

CENTER FOR GLOBAL HEALTH

U.S. CENTERS FOR DISEASE CONTROL AND PREVENTION

2017



We must remain vigilant and prepared to identify and respond to

new, known, and unknown global health threats. History, current data, and trends tell us these are likely to occur, whether these threats are natural or man-made.



Dr. Rebecca Martin
Director, Center for Global Health
U.S. Centers for Disease Control and Prevention

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Working 24/7 TO PROTECT

Americans from Global Health Threats

With the increasing frequency of international travel, the globalization of food supplies and medicine, and a rapidly expanding world population, it is more important than ever for the Centers for Disease Control and Prevention (CDC), Center for Global Health (CGH), to work 24/7 around the world to stop disease threats before they reach American borders.

As the ease of air travel and mobility of people increases, the risk of global health threats reaching American borders and destabilizing the health, security, and economy of the United States rises. Global disease threats can have an impact on American business interests at home and abroad. CDC scientists, disease detectives, laboratory technicians, and other experts are on the frontlines in more than 60 countries, working to detect disease outbreaks at the earliest possible moment, to respond to them decisively, and to stop them from spreading. That mission is driven by the same methods CDC uses wherever it works – rigorous science, accurate data, quality training, and strong collaboration with partners.

protective suit and face mask before entering an Ebola treatment unit in Liberia.



Since 2006, CDC and its partners have responded to >2,000 disease

outbreaks around the world.

By ensuring that countries have the capability to prevent, detect, and respond to threats within their borders, CDC helps prevent regional and global health crises. CDC actively tracks approximately 40 global health threats each day, and since 2006, CDC and its partners have responded to more than 2,000 disease outbreaks around the world. The knowledge and lessons learned from CDC's work abroad are critical to our public health efforts at home, and to protect Americans. Global health security is national and economic security for the U.S. CDC is protecting the health and quality of life of people in the United States and around the world. Most recently, CDC led historic responses to the Ebola epidemic in West Africa and the Zika epidemic in North and South America.



Fighting Zika At Home and Abroad

On January 22, 2016, CDC activated its Emergency Operations Center to respond to Zika virus, a complex and rapidly spreading outbreak of a disease that results in significant birth defects and other serious health issues. It is a new challenge to control the spread of an often asymptomatic infectious disease whose outcomes are not fully understood. Zika virus is the first mosquito-transmitted disease that has been found to cause birth defects.

CDC works extensively with local and international partners, including more than 21 countries, to simultaneously prevent, detect, and control the spread of Zika at home and abroad, and to develop a deeper understanding of this virus. CDC scientists are tracking mosquitos for possible insecticide resistance and developing new tools to fight them. They are improving new diagnostic tests, increasing capacity in vector management, training affected countries in effective risk communication, developing novel Zika prevention and detection methods, and conducting studies to predict the longterm consequences of Zika on affected countries and at-risk populations, including in the United States.

The knowledge gained through this work is protecting Americans at home and abroad through improved laboratory testing and diagnostic tools, new mosquito control strategies, and improved Zika-related health services for mothers and children.



Working on the Frontlines of the Ebola Outbreak

In March of 2014, West Africa experienced the largest outbreak of Ebola in history. CDC launched a large scale, historic response. With more than 1,200 staff deployed to West Africa over the course of two years, and more than 3,000 staff working on the response in the United States and globally, CDC and partners worked to contain the epidemic at its source and to rapidly respond to any imported or domestic cases.

Numerous CDC staff stepped forward to fight this deadly disease, from scientists and statisticians to public health advisors and health communication specialists. Thousands more worked on the response from the CDC's headquarters in Atlanta, other areas in the United States, and countries around the world. CDC experts relied on their resourcefulness and innovation to combat the epidemic and to protect the public's health.





CDC works 24/7 to prevent diseases, detect threats early, and respond rapidly to emerging health threats, such as Zika and Ebola, to save lives and keep America healthy, safe, and secure.



