDC's EOC in action and learn how to better manage emergencies at home. This shared knowledge has resulted in Thailand having its own cadre of trained emergency management and response experts to staff its new EOC.

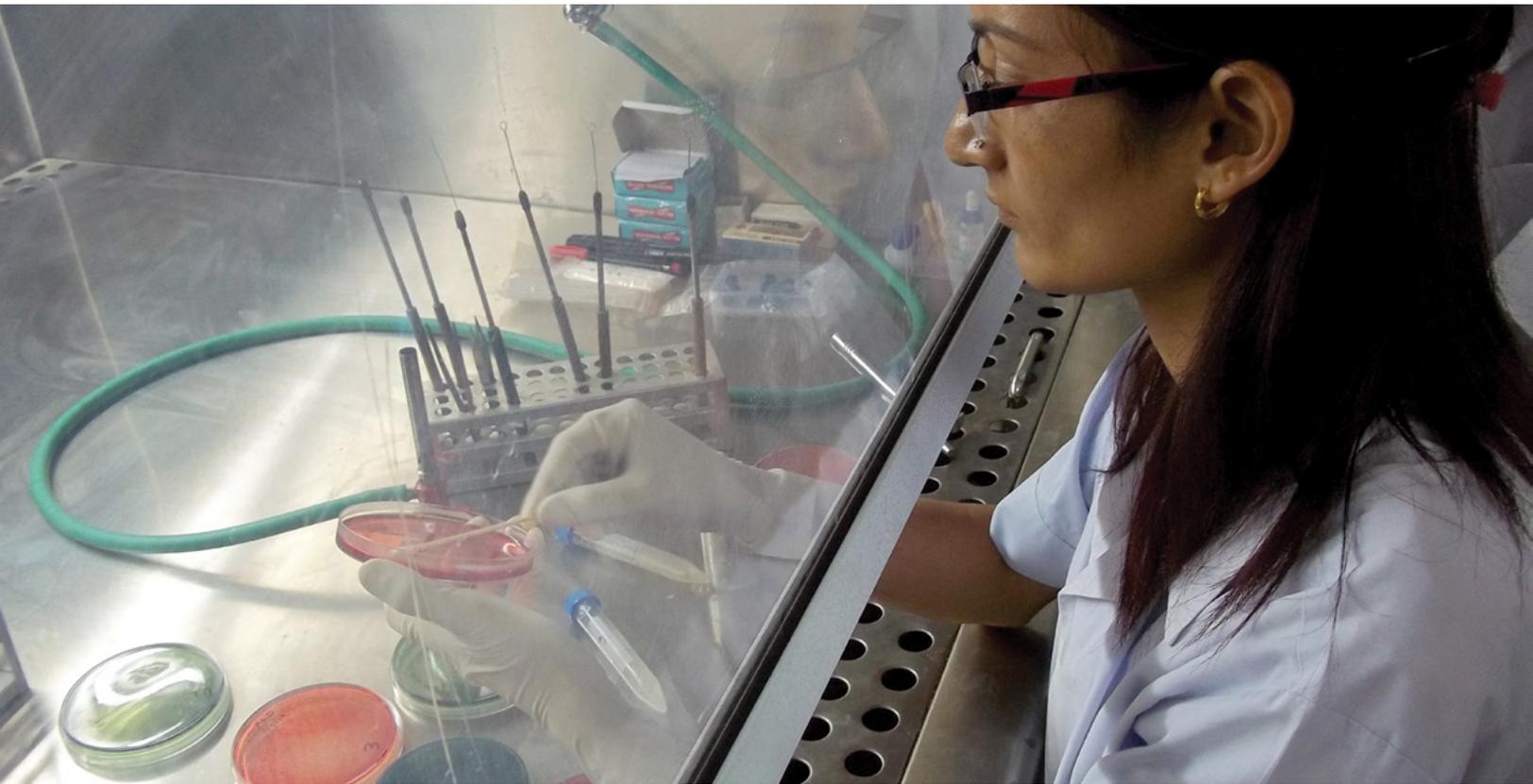
READY AGAINST OUTBREAKS AND OTHER THREATS

Determined to increase its capacity to respond to all kinds of infectious disease threats and public health emergencies, Thailand has invested in setting up a network of local and regional EOCs modeled on the national EOC, including an EOC commissioned by the Bangkok Metropolitan Administration.

