

# CDC CENTER FOR GLOBAL HEALTH (CGH)



2016  
ANNUAL  
REPORT



Photo Credit: Athit Perawongthana



Photo Credit: Ashley Greiner



Centers for Disease  
Control and Prevention  
Center for Global Health



**Rebecca Martin**

*Director, Center for Global Health,  
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**“I AM PROUD OF  
THE STRATEGIC AND  
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IN CGH OVER THE  
LAST YEAR, OFTEN  
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CONDITIONS.”**

## Message from the Director

CDC’s global health work has a clear mission: to protect and improve health globally through science, policy, partnership, and evidence-based public health action. By ensuring that countries have the capabilities to prevent, detect, and respond to or treat health threats within their borders, the Center for Global Health (CGH) helps prevent regional and global health crises that affect health, security, and economic stability abroad and at home.

In 2016, CGH’s dedicated staff advanced this mission across many disease goals and geographic areas around the world. This annual report illustrates the work that has been done in 2016 and provides a portrait of CGH’s priorities and achievements, and the work that remains. This report also illustrates why CDC’s global health work is important and how it contributes to protecting people’s health and quality of life, both in the United States and abroad.

I am proud of the strategic and impactful work in CGH over the last year, often under difficult and challenging conditions. This report highlights how scientists, epidemiologists, laboratory specialists, and countless other highly-trained experts from CGH were instrumental in achieving immunization of children at risk, in pressing forward in the fight against HIV and tuberculosis (TB), and in leading the efforts to control malaria, Zika, and a collection of other dangerous diseases that still afflict far too many people. Our work in 2016 saved lives and made Americans safer by making the world more prepared to find and stop threats.

For CGH, 2016 was a year filled with significant milestones. We must remain vigilant and prepared to identify and respond to current as well as emerging and unknown threats that history tells us are likely to occur, whether those threats are natural or man-made. CGH, and CDC overall, are ready and well-equipped to address those challenges. In 2017 and beyond, CDC continues to put science into action to implement proven, life-saving programs to defend against global health threats. We will continue to work 24/7 to prevent diseases, detect outbreaks early to stop them from entering the United States, and to respond rapidly to emerging health threats to keep America and the world healthy, safe, and secure.

Rebecca Martin  
Director, Center for Global Health  
September 2017

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During a cholera outbreak, disease detectives in Tanzania collect samples from a contaminated water source.  
Photo Credit: Yazid Kachwamba



# Center for Global Health



## Division of Global Health Protection



## Division of Global HIV & TB



## Division of Parasitic Disease and Malaria



## Global Immunization Division

## CDC's Center for Global Health (CGH)

Disease knows no borders. In today's interconnected world, a disease threat anywhere can be a health threat everywhere, including the United States. CDC fights disease globally to protect Americans locally. CDC's global activities protect Americans from major health threats such as Ebola, Zika, and pandemic influenza. The Center for Global Health (CGH) helps prevent regional and global health crises that affect health, security, and economic stability abroad and at home. As a global health leader, CDC, through CGH monitors disease outbreaks 24/7 around the world.

## CGH Divisions and Priorities

**CGH coordinates global health activities across CDC.** CGH is made up of four divisions: Division of Global Health Protection (DGHP), Division of Global HIV & TB (DGHT), Division of Parasitic Diseases and Malaria (DPDM), and Global Immunization Division (GID). Each division has a specific focus, but all aim to protect the health of Americans at home and to save lives overseas.

### Division of Global Health Protection Priorities:

- Monitor 24/7 for outbreaks, support robust regional disease detection, and respond rapidly to emergencies
- Conduct effective disease surveillance, use technology to detect new pathogens, train frontline public health workers, and build strong outbreak response systems
- Sustain and strengthen partnerships for global health security, including with the private sector, NGOs, and other countries

### Division of Global HIV and TB Priorities:

- Find people with HIV and link them to HIV treatment
- Find, cure, and prevent TB
- Improve data quality and use data to deliver better programs

### Division of Parasitic Diseases and Malaria Priorities:

- Reduce death, illness, and disability from parasitic diseases in the United States
- Eliminate the global burden of malaria and targeted neglected tropical diseases (NTDs)
- Advance research to detect, prevent, and eliminate parasitic diseases

### Global Immunization Division Priorities:

- Control, eliminate, or eradicate vaccine-preventable diseases to reduce death and disability globally
- Strengthen country ownership, policy, practice, and partnerships
- Ensure quality vaccination delivery to achieve high and equitable coverage
- Strengthen surveillance and immunization information
- Conduct and promote research, innovation, and evaluation

## Together, CGH works globally to:

**Respond quickly to threats** posed by infectious diseases like Ebola, Zika, MERS-CoV, avian influenza, HIV, TB, yellow fever and others.

**Implement proven prevention and treatment programs** for global epidemics like HIV, malaria, and TB.

**Detect and report outbreaks from leading disease threats** through training public health leaders and health workers to build a ready workforce and to enhance global capacity.

**Increase epidemiology and laboratory capacity** within Ministries of Health (MOHs) around the world.

**Provide technical expertise to MOHs** to develop Public Health Emergency Operations Centers (PHEOCs) and to catch outbreaks faster.

**Strengthen public health infrastructure and information systems** needed for data-driven decision-making and faster local action.

**Research, develop, and evaluate** new tools and approaches to combat global health threats.



Disease detectives in Nigeria administer questionnaires to community members to collect data about an outbreak of pertussis. Photo credit: Visa Tyakaray

# SNAPSHOT

## CGH ACCOMPLISHMENTS IN 2016



Spearheaded global response to Zika, ranging from efforts to control mosquito populations to **improving the reliability of laboratory diagnostics, supporting campaigns to educate the public and promoting basic research** that led to a better understanding of Zika in 2016.



Activated Incident Management System to support the agency's Hurricane Matthew international response efforts. **Nearly 50 members of CDC's Global Rapid Response Team (GRRT) were mobilized** to support response efforts, including conducting cholera case investigations and reestablishing surveillance systems.



