ISSUE REPORT

Ready or Not?

PROTECTING THE PUBLIC'S HEALTH FROM DISEASES, DISASTERS, AND BIOTERRORISM 2012

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Introduction

September 11, 2001 and the anthrax tragedies were a wake-up call to the country. One of the things that caught the country off-guard was how limited public health emergency preparedness was in the United States.

Since then, there have been ongoing reminders about why it is essential to maintain the ability to respond to health needs during major incidents, like Superstorm Sandy or the H1N1 pandemic flu outbreak. But what has become equally evident is the number of health threats in the realm that we can anticipate but we are not sufficiently prepared to address as a nation. In addition to extreme weather events and foodborne illnesses like *Salmonella* and *E.coli*, we have suffered a deadly rise of West Nile virus, a fungal meningitis outbreak and a resurgence of old diseases we thought were largely conquered—like whooping cough and tuberculosis—all in an era of growing antibiotic resistance.

In addition, we have learned lessons about the need to coordinate efforts and partners across a range of sectors for preparedness to be effective. Preparedness requires public health officials, health care providers (including hospitals, primary care providers and institutional care facilities), police, firefighters, EMS and other emergency personnel, the intelligence community, poison control centers, business, transportation, human services, housing officials, elected officials, community and faith-based groups, schools and a host of other groups to work together, communicate and build common goals and strategies.

The importance of being prepared for catastrophes cannot be diminished, but, as a country, we have not paid sufficient attention to the everyday threats that public health departments and health care providers face repeatedly.

The good news is that considerable progress has been made to effectively prepare for and respond to public health emergencies of all types and sizes and much of what it takes to prepare for bioterrorism or major disasters is also essential to respond to ongoing "everyday" health emergencies. The bad news is that the accomplishments achieved over the past decade to improve public health preparedness for all hazards are now being undermined due to severe budget cuts and lack of prioritization.

Since 2001, investments have led to major accomplishments in preparedness planning and coordination; public health laboratories; vaccine manufacturing; the Strategic National Stockpile; pharmaceutical and medical equipment distribution and administration; surveillance; communications; legal and liability protections; increasing and upgrading staff; and surge capacity. However, major areas of vulnerability have also persisted, particularly in biosurveillance, providing mass care during emergencies, maintaining a stable medical countermeasure (MCM) strategy and helping communities learn how to become more resilient and to cope with and recover from emergencies.

Instead of building on the achievements and tackling the continuing concerns, the progress of the past 10 years is now at risk due to factors including:

- **Outdated Congressional Authority:** Reauthorization of the Pandemic and All-Hazards Preparedness Act of 2006 (PAPHA) [previously known as the Public Health Security and Bioterrorism Act of 2002] has languished in Congress for over a year;
- **Federal Budget Cuts:** After September 11th, it was widely recognized that there was no systematic support for state and local communities to prepare for public health emergencies, and Congress acted quickly to fill that gap. These are the only funds dedicated to help state and local health departments with the ability to prepare and respond to a range of health emergencies, including bioterror attacks, natural disasters, foodborne illnesses and emerging infectious diseases. From fiscal years (FY) 2005 to 2012, however, there has been more than a 38 percent cut to these federal funds from the U.S. Centers for Disease Control and Prevention (CDC) used to support state and local preparedness (adjusted for inflation), and additional cuts are expected.

- **State Budget Cuts:** 29 states have cut their public health budgets from FY 2010-11 to FY 2011-12. Budgets in 23 states decreased for two or more years in a row, and budgets in 14 states decreased for three or more years in a row. According to a survey by the Association of State and Territorial Health Officials (ASTHO), 48 state health agencies (SHAs) reported experiencing budget cuts since 2008.[1] According to the Center on Budget and Policy Priorities (CBPP), states have experienced overall budgetary shortfalls of $540 billion combined from FY 2009 to FY 2012 and 31 states have projected or closed budget gaps totaling $55 billion in FY 2013.[2, 3]
- **Job and Program Cuts:** State and local health departments have cut more than 45,700 jobs across the country since 2008.[4] During 2011, 57 percent of all local health departments reduced or eliminated at least one program. Emergency preparedness was the hardest hit—with 23 percent of local health departments reporting a reduction.[5]

Every American deserves basic health protections and to live in a safe community. It is essential to maintain basic, core preparedness and response capabilities to protect us from unthinkable catastrophes and those we live with everyday.

READY OR NOT 2012

The Trust for America's Health (TFAH) issues the *Ready or Not?* report annually to provide the public and policymakers with an independent analysis about progress and vulnerabilities in the nation's public health preparedness. The report assesses the level of preparedness in states, evaluates the federal government's role and performance, and offers recommendations for improving emergency preparedness.

This report also aims to foster greater accountability for how effectively taxpayer dollars are used to improve the nation's readiness for health emergencies. Without transparency, it is hard for the policymakers to assess how well prepared we are for the range of threats our nation faces.

The report:

- Informs policymakers about the status of public health preparedness in the United States;
- Provides greater transparency for public health preparedness programs;
- Encourages greater accountability for the spending of preparedness funds; and
- Recommends ways to help the nation move toward a strategic, capabilities-based system able to respond effectively to health threats posed by diseases, disasters and bioterrorism.

The 2012 edition of the *Ready or Not?* report focuses on reviewing state and federal public health emergency preparedness.

The report features indicators that provide a composite snapshot of key areas of preparedness. The indicators are based on a range of preparedness concerns, reflecting a broad definition of all-hazards emergency health preparedness. Many of the indicators reflect proxy measures for areas where direct measures are not available.

Scores are not intended to serve as a reflection on performance of specific state or local health departments, since they reflect a much broader context, including resources, policy environments and health status of a community, and reflect many factors that are often beyond the direct control of these departments. Rather, this report is intended to help identify where sufficient action has been taken to support adequate public health preparedness and where and how states could improve or overcome obstacles to an all-hazards approach to public health preparedness.

Over the course of 10 years, the set of indicators featured in the report has evolved to reflect recent priorities and concerns, and some indicators have been retired when a large majority of states have consistently achieved the specific measure. The *Ready or Not?* report has documented significant accomplishments of states. For instance, all states have developed preparedness plans and pandemic flu plans; nearly every state has shown significant advances in the ability to rapidly test for biological and chemical threats; all states and Washington, D.C. have met CDC's evaluation standard for plans to receive and distribute supplies from the Strategic National Stockpile; nearly every state now uses a disease surveillance system that is compatible with the CDC's system and can send and/or receive electronic health information with health care providers; and all states and Washington, D.C. met three key criteria for the Medical Reserve Corps.

The contents of the report include:

- **Section 1:** An examination of state-by-state public health preparedness, in which states are evaluated on 10 key preparedness indicators, based on input and review from public health experts.
- **Section 2:** An examination of national policy issues and recommendations for improving all-hazards and pandemic preparedness.

READY OR NOT? 2012: KEY FINDINGS

- 29 states cut funding for public health from FY 2010-11 to FY 2011-12;
- Only three states were not able to notify and assemble public health staff to ensure quick response to an incident in 2011, based on a CDC report;
- 48 states and Washington, D.C. did not meet the U.S. Department of Health and Human Services goal of vaccinating 90 percent of 19 to 35 month old children against whooping cough;
- 13 states and Washington, D.C. do not require Medicaid to cover flu shots with no co-payment requirements for beneficiaries under the age of 65;
- 35 states and Washington, D.C. do not currently have climate change adaptation plans, which include planning for the health threats posed by extreme weather events;
- 20 states do not mandate all licensed child care facilities to have a multi-hazard written evacuation and relocation plan;
- 21 states have not been accredited by the Emergency Management Accreditation Program (EMAP);
- 26 states and Washington, D.C. do not participate in a Nurse Licensure Compact, permitting nurses to be licensed to practice in other states with compacts;
- 13 state public health laboratories report they do not have sufficient capacity to work five, 12-hour days for six to eight weeks in response to an infectious disease outbreak, such as novel influenza A H1N1; and
- Only one state public health laboratory reported a decrease in its Laboratory Response Network for Chemical Threats (LRN-C) chemical capacity from August 10, 2011 to August 9, 2012.

SECTION 1

State-by-State Public Health Preparedness Indicators and Scores

All Americans have the right to expect fundamental health protections during public health emergencies, no matter where they live.

To help assess health emergency preparedness, this section of the *Ready or Not?* report examines a series of 10 indicators of preparedness in each state that, taken collectively, offer a composite snapshot of strengths and vulnerabilities.

While federal, state and local health departments and private health providers, particularly hospitals, all have roles to play in public health preparedness, states have primary legal jurisdiction and responsibility for the health of their citizens.[6] In addition, the federal government provides funding for preparedness to states. Since the terrorist attacks of September 11, 2001, the U.S. Department of Health and Human Services (HHS) has provided $9 billion in preparedness funding to states and some major cities through CDC's Public Health Emergency Preparedness (PHEP) cooperative agreements and more than $4.6 billion to help improve the ability of hospitals and states to provide medical care during emergencies through the Hospital Preparedness Program (HPP). In 2012, these two major preparedness grant programs were aligned to improve coordination and leverage resources. In addition, there are efforts at the federal level to continue to improve coordination of preparedness programs across the Federal Emergency Management Agency (FEMA).

States differ in how they structure, deliver and fund public health services, and different states have different strengths and vulnerabilities in capabilities. States with multiple, high-density urban areas may function very differently than those with fewer residents spread across smaller cities and towns.

FEDERAL, STATE AND LOCAL PUBLIC HEALTH JURISDICTIONS

The federal role: Includes policymaking, funding programs, overseeing national disease prevention efforts, collecting and disseminating health information (including through surveillance), building capacity and directly managing some services, and supporting biomedical research and production capability.[7] Some public health capabilities, such as the Strategic National Stockpile and the National Disaster Medical System (NDMS), are federal assets managed by federal agencies that are available to supplement a state's and community's response to a public health emergency that overwhelms or may overwhelm its capabilities. Public health functions are widely diffused across eight federal agencies and two offices.

State and local roles: Under U.S. law, state governments have primary responsibility for the health of their citizens. Constitutional "police powers" give states the ability to enact laws and issue regulations to protect, preserve and promote the health, safety and welfare of their residents. In most states, state laws charge local governments with responsibility for the health of their citizens. State and local health departments and first responders are the front line in any public health emergency.

ALIGNMENT OF FEDERAL PUBLIC HEALTH PREPAREDNESS AND HOSPITAL PREPAREDNESS FUNDS FOR STATE AND LOCAL JURISDICTIONS

For the first time this year, HHS jointly awarded the PHEP cooperative agreement and the HPP grants—providing a total of $971 million to states and territories for public health preparedness, including $619 million for public health departments and $352 million for health care systems.[8]

CDC administers the PHEP cooperative agreement program, which awards funds to state, local, tribal and territorial public health departments to build and sustain public health preparedness capabilities that are flexible and adaptable in responding to public health emergencies.

Administered by ASPR, HPP provides leadership and funding through grants and cooperative agreements to states, territories, and eligible municipalities to improve surge capacity and enhance community and hospital preparedness for public health emergencies.[9] HPP provides support for health care coalitions to coordinate disaster planning, train health care personnel, exercise plans and address issues such as communications, information sharing and fatality management. It also pays for disaster training and helps local networks of hospitals—as well as local businesses and non-profit groups—work together to plan for emergencies.

