CDC Global Health Strategy

2012 - 2015

Vision

A world where people live healthier, safer and longer lives

Mission

Protect and improve health globally through science, policy, partnership and evidence-based public health action

Center for Global Health
Office of the Director

Table of Contents

Foreword

Since the creation of the Centers for Disease Control and Prevention (CDC) in 1946, the agency's global health activities have expanded in scale, scope, and depth to address evolving health challenges and emerging threats around the world. From an early focus on malaria prevention and control in the United States, CDC's efforts have expanded globally over time to encompass diverse diseases and conditions, protect the United States from external health threats, improve public health capacity internationally, and acquire science-based knowledge to improve domestic as well as global health.

In 2010, CDC established its Center for Global Health (CGH), recognizing that domestic and global health are indivisible and that no country can protect the health of its citizens in isolation from the rest of the world.[1] CDC engages internationally to protect the health of the American people and save lives worldwide, in the belief that healthy societies are also more just, stable, and prosperous.

CDC possesses unique expertise to address the challenges of global health and works in concert with domestic and international partners to improve health and well-being around the world. CGH is responsible for technical work conducted by global programs within the Center, including global immunization, HIV/AIDS, disease detection and response, health systems and laboratory strengthening, and parasitic diseases and malaria. Many other CDC programs contribute expertise and engage in global health work, including for tuberculosis elimination, the control of sexually-transmitted diseases and hepatitis infections, antimicrobial resistance, bacterial and viral respiratory infections, vectorborne diseases, rabies, and viral hemorrhagic fevers. CGH facilitates collaborations among these programs and in many cross-cutting areas such as maternal and child health, refugee health, infectious and non-communicable diseases, outbreak responsiveness, and water and sanitation. In addition, CGH provides leadership and management support to CDC's field staff and country offices, the agency's visible face on the front lines internationally where global health activities are implemented and country priorities are supported.

This global health strategy articulates CDC's role in global health, communicates the vision for global health work at CDC, and identifies CDC's global health priorities. (See Appendix for a list of reference materials used in the development of the CDC Global Health Strategy.) Invaluable input and support from across the agency and from external partners were provided during the strategy development process. CDC staff reviewed program-specific strategies, conducted interviews with its Country Directors, and facilitated workshop discussions with over 100 CDC subject matter experts. Staff solicited external feedback from representatives of key partners including the United States Agency for International Development (USAID), U.S. Department of State, Health and Human Services Office of Global Affairs, Department of Defense, United Nations Children's Fund (UNICEF), World Health Organization (WHO), CDC Foundation, and select ministries of health (MOHs). CDC also received guidance and direction from the Global Work Group, a sub-group of the Advisory Committee to the CDC Director, responsible for providing input on CDC global health issues.

I sincerely thank all those who contributed to the development of this strategy. The world has changed enormously over the past decade and organizations must adapt to that change. The creation of CGH offers opportunities for CDC to increase programmatic impact in health internationally, to augment links and collaborations between CDC's domestic and global experts, and to strengthen overall global public health capacity. The strategy should be a living document, adapting as further challenges arise and reflecting the increasingly important role of CDC as a cornerstone of the world's public health infrastructure. Thank you to those who work every day to improve the health of our world.

Sincerely,

Kevin M. De Cock, MD, FRCP (UK), DTM&H
Director, Center for Global Health, Centers for Disease Control and Prevention
June 29, 2012

Executive Summary

The Centers for Disease Control and Prevention (CDC) is inspired by the vision of a world where people live healthier, safer, and longer lives. Achieving this vision requires that CDC continue to address current global health concerns while simultaneously investigating and responding to emerging risks. To meet these combined challenges and achieve tangible, sustainable public health progress, CDC relies on its core strengths and strong partnerships. CDC's future successes in global health work are dependent upon efforts to leverage existing public health infrastructure and investments, develop and support country capacity in public health, and build upon the agency's standing as a trusted partner to shape global health strategy and policy based on sound science.

CDC builds its global health strategy on a foundation of 60 years of domestic and global public health leadership, expertise, and strong collaborations with ministries of health (MOHs), World Health Organization (WHO), U.S. Government agencies, and other critical partners. (See Appendix for a list of reference materials used in the development of the CDC Global Health Strategy.)

CDC addresses current and prepares for future challenges by leveraging its core strengths:

- Providing technical expertise.
- Implementing evidence-based public health programs.
- Developing surveillance and strategic information systems.
- Translating research into public health policy and practice.
- Building public health workforce capacity.
- Strengthening laboratory systems.
- Improving emergency preparedness and response capabilities.
- Conducting monitoring and evaluation activities to ensure health impact and cost-effectiveness.

CDC's Global Health Strategy for 2012–2015 includes four goals to be achieved between 2012 and 2015: improved health impact, enhanced global health security, increased country public health capacity, and maximized organizational capability.

Goal 1: achieve health impact by improving the health and well-being of people around the world. To accomplish this, CDC focuses on

- Preventing new HIV infections and serving the needs of HIV-positive individuals globally.
- Reducing morbidity and mortality associated with tuberculosis and malaria.
- Reducing maternal and perinatal mortality.
- Reducing child morbidity and mortality.
- Eliminating and controlling targeted neglected tropical diseases (NTDs).
- Controlling, eliminating or eradicating vaccine-preventable diseases (VPDs).
- Reducing the burden of non-communicable diseases (NCDs).

Since its creation, CDC has focused on improving health and preventing disease, whether through leading research and laboratory activities or developing and implementing programs. To achieve health impact, the agency continues this approach in its engagement in a number of global and presidential initiatives that cover a range of priorities from disease-specific and population-based targets to improvements in health systems and policy.

Goal 2: improve capabilities to prepare for and respond to infectious diseases, other emerging health threats, and public health emergencies by

- Strengthening capacity to prepare for and detect infectious diseases and other emerging health threats.
- Responding to international public health emergencies and improving country response capabilities.

The health of Americans is integrally connected to the health of the rest of the world. Governments and organizations must work together to strengthen public health programs and increase the ability of countries to respond to and address disease threats on a global scale. Strengthening health security contributes to healthy, stable, and productive societies.

Goal 3: build country public health capacity as a means to achieve lasting health improvements. The key areas for capacity building include

- Strengthening public health institutions and infrastructure.
- Improving surveillance and use of strategic information.
- Building workforce capacity.
- Strengthening laboratory systems and networks.
- Improving research capacity.

Building, strengthening, and maintaining countries' capacity to improve the health and well-being of their citizens is vital for sustainability. As countries are increasingly able to take responsibility for the programs and resources needed to maintain public health capacity locally, CDC assists with the transition of program ownership and leadership to MOHs and other local partners.

Goal 4: maximize potential of CDC's global programs to achieve impact by

- Strengthening organizational and technical capacity to better support CDC's global health activities.
- Enhancing communication to expand the impact of CDC's global health expertise.

CDC must function in an integrated way across multiple CDC programs for synergy, efficiency and coordination. CGH is key in fulfilling this goal, providing management and operational support to the agency's field staff and country offices and enhancing communication and coordination of global health activities across CDC.

CDC's Global Health Strategy outlines the agency's approach to achieving its global health vision. It will be integrated into planning, decision-making, and implementing and evaluating CDC's global

health activities. CDC looks forward to working with its partners across the U.S. Government, international organizations, MOHs, civil society groups and partner countries as we continue to strive for lasting impact in global health.

CDC Global Health Vision

The Centers for Disease Control and Prevention (CDC) aspires **to create a world where people live healthier, safer and longer lives.** Achieving this vision will require that CDC address current pressing health concerns, in addition to meeting emerging global health needs. The agency will draw upon innovation and research to meet these combined challenges and assure even greater health impact in the future. In addition, CDC and its partners will develop new evidence upon which tomorrow's improved health policies and programs will be based. Building upon 60 years of evidence-based domestic and global health work, CDC and partners must act together to protect Americans from health threats, save lives and prevent disease, and contribute to safer and more stable societies around the world. The agency's fundamental approach is to work in partnerships **to strengthen global health capacity, increase global health security, and achieve greater global health impact**.

CDC's greatest global health assets are its staff in the United States and around the world and the trust and credibility they have developed with partners and the public. CDC understands the importance of trust placed in the agency to improve health and prevent diseases. CDC also takes seriously its responsibility to be a good steward of resources provided to address the world's leading health issues. The foundation for CDC's global policy and programmatic decisions and engagement is technical rigor and expertise, special partnerships with ministries of health (MOHs) and multilateral organizations such as World Health Organization (WHO), an emphasis on capacity building and health impact from programs, and a commitment to science and evidence.

CDC's future successes in global health work are dependent upon efforts to leverage existing public health infrastructure, develop and support country capacity in public health, and build upon the agency's standing as a trusted partner to shape global health strategy and policy based on sound science.

Building on Existing Public Health Infrastructure

The nature of global health has evolved over time, requiring attention to new infectious disease challenges, potential bioterrorist activities, increasing antimicrobial resistance, new and diverse health threats from environmental and climate change, and the growing burden of non-communicable diseases (NCDs). CDC's longstanding partnerships with host countries, for example through its role as a partner in the President's Emergency Plan for AIDS Relief (PEPFAR), have created infrastructure that can serve as a foundation for deeper engagement, strategic collaboration, integrated health programming, and increased country ownership. PEPFAR is led by the Office of the Global AIDS Coordinator, Department of State, and leverages CDC's core competencies while bringing together all U.S. Government agencies under a whole-of-government approach. Through PEPFAR, CDC has worked with countries to build laboratory networks, improve surveillance capabilities, create health information systems, develop service delivery models, and strengthen workforce capacity. This infrastructure can serve as a foundation for maximizing investments and enhancing CDC's ability to address other public health issues.

Strengthening Country Public Health Capacity

CDC builds country capacity by sharing its expertise in developing, translating, and adapting scientific evidence into policies and program implementation. Efforts by CDC and its partners to increase countries' capacities to implement and evaluate their own public health activities will reduce the need for direct U.S. support and increase country ownership and sustainability of public health programs. In addition, when partner countries have stronger public health detection and response capacities, the United States is less likely to be threatened by the global spread of disease. Similar to the experience working with state health departments in the United States, CDC anticipates that its relationships with partner MOHs will change as the countries' public health expertise and capacity increase. CDC's role will evolve from support of direct services to engaging as a technical advisor to MOHs.

Shaping the Global Health Agenda in Collaboration with Partners

CDC plays a prominent role in shaping the future global health agenda through engagement with partners, serving as a key contributor to development of guidelines and strategies, and effectively delivering public health programs on a bilateral as well as multilateral basis. Multilateral involvement through such mechanisms as deployment of staff and allocation of resources shape global, regional and country-level public health policy and goals; influence global, regional and country-level program implementation; provide leadership and support for global laboratory networks; and contribute to global public health research and innovation. Guided by science and impact, CDC will continue to provide worldwide technical assistance for both the unfinished business of infectious diseases and the evolving challenges of non-communicable diseases. CDC will build strategic relationships that efficiently leverage the unique roles of all of its partners.

CDC Global Health Mission

CDC's global health mission is **to protect and improve health globally through science, policy, partnership, and evidence-based public health action.** The motivation for CDC to work in global health is to protect the people of the United States, prevent disease, save lives worldwide, and contribute to stable, productive societies. CDC achieves its global health mission by leveraging its core technical strengths and partnerships. The agency's respected capacity to respond to disease outbreaks and other public health emergencies, as well as its placement of staff in country offices, often results in CDC being on the scene early in events of public health concern. CDC strives not only to implement programs around the world to improve health, but also to build sustainable country public health capacity to address health issues. Through research and science-based programs, CDC works towards increasing global health capacity, assuring global health security and achieving measurable global health impact for safer, healthier and longer lives worldwide. The following list describes the guiding principles for CDC's global health work.