**Supported life-saving antiretroviral treatment (ART) for 6.4 million men, women, and children living with HIV globally.** Also, 1.2 million people were newly-initiated on HIV treatment with CDC support through the U.S. President's Emergency Plan for AIDS Relief (PEPFAR).



Protected more than 40 million people from malaria in PMI countries and provided diagnosis and treatment for 60 million malaria cases through the President's Malaria Initiative (PMI). With more than 1,700 imported cases diagnosed each year in the U.S., malaria also continues to be a threat to U.S. travelers, military, and U.S. citizens living abroad.



**Conducted more than 8,000 diagnostic tests for presumed parasitic diseases** and responded to more than 7,500 parasitic disease inquiries from medical providers, health departments, and the public in the U.S. in 2016.



Conducted a **rapid implementation and evaluation of fractional dose yellow fever vaccine in Democratic Republic of Congo (DRC) with partners** to respond to a deadly outbreak at a time when world stockpiles of vaccine were strained.



# SPOTLIGHT ON

## DIVISION OF GLOBAL HEALTH PROTECTION (DGHP)



In Burkina Faso, the village of Dougoumato gathers for a tutorial on community event-based surveillance, a method used to identify and report unusual health events in the community. Photo Credit: Evelyn Hockstein, CDC Foundation

## 2016 DGHP SNAPSHOT



**Trained 1,200 global “disease detectives”** in 24 countries, who are critical to the ability of countries to quickly find and stop disease outbreaks, through DGHP’s Frontline Field Epidemiology Training Program.



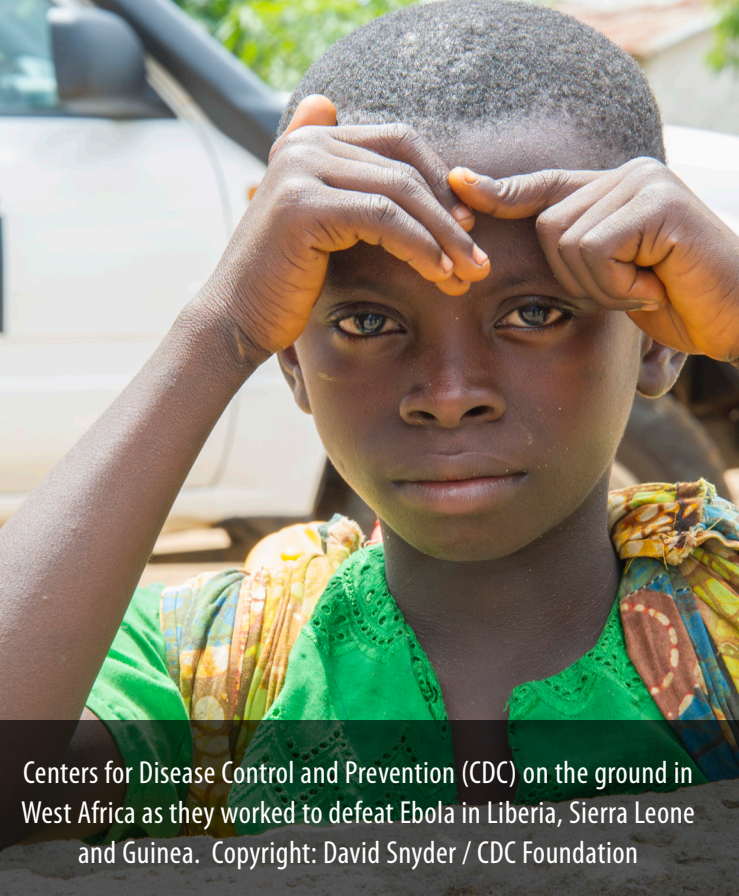
**Deployed a “rapid response team”** that was among the first responders to land in Haiti when Hurricane Matthew struck, providing essential surveillance, lab, water, sanitation and hygiene, epidemiology, and policy support.



**Conducted Joint External Evaluations (JEEs), or “stress tests”** in 28 countries that provided clear and independent assessments of each nation’s ability to find and respond to disease threats, including reviews of laboratories, training programs, and how well information is communicated to the public.



Tracked and stopped dangerous health threats, **monitoring 30-40 potential outbreaks on a daily basis**, to maintain real-time information that informs response actions and decisions.



Centers for Disease Control and Prevention (CDC) on the ground in West Africa as they worked to defeat Ebola in Liberia, Sierra Leone and Guinea. Copyright: David Snyder / CDC Foundation

## 2016 In Review

In 2016, DGHP contributed immensely toward making Americans and the world safer. From anthrax to Ebola to Zika and beyond, the division played a critical role in supporting the agency's mission of protecting the health of Americans and saving lives. DGHP responded to urgent public health threats and stopped potential new pandemics at their source.

### Monitoring and Responding to Outbreaks and Emergencies

The division's Global Disease Detection Operations Center (GDDOC) worked 24/7 monitoring potential outbreaks across the globe. Over the past 10 years, the GDDOC has been the centralized operations unit for event-based surveillance for CDC. In 2016, the GDDOC monitored and reported on over 300 outbreaks in more than 130 countries for 40 different diseases, with over 1,000 event reports or updates distributed to inform public health leaders. From MERS-CoV on the Arabian Peninsula to yellow fever in West Africa and Zika in the Americas, these outbreaks ignited global concern and affected millions of lives.

To expand workforce capabilities at the local level, DGHP launched the Frontline Field Epidemiology Training Program (FETP) in late 2015, with a focus on detecting and responding to potential outbreaks. Within 16 months of establishing FETP-Frontline, 24 programs were launched with more than 1,200 trainees graduating from the program. These graduates are critical to supporting disease surveillance and participating in outbreak responses such as anthrax in East Africa and Hurricane Matthew recovery in Haiti.