By awarding the grants jointly, HHS aims to increase efficiency and cooperation between the nation's public health and health care systems "to advance all-hazards preparedness and national health security, promote responsible stewardship of federal funds, and reduce the administrative burden for grant recipients. The programs support complementary preparedness capabilities and performance measures, use the same processes for grants administration, technical assistance and data management, use common reporting requirements, and have compatible IT systems."[10]

HPP and PHEP will continue as individual programs with separate budgets, but will have a single HPP-PHEP funding opportunity announcement, funding application, grant award and administrator—CDC's Procurement and Grants Office.

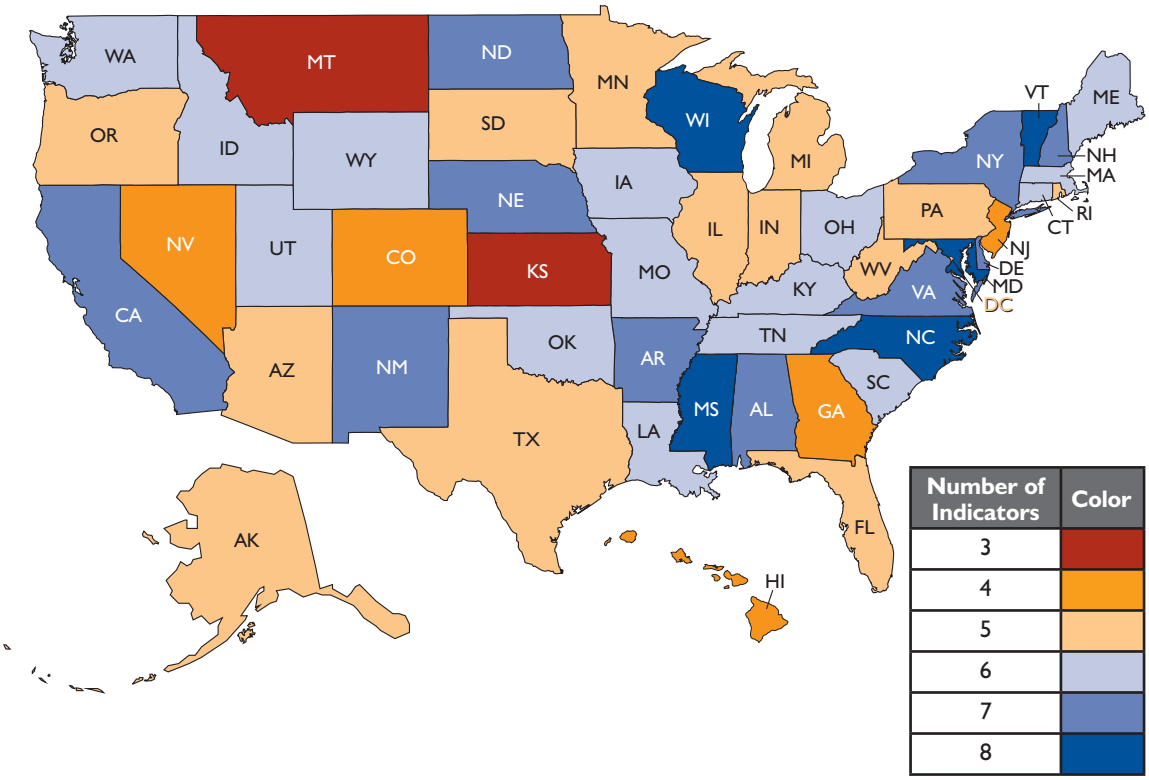
This report was developed to provide taxpayers and policymakers with information about how well-prepared their states and communities are for different types of health threats. The American people deserve to know how prepared their states and communities are for different types of health threats, particularly when their taxpayer dollars are being spent to support preparedness efforts. Currently, the American public is not equipped with enough information to monitor and hold public officials accountable for whether their communities are adequately prepared.

Limited data is made publicly available to measure public health preparedness. In fact, despite nearly a decade of federal public health preparedness funding to states and localities, reliable, valid performance measures to evaluate emergency preparedness are not yet fully developed, despite numerous commissions and studies that were funded to create them.[11, 12, 13]

In September 2012, CDC issued its fourth report on states' preparedness, *Public Health Preparedness: 2012 State-By-State Report on Laboratory, Emergency Operations Coordination, and Emergency Public Information and Warning Capabilities*, a follow-up to their 2008 and 2012 reports on states' preparedness.[14] The report differs from the *Ready or Not?* report in that it only reports on data collected by CDC.

Following up on Congress' expressed desire for CDC to continue to report state-by-state data, the CDC's reports have been a step forward in improving accountability and transparency—allowing Americans to see how their tax dollars are being used to better protect their families and communities from a range of health threats. However, the 2012 report provided little detail about the findings and measurement, and was limited to available data related to three of the 15 public health preparedness capabilities identified by CDC as the basis for state and local preparedness.

The Ready or Not? report compiles indicators based on the best publicly available data or data received from surveying states directly. Each state receives a score based on 10 key indicators. States receive one point for achieving an indicator or zero points if they do not achieve the indicator. Zero is the lowest possible overall score, and 10 is the highest. *(For more information, please see Appendix D: Data and Methodology for State Indicators.)*



8 (5 states)	7 (10 states)	6 (15 states)	5 (13 states & D.C.)	4 (5 states)	3 (2 states)
Maryland	Alabama	Connecticut	Alaska	Colorado	Kansas
Mississippi	Arkansas	Idaho	Arizona	Georgia	Montana
North Carolina	California	Iowa	D.C.	Hawaii	
Vermont	Delaware	Kentucky	Florida	Nevada	
Wisconsin	Nebraska	Louisiana	Illinois	New Jersey	
	New Hampshire	Maine	Indiana		
	New Mexico	Massachusetts	Michigan		
	New York	Missouri	Minnesota		
	North Dakota	Ohio	Oregon		
	Virginia	Oklahoma	Pennsylvania		
		South Carolina	Rhode Island		
		Tennessee	South Dakota		
		Utah	Texas		
		Washington	West Virginia		
		Wyoming			

STATE PREPAREDNESS SCORES

States	(1) Increased or maintained level of funding for public health services from FY 2010-11 to FY 2011-12	(2) Notified and assembled public health staff to ensure quick response to an incident.	(3) Met HHS goal of vaccinating 90 percent of 19 to 35 month olds against whooping cough.	(4) Requires Medicaid coverage fo flu shots with no co-pay for beneficiaries under age of 65.	(5) State has a complete climate change adaptation plan.	(6) Mandates all licensed child-care facilities to have a multi-hazard written evacuation and relocation plan.
Alabama	✓	✓		✓		✓
Alaska	✓	✓			✓	✓
Arizona		✓				
Arkansas		✓		✓		✓
California	✓	✓			✓	✓
Colorado		✓				
Connecticut	✓			✓	✓	✓
Delaware	✓	✓		✓		✓
DC	✓	✓				✓
Florida		✓			✓	
Georgia	✓	✓				
Hawaii	✓		✓			✓
Idaho	✓	✓		✓		
Illinois		✓		✓		
Indiana	✓	✓		✓		
Iowa	✓	✓		✓		
Kansas		✓		✓		
Kentucky		✓		✓		✓
Louisiana		✓		✓		✓
Maine		✓		✓	✓	
Maryland		✓		✓	✓	✓
Massachusetts	✓	✓		✓	✓	✓
Michigan		✓		✓		
Minnesota	✓	✓		✓		
Mississippi	✓	✓		✓		✓
Missouri		✓				✓
Montana		✓				
Nebraska		✓	✓	✓		
Nevada		✓		✓		✓
New Hampshire		✓		✓	✓	✓
New Jersey		✓		✓		
New Mexico		✓		✓		✓
New York	✓			✓	✓	✓
North Carolina	✓	✓		✓		✓
North Dakota	✓	✓		✓		✓
Ohio		✓		✓		✓
Oklahoma	✓	✓				✓
Oregon		✓		✓	✓	
Pennsylvania		✓			✓	✓
Rhode Island		✓		✓		
South Carolina	✓	✓		✓		
South Dakota		✓		✓		
Tennessee		✓		✓		
Texas		✓		✓		✓
Utah		✓				✓
Vermont	✓	✓		✓	✓	✓
Virginia		✓			✓	✓
Washington		✓		✓	✓	✓
West Virginia		✓		✓		✓
Wisconsin	✓	✓		✓	✓	✓
Wyoming	✓	✓		✓		✓
Total	**21 + D.C.**	**47 + D.C.**	**2**	**37**	**15**	**30 + D.C.**

States	(7) State has been accredited by the Emergency Management Accreditation Program.	(8) State participates in a Nurse Licensure Compact.	(9) State public health lab reports having enough staffing capacity to work five, 12-hour days for six to eight weeks in reponse to an infectious disease outbreak, such as novel influenza A H1N1.	(10) State public health lab reports increasing or maintaining their LRN-C chemical capability.	2012 Total Score
Alabama	✓		✓	✓	7
Alaska				✓	5
Arizona	✓	✓	✓	✓	5
Arkansas	✓	✓	✓	✓	7
California	✓		✓	✓	7
Colorado	✓	✓		✓	4
Connecticut			✓	✓	6
Delaware		✓	✓	✓	7
DC	✓		✓		5
Florida	✓		✓	✓	5
Georgia	✓			✓	4
Hawaii				✓	4
Idaho		✓	✓	✓	6
Illinois	✓		✓	✓	5
Indiana	✓			✓	5
Iowa	✓	✓		✓	6
Kansas				✓	3
Kentucky		✓	✓	✓	6
Louisiana	✓		✓	✓	6
Maine		✓	✓	✓	6
Maryland	✓	✓	✓	✓	8
Massachusetts	✓				6
Michigan	✓		✓	✓	5
Minnesota			✓	✓	5
Mississippi	✓	✓	✓	✓	8
Missouri	✓	✓	✓	✓	6
Montana			✓	✓	3
Nebraska	✓	✓	✓	✓	7
Nevada				✓	4
New Hampshire		✓	✓	✓	7
New Jersey	✓			✓	4
New Mexico	✓	✓	✓	✓	7
New York	✓		✓	✓	7
North Carolina	✓	✓	✓	✓	8
North Dakota		✓	✓	✓	7
Ohio	✓		✓	✓	6
Oklahoma	✓		✓	✓	6
Oregon			✓	✓	5
Pennsylvania	✓			✓	5
Rhode Island		✓	✓	✓	5
South Carolina	✓	✓		✓	6
South Dakota		✓	✓	✓	5
Tennessee	✓	✓	✓	✓	6
Texas		✓		✓	5
Utah	✓	✓	✓	✓	6
Vermont	✓		✓	✓	8
Virginia	✓	✓	✓	✓	7
Washington			✓	✓	6
West Virginia			✓	✓	5
Wisconsin		✓	✓	✓	8
Wyoming			✓	✓	6
Total	**29 + D.C.**	**24**	**37 + D.C.**	**49**	

The measures reflect a broad definiton of all-hazards preparedness, including disease control, response to manmade and natural disasters and bioterrorism. They also encompass a range of capabilities, policies and outcomes. Also, the 2012 indicators reflect an increasing emphasis on the intersection of public health and health care services and cross-sector preparedness.