Guiding Principles for CDC's Global Health Work

- Provide technical leadership and guidance to inform and develop strategies and policies to address global health issues.
- Develop and use data from proven scientific research findings to drive public health action.
- Strengthen the ability of countries to achieve improved global health outcomes.
- Provide leadership to develop and implement approaches to eradicate and eliminate disease.
- Promote equal access and delivery of public health interventions.
- Maximize global health impact through coordination, program integration, and partnerships.
- Monitor and evaluate programs to measure health impact and ensure cost effectiveness.

CDC Core Technical Strengths

CDC provides technical leadership on topics from specific diseases and general health issues, to more cross-cutting systems and organizational capacity issues. In these areas, CDC fills a unique role in relation to other U.S. Government (USG) and international agencies and non-governmental organizations (NGOs). Broadly, CDC has unique capacity in areas of health systems strengthening, such as disease surveillance and health information systems (including monitoring and evaluation), public health laboratory capacity, workforce training, operational research and public health actions and programs (See Figure 1). In addition, the agency has deep technical expertise in infectious as well as NCD-

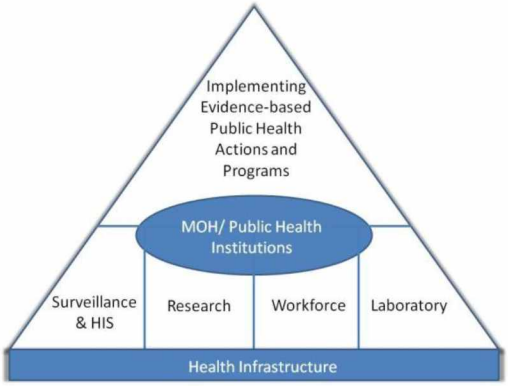

Figure 1: CDC's Public Health Framework for Health Systems Strengthening[2]

specific areas, implementation and evaluation of specific public health programs, and provision of technical assistance to MOHs, other public health institutions, and NGOs. An overview of CDC's core technical strengths is described below.

Providing Technical Expertise

CDC has over 300 employees deployed full-time in more than 55 countries around the world, and approximately 1,400 host country national staff providing crucial support and technical assistance to host country programs. Of the long-term CDC staff deployed internationally, most are located in CDC country offices. Approximately 10% are detailed to international organizations such as WHO and the United Nations Children's Fund (UNICEF), providing counsel, training, and technical assistance, while acquiring valuable knowledge and experience to inform current and future programs. In addition, CDC draws upon the extensive knowledge and skills of its headquarters' subject matter experts to provide technical assistance in global work. In FY 2011, CDC sent 2,136 public health professionals on 5,634 temporary duty missions to 156 countries around the world.

Implementing Evidence-Based Public Health Programs

In collaboration with MOHs and other partners, CDC provides the evidence-base for supporting program implementation and public health action. Whether focused on infectious or non-communicable diseases, emergency preparedness and response, or environmental health, CDC's special value results from the synergy of its different technical strengths. CDC works alongside host country staff to plan, implement and evaluate comprehensive public health programs across diseases to achieve maximum, cost-effective public health impact.

Developing Surveillance and Strategic Information Systems

A core strength for CDC is its ability to develop, strengthen, and evaluate surveillance and strategic information systems. The agency is committed to helping MOHs build the capacity to collect the health information needed to make sound decisions for appropriate use of limited resources, respond to public health problems, and assess the impact of interventions. These data systems provide a solid basis for decision-making for targeting and implementing programs with maximum effect.

CDC Core Technical Strengths

- **Providing technical expertise**
- **Implementing evidence-based public health programs**
- **Developing surveillance and strategic information systems**
- **Translating research into public health policy and practice**
- **Building public health workforce capacity**
- **Strengthening laboratory systems**
- **Improving emergency preparedness and response capabilities**
- **Conducting monitoring and evaluation**

Translating Research into Public Health Policy and Practice

CDC conducts and supports research to influence public health policy and practice in addressing global health challenges. This research includes evaluating existing interventions and programs as well as developing and assessing new tools, strategies, and interventions that can then be implemented and brought to scale, or used to modify existing programs for greater impact.

Building Public Health Workforce Capacity

With a skilled and competent workforce, countries are better equipped to quickly identify and respond to public health challenges and threats. Provision of training and technical leadership to build an effective in-country public health workforce in epidemiology, laboratory sciences, disease prevention, management, and leadership is a fundamental function for CDC in global health.

Strengthening Laboratory Systems

Frequently consulted from around the world, CDC plays an important role in global health laboratory work and often serves as a global reference laboratory. At country level, CDC works to strengthen national, regional, and local laboratories and ensure their diagnostic capacity and appropriate specimen-handling, quality assurance systems, and adequate biosafety standards. As a result of CDC's efforts, many laboratories around the world are better able to detect and monitor diseases of public health importance. These laboratory strengthening efforts are an essential component of promoting health security globally and protecting the U.S. population by identification and control of key diseases at their source.

Improving Emergency Preparedness and Response Capabilities

Ensuring emergency preparedness and response capability is the responsibility of national MOHs and international organizations such as WHO. An important element of readiness and response capability that CDC actively supports is implementation of and compliance with the International Health Regulations (IHRs), which the agency helped to define and establish. CDC also supports global readiness through its health systems strengthening work and frequent direct participation in public health responses to disease outbreaks, natural disasters, and other emergencies. CDC often delivers onsite technical support and training for data collection and analysis, providing the basis for effective response to health threats and public health emergencies.

Conducting Monitoring and Evaluation Activities

CDC's monitoring and evaluation activities include tracking program progress and impact, building partners' measurement capacities, and correcting and improving programs using evidence collected. CDC uses data to determine the effectiveness of programs, interventions, and policies. The agency uses its expertise in the monitoring and evaluation of public health programs across a wide range of disciplines and countries.

Partnerships

The scope and intensity of global health challenges ensure that no single country or agency can work alone to meet them. Partnerships are a cornerstone of CDC's global health work. To contribute to shared global health objectives, CDC works in close partnership with a wide array of international agencies and institutions to shape global health policies and to fund, implement, and evaluate programs. CDC's partnerships with international and multinational organizations include WHO and its regional offices, other United Nations agencies (such as UNICEF), and affiliated agencies such as the United Nations Foundation, the World Bank, private foundations, universities, and global health organizations. Within the U.S. Government, CDC partners with the United States Agency for International Development (USAID), including its Prevent Malaria Initiative (PMI); the Department of State's Offices of the Global AIDS Coordinator and the Global Health Initiative; U.S.

embassies; HHS Office of Global Affairs; the Department of Defense; the Peace Corps; and other USG agencies to implement the U.S. Government's global health agenda. CDC engages across these agencies and offices, building on the individual strengths of each, for a comprehensive, complementary, whole-of-government approach to global health.

One of CDC's principal partners in global health is MOHs. CDC staff assigned in countries, embedded in MOHs, and deployed from the United States, provide technical expertise, mentoring, and broad support to build national and regional capacity. These partnerships not only provide technical knowledge from CDC to partners, but also create opportunities for CDC to learn from partners and communities. CDC recognizes the central role played by MOHs and understands that long-term sustainability for in-country health activities is contingent on MOH programmatic and management capacity to plan, implement, monitor, and evaluate programs. CDC responds to MOH requests to assist with the investigation and containment of infectious disease outbreaks and other health threats, but places special emphasis on development of long-term capacity. CDC assistance to build sustainable public health capacity requires interdisciplinary collaboration between clinicians, epidemiologists, laboratory scientists, veterinarians, health educators, and other scientists and program managers. CDC collaborates with countries interested in developing their own national public health institutes and prioritizes its work in workforce development. In this regard, CDC's interactions with MOHs are reminiscent of experience in the United States with individual states where direct engagement and program implementation evolved into a relationship based on technical assistance and partnership.

CDC Global Health Strategy

CDC's global health strategy builds on the agency's many years of programmatic experience and accomplishments in implementing effective public health programs.

The strategy is characterized by four overarching goals and 17 objectives which capture the major areas of programmatic focus for CDC, including CGH's role of coordinating global health activities. The following table displays how the objectives align to the goals.

Goal	Objectives
1. **Health Impact:** improve the health and well-being of people around the world	• Prevent new HIV infections and serve the needs of HIV-positive individuals globally • Reduce tuberculosis morbidity and mortality • Reduce malaria morbidity and mortality • Reduce maternal and perinatal mortality • Reduce child morbidity and mortality • Eliminate and control targeted neglected tropical diseases (NTDs) • Control, eliminate, or eradicate vaccine-preventable diseases (VPD) • Reduce burden of NCDs
2. **Health Security:** improve capabilities to prepare and respond to infectious diseases, other emerging health threats, and public health emergencies	• Strengthen capacity to prepare for and detect infectious diseases and other emerging health threats • Respond to international public health emergencies and improve country response capabilities
3. **Health Capacity:** build country public health capacity	• Strengthen public health institutions and infrastructure • Improve surveillance and use of strategic information • Build workforce capacity • Strengthen laboratory systems and networks • Improve research capacity
4. **Organizational Capacity:** maximize potential of CDC's global programs to achieve impact	• Strengthen organizational and technical capacity to better support CDC's global health activities • Enhance communication to expand the impact of CDC's global health expertise

Priorities have been established for each objective, and those priorities include major public health areas where substantial progress can be made with sustained, coordinated effort. These priorities align to CDC's Winnable Battles, which are 1) reduced mother-to-child HIV transmission and

congenital syphilis; 2) enhanced coverage and impact through global vaccination initiatives, including against polio; 3) elimination of lymphatic filariasis and NTDs in the Americas; 4) reduced tobacco use; and 5) decreased motor vehicle injuries. These areas have been identified as opportunities for intervention because of the availability of practical, evidence-based strategies, and the potential for measuring progress across a large proportion of persons at greatest risk.

Furthermore, the CDC Global Health Strategy is built upon and supports the goals and objectives identified in the Global Health Strategy of the U.S. Department of Health and Human Services (2012–2015) and in other major global health strategies. (See Appendix for a list of reference materials used in the development of the CDC Global Health Strategy.)

Goal 1: Health Impact: Improve the Health and Well-being of People around the World

Since its creation, CDC has focused on improving health and preventing disease. Whether through leading research and laboratory activities or developing and implementing programs, CDC leverages the technical expertise of its workforce at headquarters and in the field to achieve improvement and build the capacity of its in-country partners.

CDC engages in a number of global and presidential initiatives that cover a range of priorities, from disease-specific and population-based targets to health systems and policy. Examples of strategies and initiatives used to inform the development of the CDC Global Health Strategy include the HHS Global Health Strategy, Global Health Initiative, Millennium Development Goals, President's Malaria Initiative, PEPFAR, and others. By aligning with these initiatives, CDC is better positioned to improve health and prevent disease among people both in the United States and around the world.