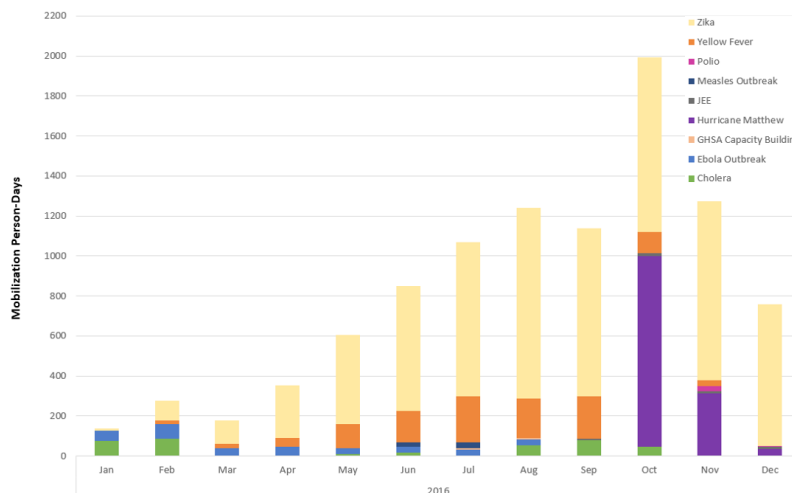
In October 2016, DGHP activated for the first time an Incident Management System (IMS) to support the agency's Hurricane Matthew international response efforts. The decision triggered the deployment of a "go team" from the Global Rapid Response Team (GRRT). GRRT is an agency-wide resource that supports CDC's response to global outbreaks, natural disasters, and other emergencies. The GRRT is designed so that at any time more than 50 CDC staff are ready to deploy anywhere in the world within 72 hours in response to a public health emergency.

In 2016, the GRRT mobilized staff over 200 times and provided over 10,000 person-days of support for infectious diseases such as Zika and yellow fever as well as for natural disasters like Hurricane Matthew.

## NOTABLE 2016 Scientific Publications

- Balajee SA, Arthur R, Mounts AW. Global health security: building capacities for early event detection, epidemiologic work force, and laboratory response. *Health Security*. 2016; 14(6):424-432.
- Gargano LM, Hajjeh R, Cookson ST. Pneumonia prevention: cost-effectiveness analyses of two vaccines among refugee children aged under two years, Haemophilus influenzae type b-containing and pneumococcal conjugate vaccines, during a humanitarian emergency, Yida camp, South Sudan. *Vaccine*. 2017; 35(3):435-442. (nominated for Charles C. Shephard award)
- Karafillakis E, Jalloh MF, Nuriddin A, et al. 'Once there is life, there is hope' Ebola survivors' experiences, behaviours and attitudes in Sierra Leone, 2015. *BMJ Global Health*. 2016; 1(3).
- Lindblade KA, Nyenswah T, Keita S, et al. Secondary infections with Ebola virus in rural communities, Liberia and Guinea, 2014-2015. *Emerg Infect Dis*. 2016; 22(9):1653-1655.
- Liu M, Ou J, Zhang L, et al. Protective effect of hand-washing and good hygienic habits against seasonal influenza: a case-control Study. *Medicine (Baltimore)*. 2016; 95(11):e3046.
- Soka MJ, Choi MJ, Baller A, et al. Prevention of sexual transmission of Ebola in Liberia through a national semen testing and counselling programme for survivors: an analysis of Ebola virus RNA results and behavioural data. *The Lancet Global Health*. 2016; 4(10): e736-743. doi: 10.1016/S2214-109X(16)30175-9. (nominated for Charles C. Shephard award)

### Notable Global RRT Mobilizations in 2016





## Assessing and Strengthening Country Health Security Systems

DGHP also worked closely with CDC colleagues and partners from international organizations to develop and rollout the International Health Regulations (2005) Joint External Evaluation (JEE), a multisectoral external assessment of country-level health security systems. Teams conducted JEEs in 28 countries through December 2016. JEE identifies gaps and limitations within a country's health system and prioritizes opportunities for skill development in disease prevention, detection, and response.

Prevention, detection, and response to public health emergencies require every country to be equipped to carry out a set of functions that are the cornerstone of strong public health systems. Many countries consolidate these functions organizationally into a National Public Health Institute (NPHI) – a science-based organization, or network of organizations, that provides leadership and coordination for public health at the central level. NPHIs, including CDC, promote evidence-based decisions, policies, and programs, and become the logical partner in government-to-government public health relationships. CDC is helping to establish NPHIs in other countries, including through linking governments with an existing NPHI in another country or with U.S. state health departments. CDC supports NPHIs by mapping existing public health systems, identifying available resources, providing technical guidance and support, developing strategic and operational plans, and prioritizing public health activities and operations. As of December 2016, CDC was supporting 20 countries to either develop or strengthen their NPHIs.

## Implementing the Global Health Security Agenda

DGHP is also leading the agency's efforts to implement the Global Health Security Agenda (GHSA) in close partnership with other CDC divisions and centers, U.S. agencies, and global partners. In 2016, the 17 GHSA Phase I countries strengthened systems to prevent, detect, and respond to outbreaks. Among their many achievements, 13 countries detected dangerous pathogens through improved laboratory capacity, and 15 assessed and improved their capacity to deal with biological threats via the JEE process.

## Supporting Global Noncommunicable Disease Prevention and Control

In September 2016, the WHO and CDC launched the Global Hearts Initiative (Global Hearts) at the Council on Foreign Relations to support governments in strengthening cardiovascular disease (CVD) prevention and control. This initiative takes a three-pronged approach to addressing the CVD crisis by bringing together complementary population-based prevention strategies in tobacco control, salt reduction, and primary care. The initiative is being piloted in 2017 and global scale-up will follow, with 24 countries already expressing interest in participating.

To further address noncommunicable disease (NCDs), DGHP has collaborated with Bloomberg Philanthropies, CDC Foundation, and other partners to establish the Bloomberg Data for Health Initiative to strengthen the collection and use of critical public health information in up to 20 low- and middle- income countries. In 2016, the Data for Health partners made significant strides in developing an open source, mixed-mode technology platform for NCD surveillance. This platform enhances the capacity of 10 participating countries to collect and disseminate data and to evaluate the impact of interventions.