With a functioning public health emergency management system in place, public health officials can quickly and effectively coordinate an overall emergency response, immediately make policy decisions and allocate personnel, collect and analyze data, and provide timely information to the public that stops epidemics and saves lives.

Since the opening of Thailand's EOC in 2016, experts within its walls have efficiently and effectively coordinated responses to two outbreaks of Zika virus—in 2017 and 2018—and helped the country manage and maintain safety at a mass gathering of hundreds of thousands of people.

Rapid Detection Accelerates India's Response to Nipah Outbreak



CDC is working internationally to build laboratory capacity so that disease can be identified at the source. Photo: CDC India

On May 17, 2018, almost two weeks after his brother died of febrile illness, a male patient in his mid-twenties visited a hospital in Kerala, India, with a fever. A day later, he was dead — but not before his doctors noticed his symptoms were consistent with encephalitis.

Recognizing the potential danger, they immediately sent samples from the patient to the Manipal Centre for Virus Research (MCVR), followed by the National Institute of Virology (NIV) in Pune, where laboratory tests identified the cause of death as Nipah virus.

WHAT IS NIPAH VIRUS?

Nipah virus is an emerging infectious disease of public health importance. There is no cure,

and it kills about 75% of people it infects. As of June 6, Nipah virus had claimed 16 lives out of 18 laboratory-confirmed cases in Kerala, a case fatality rate of 88.9 percent.

People can get sick with Nipah virus after direct contact with infected bats, pigs, or people. In humans, the infection typically presents as fever, headache, drowsiness, disorientation, or confusion, but can also include respiratory and neurological symptoms.

Because Nipah virus is deadly and can spread between people, it is critical to detect outbreaks rapidly. This means recognizing and reporting symptoms in patients quickly, and making sure laboratories have the ability to confirm the diagnosis. Thanks to recent efforts to strengthen its public health capabilities through the Global Health Security Agenda (GHSA), India was prepared to do just this.

TRAINING LEADS TO FASTER DETECTION

In August 2017, through partnership under GHSA, CDC provided laboratory training to participants from MCVR and NIV. The training was a part of an ongoing GHSA-funded study on hospital-based surveillance of acute febrile illness, giving laboratorians the skills to successfully investigate causes of these diseases and increased the diagnostic capacity of laboratories. CDC shared technical expertise, specific reagents, and training for diagnosis of dangerous viruses including Nipah virus and Crimean-Congo hemorrhagic fever through next-generation sequencing (NGS) analysis.

Less than one year later, scientists at MCVR used those skills, including NGS, to detect Nipah virus as the pathogen responsible for the outbreak and identified the exact strain of the virus. This early detection, completed for the first time in India rather than at CDC headquarters, paved the way for state and central governments to respond to the Nipah virus infections more quickly than in previous outbreaks.

Additionally, the quick diagnosis likely limited the severity of the outbreak, containing its geographic spread and potentially reducing costs in terms of loss of life and commerce in a state with significant international produce trade. Understanding the exact strain causing the outbreak also allowed doctors to anticipate which symptoms to watch for in potentially infected patients.

“MCVR’s ongoing partnerships with Kerala’s state health services and private sector partners, beginning with pandemic Influenza A/H1N1 in 2009, as well as its work under GHSA with international partners like CDC on detection of emerging pathogens, were crucial in detecting the Nipah virus infection so quickly,” said Dr. Arunkumar Govindakarnavar, who serves as the head of MCVR.