Objective 1.1: Prevent New HIV Infections and Serve the Needs of HIV Positive Individuals Globally

PEPFAR has achieved remarkable progress since its launch in 2003. PEPFAR is led by the Office of the Global AIDS Coordinator, Department of State, and brings together different USG agencies to create a whole-of-government approach and leverages CDC's core strengths. CDC is an essential PEPFAR partner and is integral to the success of this program. There are now over 3.9 million people living with HIV who are receiving antiretroviral treatment (ART) through USG support,[3] and global ART coverage has risen to 47% in 2010.[4] This achievement is due in large part to increasingly cost-effective program implementation, which has driven down the average cost of ART (see Figure 2).[6] Services for prevention of mother-to-child transmission of HIV (PMTCT) have also expanded dramatically with global coverage currently at 48% of eligible pregnant women in 2010.[7] Due to PEPFAR investments, approximately 200,000 infants were born HIV-free in FY 2011.[8] Key progress has also been achieved in HIV prevention; care and support of HIV-infected persons; workforce capacity; maternal and child health; surveillance, epidemiology, laboratory and health information systems; program monitoring and evaluation; and operational research. In addition, CDC leverages partnerships with international organizations such as WHO; the Global Fund to Fight AIDS, Tuberculosis and Malaria; Joint UN Programme on HIV/AIDS (UNAIDS); UNICEF; the World Bank and others to maximize public health improvement.

In 2011, PEPFAR saved approximately 7.7 million life years through antiretroviral treatment. Since 2004, approximately 585,000 infants have been born HIV-free through PEPFAR-supported PMTCT services.[5]

Despite tremendous progress, HIV/AIDS is still among the leading causes of death globally, with more than 4,900 deaths every day and an estimated 2.7 million new HIV infections in 2010.[7] However, recent advancements in HIV/AIDS research have demonstrated that several prevention interventions, including ART, are highly efficacious in halting the transmission of HIV. Building on these scientific findings, President Obama and Secretary of State Clinton announced in 2011 that the U.S. Government would commit to expanding the provision of proven prevention interventions to achieve the goal of creating an AIDS-free generation.[9] Specifically, the Secretary of State outlined a new USG strategy for PEPFAR emphasizing expanded ART, PMTCT and voluntary medical male circumcision, as well as increased provision of HIV counseling and testing services and continuing support for correct and consistent condom use. The goal of an AIDS-free generation was defined as a future in which virtually no children are born with HIV and individuals live successfully with HIV due to early, sustained treatment.[10] The goal also includes dramatically reduced HIV transmission by expanding prevention interventions with proven efficacy. On World AIDS Day 2011, President Obama committed the U.S. Government to support 6 million HIV-positive individuals on ART, 1.5 million additional HIV-positive pregnant women on antiretroviral medications for PMTCT and 4.7 million men voluntarily circumcised by the end of 2013.[11]

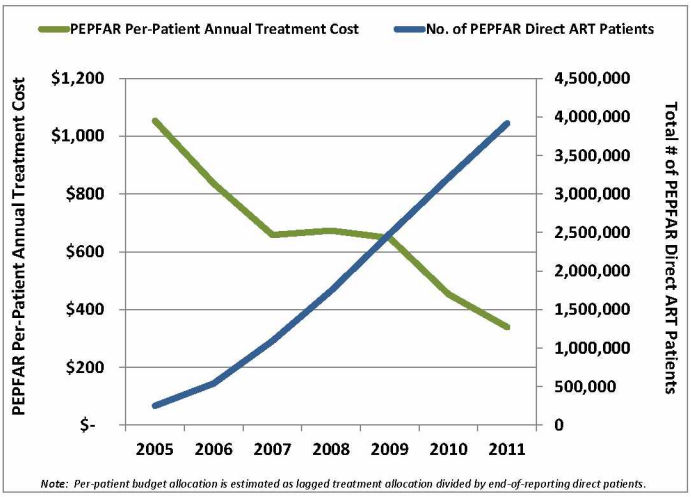

Figure 2: PEPFAR ART Average Cost and Direct ART Patients Over Time

CDC Strategic Priorities

- Reduce HIV incidence and achieve an AIDS-free generation through expanded service delivery in the highest-burden countries focusing on HIV care and treatment, PMTCT, voluntary medical male circumcision, and HIV counseling and testing services.
- Measure impact and health outcomes by monitoring and evaluating CDC-supported direct service delivery programs to ensure quality, efficiency and progress against annual targets.
- Determine the ideal balance of prevention interventions and levels of coverage needed to achieve reductions in HIV incidence by monitoring and evaluating "combination prevention" implementation.
- Conduct research to determine the most efficacious and cost-effective interventions and regimens for HIV prevention, care and treatment.
- Strengthen country capacity to implement HIV/AIDS programs by improving MOH leadership and management capabilities and by strengthening capabilities in surveillance, epidemiology, laboratory, workforce, health information systems and program monitoring and evaluation with the goal of carefully transitioning programmatic and financial responsibilities to host governments and local partners over time.

Objective1.2: Reduce Tuberculosis Morbidity and Mortality

One-third of the world's population is infected with tuberculosis (TB) and each year, nearly nine million people become sick with TB resulting in an estimated 1.5 million deaths worldwide.[12] WHO estimates that in 2010, there were 10 million children orphaned by TB worldwide.[12]TB is an issue of global concern and a major focus for prevention and control efforts for CDC and partners throughout the world. The Global Plan to Stop TB 2011–2015 has established a goal of 50% reduction in TB prevalence and death rates by 2015, compared with 1990 levels. CDC contributes to the achievement of these goals by working to improve the quality of TB control programs internationally in countries with a high burden of TB and those that contribute significantly to TB burden in the United States. CDC provides critical technical support to international partners for epidemiology and surveillance (including for drug-resistant TB); laboratory strengthening; clinical and operational research that evaluates promising diagnostic, treatment and prevention strategies. CDC is currently engaged in activities to promote the scale-up of the "three Is" (intensified case finding, isoniazid preventive therapy, and infection control) and early initiation of ART for people living with HIV in low resource countries with TB/HIV syndemics.

CDC's global TB control activities are mainly conducted in high-burden countries and countries of origin for foreign-born US TB cases, working with MOHs and other partners to build strong national TB programs. CDC plays an important role in finding the most effective ways to implement new tools and approaches in resource-limited and high-burden settings through clinical and operational research, technical assistance, program and policy design, demonstration projects, and program monitoring and evaluation. CDC focuses on supporting innovative approaches to screening, diagnosis, case-finding, and curing TB to stop the spread of disease and prevent development of drug resistance, and provides technical support and builds capacity for implementation of TB treatment programs, (e.g., DOTS).

CDC's strategic TB research has yielded two groundbreaking findings identifying better ways to prevent and diagnose TB in people living with HIV (PLHIV). These studies changed international guidelines and are now being scaled up around the world.[13]

CDC Strategic Priorities

- Conduct programmatically relevant research that informs and strengthens TB programs' ability to achieve global TB prevalence and mortality targets.
- Support the implementation of evidence-based TB activities through technical guidance, training, and piloting new tools and approaches in designated countries.
- Improve prevention and control of TB through enhanced technical assistance and by emphasizing the use of existing effective strategies (e.g., DOTS) and new tools.
- Strengthen TB surveillance including anti-TB drug resistance surveillance and impact measurement by providing scientific leadership and direct technical assistance to selected countries.
- Improve TB detection, control and management by conducting clinical and laboratory research aimed at developing and testing new tools for TB control, including shorter, effective treatment and prevention regimens and better diagnostic tests.

- Build global human resource capacity for TB prevention and control through training, conducting collaborative research, and providing technical assistance to high-burden and origin countries.

Objective 1.3: Reduce Malaria Morbidity and Mortality

Approximately half the world's population lives in areas at risk of malaria transmission. WHO estimates that in 2010 malaria caused approximately 216 million clinical episodes and 655,000 deaths. Of these malaria deaths, 86% were children under 5 years of age, and 91% occurred in sub-Saharan Africa.[14] CDC provides scientific leadership in the fight against malaria through technical expertise in policy development, program guidance and support, scientific research, and monitoring and evaluation of progress toward Roll Back Malaria goals. Together with USAID, CDC implements the President's Malaria Initiative (PMI), which was first established in 2006.

CDC has led the implementation of monitoring and evaluation activities in support of PMI in 17 countries. PMI data have shown a 16 to 50 percent reduction in all-cause mortality in children under five years since PMI activities began.[15]

The goal of PMI is to reduce malaria-related deaths by 50% in PMI-focus countries and regions with a high burden of malaria by expanding coverage of four highly effective malaria prevention and treatment measures: insecticide treated bed nets (ITNs), indoor residual spraying (IRS), intermittent preventive treatment during pregnancy (IPTp), and artemisinin combination therapy (ACT). CDC-led science has established the efficacy and potential impact of each of these recommended interventions.[16] Through PMI and its partners since 2006, tens of millions of persons have received long-lasting ITNs or had their residences treated with IRS. Case management training for tens of thousands of health workers and the distribution of rapid diagnostic tests has resulted in better case management. PMI procured more than 41 million ACT treatments and 6 million IPTp treatments in 2010 alone. [17]

CDC provides technical expertise to improve vector control, case management, surveillance, monitoring and evaluation, and capacity building. CDC also works with MOHs and other partners to conduct essential operational research to optimize current interventions and develop new tools and strategies in the face of looming anti-malarial drug and insecticide resistance. CDC develops opportunities for integration of malaria prevention with other health and development initiatives. In addition, the agency conducts activities to prevent, treat, and monitor malaria among U.S. travelers and visitors.

CDC laboratories have also been pivotal to WHO's call for universal access to high-quality malaria diagnosis and treatment for malaria illness. The agency performs quality testing of all commercially available malaria rapid diagnostic tests, an activity which is critical to procurement decisions by national and international authorities. CDC also participates in a global network to identify counterfeit and substandard treatment drugs.

CDC Strategic Priorities

- Provide leadership in achieving global malaria reduction goals by providing technical expertise and guidance on operational research priorities and by supporting the implementation of malaria-related activities in designated countries.
- Promote an integrated and sustainable approach to malaria prevention and control by emphasizing the use of existing and new tools endorsed by WHO and local partners.
- Strengthen antimalarial drug-resistance surveillance and insecticide resistance monitoring programs by providing scientific leadership and enhanced laboratory support.
- Improve prevention and control of malaria through the development and testing of innovative methods and tools.
- Build global capacity for malaria prevention and control through training qualified malariologists, entomologists, and laboratory scientists and conducting collaborative research with and providing direct technical assistance to endemic countries.

Objective 1.4: Reduce Maternal and Perinatal Mortality

Progress is being made in reducing maternal and perinatal mortality; nevertheless, many countries still have maternal mortality ratios greater than 500 deaths per 100,000 live births.CDC is working with MOHs and other partners to impact positively the health of expectant and new mothers in a variety of ways, such as direct technical assistance to improve programs and technical expertise to improve the underlying health systems which women must use to manage their pregnancy.

CDC's current maternal and perinatal health activities can be broadly divided into two types of efforts: 1) technical assistance and evaluation of public health and clinical interventions focused on family planning, micronutrient fortification, integrated antenatal care (incorporating hand washing education with HIV and syphilis screening), and improved emergency obstetric and neonatal care (EmONC) services; and 2) technical guidance for health system strengthening activities with a focus on key information systems, including surveillance (maternal death surveillance and response), vital registration, birth registers, Reproductive Age Mortality Surveys, and routine program monitoring and evaluation.

CDC led the way in establishing that periconceptional use of 400 µg of folic acid prevents neural tube defects. Mandatory folic acid fortification of cereal grain products in the USA contributed to a 36% reduction in neural tube defects. With CDC support through the Flour Fortification initiative, 63 countries have implemented policies fortifying foods with folic acid preventing at least 22,000 fatal or disabling birth defects annually world-wide.[18,19]

CDC and its partners have contributed to implementing reproductive health surveys and developing guidelines for maternal death surveillance, family planning, and micronutrients. CDC supports strengthening district health system networks to improve access and quality of emergency obstetric and neonatal care. In addition, the agency contributes to the campaigns to eliminate congenital syphilis (monitoring, evaluation, and rapid testing strategies), perinatal hepatitis B transmission, and tetanus and to decrease neural tube defects through folic acid

fortification. Given the importance of maternal and perinatal health in the global health arena, CDC is working to strengthen and expand its contributions to the achievement of USG and global goals.