Low scores are not intended to lead to punitive actions. In fact, scores are not intended to serve as a reflection on performance of specific state or local health departments, since they reflect a much broader context, including resources, policy environments and health status of a community, and reflect many factors that are often beyond the direct control of these departments. Rather, this report is intended to help identify where sufficient action has been taken to support adequate public health preparedness and where and how states could improve or overcome obstacles to an all-hazards approach to public health preparedness. In addition, providing information about which states have particular strengths allows others to know which states to turn to for best practices and models to guide their own preparedness efforts.

The indicators in this report were selected based on:

- Reflection of a fundamental, systemic public health need;
- Consultation with key experts about areas important to serving basic public health emergency needs; and
- The availability of state level data which were able to be verified through independent means or in consultation with states.

Based on only being able to use available, verifiable data, TFAH is only able to assess states comparatively where there are data available for all 50 states and DC. It is important to note that many states have taken action and developed strengths in other areas of preparedness or may be in the process of increasing certain capabilities not reflected in this report that may be important for that state.

Data from these indicators were drawn from a range of publicly available sources, including CDC, a survey conducted by the Association of Public Health Laboratories (APHL), Save the Children, Kaiser Family Foundation, Center for Climate and Energy Solutions, Emergency Management Accreditation Program (EMAP), the National Council of State Boards of Nursing, states' public documents and interviews with government officials.

READY OR NOT? DOCUMENTS PREPAREDNESS PROGRESS

The Ready or Not? report has documented the significant progress that states have made in preparing for public health emergencies.

The 10 indicators are adapted annually to reflect changing expectations for preparedness and changes in state preparedness data that are made publicly available. Updating the indicators each year allows the report to reflect a range of preparedness issues, including emphasizing what is of the highest concern in any given year, but all of the issues are considered to be important and integral parts of overall public health emergency capabilities. The report does maintain some consistency between years to help balance measuring ongoing concerns with new, revised, or highlighted concerns.

NATIONAL HEALTH SECURITY PREPAREDNESS INDEX

ASTHO, through a cooperative agreement with CDC, is working with a range of public and private partners to facilitate development of a tool to measure progress in preparedness, the National Health Security Preparedness Index (NHSPI), to help quantify the current status of public health and health system preparedness at the national and state level. The NHSPI will serve as a single tool for state and local officials to measure their community's preparedness, and will identify current capabilities and gaps, as well as best practices for improvement. It will also maintain accountability for federal preparedness funding by assessing current investments' effects on preparedness.[15] The methodology of the NHSPI is currently in development and the first evaluation is expected to be released in 2013.

More information about the NHSPI is available at: http://www.astho.org/preparednessindex/

CDC'S 15 PUBLIC HEALTH PREPAREDNESS CAPABILITIES[16]

In 2011, CDC identified 15 core capabilities in six domains to assist state and local public health departments in strategic planning for public health preparedness:

Biosurveillance

- **Public health laboratory** testing is the ability to conduct rapid and conventional detection, characterization, confirmatory testing, data reporting, investigative support and laboratory networking to address actual or potential exposure to all hazards, including chemical, radiological and biological agents in clinical, food and environmental samples.
- **Public health surveillance and epidemiological investigation** is the ability to create, maintain, support and strengthen routine surveillance and detection systems and epidemiological investigation processes, as well as to expand these systems and processes in response to public health emergencies.

Community Resilience

- **Community preparedness** is the ability of communities to prepare for, withstand and recover from public health incidents in the short and long term, through engagement and coordination with emergency management, health care organizations and providers, community and faith-based partners, and state and local governments.
- **Community recovery** is the ability to collaborate with community partners to plan and advocate for the rebuilding of public health, medical and mental/behavioral health systems to a functioning level or better after an emergency.

Incident Management

- **Emergency operations coordination** is the ability to direct and support a public health or medical incident by establishing a standardized, scalable system of oversight, organization and supervision consistent with jurisdictional standards and practices and with the National Incident Management System.

Information Management

- **Emergency public information and warning** is the ability to develop, coordinate and disseminate information, alerts, warnings and notifications to the public and incident management responders.
- **Information sharing** is the ability to conduct multijurisdictional, multidisciplinary exchange of health-related information and situational awareness data among all levels of government and the private sector in preparation for and in response to public health incidents.

Surge Management

- **Fatality management** is the ability to coordinate with other organizations to ensure the proper recovery, handling, identification, transportation, tracking, storage and disposal of human remains and personal effects; certify cause of death; and facilitate access to mental/behavioral health services to the family members, responders and survivors.
- **Mass care** is the ability to coordinate with partner agencies to address the public health, medical and mental/behavioral health needs of those affected by an incident and gathered together. This capability includes ongoing surveillance and assessment as the incident evolves.
- **Medical surge** is the ability to provide adequate medical evaluation and care during events that exceed the limits of the normal medical infrastructure, and to survive a hazard impact and maintain or rapidly recover operations that were compromised.
- **Volunteer management** is the ability to coordinate the identification, recruitment, registration, credential verification, training and engagement of volunteers to support the public health agency's response.

Countermeasures and Mitigation

- **Medical countermeasure dispensing** is the ability to provide medical countermeasures in support of treatment or prophylaxis to the identified population in accordance with public health guidelines and/or recommendations.
- **Material management and distribution** is the ability to acquire, maintain, transport, distribute and track medical materiel during an incident and to recover and account for unused medical materiel, as necessary, after an incident.
- **Non-pharmaceutical interventions** are the ability to recommend to the applicable lead agency and implement strategies for disease, injury and exposure control, such as quarantine, social distancing and hygiene.
- **Responder safety and health** is the ability to protect public health agency staff responding to an incident and support the health and safety needs of hospital and medical facility personnel, if requested.

PRESIDENTIAL POLICY DIRECTIVE-8 AND NATIONAL HEALTH SECURITY STRATEGY UPDATES

In March 2011, President Obama issued Presidential Policy Directive-8 (PPD-8): National Preparedness, which laid out the country's approach to preparing for acts of terrorism, such as cyber attacks, disease outbreaks and natural disasters.[17] Requirements of the directive include a National Preparedness Goal; a National Preparedness System that includes a series of National Frameworks and Federal Interagency Operational Plans; a National Preparedness Report; and a Campaign to Build and Sustain Preparedness. The U.S. Department of Homeland Security (DHS) released an updated National Preparedness Goal in September 2011, which set the vision for preparedness in five mission areas—prevention, protection, mitigation, response and recovery. In November 2011, DHS released the National Preparedness System—the integrated guidance, programs and processes need to implement the National Preparedness Goal. The National Preparedness Report, released in March 2012, summarizes the nation's current level of preparedness in the five mission areas and identifies progress and opportunities for improvement.[18] The report's findings related to public health and medical services included that:

1. Federal coordination of medical countermeasure efforts across agencies—from research and development through utilization—has greatly improved since 2001.
2. A focus on hospital medical surge planning and capabilities has improved hospital preparedness nationwide. Greater emphasis is being place on community approaches that involve healthcare coalitions, which include a variety of healthcare organizations, public health, mental and behavioral health and emergency management to enhance medical surge.
3. The nation has built a highly responsive public health capability for managing incidents, but recent reductions in public health funding and personnel have impacted these capabilities.
4. Emergency Medical Services (EMS) capabilities are critical to managing medical emergencies. Continuing to integrate EMS into planning and preparedness initiatives is an area of national focus.
5. The nation has developed an array of federal and volunteer medical assets to supplement state, local, tribal and territorial capabilities.

In December 2009, HHS released the National Health Security Strategy (NHSS) to help galvanize efforts to minimize the health consequences associated with significant health incidents. The strategy is built on a foundation of community resilience.[19] In May 2012, HHS released the NHSS Implementation Plan, which describes the outcomes desired in order to meet the strategic objectives of the NHSS, and identifies priority implementation activities, including fostering informed, empowered individuals and families and developing and maintaining the workforce needed for national health security.[20]

A. 2012 *READY OR NOT?* STATE-BY-STATE INDICATORS

Indicators	What the Indicators Measure
1. Funding Commitment — Did the state maintain or increase funding for public health programs from FY 2010-2011 to FY 2011-12?	This indicator, adjusted for inflation, demonstrates states' commitment and ability to fund public health programs, which support the infrastructure needed to adequately respond to emergencies.
2. Response Readiness — Was the state able to notify and immediately assemble (within the goal time of 60 minutes) public health staff to ensure a quick response to an incident in 2011?	The ability to assemble key decision makers quickly is essential for public health agencies to assess an emergency situation so they can quickly and effectively direct resources and personnel where they are needed.
3. Infectious Disease Control and Vaccinations — Did the state meet the HHS goal of vaccinating 90 percent of 19- to 35-month-olds against whooping cough?	The ability to regularly vaccinate the public, particularly children, is an important measure for how well the system can effectively reach and encourage vaccinations among the public. The need for this capability is amplified during a time of crisis when it is often necessary to reach and encourage mass segments or the whole population of a community to get vaccinated against a new threat on a time-sensitive schedule.
4. Infectious Disease Control — Does the state require Medicaid to cover flu shots with no co-pays for beneficiaries under the age of 65?	Establishing a cultural norm of annual flu vaccinations ensures the country has a strong mechanism in place to be better able to vaccinate all Americans quickly during a new pandemic or unexpected disease outbreak. Eliminating co-pays for Medicaid beneficiaries is particularly important since these Americans include many of the lowest-income and most vulnerable in terms of quality of health.
5. Extreme Weather Event Preparedness — Does the state currently have a complete climate change adaptation plan?	Climate change adaptation plans include building an understanding and planning for changing health considerations based on new weather patterns and threats.
6. Community Resiliency — Does the state mandate all licensed child-care facilities to have a multi-hazard written evacuation and relocation plan?	Having plans and mechanisms in place for the needs of children and other vulnerable populations is particularly important during emergencies.
7. Emergency Management — Has the state been accredited by the EMAP?	Accreditation is an important process for setting standards and establishing baseline capabilities. States that have been accredited through EMAP's voluntary, peer-reviewed process have taken the opportunity to demonstrate and be recognized for meeting these standards.
8. Health System Preparedness — Does the state participate in a Nurse Licensure Compact?	Multi-state licensure to practice in other states or localities can be particularly important in emergencies, when it is important to be able to recruit trained medical staff and volunteers from other jurisdictions to help in the response.
9. Public Health Laboratories Staffing and Surge Capacity — Does the state public health laboratory report having enough staffing capacity to work five, 12-hour days for six to eight weeks in response to an infectious disease outbreak, such as a novel influenza A H1N1, from August 10, 2011 to August 9, 2012?	Public health labs are on the front lines of conducting diagnostic testing during new threats or outbreaks and it is important to be able to have enough capacity to manage an influx of tests during emergencies.
10. Public Health Laboratories — Chemical Threat Preparedness — Did the state public health laboratory report having increased or maintained their Laboratory Response Network for Chemical Threats (LRN-C) chemical capability from August 10, 2011 to August 9, 2012?	The ability to have a system in place to safely and quickly test chemical threats is important to be able to respond effectively to potential threats.