## What Lies Ahead – 2017 and Beyond

In 2017, DGHP is focused on:

**Improving health security:** Building on 2016 accomplishments, in 2017 and beyond, it is critical that CDC remains vigilant and continues to look at health security from a global perspective, recognizing that weak systems in one country directly impact the health and security of communities in the United States. Global health protection requires focus beyond one country, one issue, or one pathogen, as well as strong collaboration with internal and external partners around the globe.

**Evaluating global capacity:** In 2017, DGHP is adding to global health security by scheduling more than 20 "stress test" evaluations, putting the world on target to complete JEEs in at least 50 countries by the time the World Health Assembly meets in May 2017.



Ashley Greiner (Global RRT Tier 1 Epidemiologist) working long hours conducting cholera case investigations in Haiti, after Hurricane Matthew.  
Photo Credit: Coralie Giese, Global RRT

## DGHP: What We Do

DGHP works to protect the health and safety of Americans and people around the world:

- Monitor public health threats 24/7, lead CDC's GRRT, set up disease surveillance systems during crises, and build laboratory systems.
- Work with countries to prevent, detect, and respond to global health threats and address chronic or systemic gaps in local capabilities.
- Bring unique technical and leadership expertise that is far reaching, not limited to a single pathogen, and underpinned by science and evidence-based approaches.
- Protect Americans by responding immediately to public health threats and by helping countries and partners develop the ability to contain at their source any threats that may emerge.

# SPOTLIGHT ON

## DIVISION OF GLOBAL HIV & TUBERCULOSIS (DGHT)



Young girl standing outside of family home in Lima, Peru. Her father is in a separate room, to reduce the risk of passing on MDR TB to his four children and wife.  
Copyright: David Snyder / CDC Foundation

# 2016 DGHT SNAPSHOT



Supported **life-saving ART for 6.4 million men, women, and children** living with HIV.



Delivered **treatment to 411,000 HIV-positive pregnant women** during pregnancy and childbirth to reduce the risk of mother-to-child transmission.



As of year-end 2016, **121 DGHT-supported laboratories across sub-Saharan Africa, Asia, and the Caribbean** met international standards for laboratory accreditation.



Developed and is evaluating a **simple rapid test that can simultaneously diagnose HIV** and identify if an infection is recent.



Supported voluntary medical male circumcision for **1.2 million men**.



**Provided expertise for the Population-based HIV Impact Assessments** to measure national HIV prevalence, incidence, viral suppression, and the impact of program efforts in 13 countries severely impacted by HIV.



**Screened 3.5 million TB cases for HIV**, resulting in HIV treatment for 142,332 patients infected with both HIV and TB.



Laboratory technician pipetting samples in South Africa, National Institute for Communicable Diseases.

## NOTABLE 2016 Scientific Publications

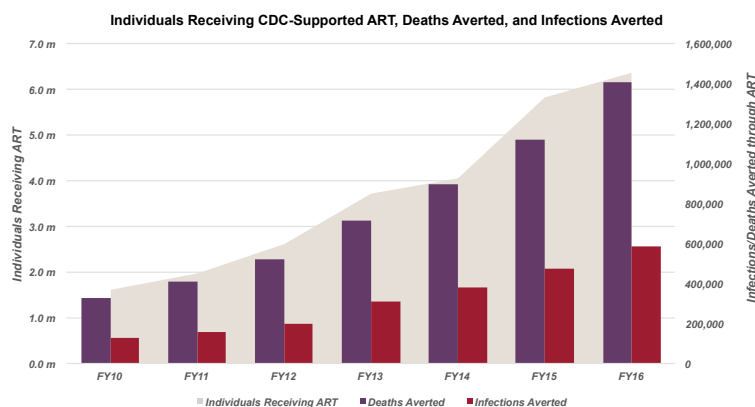
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2. Diallo K, Kim AA, Lecher S, et al. Early diagnosis of HIV infection in infants – one Caribbean and six Sub-Saharan African countries, 2011–2015. *MMWR*. 2016; 65:1285–1290 doi: <http://dx.doi.org/10.15585/mmwr.mm6546a2>.
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4. Hader SL. Role of public-private partnerships in meeting healthcare challenges in Africa: a perspective from the public sector. *J Infect Dis*. 2016; 213(Suppl 2):S34. doi: [http://jid.oxfordjournals.org/content/213/suppl\\_2/S34.full](http://jid.oxfordjournals.org/content/213/suppl_2/S34.full).
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8. Shirvastava R, Gadde R, Nkengasong JN. Importance of public-private partnerships: Strengthening laboratory medicine systems and clinical practice in Africa. *J Infect Dis*. 2016; 213(Suppl 2): S35–40. doi: [http://jid.oxfordjournals.org/content/213/suppl\\_2/S35](http://jid.oxfordjournals.org/content/213/suppl_2/S35).

# 2016 In Review

## Providing Life Saving HIV Care and Treatment

DGHT had a considerable role in expanding HIV care and treatment. With PEPFAR support through DGHT, 1.8 million people were diagnosed as HIV-positive in fiscal year 2016. DGHT supported life-saving ART for 6.4 million men, women, and children living with HIV (Figure 1).

In fiscal year (FY) 2016, 1.2 million people were newly-initiated on HIV treatment with DGHT’s assistance in the larger effort to combat HIV. DGHT also released a study in the October 2016 edition of the *Journal of Acquired Immune Deficiency Syndromes* that highlighted alternative models of care, such as community support groups that help expand HIV treatment and improve patient retention in care. Additionally, DGHT delivered treatment to 411,000 HIV-positive pregnant women during pregnancy and childbirth to reduce the risk of mother-to-child transmission.



## Finding, Curing, and Preventing TB Worldwide

One-third of the 10 million individuals who become infected with TB are never diagnosed or treated, allowing the disease to continue to be transmitted. Drug-resistant TB poses another challenge – nearly half a million people develop multidrug-resistant TB each year, and extensively drug-resistant TB, an even more severe form of the disease, has been reported in 105 countries. As in previous years, DGHT continues working to find, cure, and prevent TB worldwide, through on-the-ground interventions in more than 25 countries and global leadership in research and technical expertise.