CDC Strategic Priorities

- Provide leadership on measuring maternal mortality, understanding its causes and contributory factors, and accelerating effective responses to reduce maternal deaths by providing technical expertise and guidance on maternal death surveillance and response and functioning vital registration systems.
- Strengthen district obstetric care networks to improve coverage, access to and quality of emergency obstetric and neonatal care by supporting the development and implementation of technical guidelines, training of health care personnel, and development of information systems and monitoring and evaluation.
- Improve maternal and perinatal health interventions, particularly PMTCT and elimination of congenital syphilis, by strengthening coverage and quality of antenatal care services, diagnostic testing, and improving monitoring and evaluation through better information systems.
- Increase contraceptive prevalence through integration of family planning with other public health programs and research to improve the uptake of long-acting reversible contraception.
- Expand micronutrient supplementation and fortification to reduce neural tube defects and other conditions such as anemia through technical assistance, surveillance, and capitalizing on private partnerships.

Objective 1.5: Reduce Child Morbidity and Mortality

Children represent the future generations and growth of societies, and ensuring their healthy growth and development are of paramount concern. In 2010, an estimated 7.6 million children died before reaching their fifth birthday, a decrease of around 2 million childhood deaths during the past decade.[20] Approximately 68% of these deaths are attributable to infectious diseases, most notably pneumonia (18% of deaths) and diarrhea (15% of deaths). Malaria, neonatal sepsis, HIV/AIDS, and measles are also important causes of death. Undernutrition, including deficiencies of micronutrients such as vitamin A, iron, and zinc, contributes to at least one-third of all childhood deaths, usually in interaction with infectious causes.[21] The vast majority of gains in child survival during the past decade have been accomplished through scale up of interventions such as immunization, micronutrient supplementation, access to safe water, insecticide-treated bednets (ITN), oral rehydration therapy, antibiotics, antimalarial therapy, and antiretroviral therapies.[25]Increased financial resources, strong

Diarrheal diseases in children: over the past 5 years, CDC has provided technical support to partners that have resulted in the distribution of sufficient water treatment products to treat 12 to 18 billion liters of water a year in over 20 countries; water treatment can reduce the risk of diarrhea by 40%. CDC has also pioneered programs to integrate water treatment and hygiene into antenatal care, infant immunization visits, MCH clinics, and HIV services.[22,23,24]

partnerships, intensified country support, innovations in service delivery approaches, improvements in women's education, and economic growth have made possible the gains in child survival during the past decade.

CDC has contributed to improvements in child health through its work on the WHO-UNICEF Global Action Plan for the Prevention and Control of Pneumonia (GAPP) that outlines specific goals and targets for pneumonia (vaccination and treatment). CDC is also a partner in the Global Cookstove Alliance, which aims to reduce pneumonia in women and children and increase birth weights through the use of clean cookstoves. CDC participates in key global partnerships in the fight against diarrheal disease, including the new WHO-UNICEF Diarrheal Disease Prevention and Control Strategy, which outlines seven key actions to reduce deaths in children. CDC contributes to improved child nutrition through micronutrient supplementation and fortification programs. CDC strengthens public health systems with a focus on key information systems for child health including surveillance (birth defects, nutrition), vital registration, periodic surveys, routine program monitoring and evaluation, and capacity building.

Achievement of other health impact objectives in this strategy, including those around vaccine-preventable diseases, malaria, HIV/AIDS, and TB, assists with the achievement of this comprehensive child health objective. Looking at ways to synergize, particularly in health systems strengthening, is key, and CDC collaborates closely with USG partners, particularly USAID, MOHs and others in this effort.

CDC Strategic Priorities

- Reduce respiratory disease deaths by supporting implementation and monitoring of the GAPP and Global Alliance for Clean Cookstoves to improve indoor air quality.
- Reduce diarrheal disease deaths by supporting implementation and monitoring of the WHO-UNICEF Diarrheal Disease Prevention and Control Strategy.
- Improve prevention and control of malnutrition with an emphasis on micronutrient deficiencies, breastfeeding, improved infant and young child feeding practices, and routine growth monitoring through technical assistance and support for the Flour Fortification Initiative.
- Improve care of sick infants and children, including diagnosis and management of sepsis and other severe infections in neonates, and diagnosis and management of infants and children with fever, pneumonia, diarrhea, and sickle cell disease.
- Strengthen child health information systems with a focus on monitoring and evaluation of child health programs, disease and nutrition surveillance, vital registration, and periodic surveys.
- Conduct research to better define the etiology of disease among infants and children and assess the effectiveness of prevention strategies that might reduce childhood morbidity and mortality.

Objective 1.6: Eliminate and Control Targeted Neglected Tropical Diseases

More than one billion people suffer from one or more neglected tropical diseases (NTDs).[26] These NTDs are a group of infectious diseases that are the source of tremendous suffering because of their disfiguring, debilitating, and sometimes deadly impact. Many diseases have been grouped under the rubric of NTDs, including dengue, guinea-worm, rabies, and yaws. Five of the NTDs have been targeted by USG efforts, including the Global Health Initiative, CDC, and other global programs: lymphatic filariasis (LF), onchocerciasis, schistosomiasis, trachoma, and soil-transmitted helminths (STH).[27,28,29] These NTDs are controlled by preventive chemotherapy. CDC helps inform global policy and guidelines for NTD control programs and conducts research to improve diagnostic and other tools needed to monitor programs. CDC scientists provide technical assistance to countries and partners to build capacity, improve programs, and monitor and evaluate progress towards elimination or control of NTDs.

CDC has contributed substantially toward elimination of onchocerciasis in the Americas: of the 13 original endemic foci, only 2 still have ongoing transmission. Scale up of efforts to eliminate lymphatic filariasis in Haiti has progressed through CDC leadership, including implementation of countrywide mass drug administration for the first time in 2011-12.

CDC helps draft WHO guidelines that countries will use to assess progress of initiatives. For example, the Transmission Assessment Survey for LF is being used to determine when transmission of LF has been interrupted and mass drug administration (MDA) can be stopped. Early studies conducted by CDC and partners demonstrated that mass treatment with drugs is a safe and effective way to control and potentially eliminate LF .[30] More recently, CDC researchers demonstrated that LF health education campaigns and morbidity control programs in India can increase adherence with MDA for LF by as much as 40%.[31]

CDC Strategic Priorities

- Reduce prevalence of five NTDs (LF, onchocerciasis, schistosomiasis, trachoma, and STHs), with a focus on program monitoring and evaluation.
- Contribute to the elimination of LF in Haiti and the Americas by implementing MDA in Port au Prince, Haiti.
- Reduce or eliminate NTDs through development, testing, and implementation of improved evidence-based diagnostic and epidemiologic tools.
- Conduct evaluation of integrated NTD programs to assess additional positive health outcomes beyond those associated with the targeted NTDs.

Objective 1.7: Control, Eliminate, or Eradicate Vaccine-Preventable Diseases

The burden of vaccine-preventable diseases (VPDs) in the United States has been greatly reduced due to childhood immunization. However, in an era of mass travel and global epidemics, the health of U.S. citizens is closely linked to disease occurrence in other countries. CDC's support for immunization programs worldwide contributes towards providing protection for the United States,

as well as fulfilling the U.S. Government's broader commitment to global health. Immunizations are estimated to prevent more than 2.5 million child deaths annually around the globe, primarily due to the prevention of measles, diphtheria, polio, pertussis, and tetanus.[32] Vaccination of children is also expected to reduce mortality in adults by preventing hepatitis B virus-related cirrhosis and liver cancer and human papillomavirus-related cervical cancer.[33]

Since the Global Polio Eradication Initiative (GPEI) began in 1988, the number of polio cases around the world has been reduced by >99% from over 350,000 cases per year to 650 cases in 2011.[34] Transmission of wild poliovirus (WPV) type 2, one of the three poliovirus serotypes, has been eliminated since 1999.[36] However, new WPV cases increased substantially during 2011 in the three remaining polio-endemic countries (Afghanistan, Nigeria, and Pakistan), and international spread from polio endemic countries caused 11 WPV outbreaks globally, underscoring the risk WPV poses to all children, no matter where they live.[37] In January 2012, the completion of polio eradication was declared a "programmatic emergency for global public health" by the executive board of WHO. In response to this emergency, GPEI has developed the *Global Polio Emergency Action Plan 2012-13*. As a key GPEI partner, CDC has provided critical technical and financial support for polio immunization activities to interrupt WPV transmission, to maintain and enhance laboratory surveillance for polioviruses, to monitor progress towards reaching epidemiological targets, and to support development and implementation of a polio eradication research agenda with the long-term aim of stopping all global use of oral polio vaccine. In addition, CDC's Emergency Operations Center has been activated since December 2011 to support the final push for polio eradication.

Since the Global Polio Eradication Initiative was started in 1988, (with CDC as one of the four original spearheading partners along with WHO, UNICEF, and Rotary International), the number of countries with endemic poliovirus transmission has decreased from 125 to 3, and reported polio cases have decreased from 350,000 in 1988 to 650 in 2011.[35]

Endemic measles and rubella have been eliminated from the Western Hemisphere. To sustain and build on this achievement, CDC is working to control and eliminate measles and rubella in parts of the world responsible for importations into the United States. CDC is a founding member of the Measles and Rubella Initiative, which supports vaccination campaigns worldwide and has helped cut measles deaths globally by 74% from an estimated 535,000 deaths in 2000 to 345,000 deaths in 2005, and to 139,300 deaths in 2010.[38] The Initiative's goals are now to further reduce measles deaths globally by 95% compared to measles deaths in 2000 and to eliminate measles and rubella in at least five of six WHO regions by 2020.

CDC also provides technical expertise to strengthen the performance of national immunization programs, strengthen national and global VPD surveillance systems, inform policy development and governance, and introduce new and expand underutilized vaccinations. CDC's efforts aim to protect each new birth cohort of approximately 130 million infants born around the world each year from VPDs. These efforts require well-functioning and accessible immunization delivery strategies, laboratory-based VPD surveillance systems, and high-quality research providing evidence to

support the development and introduction of new vaccines. CDC provides technical support to multiple global VPD surveillance and laboratory networks and conducts operational research to strengthen the quality and use of data from VPD surveillance systems. CDC actively supports introduction and evaluation of available and underused vaccines that have the potential to greatly reduce global VPD morbidity and mortality, such as *Haemophilus influenzae* type B, pneumococcal conjugate, rotavirus, human papillomavirus, meningococcal group A, hepatitis B vaccine administered within 24 hours of birth, rubella, seasonal influenza, Japanese encephalitis, typhoid, cholera, and yellow fever. CDC conducts research to develop or field test new vaccines to protect against leading killers (e.g., HIV, malaria, tuberculosis, rotavirus, and dengue) in developing countries.

CDC's efforts to strengthen immunization systems are implemented in the context of global health collaborations with other USG agencies and other partners such as WHO, UNICEF, Rotary International, the Bill and Melinda Gates Foundation, the GAVI Alliance, the American Red Cross, and the United Nations Foundation.

CDC Strategic Priorities

- Provide global leadership and expert technical assistance for VPD eradication/elimination initiatives and other targeted VPD control goals, with a particular focus on reaching the goals of the GPEI.
- Strengthen capacity and enhance performance of health systems to deliver routine immunization services on a sustained basis.
- Strengthen VPD health and information systems to enhance decision making capacity for immunization programs.
- Increase the appropriate development, introduction, and use of new and underused vaccines, such as pneumococcal and rotavirus vaccines, to prevent diseases of global and regional public health importance.
- Promote synergies between immunization and other public health interventions to strengthen health systems.