BOOTS ON THE GROUND

Responding to Global Health Emergencies

CDC's Global Rapid Response Team (GRRT), established in 2015, ensures that from a pool of 400 trained experts, 50 are on call to travel anywhere in the world within 48 hours to confront an outbreak at its outset. The GRRT was mobilized more than 230 times and provided 8,000 person-days of response support in more

than 90 outbreaks worldwide in only one year after it was created in 2016, including cholera, yellow fever, Ebola, Zika, measles, polio, and natural disasters. The GRRT also has experts in global health logistics, laboratory management and training, communication, and disease detection.





GRRT sprung into action in response to Hurricane Matthew, which made landfall on October 4, 2016 near Les Anglais, Haiti as a Category 4 storm. When CDC's first wave of GRRT deployers arrived in Haiti on October 6th, the extent of the disaster, which claimed the lives of at least 546 Haitians and left an estimated 1.4 million people in need of assistance, was just emerging. The team focused on conducting cholera case investigations and rapid assessments of healthcare facilities, as well as supporting the Haiti Ministry of Health to reestablish surveillance systems disrupted by the storm. The GRRT mobilized rapidly to provide essential boots-on-the-ground support during this global emergency, building on previous CDC work done in the country.

BY THE NUMBERS

Since it was established in 2015, the Global Rapid Response Team (GRRT) has:



Supported responses in **27 countries**



Provided

9,598 person-days

of response



in more than

90 outbreaks

worldwide



CDC's Global Rapid Response Team (GRRT) is a highly-trained group of experts who can deploy anywhere in the world within 48 hours to respond to a public health crisis or emergency.



PREVENTING, DETECTING AND RESPONDING to Diseases

Across the Globe

Central Pillars of Global Response

CDC's global work is devoted to putting in place the tools and practices necessary to identify, stop, and control outbreaks at the earliest possible moment in countries throughout the world. The central pillars of CDC's strategy are quality disease surveillance, a well-trained workforce, rapid and accurate public health laboratory capacity, and emergency response via emergency operation centers (EOCs) - information and decision-making hubs. In addition, CDC conducts real-time, "on the ground" operations research and evaluation of what works to optimize lifesaving programs and services.

The Global Health Security Agenda (GHSA) is a systematic effort to provide universal and tested standards to prevent, detect, and respond to disease outbreaks worldwide. As part of GHSA, every member country is committed to having a public health emergency management system that functions according to common standards, operated by staff that includes a rapid response team and access to real-time surveillance, laboratory networks, and information systems. These standards allow country-based EOCs to activate a coordinated emergency response within several hours of identifying a public health emergency.





Global Disease Detectives

The first step in fighting or containing a disease is identifying what it is, its source, and its location. The Global Disease Detection (GDD) program is CDC's principal and most comprehensive program for helping partner countries better detect, identify, and contain emerging infectious diseases.

This is accomplished through state-of-the-art GDD Centers in different regions of the world that serve as hubs and data-gathering centers. GDD centers work closely with scientists and experts at CDC and with host countries on six core capacities, including emerging infectious disease detection and response, training in field epidemiology and laboratory methods, health communication, and laboratory systems and biosafety.

The GDD program trains local scientists, provides diagnostic and epidemiologic resources when outbreaks occur, serves as a platform for regional infectious disease control activities, conducts emerging infectious disease research of global importance, and disseminates proven public health tools. GDD experts have been involved in high-profile public health events such as Ebola, polio eradication, MERS-CoV, cholera, and Nipah virus. GDD staff have responded to over 2,000 disease outbreaks and public health emergencies between 2006–2016. Since 2005 CDC's GDDs have discovered 12 pathogens that were identified for the first time anywhere in the world.

BY THE NUMBERS

GLOBAL DISEASE DETECTION (GDD) (2006 - 2016)



10

GDD Centers help countries build core capacities in support of the International Health Regulations and Global Health Security



380+

New diagnostic tests in 59 countries, which improved disease detection capability and accelerated response interventions



90+

Countries received outbreak response, laboratory, and surveillance support from GDD Centers

Training a Ready Global Workforce

CDC's Field Epidemiology Training Program (FETP) prepares a global workforce composed of local field epidemiologists and laboratories from communities across the globe. These "disease detectives" collect, analyze, and interpret public health data and turn it into action. The FETP workforce are our "boots-on-the-ground" in the ongoing battle against infectious diseases, environmental hazards, and other health threats. FETP training focuses on "learning by doing," with residents spending over 75 percent of their time in the field investigating outbreaks, conducting studies, and training others in their countries.