DGHT screened 3.5 million TB cases for HIV, resulting in HIV treatment for 142,332 patients infected with both HIV and TB. In addition, DGHT added to a growing body of evidence that direct transmission is driving the spread of drug-resistant TB in high-burden countries by helping to lead a five-year study on the role of person to person TB transmission in South Africa.

## Advancing Interventions, Laboratory Capacity, and Service Delivery

In FY 2016, DGHT supported voluntary medical male circumcision procedures for 1.2 million men. To date, CDC has conducted 6 million voluntary medical male circumcision procedures supported by PEPFAR.

As of year-end 2016, 121 DGHT-supported laboratories across sub-Saharan Africa, Asia, and the Caribbean have met international standards for laboratory accreditation. In addition, DGHT developed and is evaluating a simple rapid test that can simultaneously diagnose HIV and identify if an infection is recent.

DGHT is advancing the quality of HIV service delivery by nurses and midwives through the African Health Professions Regional Collaborative in 18 countries and innovative clinical mentorship pilots in five programs supported by PEPFAR.

## Using Data to Achieve Epidemic Control and Efficient Spending

Through the collection and utilization of better and more precise data, DGHT researchers help provide a more comprehensive picture of the HIV and TB epidemics to determine the most effective prevention and treatment strategies to fight these diseases. With PEPFAR support, DGHT is providing expertise for the Population-based HIV Impact Assessments to measure national HIV prevalence, incidence, viral suppression, and the impact of program efforts in 13 countries severely impacted by HIV. Data from assessments in Malawi, Zambia, and Zimbabwe suggest these countries are making tremendous progress towards achieving epidemic control, and also highlight specific populations that need greater attention and services to meet their needs.

To maximize the value of each dollar spent in the fight against HIV and TB, DGHT experts work alongside MOHs, community groups, and other global partners to accelerate the impact and efficiency of HIV and TB programs across the globe. DGHT has supported economic studies in more than 20 countries that provide valuable information to inform the efficiency and impact of investments made by the U.S. government and other donors.

## DGHT: What We Do

**DGHT combines science with on-the-ground experience to stop the spread of HIV and TB:**

- Work worldwide to deliver effective HIV prevention, care, and treatment, and to find, cure, and prevent TB worldwide.
- Protect the health and well-being of Americans and people around the world by supporting countries to save lives and control the HIV and TB epidemics, preventing future loss of life and treasure.

## What Lies Ahead – 2017 and Beyond

In 2017, DGHT is focused on:

**Doing More:** Find people with HIV and accelerate HIV treatment. DGHT is efficiently and effectively identifying HIV-positive individuals who are unaware of their infection and linking them to treatment; supporting country programs to achieve targets of 90 percent of all people diagnosed with HIV to access treatment and 90 percent of all people on HIV treatment to have suppressed viral loads. The target is to reach sustainable epidemic control through implementation of (i) Test and Start, (ii) treatment for key and priority populations, (iii) differentiated service delivery, which adapts how HIV services are provided based upon the needs of the patients while reducing burden on the health system, (iv) viral load scale up, and (v) clinical mentorship; establishing systems and improving efficiencies for viral load testing and uptake of test results toward achieving 90 percent of individuals on HIV treatment that reach viral suppression; and supporting countries to identify and implement effective combination prevention interventions.

**Bending the Curve:** Find, cure, prevent TB. DGHT is optimizing TB/HIV treatment, reducing incidence; combatting multidrug-resistant TB; expanding infection control practices; improving pediatric diagnosis and treatment; and strengthening labs and data.

**Working Smarter:** Improve data quality and use, especially in countries and among government partners. PEPFAR's approach to achieving an AIDS-free generation places a greater focus on data collection and on using data to drive better programs. As part of these efforts, PEPFAR country teams are on the cutting edge of collecting, analyzing, and sharing data. DGHT is helping countries to rapidly identify where there are challenges with data collection, and use and determining what course corrections are needed to improve their programs. This understanding enables countries to funnel limited resources to the populations and geographic areas that need them most and produce the greatest impact. The Population-based HIV Impact Assessments are an example of where PEPFAR, DGHT, and countries are using data to drive program decisions.

# SPOTLIGHT ON

## DIVISION OF PARASITIC DISEASES AND MALARIA (DPDM)



Insecticide-treated bed nets help protect against diseases like malaria that are spread by mosquitoes.

Copyright: David Snyder / CDC Foundation

# 2016 DPDM SNAPSHOT



Performed more than 8,000 diagnostic tests for presumed parasitic diseases.



Responded to more than 7,500 inquiries to its hotlines, providing advice on diagnosis and treatment to healthcare providers, blood banks, and other essential healthcare facilities, as well as on preventing malaria to travelers.



Led or assisted 26 investigations of parasitic infections associated with organ transplantation involving 58 organ recipients.



Provided diagnosis and treatment for more than 60 million cases in focus countries during 2016 alone, and protected more than 275 million people from malaria with insecticide-treated nets (ITNs) and indoor residual spraying (IRS) with insecticides.



In 2016 the 25 most visited CGH webpages belonged to DPDM.



## NOTABLE 2016 Scientific Publications

1. Bushman M, Morton L, Duah N, et al. Within-host competition and drug resistance in the human malaria parasite *Plasmodium falciparum*. *Proceedings of the Royal Society B*. 2016; 283(1826):20153038.
2. Gimnig JE, Otieno P, Were V, et al. The effect of indoor residual spraying on the prevalence of malaria parasite infection, clinical malaria and anemia in an area of perennial transmission and moderate coverage of insecticide treated nets in western Kenya. *PLoS ONE*. 2016; 11:e0145282.
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4. Lau CL, Won KY, Lammie PJ, et al. Lymphatic Filariasis elimination in American Samoa: evaluation of molecular Xenomonitoring as a surveillance tool in the endgame. *PLoS Neglected Tropical Diseases*. 2016; 10(11):e0005108.
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9. Tan KR, Cullen KA, Koumans EH, et al. Inadequate diagnosis and treatment of Malaria among travelers returning from Africa during the Ebola epidemic—United States, 2014–2015. *MMWR*. 2016; 65:27–29.
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## 2016 In Review

### Developing Revolutionary Diagnostic Tools

In 2016, DPDM staff conducted more than 8,000 diagnostic tests for presumed parasitic diseases in the United States as well as globally. DPDM staff initiated development of Universal Protozoan and Parasitic Diagnostics (UPDx), a test that has the potential to revolutionize the diagnosis of parasitic infections through faster and more accurate diagnosis. This new laboratory assay that can quickly and accurately identify the full range of clinically important protozoan parasite infections in a single blood sample.