Objective 1.8: Reduce Burden of Non-Communicable Diseases

NCDs include chronic diseases (e.g., heart disease and stroke, cancer, diabetes), injuries, disabilities, and diseases caused by environmental hazards. NCDs kill more people globally than infectious diseases, affecting countries of all economic levels.[39] Worldwide, the chronic illnesses of heart disease, stroke, cancer, and diabetes are responsible for 36 million deaths each year, representing nearly two-thirds of the world's total deaths.[40] These four diseases share the common risk factors of tobacco use, unhealthy diets, physical inactivity, and harmful use of alcohol. Several are related to high blood pressure and high cholesterol. If not addressed, cumulative output loss is estimated to reach U.S. $47 trillion by 2030, threatening national and global economic advancement.[40] In addition to chronic NCDs, injuries and environmental health hazards are also critical public health areas. Road traffic crashes are the leading cause of death worldwide for people between the ages of 15 and 29.[41] Injuries and violence are a major public health issue globally and account for nearly 1 out of every 10 deaths every year.[42] Lead poisoning is one of the most common and best-recognized

childhood diseases of toxic environmental origin.[43] Cooking and heating indoors using solid fuels pollutes the air and increases the risk of illness for nearly 3 billion people worldwide.[44]

CDC's global work addressing infectious diseases has helped build expertise and reliable service delivery platforms in many developing counties that can help reduce the burden of NCDs. Specifically, CDC's role in addressing NCDs focuses on (1) surveillance, epidemiology, and laboratory support; (2) identifying risk factors and evidence-based prevention strategies; (3) strengthening data, data systems, and use of data to increase effective policy development and public health action; and (4) increasing country capacity and workforce skill development.

CDC helped establish the Global Tobacco Surveillance System (GTSS), which aims to enhance country capacity to design, implement, and evaluate tobacco control interventions. CDC also collaborates with WHO to develop and disseminate guidelines for cervical cancer screening and helps build country capacity to conduct high-quality cervical cancer screening, surveillance, and prevention.

CDC works with a variety of global partners to build capacity by improving road traffic injury surveillance systems, documenting the magnitude and impact of traffic injuries, and developing and testing effective interventions. To improve access to safe water and hygiene, CDC helps to identify water, sanitation, and hygiene interventions, such as technology to treat and safely store drinking water in homes. In addition CDC assists in identifying hazards and solutions to contamination of community water sources.

CDC has provided technical assistance to 180 countries on the implementation of globally standardized tobacco surveys for youth, adults, and specific population groups. The survey findings help countries track tobacco use and develop, implement, and evaluate tobacco control programs and policy interventions.

CDC Strategic Priorities

Chronic Diseases

- Assist countries to develop, implement, and evaluate national plans to address the burden of NCDs and their risk factors.
- Strengthen country capacity to conduct surveillance of chronic disease risk factors and use of data for guidance and decision-making.
- Help build the global evidence base for NCD prevention and control by supporting the implementation and evaluation of interventions.
- Assist countries to develop, implement, and evaluate the Global Adult Tobacco Survey (GATS), and use data to inform interventions in accordance with the Framework Convention on Tobacco Control and the MPOWER strategy.
- Assist and support countries to plan, implement, and evaluate activities to reduce sodium consumption and high blood pressure through guidelines, programs, and partnerships.

Injuries and Violence

- Promote and implement international demonstration projects to prevent road traffic injury in worker populations, in support of high-priority activities for the UN Decade of Action for Road Safety.
- Enhance surveillance and evaluation of motorcycle helmet use globally and aid in the development of guidelines and programs which increase the use of helmets.
- Build country capacity in road safety injury surveillance and use of data for guidelines and decision-making, to support the successful implementation and evaluation of effective and appropriate interventions.
- Increase the capacity of low- and middle-income countries to measure the burden of violence through the implementation of national surveys designed to capture information on sexual, physical, and emotional violence to support the creation of guidelines.

Environmental Health Hazards

- Increase the number of lead-safe environments for children globally by providing technical support in the development and implementation of WHO guidelines for reduction of lead poisoning in children, elimination of lead paint globally, and remediation of contaminated sites.
- Improve water treatment, sanitation, and hygiene promotion (WaSH) programs, and enhance integration between WaSH programs and health services targeting vulnerable populations.
- Promote improved indoor air quality programs, and enhance their integration with health services, particularly for vulnerable populations.

Goal 2: Health Security: Improve Capabilities to Prepare and Respond to Infectious Diseases, Other Emerging Health Threats, and Public Health Emergencies

The health of Americans is integrally connected to the health of the rest of the world. Governments and organizations must work to strengthen public health programs and increase the ability of countries to respond to and address disease threats on a global scale. Strengthening the health security of countries around the world contributes to healthy, stable, and productive societies. Improving global health also makes the United States more secure by building partnerships that can solve local problems before they become global challenges. CDC provides public health technical and policy support to USG security and development organizations involved in global health security activities worldwide. CDC's global health security activities are integral to the implementation of the National Security Strategy and the National Strategy for Countering Biological Threats which call on the U.S. Government to promote global health security, reinforce norms of safe and responsible conduct, and obtain timely and accurate insight on current and emerging risks: all CDC core areas of expertise. CDC works with other USG agencies to support national and international health and security strategic partnerships such as the Global Partnership Against the Spread of Weapons and Materials of Mass Destruction (G8GP), and assists other federal agencies and other governments meet their responsibilities under the Biological Weapons Convention (BWC) and the U.N. Security Council Resolution (UNSCR) 1540.

Objective 2.1: Strengthen Capacity to Prepare for and Detect Infectious Diseases and Other Emerging Health Threats

In recent decades, the world has faced an accelerating assault from emerging infections, both from new diseases and changing endemic ones. HIV, West Nile virus, and SARS are examples of diseases caused by previously unknown or minor pathogens that have had global impact. Strong public health systems enable countries to quickly identify and effectively respond to these dynamic events. Pathogens ignore borders, and a problem at one locality can rapidly threaten the world. International standards have emphasized the importance of all countries to conduct surveillance where it was not previously done, such as at ports of entry, in refugee settings, and among migrant populations. CDC works to strengthen the preparedness of public health systems to detect and respond to emerging health threats. This entails not only supporting MOH infrastructure development, but also helping to build the human capacity to conduct surveillance, diagnose illness, communicate and analyze evidence, and respond effectively. In addition, CDC helps to build the capacity of other systems, such as enhancing surveillance in refugee camps to detect emerging disease threats. The 2005 International Health Regulations are an international legal instrument created by WHO and adopted by 194 countries with the aim to help prevent and respond to acute public health risks that have the potential to cross borders. CDC is a technical leader in IHR implementation, working with other agencies to build global capacity.

CDC works with countries to identify potentially emerging pathogens, including pathogens causing respiratory, diarrheal, foodborne, zoonotic, and vectorborne infections. Because an emerging pathogen is by its nature unknown or unanticipated, identifying pathogens requires the ability to do applied infectious disease research as well as integrated disease surveillance, laboratory diagnosis, prevention, and control. CDC has helped MOHs build laboratory diagnostic testing capacity in various countries (e.g., Uganda for diagnosing plague and hemorrhagic fevers). In countries served by Global Disease Detection Regional Centers, laboratory diagnostic testing capacity has not only assisted in overall rapid diagnosis of pathogens causing respiratory, diarrheal, foodborne, and vectorborne infections, but also with detection of new pathogens (Figure 3). CDC's strength and reputation as a global reference center is often critical to the identification of new threats. CDC has contacts in almost every country making timely response to outbreaks possible, often developing innovative, headquarters-based surveillance methods and new laboratory diagnostics to augment the detection and response. CDC works to strengthen refugee and migrant screening and treatment of infectious diseases, which improves the health of these populations and prevents the importation of diseases, such as multi-drug resistant TB.

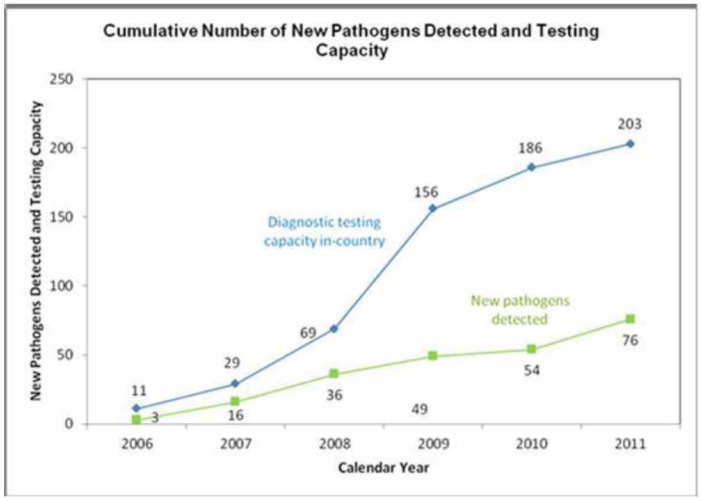

Figure 3. By increasing the laboratory diagnostic testing capabilities in host and neighboring countries of the GDD Regional Centers, CDC has been able to detect new pathogens.

CDC Strategic Priorities

- Increase country capacity to comply with the IHR by providing in-country support and technical assistance with planning efforts, including the development of plans for IHR implementation.
- Improve early detection for emerging threats through enhanced surveillance, communication, clinical diagnosis, event analysis, and response.
- Improve the capacity of laboratories to detect unusual pathogens by improving their capacity to accurately identify their endemic pathogens.
- Provide technical assistance and guidance to improve the detection of disease in vulnerable populations.
- Improve methods for detecting and preventing emerging pathogens that result from social and demographic trends that increase human contact with animals, vectors, and poor sanitation.

Objective 2.2: Respond to International Public Health Emergencies and Improve Country Response Capabilities

When a humanitarian or natural emergency compromises health security or when global public health systems fail to detect a threat, it is vitally important that CDC work with international partners and MOHs to quickly respond to urgent needs. At the same time, the agency must also plan for long-term systems infrastructure support. In addition to large scale events, day-to-day efforts to control, manage, and treat populations with certain diseases (e.g., multi-drug-resistant TB) are of critical importance. A delayed response can increase the magnitude of the problem and the challenges with containment. At the invitation of MOHs or WHO, CDC is able to quickly mobilize response units, comprised of a wide array of public health experts. When an emergency occurs, it is critical to respond early to control and reduce morbidity, mortality, and spread, and to help countries improve capabilities to prepare for future events following the response.

Since 2006, CDC, in collaboration with MOHs, WHO, and other partners, has responded to over 900 international disease outbreaks and other public health emergencies. Of these, 64% were initiated within 24 hours of receiving a request for assistance and 53% included laboratory support that led to a confirmed cause.

CDC engages its in-country, regional, and headquarters staff to rapidly respond to outbreaks in host countries for a wide range of emerging infections including respiratory syndromes, diarrheal diseases, foodborne illnesses, and zoonotic diseases. By establishing long-term relationships with MOHs and in-country partners, CDC assists countries to increase their capacity to respond to threats themselves. These relationships can reduce the time from recognition of a threat or event to its containment and resolution. When a threat or event requires CDC's rapid response, CDC deploys highly-skilled multidisciplinary teams. These teams draw upon a variety of public health professions from around the agency in areas such as epidemiology, laboratory, veterinary medicine, and risk communication to respond directly and assist country and regional offices in their responses to disease outbreaks. Deployments respond to known pathogens such as influenza, measles, polio, cholera, and anthrax, in addition to illnesses of unknown etiology, such as nodding disease. CDC implements laboratory networks and epidemiologic systems to track cases and prevent further spread of disease. CDC has responded to hundreds of outbreaks utilizing field offices and technical experts from headquarters.