The goal of FETP is to foster investments today to build the global public health workforce needed to respond to the crises of tomorrow. The FETP program has trained more than 9,000 graduates across three types of programs (advanced, intermediate, and frontline) in 70 countries. Significantly, more than 80 percent of the graduates continue working in their countries with many moving into public health leadership positions. Between 2009–2014, FETP graduates took part in more than 2,000 outbreak investigations, which kept their countries and the world safer and healthier.





CDC helps countries prevent, detect and respond to diseases and outbreaks. CDC's disease detection work and training programs provide countries with the tools and expertise needed to monitor and respond to health threats. The Global Health Security Agenda is the framework through which global standards are achieved and upheld.



CDC Serves as a GOLD STANDARD FOR LABORATORIES Worldwide

An effective, reliable, and consistent nationwide laboratory system is the cornerstone of any well-functioning public health system. CDC lab experts play a key role in ensuring that countries train laboratory staff, and create reliable and high-quality operating standards. CDC is renowned for its laboratory training programs and for strengthening laboratory management toward accreditation (SLMTA). CDC has also engaged in an innovative public-private partnership, "Labs for Life," to support quality laboratory systems to scale up global

HIV prevention, care, and treatment efforts. CDC also works closely with the African Society for Laboratory Medicine (ASLM) to advance laboratory networks in Africa. Through CDC's polio and smallpox eradication work, CDC has further strengthened laboratory biosafety and quality assurance in many countries throughout the world. CDC's world-renowned laboratorians and disease-specific labs are able to identify organisms rapidly and accurately. CDC labs are global reference centers, nationally and internationally.



When the SARS virus first emerged in Asia in 2003, the infectious agent was unknown. CDC was on the forefront of the biological and genetic characterization of the agent.

Additionally, CDC has developed more than 16,000 HIV testing sites throughout the world and recently developed and is evaluating a simple rapid test that can simultaneously diagnose HIV and identify if an infection is recent.

More recently, CDC experts have worked to improve the reliability of laboratory diagnostics of Zika; set up mobile labs in Liberia and Sierra Leone to test for Ebola; supported 121 laboratories across sub-Saharan Africa, Asia, and the Caribbean to meet international standards for laboratory accreditation; and initiated development of a new laboratory tool that quickly and accurately identifies all protozoan parasite infections, including malaria, in a single blood sample.



CDC's laboratories are here to help. This CDC scientist is harvesting H7N9 influenza virus to share with partner laboratories for research purposes.



CDC experts are supporting and enhancing laboratories and diagnostic capabilities worldwide, and CDC labs are on the cutting edge, serving as reference centers, nationally and internationally.

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Achieving An AIDS-FREE Generation

CDC works to combat HIV as an implementing agency of the U.S. President's Emergency Plan for AIDS Relief (PEPFAR). CDC works side by side with ministries of health, leveraging our scientific and technical expertise to help deliver high impact, sustainable prevention, care, and treatment to millions of people in countries most affected by this disease. CDC has been doing this since the start of the epidemic.

The United Nations has proclaimed that ending AIDS by 2030 is an achievable goal, and CDC is helping to lead the global effort to accomplish this. The expanding use and availability of HIV treatment known as antiretroviral drug therapy (ART) is providing an opportunity for more than 18 million people worldwide currently on ART to live with hope and better health. Intensive efforts to eliminate mother-to-child transmission of HIV have yielded tangible results.

By the end of 2016, with the support of PEPFAR and other partners, CDC had conducted 6 million voluntary medical male circumcision procedures to help reduce HIV transmission risk from women

to men, reduced the risk of mother-to-child transmission by delivering ART to 411,000 HIV-positive pregnant women during pregnancy and childbirth, screened 3.5 million TB cases for HIV, and developed a simple, rapid test that can simultaneously diagnose HIV and identify if an infection is recent. In 2016, 45.5 million people were provided HIV counseling and testing, and 6.4 million men, women, and children received life-saving HIV treatment. Working with ministries of health and local and international partners, CDC uses a data-driven approach to deliver effective HIV prevention, care, and treatment.