1. INDICATOR: PUBLIC HEALTH FUNDING COMMITMENT — STATE PUBLIC HEALTH BUDGETS

FINDING: 29 states cut funding for public health from FY 2010-11 to FY 2011-12.

21 states and D.C. increased or maintained level funding for public health services from FY 2010-11 to FY 2011-12	29 states DECREASED funding for public health services from FY 2010-11 to FY 2011-12
State and percent increase (adjusted for inflation)	**State and percent decrease (adjusted for inflation)**
Alabama (4.4%)	Arizona (-10.2%) ^
Alaska (4.2%)[2]	Arkansas (-2.1%)
California (1.5%)	Colorado (-3.9%) ^
Connecticut (3.9%)[2]	Florida (-15.5%)[2]
Delaware (29.4%)[2]	Illinois (-2.5%) ^
D.C. (15.6%)	Kansas (-6.0%)[4, ^]
Georgia (1.2%)	Kentucky (-2.9%)*
Hawaii (0.1%)[2]	Louisiana (-19.3%)
Idaho (14.4%)	Maine (-7.7%)2, *
Indiana (32.9%)	Maryland (-1.3%)[2, ^]
Iowa (10.2%)	Michigan (-18.4%)[3]
Massachusetts (0.7%)	Missouri (-2.8%) ^
Minnesota (16.7%)[2, 4]	Montana (-21.0%)*
Mississippi (0.1%)[2]	Nebraska (-2.5%)*
New York (5.3%)	Nevada (-5.1%)4 ^
North Carolina (2.1%)[2]	New Hampshire (-17.4%)*
North Dakota (21.9%)[3]	New Jersey (-1.3%) ^
Oklahoma (6.9%)[1]	New Mexico (-9.1%) ^
South Carolina (0.2%)	Ohio (-8.7%)
Vermont (10.5%)	**Oregon (-17.1%) ^**
Wisconsin (7.0%)	Pennsylvania (-6.7%)[2, ^]
Wyoming (0.5%)	Rhode Island (-5.6%) ^
	South Dakota (-5.6%)[4, *]
	Tennessee (-3.5%)
	Texas (-7.3%)*
	Utah (-9.5%) ^
	Virginia (-4.3%)[3, ^]
	Washington (-0.2%)[3, *]
	West Virginia (-6.3%) *

NOTES:

Biennium budgets are **bolded**.

1 May contain some social service programs, **but not Medicaid or CHIP.**

2 General funds only.

3 Budget data taken from appropriations legislation.

4 State did not respond to the data check TFAH coordinated with ASTHO that was sent out October 26, 2012. States were given until November 16, 2012 to confirm or correct the information. The states that did not reply by that date were assumed to be in accordance with the findings.

* Budget decreased for second year in a row

^ Budget decreased for third year in a row

Source: Research by TFAH of publicly available state budget documents and interviews with health and budget officials in the states.

Note: Florida's Director of Health and Surgeon General John H. Armstrong, MD, FACS, FCCP noted in his review of budget materials "the Florida Department of Health has had, and continues to have, the resources necessary to accomplish core public health functions in Florida."

This indicator, adjusted for inflation, illustrates a state's commitment and ability to provide funding for public health programs that support the infrastructure—including workforce—needed to adequately respond to emergencies.

Every state allocates and reports its budget in different ways. States also vary widely in the budget details they provide. This makes comparisons across states difficult. For this analysis, TFAH examined state budgets and appropriations bills for the agency, department, or division in charge of public health services for FY 2010-11 and FY 2011-12, using a definition as consistent as possible across the two years, based on how each state reports data. TFAH defined "public health services" broadly, including most state-level health funding.

Based on this analysis, 29 states made cuts in their public health budgets. Twenty-three states cut their budget for two or more years in a row, 14 for three or more years in a row.

Public health funding is discretionary spending in most states and, therefore, is at high risk for significant cuts during economic downturns. While few states allocate funds directly for public health preparedness, state and local funding is essential for supporting public health infrastructure and core capacities of health departments. It is notable that several states that received points for this indicator may not have actually increased their spending on public health programs. The ways some states report their budgets, for instance, by including federal funding in the totals or including public health dollars within health care spending totals, make it very difficult to determine "public health" as a separate item.

Few states allocate funds directly for bioterrorism and public health preparedness as part of their public health budgets. Instead, most rely on federal funds to support these activities. The infrastructure of other public health programs (e.g. environmental health, immunization services, etc), however, also supports their underlying preparedness capabilities.

While this indicator examines whether states' public health budgets increased or decreased, it does not assess if the funding is adequate to cover public health needs in the states. This also does not take into account ongoing hospital needs and funding.

For additional information on the methodology of the budget analysis, please see Appendix D: Methodology for Select State Indicators.

2. INDICATOR: RESPONSE READINESS — EMERGENCY OPERATIONS COORDINATION CAPABILITY

FINDING: 47 states and Washington, D.C. demonstrated the ability to notify and immediately assemble (within the goal time of 60 minutes) public health staff to ensure a quick response to an incident in 2011.

47 states and Washington, D.C. notified and assembled public health staff to ensure quick response to an incident in 2011 (1 point).	3 states did not notify and assemble public health staff to ensure quick response to an incident in 2011 (0 points).
Alabama (18 minutes)	Connecticut (70 minutes)
Alaska (58 minutes)	Hawaii (221 minutes)
Arizona (43 minutes)	New York (72 minutes)
Arkansas (48 minutes)	
California (6 minutes)	
Colorado (10 minutes)	
Delaware (44 minutes)	
D.C. (30 minutes)	
Florida (53 minutes)	
Georgia (23 minutes)	
Idaho (5 minutes)	
Illinois (25 minutes)	
Indiana (23 minutes)	
Iowa (55 minutes)	
Kansas (56 minutes)	
Kentucky (14 minutes)	
Louisiana (25 minutes)	
Maine (26 minutes)	
Maryland (18 minutes)	
Massachusetts (22 minutes)	
Michigan (41 minutes)	
Minnesota (45 minutes)	
Mississippi (11 minutes)	
Missouri (39 minutes)	
Montana (16 minutes)	
Nebraska (45 minutes)	
Nevada (14 minutes)	
New Hampshire (46 minutes)	
New Jersey (32 minutes)	
New Mexico (32 minutes)	
North Carolina (44 minutes)	
North Dakota (15 minutes)	
Ohio (56 minutes)	
Oklahoma (16 minutes)	
Oregon (49 minutes)	
Pennsylvania (36 minutes)	
Rhode Island (10 minutes)	
South Carolina (49 minutes)	
South Dakota (30 minutes)	
Tennessee (59 minutes)	
Texas (59 minutes)	
Utah (10 minutes)	
Vermont (30 minutes)	
Virginia (26 minutes)	
Washington (8 minutes)	
West Virginia (5 minutes)	
Wisconsin (8 minutes)	
Wyoming (20 minutes)	

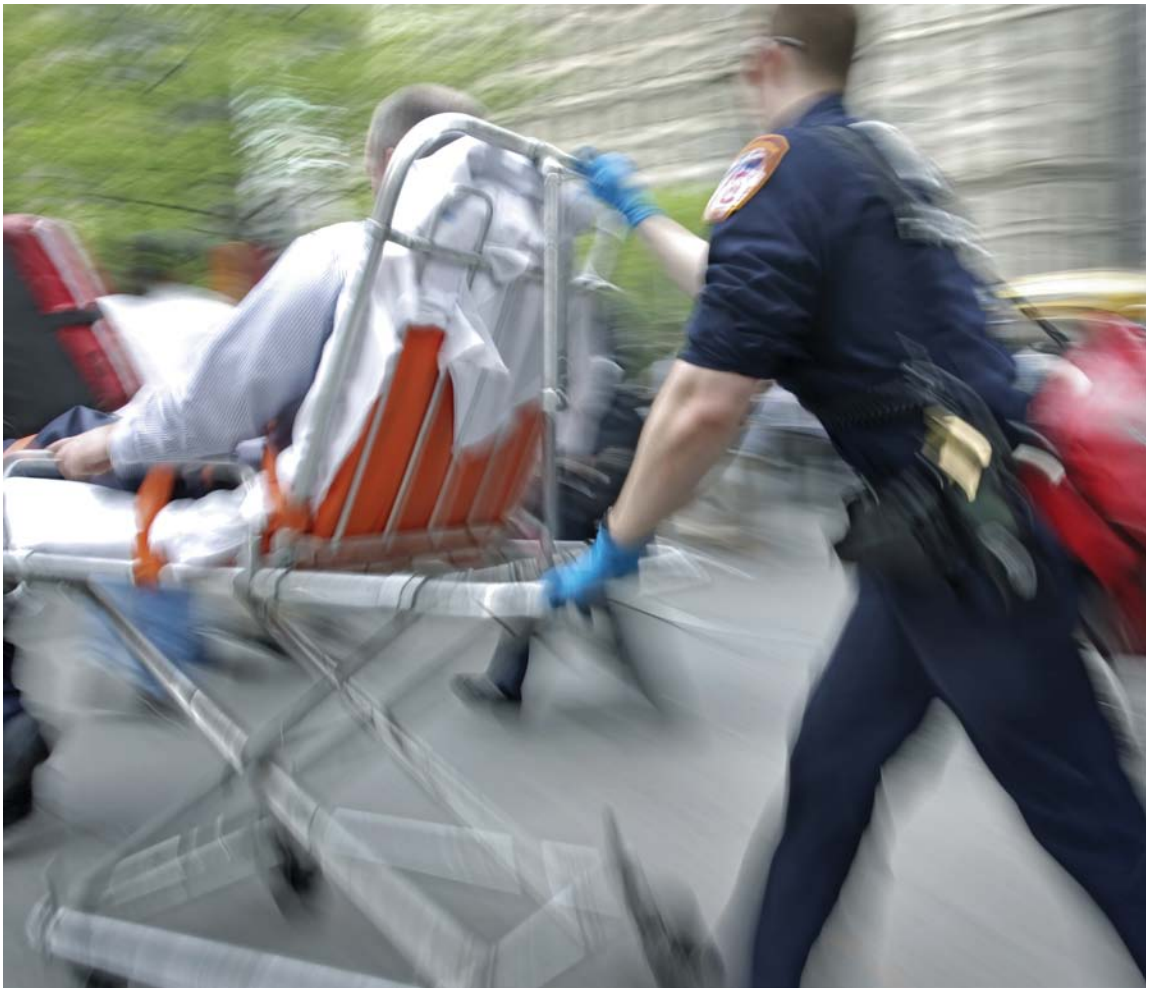
Source: U.S. Centers for Disease Control and Prevention[21]

This indicator examines which states were able to assemble key decision-makers to lead and manage a response within a goal time of 60 minutes or less, which was set by CDC. In 2011, 47 states met the 60-minute goal. Overall, states were able to assemble staff in a median time of 30 minutes. The ability to assemble key decision makers quickly is essential for public health agencies to assess an emergency situation so they can quickly and effectively direct resources and personnel where they are needed.

This indicator is based on one of the measures featured in the Public Health *Preparedness: 2012 State-By-State Report on Laboratory, Emergency Operations Coordination, and Emergency Public Information and Warning Capabilities* report, issued by CDC in September 2012.[22] The report focuses on data collected by CDC.