In Haiti, CDC has developed a unique public health reconstruction portfolio focusing on seven health impact legacy goals to improve health and well-being. The first goal is an integrated public health system comprised of a tiered, public health workforce development program, a national reference laboratory referral network, and a robust reportable disease surveillance system. This integrated system has made it possible to set clear targets for three disease elimination goals and three disease burden goals that specifically address priorities outlined in the President's Global Health Initiative.

CDC Strategic Priorities

- Control and reduce the spread of disease by conducting and supporting outbreak investigations at the invitation of the MOH or other partners.
- Facilitate rapid deployment of multidisciplinary CDC response teams to assist WHO and MOHs for outbreak responses.
- Build country emergency response capabilities to prepare and respond to disease threats by providing technical assistance and planning, including rapid response team development and coordination with the IHR National Focal Point.

Goal 3: Health Capacity: Build Country Public Health Capacity

Building, strengthening, and maintaining countries' capacity to improve the health and well-being of their citizens is vital to development and stability, not only inside the borders of any one country, but regionally and globally. Health systems are networks of private and public sector organizations, working at all levels of society to detect, control, prevent, and respond to the full spectrum of health threats. The public health system is an important component of the health system, serving as a partner in prevention, surveillance, policy, and response with hospital and clinic networks, and other sectors of society that impact overall health and disease prevention. Paramount to the long-term success of any health initiative is country ownership, and CDC is actively leveraging its technical expertise and country field offices to build this necessary capacity by responding to country and U.S. country mission priorities.

Objective 3.1: Strengthen Public Health Institutions and Infrastructure

CDC works to build and strengthen global public health capacity to achieve lasting health improvements. The agency seeks to help countries build capacity related to epidemiologic surveillance; laboratory, novel point-of-care and reference diagnostics; workforce; research; strategic information; expenditure and costing analyses; and outbreak response. A key method of strengthening this capacity is through CDC's work with WHO regional offices, MOHs, and National Public Health Institutes (NPHIs).[45]

MOHs are the entities that ultimately have the responsibility to conduct surveillance, respond to outbreaks, set national health policy guidelines, and report officially on behalf of the national government under the IHRs and other international treaties. A strong MOH is a very important contributor in achieving sustainable health programs, especially in low-resource settings.[46] CDC provides technical leadership and training for leaders and staff at MOHs to build capacity within countries to better respond to future events. CDC supports the creation and expansion of laboratory systems and data management, and works with MOHs to expand their network at the regional and national level building on CDC's expertise and experience in strengthening domestic infrastructures.

Investment in public health institutions can reduce morbidity and mortality and improve population health in resource-poor settings. In many countries, limited capacity to detect and respond to public health threats has hampered progress toward improving health outcomes. Establishing or strengthening existing science-based NPHIs can provide expertise and leadership in core public health functions in low- and middle-income countries. A strong NPHI provides a single accountable agency, increases transparency, results in better surveillance for a more effective response to disease threats, and provides a home for building sustainable public health capacity. CDC relies upon public health professionals and subject matter experts from across the agency and the ability to leverage existing partnerships with numerous collaborators to support building or strengthening NPHIs and other allied public health institutions. By linking NPHI efforts with the experts across CDC, disease-specific objectives are also addressed to maximize impact.

CDC Strategic Priorities

- Improve public health outcomes through strengthened capacity and enhanced performance of public health programs and services at national and sub-national levels.
- Strengthen MOH infrastructure by enhancing its risk communication capabilities and its ability to communicate public health messages to health workers, the public, and the media.
- Lead the establishment of standards to define capacity development from a public health perspective.
- Provide technical assistance to countries in the establishment and strengthening of national public health institutes.
- Increase country ownership and sustainability by transitioning programmatic and financial responsibilities to host governments and local partners.

Objective 3.2: Improve Surveillance and Use of Strategic Information

CDC helps countries establish surveillance systems to produce reliable, timely information on health determinants, health status, and the performance of health systems. It also supports the development and implementation of complementary health information systems to support patient management and program monitoring. CDC strengthens the capacity of MOH officials to collect and analyze data from these multiple sources to make evidence-based public health decisions for impact. Improved surveillance methodologies and innovative technologies also provide countries with increased insight and flexibility to detect and respond more quickly and accurately.

Strategic epidemiologic information plays a critical central role in the effective functioning of health systems. CDC works with MOHs to build and enhance the systems needed to generate those data as well as supports the institutions responsible for managing those systems and interpreting the data. Advances in informatics benefit public health systems and have created unprecedented opportunities to transform public health practice through interoperable information systems that support surveillance, epidemiology, service implementation, and monitoring and evaluation. CDC provides coordination, leadership, and cross-cutting, comprehensive public health informatics strategies and standards to support information systems. The agency also supports the development of tools to strengthen public health systems and the practice of epidemiology, surveillance, laboratory, and patient management. The result of these activities leads to more accurate, timely, and complete information; improved analysis, reporting, and dissemination of data; and integrated information systems to extract and exchange data from various sources and systems. Through technical assistance and development of guidelines and tools, CDC works closely with MOHs to implement strategies and activities for improving surveillance and response.

Integrated Disease Surveillance and Response (IDSR) is a WHO/AFRO strategy adopted by the 46 countries in the African region in 1998 for improving national surveillance and response systems. The goal of IDSR is to develop sufficient surveillance and response capacities at each level of the national system in order to detect and respond to those diseases that are priorities for African countries. CDC's role in IDSR has been to lead the design and development of the IDSR framework, building on components of polio, meningococcal meningitis, cholera, and yellow fever disease control programs. CDC provides surveillance and disease-specific expertise in designing and

developing IDSR guidelines, surveillance norms, thresholds for action, standards, metrics, and implementation strategies. Because IDSR is grounded in activities for strengthening national, multi-level, multi-disease surveillance systems, the member countries recommended that the IHR be implemented through the IDSR framework and CDC has been working to include IHR requirements in materials and approaches.

Evaluation of IDSR in Burkina Faso showed a two-week reduction in time to peak of meningitis outbreaks and statistically significant reductions in the number of cases and deaths, as well as a cost savings of $80 per case averted and $260 per death averted.[47]

Evidence of country ownership of IDSR is seen in assessment results. For example, by 2012, 43 of the 46 countries were implementing IDSR to some extent. At least half the countries have a national budget line for IDSR, have adopted regulations or legislation governing public health surveillance, and also have a national policy for IDSR implementation. Many countries are now publishing a weekly epidemiologic bulletin with analyzed data from reporting districts.[48]

CDC Strategic Priorities

- Assist countries in establishing health information systems that contribute to improved disease surveillance, patient management, program monitoring, and public health planning.
- Increase MOH ability to successfully manage the process of transforming data into knowledge, knowledge into guidelines, and guidelines into improved, cost-effective programs and public health practice.
- Assist countries in developing capacity for conducting critical surveillance activities such as monitoring disease burden, tracking morbidity and mortality data, evaluating behavioral risk factors, and monitoring and evaluating the impact of health interventions.
- Provide leadership in establishing consistent standards for global public health informatics.

Objective 3.3: Build Workforce Capacity

Effective public health systems depend on a trained and motivated workforce to carry out the services needed to achieve health goals. CDC's experts work with MOHs and other partners to establish a sustainable public sector health workforce globally. Establishing sustainable public health workforce capacity is more than just training—it requires strengthening a complex system of human resource dynamics, including planning and management of the health workforce; producing new health workers through pre-service education; ensuring adequate recruitment into the public health system; improving the quality of training, mentorship, and supervision; and providing appropriate retention incentives. CDC's highly trained medical officers, public health advisors, epidemiologists, health economists, behavioral scientists, laboratorians, veterinarians, and program managers offer unique technical and scientific expertise to strengthen sustainable public health workforce capacity.

Since 1980, CDC has worked in collaboration with local and international organizations to help MOHs develop Field Epidemiology Training Programs (FETPs), modeled after the U.S. Epidemic Intelligence Service, that build capacity in a range of areas, including epidemiology, laboratory sciences, outbreak investigation, health surveillance systems, applied research, program evaluation,

communications, and program management. CDC generally supports an FETP program for about five years, with gradual transfer of responsibility and program costs to ensure that the country can sustain the program. CDC also helps MOHs in developing countries to strengthen public health management policies, practices, and systems through competency building, strategic partnerships that leverage technical expertise, and applied research and evaluation.

Since 1980, CDC has helped develop 46 international Field Epidemiology Training Programs serving 64 countries, graduating over 2500 epidemiologists prepared to evaluate health programs and detect and respond to health threats.

CDC Strategic Priorities

- Improve workforce ability to conduct the core functions of public health, implement and manage critical health programs, and address country and regional priorities with a focus on strengthening existing and establishing new programs and networks (e.g., FETPs and FETP regional networks) by working with multi-national partners.
- Strengthen country public health workforce development planning by providing tools to conduct workforce assessments and to develop workforce plans based on assessment results.
- Improve leadership and management competencies at MOHs and other public health institutions by developing and delivering training and by coordinating knowledge-sharing through established forums.
- Provide technical assistance in helping MOHs establish human resources information systems to track the production, registration, and deployment of the health workforce.
- Provide leadership to countries in developing workforce standards and policies and procedures to address topics such as retention, public health career paths, monitoring and measuring performance, and standard training curriculum to address workforce needs.

Objective 3.4: Strengthen Laboratory Systems and Networks

Laboratories play a vital role in the early detection and monitoring of a variety of diseases and health events, as well as in surveillance to monitor the impact of vaccination programs, enabling countries to better respond, treat, control, and prevent spread of disease in a population. Laboratories also play a critical role in monitoring and evaluation of the impact of program interventions to control and eliminate diseases. CDC assists countries to build sustainable and integrated laboratory networks as a critical and core component of the overall health system. CDC works to assist multiple countries in Africa, Asia, and Latin America to develop national strategic plans to strengthen public health laboratory networks. Key components addressed in these plans include: training and personnel retention, logistics and

Since 2010, CDC has assisted 31 countries to implement a step-wise approach to improve laboratory quality management towards internationally recognized accreditation. This has resulted in provision of more reliable laboratory results for patient management, surveillance, and program monitoring and evaluation.

commodities management, facility and equipment maintenance, laboratory information systems, laboratory policy and regulatory issues, and improved quality management across national laboratory systems. These plans help to integrate parallel disease-specific laboratory systems where possible, building efficiency and strengthening the ability of countries to respond effectively to numerous infectious diseases, including HIV/AIDS, TB, malaria, emerging infections, and avian influenza. In addition to this important work in infectious diseases, laboratory systems are critical for early diagnosis, treatment, and interventions for non-communicable diseases.

CDC collaborates with USG partners, host governments, MOHs, non-governmental organizations, U.S.-based universities, multilateral organizations, and the private sector to provide systematic training, guidance, and support for laboratories. CDC works with international accrediting organizations to establish guidance for laboratory quality improvement towards accreditation of laboratory services in resource-constrained settings. In addition, CDC serves as a global reference laboratory in many disease-specific areas responding to global public health emergencies such as the H1N1 influenza pandemic and participating in global surveillance activities and international outbreak investigations.