Population-based HIV Impact Assessments (PHIA) show that country, global, and U.S.-supported HIV efforts have made critical progress toward achieving an AIDS-free generation. PHIA household surveys and testing are the first to directly measure national HIV incidence, pediatric HIV prevalence, and HIV viral load suppression in countries most affected by the HIV epidemic. In collaboration with partners, CDC is playing a key role in designing and implementing the PHIA surveys.





CDC is a key partner in the global effort to end HIV/AIDS and to fulfill the goals of PEPFAR. CDC experts are critical in moving the world toward an ambitious 2020 goal in which 90 percent of all people with HIV are diagnosed, 90 percent of those diagnosed are receiving antiretroviral therapy, and 90 percent of those on antiretroviral therapy remain virally suppressed.



INNOVATIONS IN TB

Screening, Treatment, and Prevention



Tuberculosis (TB) spreads through the air from person to person. Two billion people – one fourth of the world's population – are infected with TB worldwide, with more than 10 million becoming ill with the disease each year and at risk for transmitting TB to others. TB is also the world's top infectious disease killer, claiming nearly 2 million lives every year.

CDC experts are working on the frontlines in 25 countries to find, cure, prevent, and treat TB, HIV-associated TB, and drug-resistant TB through a combination of on-the-ground interventions and global leadership in research and technical expertise. As part of the work, CDC is at the forefront of global efforts to find and test the estimated 4 million people worldwide who have TB, but are undiagnosed or not accessing treatment. CDC experts are also on the leading

edge of an aggressive and multi-faceted effort to find and combat drug-resistant TB, which exists in two forms: multidrug-resistant TB (MDR TB) and extensively drug-resistant TB (XDR TB). CDC played a critical role in the global effort to rollout Xpert MTB/RIF®, a rapid molecular diagnostic test. In 2015, there were nearly 500,000 cases of MDR TB, a form of TB that is resistant to at least two of the first-line anti-TB drugs. This form of TB is now found in every country in the world. Only 1 in 5 people with MDR TB are diagnosed and treated; only half of all people who are treated are cured. XDR TB is the deadliest and most dangerous form of TB. Less than half of all patients treated are cured, with death rates as high as 80 percent. CDC is working to find, cure, and prevent TB worldwide, and as a result, is helping to create a safer America and a safer world.



CDC brings cutting-edge science and close collaboration with partners to find, cure, and prevent TB in the United States and around the world.



Eradicating Polio and Combating VACCINE-PREVENTABLE DISEASES

Although CDC's global immunization efforts to control and eliminate vaccine-preventable diseases have protected Americans, outbreaks can still happen in the United States when people are not immunized. Vaccines against deadly diseases save 3 million lives each year and are one of the most cost effective interventions. Death and disability from once common infections such as measles, rubella, and polio are now rare in the U.S., and preventing infections caused by human papillomavirus (HPV) and hepatitis B not only saves lives but also saves millions of dollars related to cancer and chronic diseases.

Despite the achievements of immunization programs worldwide, millions of people globally do not having access to life-saving immunizations and are vulnerable. Other epidemic-prone vaccine-preventable diseases, including rubella, mumps, cholera, diphtheria, pertussis, influenza, Japanese encephalitis, and yellow fever continue to occur. CDC works closely with partners to provide scientific expertise, implement and evaluate prevention strategies and practices, provide quality laboratory systems, and build upon public health workforces, in order to protect Americans at home and globally from lifethreatening vaccine-preventable diseases.



Polio: Working Towards Eradication

Polio is on the verge of being eradicated: it persists in only three countries, and CDC remains committed to eradicating this disease. Polio is the second human disease after smallpox to potentially be eradicated. In 2016, wild polio virus existed only in Pakistan, Afghanistan, and Nigeria. In 1988 there were 350,000 cases of polio virus in 125 countries. and in 2016 there were only 37 cases worldwide. which equates to a 99 percent reduction of this crippling disease. Each year, 155 countries are vaccinating their populations against this disease. CDC is a partner of the Global Polio Eradication Initiative (GPEI), a public-private partnership led by national governments and spearheaded by the World Health Organization (WHO), Rotary International, and the United Nations Children's Fund (UNICEF) with the goal to eradicate polio worldwide. The work of GPEI and global partners has resulted in the fewest cases of polio in the fewest places in history.