IMPACTS OF A COORDINATED OUTBREAK RESPONSE

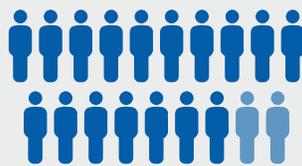
The ability to diagnose dangerous pathogens like Nipah virus is one critical part of India’s faster, smarter response capabilities, where partners now work hand-in-hand to contain deadly outbreaks at the source.

India’s commitment to GHSA and enhanced detection and response represent a significant gain in the world’s ability to address disease threats. With a population of 1.3 billion people, progress in India’s health security leads to a safer and more secure world.



75%

Of people affected with Nipah virus die-
THERE IS NO CURE



17

Nipah virus has killed
17 of the 19 confirmed cases as of June 2018



88.9%

The reported **case fatality rate for Nipah virus**

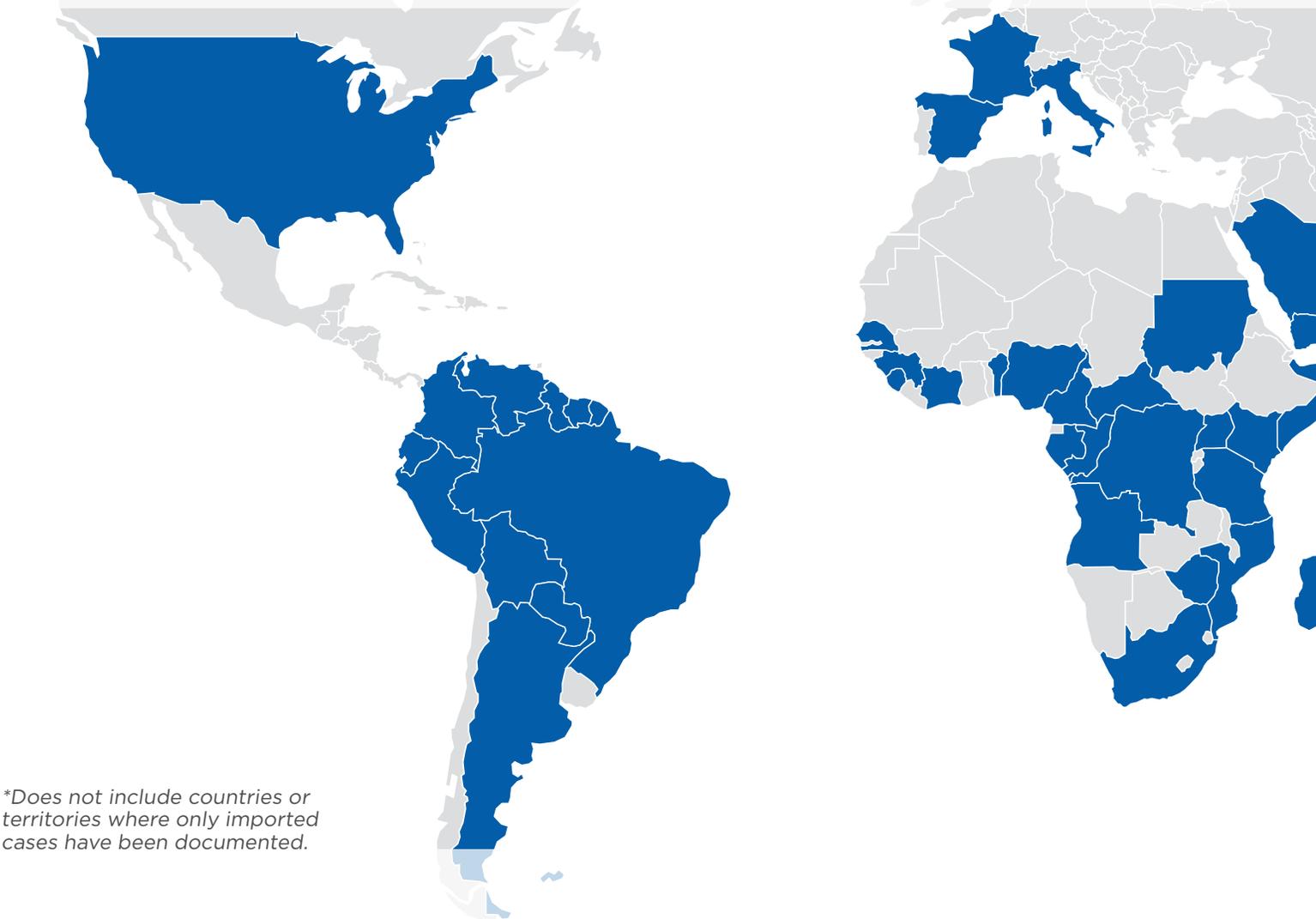
Awareness Campaign Helps Combat the Spread of Chikungunya