CDC Strategic Priorities

- Support the development of laboratory-related policies, laws, standards, and national laboratory strategic plans to facilitate country ownership.
- Improve development of the laboratory workforce by conducting training and work with countries to create career paths and job descriptions and develop credentialing programs.
- Improve laboratory capacity by facilitating the development and maintenance of laboratory networks, improving laboratory biosafety, strengthening laboratory-based surveillance systems, developing and establishing specific diagnostic assays, and defining a minimum set of essential capabilities.
- Maximize resource use and public health response capability by integrating laboratory-based surveillance into comprehensive public health surveillance efforts.
- Strengthen laboratory quality management systems to enhance performance of individual laboratories and national laboratory networks, leading towards achievement of internationally recognized accreditation standards.

Objective 3.5: Improve Research Capacity

The primary objective of research for public health is to provide sound scientific evidence to develop tools and strategies to improve public health impact and public health systems, and to inform and improve relevant policy and guidelines. Research is also needed to assist in development of priorities with a focus on cost-effectiveness.

CDC conducts epidemiologic and laboratory research to improve existing or develop new promising interventions and tools, while examining the cost-effectiveness and efficiency of programs. Through its focus on research, CDC also works with partners to strengthen the capacity of Institutional Review Boards in countries to achieve improved guidance and safeguards for research activities.

CDC also conducts public health systems research to examine the organization, financing, and delivery of public health services within communities and the impact of these services on public health. This concept can encompass broad aspects of translational, implementation, and operational research in order to achieve effective health outcomes.

CDC Strategic Priorities

- Identify new and strengthen existing public health interventions and validate the effectiveness of interventions and tools.
- Assist countries to develop expertise and capacity to conduct research (operational, applied, and laboratory) activities.
- Develop and disseminate guidelines to translate research into national initiatives for implementation to improve health activities.
- Develop, evaluate, and deploy innovative technologies to support epidemiologic and laboratory public health programs and global health security initiatives, with a particular focus on field and low-resource settings.
- Collaborate with host countries and USG partners to strengthen the capacity of local Institutional Review Boards.

Goal 4: Organizational Capacity: Maximize Potential of CDC's Global Programs to Achieve Impact

To maximize impact, CDC must function in an integrated way, delivering public health programs and conducting research supervised directly by the responsible CDC program for technical excellence and accountability, but also integrating across multiple programs for synergy, efficiency and coordination. In addition, CDC coordinates with multiple USG agencies and multilateral and bilateral partners to ensure an integrated, comprehensive approach to global health. Further, CGH provides management and operational support to CDC's field staff and offices where global health activities are implemented in order to improve efficiency and enhance communication and coordination.

CDC's work overseas is affected by many U.S. Government laws and regulations, and HHS policies. In early 2012, CDC released an electronic, updated CDC Guide to Global Operations, which provides overseas staff easy, user-friendly access to this information.

Objective 4.1: Strengthen Organizational and Technical Capacity to Better Support CDC's Global Health Activities

Fundamental to strong, sustained program implementation is an efficient organizational capacity to support those efforts. CGH, in close coordination with other CDC global programs and CDC business services offices, provides management and operational support to CDC country operations and field offices in a variety of areas, including country governance, overseas operations, and workforce planning and management.

Consistency in country operations is an important aspect of organizational capacity. CDC has established a governance structure for country operations which clearly defines the roles and responsibilities of headquarters and field offices. CDC has also developed a written guide to global operations that provides agreed-upon tools, guidance, and procedures to promote consistency and accountability. CDC must continue to recruit and prepare staff for international assignments and recruit, train, retain, and provide professional development for talented locally employed staff to deliver and support country work.

CDC Strategic Priorities

- Improve and continuously modify as needed the implementation of the country governance structure by systematically collecting and evaluating feedback to ensure the structure is meeting the needs of the country field offices.
- Improve efficiency, consistency, and accountability of headquarters and overseas office operations by providing guidance on strengthening infrastructure and management systems.

- Improve workforce planning, processes, and support to consistently address recruitment, retention, and training needs to build and sustain a capable workforce.
- Increase the skills of CDC's technical experts to address evolving global health priorities and to help build country capacity.

Objective 4.2 Enhance Communication to Expand the Impact of CDC's Global Health Expertise

Critical to CDC's ability to maximize the impact of global programs are improvements in communication and coordination among CDC's headquarters programs and field offices and with its partners. CDC develops evidence for effective public health interventions, and the impact of its global health work is amplified when knowledge about the relative impact and cost-effectiveness of those interventions is effectively communicated:

- Within CDC, across programs and countries, and between headquarters and the field.
- With other USG departments and agencies to assure a whole-of-government approach.
- With multilateral institutions which establish guidelines and/or invest in global health programs.
- With other donor nations investing in global health programs.
- With implementing partners, including most importantly officials in host ministries.
- With policymakers to inform decisions about investments of scarce resources.
- With the policy and academic community to permit even greater refinement and amplification of scientific findings.
- With a broad array of media to reach multiple audiences and thus better communicate the full extent of USG contributions.

Each audience demands a different communication and dissemination approach. CDC will intensify efforts to communicate and disseminate key public health information.

CDC Strategic Priorities

- Work strategically across the agency to improve effectiveness of programs and improve coordination and integration of global health efforts.
- Articulate CDC's unique role in global health to create awareness of the importance of cost effective evidence-based programming among partners and stakeholders.
- Increase the partnership capacity of CDC's global health programs by supporting and facilitating partnership outreach and communication to existing and new partners.
- Improve and encourage communication across CDC programs (headquarters and field) to more effectively utilize and maximize resources and knowledge.

Conclusion

CDC's Global Health Strategy outlines the agency's approach to achieving its global health vision of a healthier and safer world, and protecting the US from external health threats, through programs based on strong scientific evidence. The strategy will be integrated into planning, decision-making, and the implementation and evaluation of CDC's global health activities. This includes prioritizing activities and partnerships and leveraging resources, investments, and the work of other USG and global partners, with an overriding focus on improving coordination and communication to maximize impact.

CDC looks forward to working with its partners across the U.S. Government, international organizations, and MOHs in partner countries as all continue to strive for lasting impact in global health.

Appendix: Global Health Strategies, Frameworks, and Plans

- *2008-2013 Action Plan for Global Strategy for the Prevention and Control of Non-communicable Diseases, April 2008. World Health Organization*
  http://www.who.int/nmh/publications/ncd_action_plan_en.pdf

- *A CDC Framework for Preventing Infectious Diseases: Sustaining the Essentials and Innovating for the Future, October 2011. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention*
  http://www.cdc.gov/oid/docs/ID-Framework.pdf

- *A National Strategic Plan for Public Health Preparedness and Response,* September 2011. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Office of Preparedness and Response
  http://www.cdc.gov/phpr/publications/2011/A_Natl_Strategic_Plan_for_Preparedness_20110901A.pdf

- *Association of Public Health Laboratories Strategic Plan 2010–2013*
  http://www.aphl.org/AboutAPHL/publications/Documents/APHL_Strategic_Plan_2010-2013.pdf

- *The Biological Weapons Convention, United Nations Office*
  http://www.unog.ch/80256EE600585943/(httpPages)/04FBBDD6315AC720C1257180004B1B2F?OpenDocument

- *CDC Global Immunization Strategic Framework, 2011-2015.* U.S. Department of Health and Human Services, Centers for Disease Control and Prevention
  http://www.cdc.gov/ncird/downloads/GID-strat-framewk.pdf

- *CDC's Public Health Framework for Health Systems Strengthening.* U.S. Department of Health and Human Services, Centers for Disease Control and Prevention
  http://www.cdc.gov/globalhealth/pdf/HHS_one_pager_factsheet_press_quality.pdf

- *Diarrhoea: why children are still dying and what can be done. World Health Organization, United Nations Children's Fund*
  http://www.who.int/maternal_child_adolescent/documents/9789241598415/en/index.html

- *The First Quadrennial Diplomacy and Development Report: Leading Through Civilian Power, 2010. U.S. Department of State*
  http://www.state.gov/s/dmr/qddr/

- *Global Action Plan for the Prevention and Control of Pneumonia, World Health Organization, United Nations Children's Fund*
  http://www.unicef.org/media/files/GAPP3_web.pdf

- *Global Alliance for Clean Cookstoves*
  http://cleancookstoves.org/

- *Global Health Strategic Framework: Better Health for Development FY 2012 – FY 2016. April 2012, U.S. Agency for International Development*
  http://transition.usaid.gov/our_work/global_health/home/Publications/gh_framework.html

- *Global Health Strategy, 2011-2015. U.S. Department of Health and Human Services*
  http://globalhealth.gov/pdfs/GlobalHealthSecretary.pdf

- *Global Malaria Action Plan, Roll Back Malaria*
  http://www.rollbackmalaria.org/rbmgmap.html

- *Global Measles and Rubella Strategic Plan, 2012-2020.* World Health Organization
  http://www.who.int/immunization/newsroom/Measles_Rubella_StrategicPlan_2012_2020.pdf

- *The Global Partnership Against the Spread of Weapons and Materials of Mass Destruction (G8GP)*
  http://www.g20-g8.com/g8-g20/g8/english/priorities-for-france/the-priorities-of-the-french-presidency/g8-priorities-sheets/the-global-partnership-against-the-spread-of.884.html

- *The Global Plan to Stop TB, 2011-2015: Transforming the Fight Towards Elimination of Tuberculosis, October 2010. World Health Organization, STOP TB Partnership*
  http://stoptb.org/assets/documents/global/plan/TB_GlobalPlanToStopTB2011-2015.pdf

- *Global Polio Emergency Action Plan, 2012-13*
  http://www.who.int/immunization/newsroom/highlights/2011/en/index3.html
  http://timesofindia.indiatimes.com/topic/20.-Global-Polio-Emergency-Action-Plan-2012-13

- *Global Tuberculosis Control, 2011.* World Health Organization
  http://www.who.int/tb/publications/global_report/en/index.html

- *Governance Document for Country Offices and Global Operations*, January 2011. Department of Health and Human Services, Centers for Disease Control and Prevention, Center for Global Health

- *Guidance for Global Health Initiative Country Strategies,* February, 2011. Department of Health and Human Services, Centers for Disease Control and Prevention, Center for Global Health, Global Health Initiative
  http://www.ghi.gov/documents/organization/165092.pdf

- *International Health Regulations, 2005 (reprinted in 2008). World Health Organization*
  http://www.who.int/ihr/en/

- *Lantos-Hyde United States Government Malaria Strategy, 2009-2014*
  http://pmi.gov/resources/reports/usg_strategy2009-2014.pdf

- *The Millennium Development Goals, United Nations Development Programme*
  http://web.undp.org/mdg/basics.shtml
- The Millennium Development Goals Report, 2011. United Nations Secretary-General
  http://www.un.org/millenniumgoals/11_MDG%20Report_EN.pdf
- *MPOWER Measures*, World Health Organization
  http://www.who.int/tobacco/mpower/en/
- *National Security Strategy, 2010*. The White House
  http://www.whitehouse.gov/sites/default/files/rss_viewer/national_security_strategy.pdf
- President's Malaria Initiative
  http://www.fightingmalaria.gov/
- *The President's Malaria Initiative Sixth Annual Report to Congress, April 2012.* U.S. Agency for International Development
  http://pmi.gov/resources/reports/pmi_annual_report12.pdf
- *President's Emergency Plan for AIDS Relief*
  http://www.pepfar.gov/
- *President's Emergency Plan for AIDS Relief: Five-Year Strategy, December 2009*
  http://www.pepfar.gov/strategy/document/133251.htm
- *UN Decade of Action for Road Safety. Peden M. UN General Assembly calls for decade of action for road safety. Injury Prevention. 2010; 16(3):213.*
  http://www.roadsafetyfund.org/UnDecadeOfAction/Pages/default.aspx
- *UN Security Council Resolution (UNSCR) 1540*, U.S. Department of State
  http://www.state.gov/t/isn/c18943.htm
- *U.S. Government Global Health Initiative Strategy, March 2011. U.S. Global Health* Initiative
  http://www.ghi.gov/resources/strategies/159150.htm
- *U.S. Global Health Initiative*
  www.ghi.gov
- *WHO Framework Convention on Tobacco Control*
  http://whqlibdoc.who.int/publications/2003/9241591013.pdf
- *World Malaria Report, 2011.* World Health Organization
  http://www.who.int/malaria/world_malaria_report_2011/9789241564403_eng.pdf
- *Winnable Battle Plan: Global Immunization*. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention
  http://www.cdc.gov/WinnableBattles/GlobalImmunization/index.html