Measles: Immunization is Key to Fighting This Disease

Between 2000-2015, measles deaths have decreased 79 percent worldwide as a result of tireless work by CDC and its many partners to ensure that children everywhere are vaccinated. More progress can be expected as new and underutilized vaccines are used, saving an estimated 23 million lives in low-income countries between 2011-2020. The global fight against measles is a collaboration among CDC and WHO, UNICEF, the United Nations Foundation, and the American Red Cross—other partner agencies of the Measles and Rubella Initiative. This initiative works to provide vaccines to the 130 million children born each year before they are exposed to this deadly disease. To date, this initiative has already reached over 1 billion children. Much of the global fight focuses on strengthening immunization systems, conducting large vaccination campaigns, and building surveillance systems to detect and respond to measles outbreaks as quickly as possible.



Yellow Fever: Stopping a Potential Global Threat

Yellow fever, found in South America and Africa, is an often overlooked disease that could potentially be a significant health threat.

Outbreaks occurring in affected areas pose a significant risk to those who are unaware that a safe and effective vaccine is available. In April 2016, thousands of people were suspected to be infected with the disease in the Democratic Republic of Congo (DRC). A shortage of supplies led the WHO to recommend administering

1/5 of the regular dose of yellow fever vaccine (fractional dosing). CDC staff worked with partners to help conduct a rapid, simultaneous immunization and evaluation of the fractional yellow fever dose in the DRC. This innovative, fast-paced vaccination program is just one example of CDC's ability to effectively respond under challenging circumstances. A similar approach is being taken in other locations, such as Brazil, in high population areas.



SNAPSHOT

CDC works closely with partners to protect Americans at home and globally from lifethreatening vaccine-preventable diseases, including polio, measles, and yellow fever.



Reducing DEATHS AND ILLNESS from MALARIA

Malaria caused 212 million illnesses and 429,000 deaths in 2015—the equivalent of one child dying from malaria every two minutes. Malaria remains persistent and all too deadly, despite significant gains against the disease in recent years. Approximately 3.2 billion people (half the world's population) in 96 countries/territories remain at high risk of contracting malaria. Moreover, the disease continues to be a threat to U.S. travelers, military, and U.S. citizens living abroad, with more

than 1,500 imported cases diagnosed each year. Malaria carries a financial burden, estimated to be at least US\$ 12 billion per year globally.

CDC and its global partners remain committed to and are making progress in combating this disease. From 2000-2015, massive scale-up of malaria prevention and treatment interventions saved 6.8 million lives globally, and malaria death rates in Africa were cut by more than half.



CDC provides scientific leadership to fight against malaria by providing critical information on parasites and effective interventions to prevent illness and death. In collaboration with WHO, CDC helped develop evidence-based guidelines used by national malaria control programs and their partners worldwide, and has developed tools and methods for evaluating the value of insecticide-treated bed nets, rapid diagnostic tests, treatment with effective high-quality drugs, treatments to protect pregnant women and their newborn children, and indoor spraying of homes to protect people from mosquitoes that carry the malaria parasite.

CDC is also a co-implementer of the President's Malaria Initiative (PMI). Launched in 2005, this U.S. government initiative is designed to cut malaria deaths in half in target countries in sub-Saharan Africa, Through PMI, CDC works with countries and partners to further reduce malaria deaths and to substantially decrease malaria morbidity, towards the long-term goal of malaria elimination. CDC also supported drug efficacy monitoring in PMI countries and advanced diagnostics of malaria cases imported in the United States to enhance our understanding of the drug resistance and to issue the best possible guidance to protect Americans in the U.S., as well as those traveling, living, and working abroad.



Each year approximately

1,500 people

in the U.S. are diagnosed with malaria after international travel



About 70%

of all malaria deaths worldwide are among children under 5 years old



Since 2000 Global Health Action has saved

6.8 million

lives from Malaria



CDC experts are providing scientific leadership in fighting malaria at home and around the world, protecting Americans and saving lives globally.