In addition to the performance measure addressing the ability to assemble public health staff, the CDC report also provided data on additional measures supporting the emergency operations coordination capability, including finding that:

- 47 states and Washington, D.C. successfully developed approved incident action plans (IAPs), which describe the strategy and objectives for an incident's operational period and are approved by the incident commander. The incidents can be real or based on exercises. In 2011, more than half of IAPs were developed in respond to an executed or planned exercise, while natural disasters accounted for the rest of the IAPs. Seventy-seven percent of CDC's grantees partnered with other public or private agencies as part of their response activities. The IAPs are living documents to brief and be disseminated to public health response staff to help inform about past, present, and future steps in responding to disasters or emergencies.
- Every state and Washington, D.C. completed an after action report and improvement plan (AAR/IP). These plans are used to assess what worked well during an exercise or real incident and what can be improved. By evaluating the state's response and identifying gaps and areas that need improvement, state health departments can improve their preparedness and response operations.



3. INDICATOR: INFECTIOUS DISEASE CONTROL AND VACCINATIONS — PERTUSSIS VACCINATIONS

FINDING: Only two states met the HHS goal of vaccinating 90 percent of 19- to 35-month-olds against whooping cough.

2 states met the HHS goal of vaccinating 90 percent of 19 to 35 month olds against whooping cough (1 point).	48 states and Washington, D.C. did NOT meet the HHS goal of vaccinating 90 percent of 19 to 35 month olds against whooping cough (0 points).
Hawaii (90.6%)	Alabama (87.5%)
Nebraska (92.3%)	Alaska (77.4%)
	Arizona (86.0%)
	Arkansas (84.5%)
	California (87.7%)
	Colorado (81.0%)
	Connecticut (88.8%)
	Delaware (83.7%)
	D.C. (87.4%)
	Florida (84.6%)
	Georgia (87.5%)
	Idaho (79.0%)
	Illinois (84.0%)
	Indiana (82.2%)
	Iowa (85.7%)
	Kansas (87.6%)
	Kentucky (87.2%)
	Louisiana (84.2%)
	Maine (88.9%)
	Maryland (89.5%)
	Massachusetts (88.4%)
	Michigan (81.7%)
	Minnesota (86.7%)
	Mississippi (80.8%)
	Missouri (80.8%)
	Montana (76.8%)
	Nevada (75.2%)
	New Hampshire (84.6%)
	New Jersey (86.7%)
	New Mexico (86.7%)
	New York (82.6%)
	North Carolina (81.3%)
	North Dakota (89.7%)
	Ohio (85.2%)
	Oklahoma (84.1%)
	Oregon (76.6%)
	Pennsylvania (85.8%)
	Rhode Island (84.5%)
	South Carolina (79.5%)
	South Dakota (75.8%)
	Tennessee (81.9%)
	Texas (82.7%)
	Utah (82.0%)
	Vermont (88.2%)
	Virginia (84.4%)
	Washington (85.5%)
	West Virginia (78.4%)
	Wisconsin (88.4%)
	Wyoming (75.5%)

Source: Morbidity and Mortality Weekly Report (MMWR)[23]

This indicator examines which states meet the national goals for the number of children ages 19 to 35 months old who have been vaccinated against pertussis (whooping cough). Only two states—Hawaii and Nebraska—met the goal set by HHS in the *Health People 2010*[24] and *Healthy People 2020*[25] of vaccinating 90 percent of children ages 19 to 35 months against pertussis. Nebraska had the highest rate of vaccinations at 92.3 percent, while Nevada had the lowest at 75.2 percent. Nine states had rates below 80 percent. The national average in 2011 was 84.6 percent. Meeting vaccination rate goals serves as a marker for the ability to protect the population from infectious diseases, and a part of this role involves the ability to effectively communicate about the importance, safety and efficacy of vaccinations.

The ability to regularly vaccinate the public, particularly children, is as an important measure for how well the system can effectively reach and encourage vaccinations among the public. This need for this capability is amplified during a time of crisis, when it is often necessary to reach and encourage mass segments or the whole population of a community to get vaccinated against a new threat on a time-sensitive schedule.

Pertussis, commonly known as whooping cough, is a highly contagious bacterial respiratory infection that can be fatal in infants, who are too young to complete the entire vaccination series. Early symptoms mirror those of a cold, but infection progresses into a severe cough that can affect breathing. The best way to prevent pertussis is through the DTaP (diphtheria, tetanus and pertussis) vaccine.[26]

In 2012, the majority of states saw increases in the number of pertussis cases, as compared with 2011. As of November, over 36,000 cases and 16 deaths (most in infants younger than three months) were reported to CDC. Rates have also increased in children ages 7 to 10, and in adolescents ages 13 and 14.[27] Observational studies suggest these outbreaks in children and adolescents may be a result of early waning of immunity due to reformulated vaccine in 1997.[28] However, some experts believe that reduced vaccination rates may also be a contributing factor. Several states allow parents to refuse vaccination for their children based on personal or philosophical reasons, and many of those states, including Wisconsin and Washington have seen the largest spikes in incidence. Compared to 2011, the number of cases this year has increased fourfold in Wisconsin and sixfold in Washington.[29, 30]

States with an incidence of pertussis the same or higher than the national incidence (as of November 23, 2012), which is 11.6/100,000 persons.[31]

Wisconsin	93.4	New Mexico	31.0	Arizona	13.5
Minnesota	78.1*	Alaska	28.6	Illinois	13.5
Vermont	66.1	North Dakota	25.6	Idaho	13.1
Washington	64.3	Oregon	22.1	Pennsylvania	12.9
Iowa	47.5	Kansas	21.9	Missouri	12.3
Maine	45.6	New Hampshire	15.7	-	-
Montana	44.3	Colorado	15.2	-	-
Utah	40.9	New York	14.5	-	-

**Only a small subset of Minnesota pertussis cases have been reported through NNDSS for 2012. This data was accessed from the Minnesota Department of Health website.*

The Section 317 Immunization Program, which supports grants to states for vaccinating underinsured children and adults, has received additional funding in recent years through the Prevention and Public Health Fund and American Recovery and Reinvestment Act. However, a large shortfall remains. Appropriations have not kept up with the cost increase of additional vaccine recommendations according to CDC. A FY 2012 CDC report to Congress outlined that the 317 program needs about $914 million to fully achieve its mission, about $350 million above the President's FY2013 request.[32] Meanwhile, National Association of County and City Health Officials (NACCHO) reports that 19 percent of local health departments have cut immunization programs,[33] while nearly a third of state and territories have reduced vaccine programs as a result of budget cuts.[34]

4. INDICATOR: INFECTION CONTROL — MEDICAID COVERAGE OF FLU SHOTS WITH NO CO-PAY

FINDING: 37 states require Medicaid to cover flu shots for adults under the age of 65 with no co-pay.

37 states require Medicaid coverage of flu shots with no co-pay for beneficiaries under the age of 65 (1 point).	13 states and Washington, D.C. do NOT require Medicaid coverage of flu shots with no co-pay for beneficiaries under the age of 65 (0 points).
Alabama	Alaska
Arkansas	Arizona
Connecticut	California
Delaware	Colorado
Idaho	D.C.**
Illinois	Florida*
Indiana	Georgia*
Iowa	Hawaii**
Kansas	Missouri
Kentucky	Montana
Louisiana	Oklahoma
Maine	Pennsylvania
Maryland	Utah
Massachusetts	Virginia
Michigan	
Minnesota	
Mississippi	
Nebraska	
Nevada	
New Hampshire	
New Jersey	
New Mexico	
New York	
North Carolina	
North Dakota	
Ohio	
Oregon	
Rhode Island	
South Carolina	
South Dakota	
Tennessee	
Texas	
Vermont	
Washington	
West Virginia	
Wisconsin**	
Wyoming	

Source: Kaiser Commission on Medicaid and the Uninsured[35]

** Do not cover flu shots even with co-pays. **District of Columbia, Hawaii and Wisconsin did not participate in the survey. Wisconsin confirmed they do not require a co-pay via correspondence with TFAH; Hawaii's online materials about benefits indicate they require a co-pay.*[36]

This indicator examined which states' Medicaid programs cover flu shots without co-pays or other cost-sharing. While 46 states cover the vaccine under Medicaid, only 37 states have eliminated co-pays and other cost-sharing for these vaccinations.[37] Eliminating co-pays for Medicaid beneficiaries is particularly important since these Americans include many of the lowest-income and most vulnerable in terms of quality of health. Requiring co-pays are a strong disincentive and can often make the shots economically out-of-reach for many Americans.

Establishing a cultural norm of annual flu vaccinations ensures the country has a strong mechanism in place to be better able to vaccinate all Americans quickly during a new pandemic or unexpected disease outbreak.

The Advisory Committee on Immunizations Practices (ACIP) recommends yearly influenza vaccines for all individuals 6 months and older. Recent studies estimate that vaccine rates may need to be as high as 85 percent to 90 percent to establish herd immunity.[38, 39] The seasonal flu vaccine protects against three different viruses and is the best way to avoid contracting the virus. The higher the number of people who are vaccinated, the lower the likelihood a carrier will come in contact with an unvaccinated person. During the 2011-2012 flu season, only around 42 percent of Americans were vaccinated.[40]

The Affordable Care Act (ACA) requires new group and individual health plans to provide the vaccines recommended by ACIP prior to September 2009 with no cost-sharing, if provided by an in-network provider. (For recommendations after September 2009, the no-cost sharing requirement takes effect one year following the date of the recommendation.)[41] However, the legislation did not eliminate cost-sharing requirements under Medicaid. In an effort to encourage states to adopt the requirements in their Medicaid plans, under the ACA, states can earn a one-percentage point increase in their federal matching rate starting January 1, 2013 if they eliminate cost-sharing for the 10 immunizations recommended by ACIP.

Flu takes a toll on the country each year. During the seasonal outbreak time, an average of 5 percent to 20 percent of the U.S. population gets the viral respiratory infection influenza, leading to more than 200,000 hospitalizations. Flu strains vary from year to year and can be mild or severe—causing 3,000 to 49,000 deaths from 1976 to 2006. Certain populations are at higher risk for complications from influenza, including children, the elderly, pregnant women, and those with certain health conditions like asthma or heart disease.[42]

In addition to its health effects, flu has a serious impact in terms of health care and worker absenteeism costs. Seasonal flu can often result in a half day to five days of work missed, which affects both the individual and his or her employer. Annually, the flu leads to approximately $10.4 billion in direct costs for hospitalizations and outpatient visits, and $76.7 million in indirect costs.[43]

Approximately half of Americans do not have paid sick leave from their employers, which means they risk not getting paid or possibly losing their jobs if they stay home from work because they get sick or must care for sick family members. A significant percentage of service workers, such as waiters or cashiers, who come in to direct contact with a range of customers or consumers, do not have paid sick leave.

By preventing hospitalizations, influenza immunizations can save $80 per year, per person vaccinated.[44]

5. INDICATOR: EXTREME WEATHER EVENTS PREPAREDNESS

FINDING: 15 states currently have climate change adaptation plans that are completed.