- *Winnable Battle Plan: Global Motor Vehicles.* U.S. Department of Health and Human Services, Centers for Disease Control and Prevention
  http://www.cdc.gov/WinnableBattles/MotorVehicleInjury/index.html

- *Winnable Battle Plan: Lymphatic Filariasis.* U.S. Department of Health and Human Services, Centers for Disease Control and Prevention
  http://www.cdc.gov/winnablebattles/LymphaticFilariasis/index.html

- *Winnable Battle Plan: Mother-to-Child Transmission of HIV and Syphilis Globally.* U.S. Department of Health and Human Services, Centers for Disease Control and Prevention
  http://www.cdc.gov/winnablebattles/Mother-to-ChildTransmission/

- *Winnable Battle Plan: Tobacco Use*. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention
  http://www.cdc.gov/WinnableBattles/Tobacco/index.html

Endnotes

[1] US Department of Health and Human Services. The Global Health Strategy of the U.S. Department of Health and Human Services. Available at http://globalhealth.gov/pdfs/GlobalHealthSecretary.pdf

[2] CDC Center for Global Health. Public Health Framework for Health Systems Strengthening [factsheet]. Available at http://www.cdc.gov/globalhealth/pdf/HHS_one_pager_factsheet_press_quality.pdf

[3] President's Emergency Plan for AIDS Relief FY 2011 Annual Program Results. Available at http://www.pepfar.gov/documents/organization/80161.pdf

[4] World Health Organization. Progress Report: Global HIV/AIDS response, 2011, p.2. Coverage based upon WHO's 2010 guidelines for initiation of ART at a CD4 T-cell threshold of 350 cells/µl.

[5] Life years saved through ART are attributable to the direct and indirect benefits of antiretroviral treatment and were estimated using CDC's PEPFAR ART cost model. The estimate of infant infections averted is based upon PEPFAR 2011 annual program results and the preventive efficacy of PMTCT services.

[6] Based upon preliminary data analysis, per-patient cost is estimated as PEPFAR country operational plan treatment budget allocation divided by reported direct patients supported by PEPFAR, lagged by one year (COP treatment allocation in year t divided by treatment results in year t+1). Data sources are PEPFAR country operational plan budgets and the PEPFAR annual program results.

[7] World Health Organization. Progress Report: Global HIV/AIDS response, 2011, p.1.

[8] Modeling estimate based upon PEPFAR annual program results and preventive efficacy of PMTCT services.

[9] Remarks on "Creating an AIDS-free Generation" by Hillary Rodham Clinton, National Institutes of Health, Nov. 8, 2011. Available at http://www.state.gov/secretary/rm/2011/11/176810.htm See also "American Leadership to Reach an AIDS-Free Generation" by Gayle Smith and Ambassador Eric Goosby, The White House Blog, December 1, 2011. Available at http://www.whitehouse.gov/blog/2011/12/01/american-leadership-reach-aids-free-generation

[10] Remarks on "Creating an AIDS-free Generation" by Hillary Rodham Clinton, National Institutes of Health, Nov. 8, 2011. Available at http://www.state.gov/secretary/rm/2011/11/176810.htm

[11] Remarks by the President on World AIDS Day, President Barack Obama, George Washington University, December 1, 2011. Available at http://www.whitehouse.gov/the-press-office/2011/12/01/remarks-president-world-aids-day

[12] World Health Organization. Global Tuberculosis Control 2011. Geneva, Switzerland 2011.

[13] World Health Organization. Guidelines for intensified tuberculosis case-finding and isoniazid preventive therapy for people living with HIV in resource-constrained settings. Geneva, Switzerland 2011.

[14] World Malaria Report, 2011. Available at http://www.who.int/malaria/world_malaria_report_2011/9789241564403_eng.pdf

[15] The President's Malaria Initiative Sixth Annual Report. Available at http://pmi.gov/resources/reports/pmi_annual_report12.pdf

[16] Lantos-Hyde United States Government Malaria Strategy, 2009-14. Available at http://pmi.gov/resources/reports/usg_strategy2009-2014.pdf

[17] The President's Malaria Initiative Sixth Annual Report. Available at http://pmi.gov/resources/reports/pmi_annual_report12.pdf

[18] Berry RJ, Li Z, Erickson JD, Li S, Moore CA, Want H, et al. Prevention of Neural Tube Defects with folic acid in China. N Engl J Med. 1999; 341 (20): 1485-90.

[19] CDC Grand Rounds: Additional opportunities to prevent neural tube defects with folic acid fortification MMWR; August 13, 2010/59(31);980-4.

[20] United Nations Children's Fund. Levels and Trends in Child Mortality 2011. Available at http://www.childinfo.org/files/Child_Mortality_Report_2011.pdf

[21] Black R, Cousens S, Johnson H, Lawn J, Rudan I, Bassani D, Jha P, Campbell H, Walker C, Cibulskis R, Eisele T, Liu L, and Mathers C, for the Child Health Epidemiology Reference Group of WHO and UNICEF, 2010, "Global, Regional, and National Causes of Child Mortality in 2008: A Systematic Analysis," *Lancet* 375(9730): 1969–87.

[22] Briere EC, Ryman TK, Cartwright E. et al. Impact of integration of hygiene kit distribution with routine immunizations on infant vaccine coverage and water treatment and handwashing practices of Kenyan mothers. JInfectDis 2012; 205:S56-64.

[23] Lule J. Mermin JE, Ekwaru JP et al. Effect of home-based water chlorination and safe storage on diarrhea among persons with HIV in Uganda. AmJTropMedHyg 2005;73(5):926-33.

[24] Sheth AN, Russo E, Menon M et. Al. Impact of the integration of water treatment and handwashing incentives with antenatal services on hygiene practices of pregnant women in Malawi. AmJTropMedHyg. 2010; 83(6):1315-21.

[25] Centers for Disease Control and Prevention, Morbidity and Mortality Weekly Report. Ten Great Public Health Achievements—Worldwide, 2001–2010. Available at http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6024a4.htm?s_cid=mm6024a4_w

[26] Working to overcome the global impact of neglected tropical diseases: the first WHO report on neglected tropical diseases. Available at http://whqlibdoc.who.int/publications/2010/9789241564090_eng.pdf

[27] Global Health Initiative. Results. Available at http://www.ghi.gov/about/goals/index.htm

[28] World Health Organization. Tribute to the over one million Community Directed Distributors (CDDs): an unprecedented commitment to eliminating Onchocerciasis from Africa through a unique Partnership [Internet] Available at http://www.who.int/apoc/en/

[29] World Health Organization. The Partners for Parasite Control. [Internet] Available at http://www.who.int/wormcontrol/about_us/en/

[30] Addiss, D.G., Beach, M.J., Streit, T.G., Lutwick, S., LeConte, F.H., Lafontant, J.G., and Lammie, P.J. Randomised placebo-controlled comparison of ivermectin and albendazole alone and in combination for *Wuchereria bancrofti* microfilaraemia in Haitian children. Lancet. 1997. 350:480-4.

[31] Cantey P et al. Increasing compliance with mass drug administration programs for lymphatic filariasis in India through education and lymphedema management programs. PLoS Negl Trop Dis. 2010 Jun 29; 4(6):e728.

[32] The World Bank. State of the World's Vaccines and Immunization, Third Edition. Available at http://whqlibdoc.who.int/publications/2009/9789241563864_eng.pdf

[33] Garnett GP, Kim JJ, French K, Goldie SJ. Modelling the impact of HPV vaccines on cervical cancer and screening programmes. Vaccine. 2006. 24: S178-86. Available at http://ije.oxfordjournals.org/content/34/6/1329.full.pdf

[34] Centers for Disease Control and Prevention. Progress Towards Interruption of Wild Poliovirus Transmission—Worldwide January 2011-March 2012. [Internet] Available at http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6119a6.htm

[35] Centers for Disease Control and Prevention. Morbidity and Mortality Weekly Report. Progress Toward Global Interruption of Wild Poliovirus Transmission—Worldwide, January 2011-March 2012. Available at http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6119a6.htm

[36] Centers for Disease Control and Prevention. Apparent Global Interruption of Wild Poliovirus Type 2 Transmission. [Internet] Available at http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5012a2.htm

[37]Centers for Disease Control and Prevention. Morbidity and Mortality Weekly Report. Progress Toward Global Interruption of Wild Poliovirus Transmission—Worldwide, January 2011-March 2012. Available at http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6119a6.htm

[38] Assessment of the 2010 Global Measles Mortality Reduction Goal: Results from a Model of Surveillance Data. Lancet. Available at http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(12)60522-4/abstract

[39] World Health Organization. Global Status Report on Noncommunicable Diseases 2010. Available at http://www.who.int/nmh/publications/ncd_report_full_en.pdf

[40] World Economic Forum. Global Economic Burden of Noncommunicable Diseases. Available at http://www3.weforum.org/docs/WEF_Harvard_HE_GlobalEconomicBurdenNonCommunicableDiseases_2011.pdf

[41] World Health Organization. *Global status report on road safety: time for action*. Geneva, WHO, 2009. Available at www.who.int/violence_injury_prevention/road_safety_status/2009

[42] World Health Organization. *The Global Burden of Disease: 2004 Update.* Geneva, WHO, 2008. Available at www.who.int/healthinfo/global_burden_disease/2004_report_update/en/index.html

[43] Meyer P, Brown MJ, Falk H. Global approaches to reducing lead exposure and poisoning. Mutation Research-Reviews in Mutation Research. 2008; 659: 166-75.

[44] World Health Organization. Indoor Air Pollution: National Burden of Disease Estimates. Available at http://www.who.int/indoorair/publications/indoor_air_national_burden_estimate_revised.pdf

[45] Frieden, Koplan. Stronger national public health institutes for global health. Lancet. 2010 Nov 20. 376. 1721-2. Available at http://www.ianphi.org/uploads/news/Lancet%20NPHIs.pdf

[46] Bloland P, Simone P, Burkholder B, Slutsker L, DeCock, KM (2012) The Role of Public Health Institutions in Global Health System Strengthening Efforts: The US CDC's Perspective. PLoS Med 9(4): e1001199. Doi:10.1371/journal.pmed.1001199. Available at http://www.plosmedicine.org/article/info%3Adoi%2F10.1371%2Fjournal.pmed.1001199

[47] Sonda ZC, Perry HN, Messonnier NR, Djingarey MH, Ki SO, Meltzer MI (2010) Modeling the Cost-Effectiveness of the Integrated Disease Surveillance and Response (IDSR) System: Meningitis in Burkina Faso. PLos ONE 5(9): e13044. Doi:10.1371/Journal.pone.0013044

[48] World Health Organization Regional Office for Africa (2012). Report of IDSR Country Assessments in the WHO African Region. Brazzaville.