### Providing Expert Technical Advice

Staff provided expert technical advice on prevention, diagnosis, and treatment through its 24-hour hotlines for parasitic diseases, responding to more than 7,500 inquiries in 2016. DPDM also released otherwise unavailable, life-saving medications for 148 patients in the U.S. with parasitic infections; more than half were individuals treated for Chagas disease (59) or severe malaria (48).

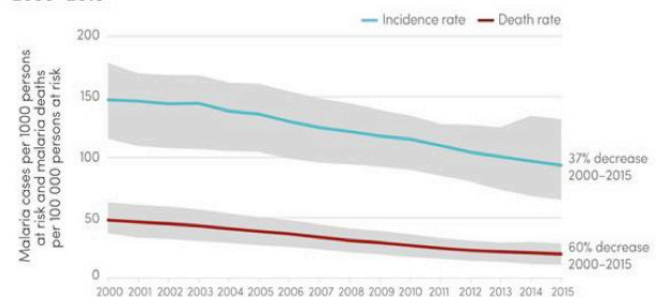
### Leading Life Saving Investigations

Staff led or assisted with 26 investigations of infections associated with organ transplantation involving 58 recipients, and collaborated with the Association of Organ Procurement Organizations to improve screening for the strongyloides parasite by Organ Procurement Organizations (OPOs) to prevent death and illness-associated infections in transplant recipients. DPDM's efforts to increase awareness helped to increase from 10% to 24% the proportion of OPOs in the United States conducting or considering targeted donor screening for strongyloidiasis, which is estimated to save 200-600 lives annually.

### Implementing the President's Malaria Initiative (PMI)

Helping to reduce the worldwide health and economic toll of malaria, as well as the risk it poses for all, DPDM continues to co-implement PMI with USAID in the countries most affected. Through PMI, CDC experts fine-tuned insecticide-treated bed net (ITN) and indoor residual spraying (IRS) to protect more than 275 million people and provided diagnostic tests and treatment drugs to care for more than 60 million clinical cases in 2016, helping to save thousands of lives. In 2016, DPDM, together with DGHP and Global Immunization Division (GID), launched an effort to further reduce malaria death and illness in Nigeria by effectively using the tools, systems and expertise from combatting and applying it to malaria. The polio model has been credited with helping Nigeria quickly and effectively respond to the 2014 Ebola outbreak there.

**Figure 2.1 Estimated malaria case incidence and death rate globally, 2000–2015**



Source: WHO estimates

## Conducting Cutting Edge Research

To accelerate progress towards elimination of malaria, DPDM conducts cutting-edge research towards the development and evaluation of new epidemiological and laboratory tools that will help manage and mitigate threats from malaria drug and insecticide resistance, and provide the body of evidence and tools needed for elimination. For example, DPDM scientists have been testing for drug resistance markers in blood samples from patients diagnosed and treated for malaria in the U.S. This innovative approach is being shared with U.S. public health labs and greatly expands the number of countries where CDC can have first-hand evidence of drug resistance information to better inform prevention and treatment advice, and where drug-resistant malaria is emerging or spreading. DPDM also developed a more sensitive test that can be used to detect active or recent malaria transmission hotspots in countries approaching elimination.

## Accelerating Elimination of Neglected Tropical Diseases

Similarly, DPDM conducts research to accelerate elimination of neglected tropical diseases (NTD) and to improve epidemiological and laboratory tools to document interruption of NTD transmission. For example, DPDM scientists developed a blood test to monitor transmission of trachoma (an NTD and leading infectious cause of blindness) to help assess progress towards elimination and to detect if trachoma had returned. The test, which underwent large-scale field evaluations in 2016, has the potential for huge program savings compared to current eye exams that are both logistically challenging and resource intensive. DPDM also developed a rapid, hand-held version of the new test.

DPDM has had particular successes in Haiti, where it has been working closely with ministry counterparts to eliminate lymphatic filariasis (LF) (an NTD also known as elephantiasis). In 2016, survey results showed that 50% of Haiti's population are no longer at risk for LF, thanks to the efforts of Haiti, DPDM, and partners. Also in collaboration with Haiti and with initial support from the Bill and Melinda Gates Foundation, DPDM is leading a consortium of partners to eliminate malaria from Haiti and the Dominican Republic by 2020. In 2016, DPDM and partners provided technical support on surveillance, malaria diagnosis, and monitoring antimalarial drug resistance to help bend the curve to zero cases there.

## DPDM: What We Do

**DPDM protects the health of Americans, including active and retired military personnel, travelers returning to the U.S., and those living abroad, as well as the global community from parasitic diseases:**

- Provide life-saving diagnostic, consultative, and epidemiologic and entomological services and training.
- Prevent, track, and treat parasitic diseases in the United States; prevent and control NTDs and malaria worldwide.
- Co-implement PMI, conducting innovative research to accelerate control and elimination of malaria as well as other parasitic diseases.



Community members in the Muheza district of Tanzania wait in line to be tested for lymphatic filariasis and onchocerciasis.

## What Lies Ahead – 2017 and Beyond

In 2017, DPDM is focused on:

**Protecting the United States:** Working with healthcare providers to deliver life-saving diagnosis and treatment of parasitic diseases in the United States and around the world, and to disseminate up-to-date, data-driven guidelines and recommendations for public health partners and the public.

**Eliminating the Global Burden:** Reducing the global deaths, illnesses, and risks of malaria and NTDs by providing scientific support to ensure data-driven, effective disease control and elimination programs.

**Advancing Research:** Conducting research to develop tools and approaches to better detect, prevent, and control parasitic diseases, mitigate drug and insecticide resistance, and accelerate progress towards elimination.