15 states currently have climate change adaptation plans that are completed (1 point).	35 states and Washington D.C. do not currently have complete climate change adaptation plans (0 points).
Alaska	Alabama
California	Arizona
Connecticut	Arkansas
Florida	Colorado
Maine	Delaware*
Maryland	D.C.
Massachusetts	Georgia
New Hampshire	Hawaii
New York	Iowa
Oregon	Idaho
Pennsylvania	Illinois
Vermont	Indiana
Virginia	Kansas
Washington	Kentucky
Wisconsin	Louisiana
	Michigan
	Minnesota*
	Mississippi
	Missouri
	Montana
	Nebraska
	Nevada
	New Jersey*
	New Mexico
	North Carolina
	North Dakota
	Ohio
	Oklahoma
	Rhode Island*
	South Carolina
	South Dakota
	Tennessee
	Texas
	Utah
	West Virginia
	Wyoming

Source: Center for Climate and Energy Solutions[45]

**Plans in progress*

This indicator examines which states have complete climate adaptation plans, which include understanding and planning for changing health considerations based on new weather patterns and threats. According to the Center for Climate and Emergency Solutions, 15 states currently have complete climate adaptation plans, and four additional states have plans in progress. Depending on the region's specific needs, adaptation plans can focus on a variety of issues, to include sea-level rise and associated flooding, drought mitigation and water insecurity, hurricanes and other severe weather, and extreme heat events.[46] All 15 states with adaptation plans include public health concerns.

According to the U.S. Environmental Protection Agency (EPA), as the environment changes, people will be at a higher risk for a range of health threats.[47] As temperatures and sea levels rise, many of the current U.S. environmental health challenges—such as natural disasters and infectious diseases that favor warmer climates—are expected to increase and become

more severe. In 2012 alone, the United States has endured a nationwide drought, a West Nile virus outbreak, a historic derecho (severe windstorm), and two devastating hurricanes. This summer's extreme heat caused roads to buckle in Wisconsin, a railroad bridge to collapse in Illinois due to warped train tracks, and a nuclear power plant to shutdown due to not-so-cool cooling seawater.[48] And in October, a hurricane, a nor'easter, and the jet stream collided to create a once-in-a-century extreme weather event. Superstorm Sandy cast its fury across a span of 1.8 million square miles,[49] leaving Lower Manhattan underwater, the New Jersey coast damaged and millions across the eastern seaboard without power—some for weeks. Early estimates indicate the damage caused by Sandy could cost $50 billion, making it the second costliest storm after Hurricane Katrina.[50] In November 2012, the Pacific Northwest also faced severe storm challenges with record rainfall and flooding.[51]

Some major health concerns related to extreme weather changes include:

- **Temperature Effects:** Severe heat waves are projected to intensify, which can increase heat-related deaths and sickness.
- **Air Quality Changes:** Worsening regional ozone pollution, with associated risks of respiratory infections, aggravation of asthma, increased allergic airway disease and premature death.
- **More Extreme Weather Events:** Storm impacts, particularly hurricanes and tropical storms, are likely to be more severe—increasing the risk of injury, flooding, and adverse water quality effects due to runoff. Other areas will suffer from reduced precipitation leading to droughts and wildfires.
- **Climate-Sensitive Diseases:** Certain vector-, food- and water-borne diseases are expected to increase and spread as temperature and weather patterns allow these pathogens to expand into new geographic regions.

Communities across the United States will experience the negative health effects associated with climate change in different ways, for instance:

- **Urban Communities:** Urban neighborhoods, particularly low-income areas, are especially vulnerable to natural disasters, such as floods and heat waves.
- **Rural Communities:** Rural communities may be threatened by increased food insecurity due to geographical shifts in crop-growing conditions and yield changes in those crops; reduced water resources; flood and storm damage; and increased rates of climate-sensitive health outcomes.[52]
- **Coastal and Low-Lying Areas:** Climate change could lead to a rise in sea levels, a rise in surface-sea temperatures, and an intensification of hurricanes and tropical storms—threatening residents of coastal or low-lying areas.
- **Mountain Regions:** The melting of mountain glaciers and changes in snowpack and seasonal timing of snow melt can affect freshwater runoff. If the temperature warms at higher altitudes, some vector-borne pathogens could take advantage of new habitats.[53]
- **Polar Regions (Alaska):** While Alaskan communities could see a reduction in cold-weather-related injuries and death, melting polar ice also puts indigenous communities at risk as they have to travel further for food hunting into treacherous, shifting ice and waters. This warming could be accompanied by the spread of disease into what were traditionally cooler climates.[54]

Public health departments are uniquely positioned to help communities prepare for the adverse effects of climate change given their role in building healthy communities. Public health workers are trained to develop communication campaigns that both inform and educate the public about health threats and can use these skills to educate the public about climate change prevention and preparedness. Public health departments are also on the frontlines when there is an emergency, whether it's a natural disaster or an infectious disease outbreak. These types of emergency preparedness and response skills will be invaluable as extreme weather events become more common.

To help prepare for the health impact of extreme weather incidents and climate change, CDC's Climate-Ready States and Cities Initiative has awarded $7.25 million in grants to 16 states and 2 cities to build resilience to the health impacts of climate change, with plans to award up to $19.25 million by 2016. CDC will assist awardees in developing and using models to more accurately anticipate health impacts, monitor health effects, and identify the most vulnerable areas in their region. Awardees include departments of health in Arizona, California, Florida, Illinois, Maine, Maryland, Massachusetts, Michigan, Minnesota, New Hampshire, New York City, New York State, North Carolina, Oregon, Rhode Island, San Francisco, Vermont and Wisconsin.[55]

6. INDICATOR: COMMUNITY RESILIENCY — CHILDREN AND PREPAREDNESS

FINDING: 30 states and Washington, D.C. mandate all licensed child-care facilities to have a multi-hazard written evacuation and relocation plan.

30 states and Washington, D.C. mandate all licensed child-care facilities to have a multi-hazard written evacuation and relocation plan (1 point).	20 states do NOT mandate all licensed child-care facilities to have a multi-hazard written evacuation and relocation plan (0 points).
Alabama	Arizona
Alaska	Colorado
Arkansas	Florida
California	Georgia
Connecticut	Idaho
Delaware	Illinois
District of Columbia	Indiana
Hawaii	Iowa
Kentucky	Kansas
Louisiana	Maine
Maryland	Michigan
Massachusetts	Minnesota
Mississippi	Montana
Missouri	Nebraska
Nevada	New Jersey
New Hampshire	Oregon
New Mexico	Rhode Island
New York	South Carolina
North Carolina	South Dakota
North Dakota	Tennessee
Ohio	
Oklahoma	
Pennsylvania	
Texas	
Utah	
Vermont	
Virginia	
Washington	
West Virginia	
Wisconsin	
Wyoming	

Source: Save the Children[56]

This indicator examines whether a state has a law or regulation mandating all licensed child-care facilities to have a multi-hazard written evacuation and relocation plan for moving kids to a safe location during multiple types of disasters. The plans must go beyond the provisions of a basic fire drill. According to the 2012 *Is America Prepared To Protect Our Most Vulnerable Children in Emergencies?* report by Save the Children, 30 states and Washington, D.C. have such a mandate in place. [57] This is an increase from 25 states and Washington, D.C. in 2010, and 20 states and Washington, D.C. in 2009.

This indicator reflects only one of four measures in the Save the Children report. The other measures in the report included whether a state: 1) requires all K-12 schools to have a disaster plan that accounts for multiple types of hazards its community may encounter (e.g., earthquakes, wildfires, gun violence); 2) regulates child care facilities to have a written plan that accounts for any special assistance an infant, toddler, a child on crutches, or a child with physical or cognitive disabilities may require (e.g., moving cribs on wheels or children in wheelchairs); and 3) requires all regulated child care facilities to have a written plan to notify parents of an emergency and reunite parents with their kids.

Only 17 states met all four criteria. Five states (Idaho, Iowa, Kansas, Michigan and Montana)

met none of the indicators. Failing to plan for these worst-case scenarios puts children and adolescents at increased risk of injury.

Planning to care for 67 million children in American schools and child-care settings during a public health emergency presents complex considerations and challenges. Children are not "small adults" and special consideration needs to be given to complicated issues ranging from child-appropriate doses of medications and vaccines, to caring for children if schools and child care facilities are closed for extended periods. Parents and other caregivers may also become sick or injured during a disaster, complicating their ability to care for children.

SAVE THE CHILDREN'S *IS AMERICA PREPARED TO PROTECT OUR MOST VULNERABLE CHILDREN IN EMERGENCIES?* REPORT

In the Save the Children Report Card, a state is not judged to meet a particular standard unless (1) the substance of the state's policy meets the minimum requirements of the standard; (2) the policy is mandated; and (3) all licensed or regulated child care facilities—or in the case of the 4th criteria—all K–12 schools are subjected to the policy. A rule is considered mandated if it is (1) in statute; (2) in regulation; or (3) is provided by the relevant agency as mandatory guidance. Mandatory guidance includes forms, templates and technical assistance that are provided to all licensed or regulated child-care facilities and are required to be completed or implemented.

For additional information on the methodology of the Save the Children report, please see Appendix E.

- 42 states require all K–12 schools to have a disaster plan that accounts for multiple types of hazards its community may encounter (e.g., earthquakes, wildfires, gun violence): Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida*, Georgia, Hawaii, Illinois, Indiana, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Minnesota, Mississippi, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, and Wisconsin.
- 23 states and Washington, D.C. require all regulated child care facilities to have a written plan that accounts for any special assistance an infant, toddler, a child on crutches, or a child with physical or cognitive disabilities may require (e.g., moving cribs on wheels or children in wheelchairs): Alabama, Alaska, Arkansas, California, Connecticut, District of Columbia, Hawaii, Kentucky, Louisiana, Maryland, Massachusetts, Mississippi, Missouri, New Hampshire, New Mexico, New York, North Carolina, Rhode Island, Tennessee, Vermont, Washington, West Virginia, Wisconsin, and Wyoming.
- 32 states and Washington, D.C. require all regulated child care facilities to have a written plan to notify parents of an emergency and reunite parents with their kids: Alabama, Arkansas, California, Colorado, Connecticut, Delaware, District of Columbia, Florida*, Hawaii, Indiana, Kentucky, Louisiana, Maryland, Massachusetts, Minnesota, Mississippi, Missouri, New Hampshire, New Mexico, New York, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin and Wyoming

**Regulations are under revision and a draft of the proposed regulations was reviewed and met criteria.*

SURVEY: MOST SCHOOLS NOT READY TO RESPOND TO PANDEMIC OR OTHER OUTBREAKS

Researchers at St. Louis University surveyed nearly 2,000 school nurses from 26 states on their schools' readiness to respond to a disaster or infectious disease outbreak. The survey found that, despite the 2009 H1N1 pandemic: less than half of schools' written disaster plans addressed pandemic preparedness; less than a third have stockpiles of personal protective equipment; only 1.5 percent of schools have medications stockpiled; and children are trained in respiratory hygiene less than once a year in a third of schools. Three-quarters of school nurses reported they received the seasonal influenza vaccine, though only two percent of schools mandate it. The study suggests that schools should review and update their pandemic plans annually and coordinate them with local disaster responders. It also recommends that schools participate in community surveillance programs to assist in early detection of infectious disease outbreaks.[58]

EXPERT COMMENTARY

School Nurses: The Front Line of Emergency Response for Many Children

By Shirley Schantz, EdD, RN, ARNP, Director of Nursing Education, National Association of School Nurses and Christine Tuck, MS, BSN, RN, NCSN, Health Services Director, Seaman School District, Topeka, KS

School nurses are on the front line caring for children at school. Fifty-two million children attend school every day, and school buildings are also the workplace for millions of staff, making school nurses the first health professionals to care for students and school staff in an emergency.