Combating the Threat from Parasitic Diseases including Neglected Tropical Diseases

Parasitic Diseases

Parasitic diseases cause a devastating health burden for hundreds of millions of people around the world. CDC works to prevent and control parasitic diseases both in the U.S. and globally by providing diagnostic services, expert consultation, and training. CDC provides 24/7 parasitic diseases treatment and management assistance, including the release of lifesaving medications to people in the U.S. who have acquired diseases in the U.S. and abroad. CDC has targeted five parasitic infections as priorities for public health action: Chagas disease, neurocysticercosis, toxocariasis, toxoplasmosis, and trichomoniasis.





Neglected Tropical Diseases

For more than two decades. CDC has been working to reduce the illness, disability, and death caused by neglected tropical diseases (NTDs), such as lymphatic filariasis (LF), river blindness, and trachoma. These and other NTDs afflict more than 1.5 billion people and kill hundreds of thousands each year. CDC develops global strategic policies and guidelines for NTD control programs, conducts research to improve existing diagnostic and other tools needed to monitor programs, evaluates progress toward elimination/control of NTDs, provides technical expertise to countries and other partners to improve programs, and studies additional NTDs to identify and develop better tools and approaches to control and eliminate them. CDC and its partner prevention efforts mean that once common parasitic diseases such as Guinea worm and river blindness are now on the verge of being eradicated. Through case detection and containment, safe drinking water, vector control. health education, and community mobilization, CDC is committed to ensuring eradication of these parasitic diseases.



More than 1.5 billion people

people are affected by at least one neglected tropical disease



CDC provides **24/7** parasitic diseases treatment and management assistance



Guinea worm disease cases have fallen from 3.5 million in 1986 to only **25 cases** in 2016



CDC provides expertise to domestic and global partners to reduce death, illness, and disability from parasitic diseases in the United States and globally, by ensuring accurate and timely diagnosis, treatment, and developing tools to eliminate parasitic diseases where possible.



Using CDC's Expertise Across The Continuum Of Global To Domestic Programs To Save Lives And Protect Americans

An effective global response requires using the full assets of CDC, including global work that spans beyond the CDC Center for Global Health (CGH). From preparing a vaccine for the upcoming flu season to compiling up-to-date information on global health threats for travelers or fighting antimicrobial resistance, saving lives and protecting Americans from the global burden of disease requires coordination across all disciplines, expertise, and centers. This type of collaboration is a longstanding hallmark of CDC's values, as resources and expertise are often drawn from across the agency to understand and resolve a critical public health concern.

Combating complex epidemics like Zika, Ebola, and Influenza required close collaboration between CGH, Center for Surveillance, Epidemiology, and Laboratory Services (CSELS), National Center for Immunization and Respiratory Diseases (NCIRD), National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), National Center for HIV/AIDS, Viral Hepatitis, STD and TB Prevention (NCHHSTP), National Center for Birth Defects and Developmental Disabilities (NCBDDD), Office of Public Health Preparedness and Response (OPHPR), and many other groups and individuals across CDC.



This CDC staff member (left), along with this member of the Sierra Leone Ministry of Health, are transporting Ebola specimens from a United Nations helicopter to a CDC lab for testing.

Another prime example of cross-agency collaboration can be found in CDC's response to Middle East Respiratory Syndrome Coronavirus (MERS-CoV), which first emerged in the Middle East in September 2012 and then in the United States in May of 2014. The MERS-CoV response integrated dedicated staff from across multiple divisions and centers at CDC, including NCIRD, NCEZID, as well as CGH. Together, staff worked to prepare and educate clinicians, custom and border protection agents, as well as the general public and international travelers. When the first case of MERS-CoV arrived in the United States, preparedness efforts were well underway, critical relationships had been established with partners, and the response team had laid the groundwork for the response. CDC's dedicated staff across the agency worked together on this and many other important health issues and responses.



The world is at greater risk than ever from global health threats. We may not know what the next epidemic will be, but we know that one is coming.











Issues such as Zika, Ebola, pandemic flu, antimicrobial resistance, travelers' health, and MERS-CoV illustrate the nature of global health work drawing on expertise across CDC. Collaboration is the key to addressing pressing global health issues that impact the health and safety of Americans and people worldwide.



TUBERCULOSIS MEASLES LYMPHATIC FILARIASIS

ZIKA FLU

MERS-COV POLIO

MALARIA



NATURAL DISASTERS

GUINEA WORM

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