# SPOTLIGHT ON

## GLOBAL IMMUNIZATION DIVISION (GID)



CDC health scientist working on a polio vaccination campaign in Equatorial Guinea, near the city of Niefang.



Mural at the health clinic in Paynesville, Liberia  
Photo Credit: Deblina Datta

## 2016 GID SNAPSHOT



Reduced the number of new wild polio infections to the lowest level ever recorded. The virus spread is more geographically limited than at any point in history – endemic in only Nigeria, Pakistan, and Afghanistan.



Trained and deployed 435 public health professionals to 35 countries via the Stop Transmission of Polio (STOP) program, improving vaccine-preventable disease surveillance, and strengthening the planning, implementation, and evaluation of vaccination campaigns.



Conducted a rapid implementation and evaluation of fractional dose yellow fever vaccine in Democratic Republic of Congo (DRC), responding to a deadly outbreak at a time when world stockpiles of vaccine were strained.



Provided expertise in the development and implementation of supplementary immunization activities for measles campaigns in the 6 countries that account for 75% of global measles deaths: Democratic Republic of Congo, Ethiopia, India, Indonesia, Nigeria, and Pakistan.





Young Nigerian girl receives dose of orally-administered polio vaccine as part of N-STOP program. Photo Credit: Alford "A.J." Williams

## 2016 In Review

### Developing A Strategic Framework For Global Immunization

Scientists, experts and staff from across the agency joined forces to develop a new CDC Strategic Framework for Global Immunization, 2016-2020. The Strategic Framework is a cornerstone document guiding immunization efforts, strategies, and evaluations for CDC. It is built around five interconnected goals: to improve the impact of vaccines on the health outcomes of specific diseases; three goals to increase vaccine reach by strengthening country-owned immunization programs; and a foundational goal to provide evidence to effectively implement policies and programs.

### Supporting Polio Eradication Efforts Worldwide

In the continuing effort to eradicate polio, GID played a key role in helping 155 nations transition successfully from trivalent oral polio vaccine (tOPV) to other types of polio vaccines, including bivalent OPV (bOPV) and inactivated polio vaccine (IPV).

Despite those efforts, polio continues to persist. August 2016 illustrated the challenge when, after two years with no documented cases of polio, Nigeria reported two cases of wild polio virus in the northeastern part of the country. GID worked with the Nigerian federal MOH and global partners to conduct a detailed risk analysis of the outbreak; to assess population immunity levels; and to increase surveillance and immunization activities, including a multi-country vaccination response with border countries to prevent further transmission.

CDC's Stop Transmission of Polio (STOP) program trains and deploys public health professionals to improve vaccine-preventable disease surveillance and to help plan, implement, and evaluate vaccination campaigns in countries at higher risk for polio transmission. In 2016, the STOP program sent 435 professionals on assignments to 35 countries.

GID is at the forefront of challenging ourselves and partners to be more accountable for resources and outcomes by expanding use of program indicators into an innovative dashboard to improve management and accountability within the polio program. GID created enhanced country support structures, including country-specific teams for Afghanistan, Nigeria, and Pakistan.

### Improvements in Polio Surveillance

Polio surveillance is among the most effective methods for monitoring disease transmission and outbreaks. To address strengthening polio surveillance systems, GID, along with the Global Polio Eradication Initiative, established a task team to focus on further innovating and improving poliovirus detection worldwide. Examples of GID's ongoing efforts to strengthen surveillance include the Brazzaville Initiative in Africa. This initiative identified surveillance gaps in eight high-risk countries and provided experienced consultants with resources to improve environmental and acute flaccid paralysis (AFP) surveillance as well as analysis of the quality of supplementary immunization campaigns in poorly performing regions. The developed strategies were included into ongoing surveillance efforts in each participating country to create lasting improvements.

## ★ NOTABLE 2016 Scientific Publications

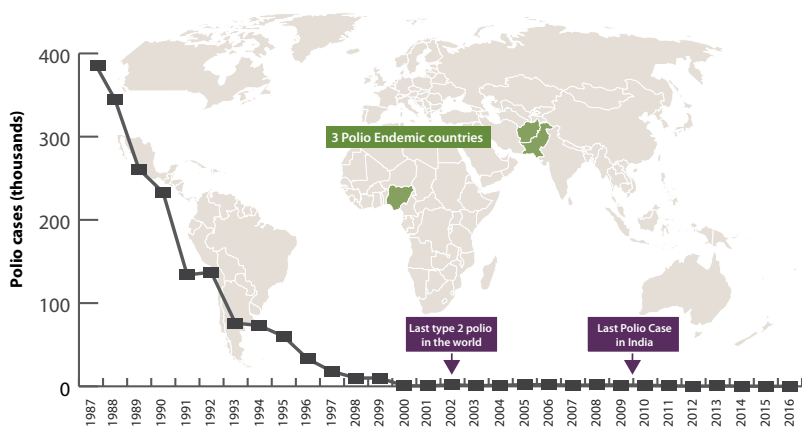
1. Cardemil CV, Estivariz C, Shrestha L, et al. The effect of diarrheal disease on bivalent oral polio vaccine (bOPV) immune response in infants in Nepal. *Vaccine*. 2016; 34(22):2519-2526. doi:10.1016/j.vaccine.2016.03.027. [Epub 2016]
2. Duintjer Tebbens RJ, Hampton LM, Thompson KM. Implementation of coordinated global serotype 2 oral poliovirus vaccine cessation: risks of inadvertent trivalent oral poliovirus vaccine use. *BMC Infect Dis*. 2016; 16:237. doi: 10.1186/s12879-016-1537-1538.
3. Hao L, Ma C, Wannemuehler KA, et al. Risk factors for measles in children aged 8 months-14 years in China after nationwide measles campaign: a multi-site case-control study, 2012-2013. *Vaccine*. 2016; pii: S0264-410X(16)00131-6. doi: 10.1016/j.vaccine.2016.02.005. [Epub ahead of print]
4. Mast EE, Cochi SL, Kew O, et al. Fifty years of global immunization at CDC, 1966-2015. *Public Health Reports*. 2017; 132(1):18-26 doi: 10.1177/0033354916681490
5. Scobie HM, Mao B, Buth S, et al. Tetanus immunity among women aged 15 to 39 years in Cambodia: a national population-based serosurvey, 2012. *Clin Vaccine Immunol*. 2016; 23(7):546-554. doi: 10.1128/CVI.00052-16.