Nurses have the education and knowledge to identify emergency situations, manage the situation until relieved by emergency medical services (EMS) personnel, communicate the assessment and interventions to EMS personnel and follow up with the health care provider. School nurses provide first responder and pre-hospital care in school settings in situations of mass casualty emergencies, including bioterrorism, chemical and radiological events.

It is the position of the National Association of School Nurses (NASN) that school nurses provide leadership in all phases of emergency preparedness and management and are a vital part of the school team that develops emergency response procedures for the school setting, using an all-hazards approach.

The role of the school nurse within the four identified phases of emergency management planning includes:

- **Prevention/Mitigation** — On-going assessment and identification of hazards from all sources and reduce the potential for an emergency situation.
- **Preparedness** — School nurses serve on community planning coalitions and committees with a focus on emergency preparedness needs for all children, including those with special needs.
- **Response** — The school nurses is knowledgeable about his or her role, including triage, organization and coordination of first aid response teams, and direct physical and mental health care to all victims of the emergency, children and adults, linking them to medical and public health resources. The school nurse is vital in reuniting families during and after a crisis.
- **Recovery** — The school nurse acts as a liaison between students, school personnel, and families and community resources as they return to the school community after a disaster.[59]

You might not realize it, but school nurses are the most qualified school employees to provide training to other staff as well as collaborating with the community. Their primary role is to have a system to provide triage and immediate first aid care to students and staff. School nurses are leaders of the school first aid plan. They lead the triage planning and implementation and are responsible for initial and secondary triage until emergency personnel arrive. The school nurse must be integral in forming an emergency response plan and be involved in training other school personnel to ensure that the plan can be put into place in the event of a disaster.

The school nurse also coordinates the collection of information from a variety of sources to develop emergency plans. Emergency response plans require coordination with school administrators, staff, and other community first responders.

Noting the importance of nurses, many schools have taken federally recommended steps to plan and prepare for emergencies, including the development of emergency management plans and procedures for staff roles and responsibilities. However, many of these plans do not include practices of those procedural 'drills and skills'. While there may be plans in place they are much more effective and useful if they are practiced on a regular basis.

Schools also experience challenges in planning for emergencies, which include difficulties in communicating and coordinating with first responders,

School nurses respond to emergencies and disasters that can range from one student or adult who is injured on the playground to the mass illness situations seen with the H1N1 pandemic flu. School nurses deal with weather-related emergencies, and the nature of these emergencies often depends on geographic location. They can range from hurricanes, tornadoes, tsunamis and flooding to snow and ice storms. If students are required to be sheltered in school for long periods of time this creates issues for students with chronic health conditions, including diabetes, asthma, and allergies/anaphylaxis. Dramatic large scale emergencies occur in the school as well as many well publicized violent events, such as school shootings that create serious safety and injury issues. Schools can also be vulnerable to explosions and fires. In addition, schools located near nuclear power plants have their own concerns about potential accidents and emergencies.

lack of equipment, training for staff, as well as balancing priorities related to educating students with activities for emergency management.

In addition, even those schools with emergency management plans may experience a lack of partnerships, limited time or funding to plan, or lack of interoperability between equipment used by the school district and first responders. Meanwhile developing, maintaining and exercising the plan assists staff members in responding quickly, appropriately, and efficiently with best practices and should be designed as a comprehensive reference to assist schools and the community in providing a safe learning environment.

For example, the role of the school nurse in pandemic flu preparedness was evident during the 2009 H1N1 pandemic. Schools illness rates during flu and pandemic flu are usually high and schools contribute to the spread of flu. The school nurse is the health expert in the school and has the knowledge related to epidemiology, prevention efforts, surveillance, reporting and connecting with the public health community.[60]

To address issues related to the emergency management planning in school districts, it is recommended that states clearly identify school districts as entities to which state and local governments may disburse grant funds through the State Homeland Security Program, Citizen Corps/Medical Reserve Corps to ensure funding is disbursed to school districts. Departments of Education, Health and Human Services, and Emergency Management should partner to identify factors that promote school districts, first responders, and community partners to train together, to develop strategies for addressing those factors, and promote efforts to assist school districts in this area. Effective management of school emergencies requires training, preparation and planning in the best practices to maximize success. To help support training, the National Association of School Nurses created the School Emergency Triage Training (SETT) program (http://www.nasn.org/ContinuingEducation/LiveContinuingEducationPrograms/SETT), which provides school nurses with the knowledge, skills, and resources to perform as leaders of First-Aid teams in response to mass casualty events occurring in schools.

Schools are also challenged with emergency management planning efforts related to students with special health care needs for evacuation of, housing for, and care of during an emergency event. The school nurse is a vital health professional who is knowledgeable about the physical and emotional needs of students in the school, and identifies specific plans to meet the chronic and acute health care needs of these students, including during emergency events.

Many school districts lack personnel to fulfill roles relative to emergency planning and response, such as school resource officers (SROs), counselors and school nurses. The school nurse is critical to the planning and response efforts in all phases of emergency preparedness and management and are a vital part of the school team that develops emergency response procedures for the school setting, using an all-hazards approach.

7. INDICATOR: EMERGENCY MANAGEMENT — EMERGENCY MANAGEMENT ACCREDITATION

Finding: 29 states and Washington, D.C. have been accredited by the Emergency Management Accreditation Program (EMAP).

29 states and Washington, D.C. have been accredited by the Emergency Management Accreditation Program (EMAP) (1 point)	21 states have NOT been accredited by Emergency Management Accreditation Program (EMAP) (0 points)
Alabama	Alaska
Arizona	Connecticut
Arkansas	Delaware
California	Hawaii
Colorado	Idaho
D.C.	Kansas
Florida	Kentucky
Georgia	Maine
Illinois	Minnesota
Indiana	Montana
Iowa	Nevada
Louisiana	New Hampshire
Maryland	North Dakota
Massachusetts	Oregon
Michigan	Rhode Island
Mississippi	South Dakota
Missouri	Texas
Nebraska	Washington
New Jersey	West Virginia
New Mexico	Wisconsin
New York	Wyoming
North Carolina	
Ohio	
Oklahoma	
Pennsylvania	
South Carolina	
Tennessee	
Utah	
Vermont	
Virginia	

Source: Emergency Management Accreditation Program[61]

This indicator examines which states have been accredited by the Emergency Management Accreditation Program. So far, 29 states, Washington, D.C. and 13 additional jurisdictions have met the EMAP standards.

EMAP[62] was created following a 1997 National Emergency Management Association-hosted session on the need for standards and assessments within emergency management. The resulting Emergency Management Standard was developed with input from stakeholders from national emergency management agencies, as well as state and local government. Emergency management, as defined by EMAP, encompasses all organizations with emergency or disaster functions in a jurisdiction, which may include prevention, mitigation, preparedness, response and recovery.

EMAP is a voluntary, peer reviewed process that gives programs the opportunity to demonstrate and be recognized for meeting national standards. The standards do not uniquely apply to public health, but focus on the overall emergency response preparedness capabilities in an area. The evaluations do specifically include whether responsibility for public health and a range of other sectors is assigned, public health threat surveillance and creating public communication plans that act to protect the public's health. Since this is a voluntary program, states that are not accredited may have chosen not to participate in the program rather than it being a reflection on their state of preparedness.

The EMAP voluntary accreditation for all emergency preparedness is an important mechanism

for improving evaluation and accountability, but it is also important to continue to work toward baseline performance measures that go beyond planning and even stricter accreditation standards.

The steps to EMAP accreditation include the following:

- Self-assessment and documentation;
- On-site assessment by a team of trained, independent assessors;
- Committee review and recommendation; and
- Accreditation decision by an independent commission.

EMAP reviews prevention, preparedness, mitigation, response and recovery, including:

1. Fiscal and administrative procedures that support day-to-day and disaster operations,
2. Legal statutes and regulations establishing authority for its development and maintenance.
3. Hazard identification, risk assessment and consequence analysis.
4. A mitigation program for the effects of emergencies associated with the identified risks.
5. Prevention responsibilities, processes, policies and procedures.
6. Plans that describe emergency response; continuity of operations; continuity of government; and recovery.
7. An incident management system.
8. Pre-emergency, systematic identification of resource requirements, shortfalls and inventories.
9. Agreements for sharing resources across jurisdictional lines.
10. A communications plan that provides for using, maintaining and augmenting all of the equipment necessary for preparation, response and recovery.
11. Operational plans and procedures developed, coordinated and implemented among all stakeholders.
12. Facilities necessary to adequately support response and recovery activities.
13. A training program for program officials, emergency management/response personnel, and the public.
14. An exercise, evaluation and corrective action process.
15. Crisis communication, public information and education plan and procedures.

In addition to the 29 accredited states and Washington, D.C., a number of jurisdictions have been accredited by EMAP, including: Austin, Texas; Boston, Massachusetts; East Baton Rouge Parish, Louisiana; Great Lakes and Ohio River District, Huntington, West Virginia; Colorado Springs and Denver, Colorado; Consolidate City/County of Jacksonville/Duval, Florida; San Diego, California; Miami-Dade, Florida; Orange County, Florida; Pierce County, Washington; City of Providence, Rhode Island; and Springfield-Greene County, Missouri.

CDC's Emergency Management Program will be assessed by EMAP in June 2013 to become the first federal agency-level program to be reviewed.

The lack of strong accountability standards and measures has been an ongoing problem in public health preparedness in terms of defining baseline capabilities; measuring how prepared a state or locality is; and being accountable to the public. A Public Health Accreditation Board (PHAB), created in 2007, has created a voluntary public health accreditation program for state and local public health departments and is currently reviewing the first wave of accreditation applicants.[63] This accreditation process serves a major effort to improve and standardize core capabilities of health departments including preparedness.

PUBLIC HEALTH ACCREDITATION BOARD

The PHAB administers the national public health department accreditation program to public health departments operated by Tribes, states, local jurisdictions and territories.[64] PHAB is set up by domains, standards and measures. Domains are groups of standards that pertain to a broad group of public health services. There are 12 domains; the first ten domains address the 10 Essential Public Health Services; domain 11 addresses management and administration, and domain 12 addresses governance. Standards are the required level of achievement that a health department is expected to meet, and measures provide a way of evaluating if the standard is met.[65]

The 12 domains include:

Domain 1: Conduct and disseminate assessments focused on population health status and public health issues facing the community.

Domain 2: Investigate health problems and environmental public health hazards to protect the community.

Domain 3: Inform and educate about public health issues and function.

Domain 4: Engage with the community to identify and address health problems.

Domain 5: Develop public health policies and plans.

Domain 6: Enforce Public Health Laws.

Domain 7: Promote strategies to improve access to health care services.