A chikungunya outbreak was identified in Dhaka in May 2017. In July 2017 the Government of Bangladesh activated its Emergency Operations Center for the first time in response to the outbreak, prompting the dissemination of prevention messages to the community.

Bangladesh's Institute of Epidemiology, Disease Control and Research (IEDCR) assigned 11 Advanced Field Epidemiology Training Program (FETP) fellows as key organizers of a 1-day Chikungunya Awareness Campaign to perform Ministry of Health senior level duties. FETP

Countries and territories where chikungunya cases have been reported*

As of May 29, 2018



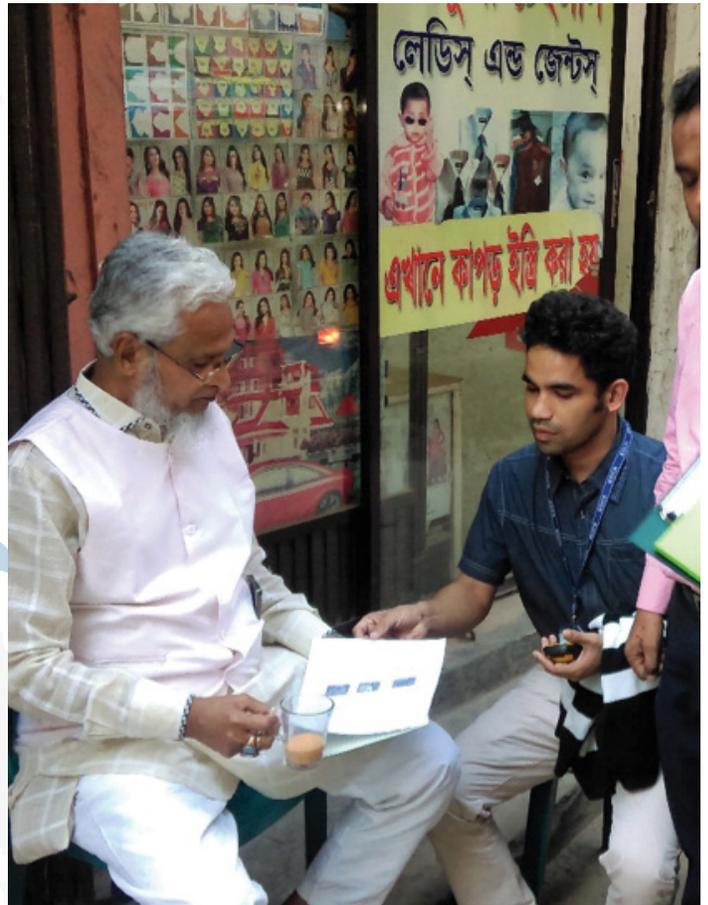
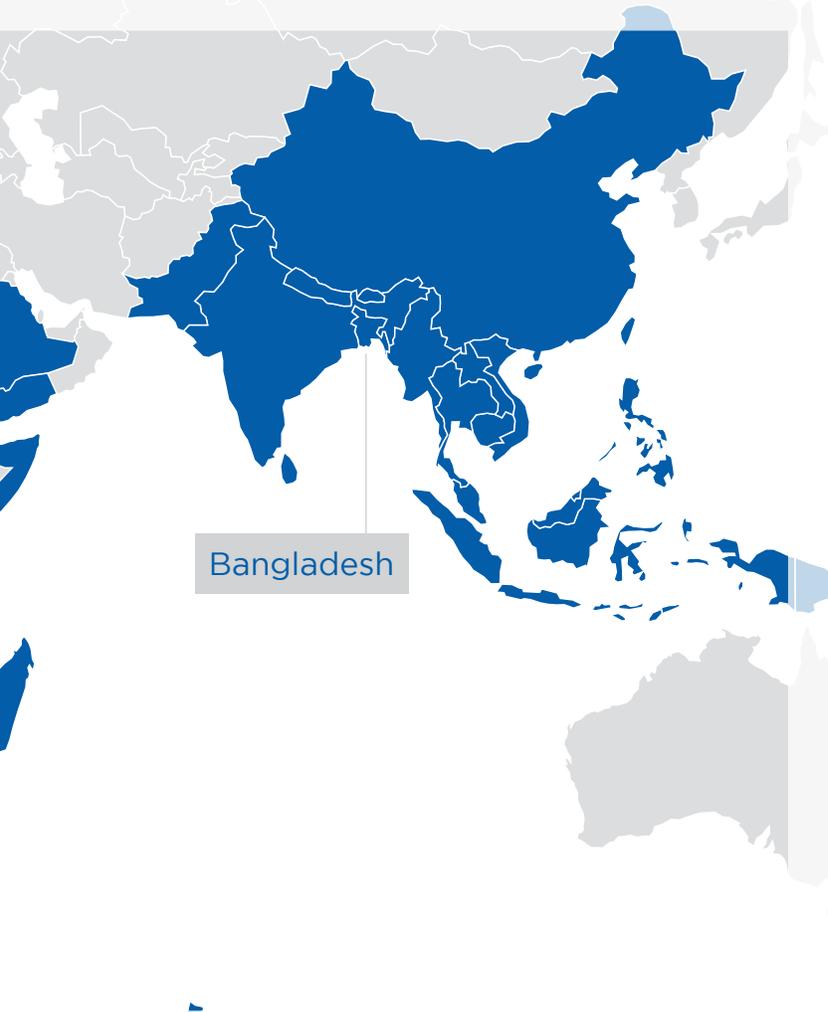
**Does not include countries or territories where only imported cases have been documented.*



FETP fellow, Dr. Sabiha Zahid (fourth from left) leads a group of health students.

fellows were responsible for coordinating logistics to organize approximately 860 health workers into teams and lead them in conducting household visits in 11 (out of the 92) selected areas of the city. FETP fellows also assisted staffing the Chikungunya Control Room at IEDCR where they were responsible for answering the hotline, counseling chikungunya

patients on treatment and prognosis, and disseminating evidence-based awareness messages to the public. Additionally, an FETP fellow conducted a study (May-Oct 2017) to better understand chikungunya prevalence in two areas of Dhaka and knowledge, attitudes, and practices regarding chikungunya prevention.



FETP fellow, Dr. Omar Qayum (second from left) and Dr. Sirajul Islam (third from left) sharing information with a community member.



Photo: Patrick Adams, RTI International



Yonas Getachew, RTI International

“

Now is the time for us to come together to look at what we can offer the global community, for **there are no greater investments than those which will protect our physical, social, and economic wellbeing.**

”

CAPT Nancy Knight, MD
Director, Division of Global Health Protection



Photo: Nabin Baral, RTI International



U.S. Department of
Health and Human Services
Centers for Disease
Control and Prevention

Photo: Ruth McDowall, RTI International