## Securing a Polio-Free World: Containing Polioviruses

The appropriate containment of eradicated poliovirus is a key objective of the Polio Eradication and Endgame Strategic Plan 2013-2018. GID is working with partners to ensure that all remaining poliovirus stocks are securely contained to minimize the risk of accidental or intentional reintroduction of the viruses after eradication.

By the end of 2016, 175 countries and territories reported to WHO that they no longer held any wild or vaccine-derived poliovirus type 2. Eighteen countries and territories have designated poliovirus-essential facilities to retain poliovirus type 2 materials.

### Global update: Distribution of Wild Poliovirus



## Responding Rapidly During a Yellow Fever Outbreak

GID provided assistance during a dangerous yellow fever outbreak in the Democratic Republic of Congo that occurred at a time with strained supplies of yellow fever vaccine. In August 2016, the World Health Organization (WHO) recommended a strategy of administering 1/5 of the regular dose of yellow fever vaccine to men, women, and children at approximately 2,000 vaccination sites. GID expert helped conduct a rapid – and simultaneous – immunization campaign and a structured evaluation of the fractional yellow fever dose. This approach was later used in other countries to fight yellow fever.

## Building Immunization Systems and a Ready Workforce

GID’s work in Africa continued in 2016 with the launch of the National Stop Transmission of Polio (N-STOP) program to increase South Sudan’s immunization work force at both national and state levels. The program will train 56 South Sudanese health workers on disease surveillance with the intent that participants will become part of the government workforce upon successfully completing the training.

GID supported a midterm review of the Global Measles and Rubella Strategic Plan 2012-2020. The review recommended improving immunization systems to ensure that country gains in measles and rubella control were sustained. GID assumed leadership of the Measles and Rubella Initiative’s (M&RI’s) management team. The M&RI is an initiative promoting the elimination of both diseases. This change in leadership brought new energy and focus to the effort to implement the review recommendations.



Lao Ministry of Health official administering a flu vaccination to a Laotian man during a clinic visit in a rural province.



Young girl receiving vaccination in Cambodia.

## What Lies Ahead – 2017 and Beyond

In 2017, GID is focused on:

**Eradicating Polio:** working to eradicate wild poliovirus transmission in the three remaining countries where poliovirus still circulates: Afghanistan, Nigeria, and Pakistan. This effort will include strengthening surveillance, supporting mass vaccination campaigns, preventing cross-border transmission, and ensuring rapid and effective response to any new polio cases.

**Advancing global VPD control:** Strengthen partnerships with countries to achieve global control, elimination, or eradication of vaccine-preventable diseases such as yellow fever, measles, rubella, and hepatitis B.

## Providing Scientific and Technical Expertise for Measles Elimination

In 2016, 135 million children received measles or measles-rubella vaccines as a result of vaccination campaigns. During 78% of the campaigns, other public health interventions were delivered in addition to measles or measles-rubella vaccine including vitamin A, deworming, and HIV screening.

GID celebrated with the Pan American Health Organization (PAHO) when longstanding joint efforts resulted in the Americas being declared as free from endemic measles transmission. Measles is no longer being transmitted anywhere in the region of the Americas. However, cases of measles can be imported from outside the region and infect susceptible individuals who have not been vaccinated against measles.

GID scientific experts provided technical analysis on the impact of introduction of a second dose of measles vaccine, which led the WHO Strategic Advisory Group of Experts on Immunizations to broaden its recommendations, allowing 23 of the world's most fragile countries to introduce a second routine dose of measles vaccine.

GID provided expertise in the development and implementation of supplementary immunization activities for measles campaigns in the countries that account for 75% of global measles deaths. The six countries are the Democratic Republic of Congo, Ethiopia, India, Indonesia, Nigeria, and Pakistan. These six countries also account for approximately one-half of babies born each year with congenital rubella syndrome.

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## GID: What We Do

GID protects the health, safety and security of Americans and people around the world by preventing disease, disability, and death from vaccine-preventable diseases (VPDs):

- Implement programs to eradicate polio and to eliminate measles and rubella
- Strengthen global surveillance to prevent, detect, and respond to outbreaks of VPDs
- Strengthen routine immunization programs
- Introduce new and underutilized vaccines, and promote safe injection practices
- Provide technical expertise on evidence-based research, strategies, and policy for international and government public health entities.



Staff from CDC and Sierra Leone Ministry of Health transport Ebola specimens from a UN helicopter to a CDC Lab in Sierra Leone.

## CGH Looking Forward

In 2016, dedicated staff across CGH worked to protect the health of Americans and to save lives at home and abroad. Key accomplishments included a coordinated emergency response to Zika and Hurricane Matthew, global immunization, continued efforts in the fight against HIV, TB and malaria, and many other successes. In 2017 and beyond, CGH will continue to leverage these efforts, sustaining the gains from 2016 while expanding proven interventions, implementing data-driven strategies, and evaluating prevention methods to better prevent, detect, and respond to disease threats worldwide.

In 2017 CGH will continue to facilitate and enhance synergies across the CDC to address key global public health challenges. CDC's 2017-2021 global health strategic framework will ensure efficient operations, and strengthen and enhance CDC's global health governance. CGH will work towards several disease specific goals, such as UNAIDS 95-95-95 to fight HIV/AIDS, TB elimination by 2030, NTD elimination, polio eradication, measles and rubella elimination, accelerated malaria control, as well as on strengthening and ensuring global health security.

CDC's public health expertise from global to domestic is needed 24/7 to save lives worldwide and to keep Americans safe and secure, preventing diseases from spreading in the US and reducing the economic impact of disease outbreaks worldwide.

For more information visit our website at [www.cdc/globalhealth](http://www.cdc/globalhealth)  
or contact us at [cghadc@cdc.gov](mailto:cghadc@cdc.gov)

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