Domain 8: Maintain a competent public health workforce.

Domain 9: Evaluate and continuously improve health department processes, programs and interventions.

Domain 10: Contribute to and apply the evidence base of public health.

Domain 11: Maintain administrative and management capacity.

Domain 12: Maintain capacity to engage the public health governing entity.

Standard 5.4 focuses specifically on preparedness and requires that public health departments maintain an all hazards emergency operations plan. In order to become accredited a health department must:[66]

- Participate in the process for the development and maintenance of an All Hazards Emergency Operations Plan (EOP);
- Adopt and maintain a public health emergency operations plan (EOP); and
- States provide consultation and/or technical assistance to Tribal and local health departments in the state regarding evidence-based and/or promising practices/templates in EOP development and testing.

8. INDICATOR: HEALTH SYSTEM PREPAREDNESS — NURSE LICENSURE COMPACT

FINDING: 24 states participate in a Nurse Licensure Compact.

24 states participate in a Nurse Licensure Compact (NLC) (1 point)	26 states and Washington, D.C. do NOT participate in a Nurse Licensure Compact (NLC) (0 points)
Arizona	Alabama
Arkansas	Alaska
Colorado	California
Delaware	Connecticut
Idaho	D.C.
Iowa	Florida
Kentucky	Georgia
Maine	Hawaii
Maryland	Illinois
Mississippi	Indiana
Missouri	Kansas
Nebraska	Louisiana
New Hampshire	Massachusetts
New Mexico	Michigan
North Carolina	Minnesota
North Dakota	Montana
Rhode Island	Nevada
South Carolina	New Jersey
South Dakota	New York
Tennessee	Ohio
Texas	Oklahoma
Utah	Oregon
Virginia	Pennsylvania
Wisconsin	Vermont
	Washington
	West Virginia
	Wyoming

Source: National Council of State Boards of Nursing

The Nurse Licensure Compact (NLC),[67] launched in 2000 by the National Council of State Boards of Nursing, allows a registered nurse and licensed practical/vocational nurse to have a single multistate license that permits them to practice—physically, telephonically and electronically—in other compact states beyond their home state of residency. In order to be eligible for a multistate license, a nurse must have a nursing license in good standing and a legal residence in an NLC state. Advance practice registered nurses are not included in this compact and must apply through each state they wish to practice in.

This indicator examines which states participate in the NLC. Currently, 24 states participate, allowing nurses to legally practice across state lines with other states that are part of the NLC. The ability for nurses to be able to work across state lines can be a tremendous benefit during disasters or disease outbreaks, when affected communities may experience severe workforce shortages. The NLC benefits both nurses and states in the following ways:

- Allows nurses flexibility and mobility;
- Drives standardized licensure requirements;
- Enables states to act jointly and collectively;
- Facilitates continuity of care; and
- Allows different boards of nursing to build relationships and improve processes by learning from one another

9. INDICATOR: PUBLIC HEALTH LABORATORIES — SURGE WORKFORCE

FINDING: 37 states and D.C. report having enough staffing capacity to work five, 12-hour days for six to eight weeks in response to an infectious disease outbreak, such as novel influenza A H1N1.

37 states and Washington, D.C. report having enough staffing capacity to work five, 12-hour days for six to eight weeks in response to an infectious disease outbreak, such as novel influenza A H1N1 (1 point).		13 states report NOT having enough staffing capacity to work five, 12-hour days for six to eight weeks in response to an infectious disease outbreak, such as novel influenza A H1N1 (0 points).
Alabama	Nebraska	Alaska
Arizona	New Hampshire	Colorado
Arkansas	New Mexico	Georgia
California	New York	Hawaii
Connecticut	North Carolina	Indiana
Delaware	North Dakota	Iowa
D.C.	Ohio	Kansas
Florida	Oklahoma	Massachusetts
Idaho	Oregon	Nevada
Illinois	Rhode Island	New Jersey
Kentucky	South Dakota	Pennsylvania
Louisiana	Tennessee	South Carolina
Maine	Utah	Texas
Maryland	Vermont	
Michigan	Virginia	
Minnesota	Washington	
Mississippi	West Virginia	
Missouri	Wisconsin	
Montana	Wyoming	

Source: APHL 2012 Survey of State Public Health Laboratories

An article published in the journal of the Association of Public Health Laboratories (APHL) notes that during the first wave of H1N1 in the spring of 2009, "The peak public health laboratory response was unsustainable; state and federal cutbacks have drained critical surge capacity from a system already weakened by long-term workforce shortages."[68]

In the initial phases of an outbreak of a novel influenza virus, public health labs are on the front lines conducting diagnostic testing since other labs generally lack this capacity. Once the novel virus is established in the population, diagnostic testing is no longer as important and public health labs switch to surveillance testing. The surveillance testing allows public health officials to gather enough information to track the pandemic and monitor any genetic mutations or changes in the virus.

During a pandemic flu or other infectious disease outbreak, the demand on the public health lab workforce is great, and in some cases, exceeds supply. According to a survey APHL conducted of state public health laboratories in the fall of 2012, 13 states report not having enough staffing capacity to work five, 12-hour days for six to eight weeks in response to an infectious disease outbreak, such as novel influenza A H1N1.

10. INDICATOR: PUBLIC HEALTH LABS — CHEMICAL TERRORISM PREPAREDNESS

FINDING: 49 state public health laboratories report increasing or maintaining their Laboratory Response Network for Chemical Threats (LRN-C) chemical capability from August 10, 2011 to August 9, 2012.

49 states increased or maintained their LRN-C chemical capability (1 point).			1 state and Washington, D.C. DECREASED their LRN-C chemical capability (0 points).
Alabama	Louisiana	Ohio	D.C.*
Alaska	Maine	Oklahoma	Massachusetts
Arizona	Maryland	Oregon	
Arkansas	Michigan	Pennsylvania	
California	Minnesota	Rhode Island	
Colorado	Mississippi	South Carolina	
Connecticut	Missouri	South Dakota	
Delaware	Montana	Tennessee	
Florida	Nebraska	Texas	
Georgia	Nevada	Utah	
Hawaii	New Hampshire	Vermont	
Idaho	New Jersey	Virginia	
Illinois	New Mexico	Washington	
Iowa	New York	West Virginia	
Indiana	North Carolina	Wisconsin	
Kansas	North Dakota	Wyoming	
Kentucky			
Montana			

Source: APHL 2012 Survey of State Public Health Laboratories

**Washington, D.C. declined to answer the question on the APHL survey.*

Public health laboratories around the country participate in the Laboratory Response Network (LRN) to ensure an effective laboratory response to bioterrorism. The network helps improve the nation's public health laboratory infrastructure, which, once, had limited ability to respond to bioterrorism.

According to the CDC, "the LRN is charged with the task of maintaining an integrated network of state and local public health, federal, military, and international laboratories that can respond to bioterrorism, chemical terrorism and other public health emergencies. The LRN is a unique asset in the nation's growing preparedness for biological and chemical terrorism. The linking of state and local public health laboratories, veterinary, agriculture, military, and water- and food-testing laboratories is unprecedented."[69]

Fifty-three laboratories within U.S. states, territories, or metropolitan areas make up the chemical component of the LRN and are responsible for collecting and detecting exposure to toxic chemical agents.

- Nine labs are "Level 3" laboratories — which maintain the basic functions that all of the LRN labs have to be able to work with hospitals and other first responders within their jurisdiction to maintain competency in clinical specimen collection, storage, and shipment.
- Thirty-four labs are "Level 2", meaning chemists who are trained to detect exposure to a number of toxic chemical agents are present. Analysis of cyanide, nerve agents, and toxic metals in human samples are examples of Level 2 activities.
- Ten labs are "Level 1." These laboratories can serve as surge capacity for CDC and also can detect exposure to an expanded number of chemical agents, including mustard agents, nerve agents, and other toxic industrial chemicals. These labs expand CDC's ability to analyze large numbers of patient samples when responding to large-scale exposure incidents.

This indicator is based on a question from the APHL survey of states, asking whether their LRN chemical capability increased, decreased, or was maintained from August 10, 2009 to August 9, 2010.

Forty-nine states reported they increased or maintained their LRN chemical capabilities, one reported a decrease and Washington, D.C. declined to answer. This is based on their status as part of the LRN.

National Issues and Recommendations

SECTION 2

This is a serious time for emergency preparedness in the United States. In the past decade, we have recognized the essential role that public health plays in responding to crises and have acknowledged the ongoing threats, including preventing infectious diseases and responding to serious storms. Investments have led to significant improvements, but now health departments across the country are watching their progress erode. Federal, state and local budget cuts make it impossible to maintain basic levels of preparedness.

The nation's preparedness policy should not be crossing our fingers that new emergencies won't happen, or putting our head in the sand and ignoring threats we see every day. There must be a baseline of "better safe than sorry" that should not be crossed.

In addition to maintaining resources to cover the basics, radical steps must be taken if we have a chance of improving persistent preparedness gaps. TFAH has identified a set of concerns and recommendations for maintaining and improving America's readiness for health threats, including:

A. Reauthorizing the Pandemic and All-Hazards Preparedness Act;

B. Assuring Sufficient, Dedicated Funds for Public Health Preparedness;

C. Ensuring Community Resilience;

D. Modernizing Biosurveillance;

E. Addressing Antibiotic Resistance;

F. Improving Medical Countermeasure Research, Development and Manufacturing;

G. Improving Health System Preparedness and Enhancing Surge Capacity;

H. Readying for Weather-Related Threats; and

I. Fixing Food Safety.

A. REAUTHORIZING THE PANDEMIC AND ALL-HAZARDS PREPAREDNESS ACT

The 2006 PAHPA helped to greatly strengthen the nation's preparedness and response planning, and its reauthorization provides an opportunity to update the statute to more adequately address ongoing challenges in public health preparedness.

RECOMMENDATIONS

In the past year, the Senate and House each passed a reauthorization bill. As the chambers work out the differences in the bills, TFAH recommends that the following issues be considered as top priorities for consideration to help strengthen authorities to address ongoing gaps in preparedness. These recommendations focus on language that is in either the House or Senate versions of the bill. There is not necessarily any active opposition to these measures; support or opposition to the inclusion or lack of inclusion of these sections is influenced by an interest in providing stronger language around authorities or increased support for funding:

- **Temporary Redeployment of Personnel During a Public Health Emergency** (H.R. 2405 sec. 3): This provision in the House bill would allow states to request from HHS the authority to temporarily reassign personnel from other HHS-funded grant programs to respond to a major emergency. The authority would allow states to meet the tremendous staffing needs required by a disaster, as demonstrated during H1N1.

- **Medical Countermeasure Strategic Investor** (S. 1855 sec. 402): The Senate bill's proposal for creation of a Strategic Investor would leverage private capital and business expertise to spur innovation in research and development. Given the limited availability of public funds for MCM development, a public-private partnership is a novel approach worth trying.
- **Biosurveillance** (S. 1855 sec. 203/H.R. 2405 sec. 4): Despite repeated attempts at strategies and reviews, the United States currently lacks an integrated, national approach to biosurveillance, and the fragmented, siloed and overlapping systems hamper our bioterrorism and disease outbreak response capabilities. Both bills attempt to address this problem by requiring additional planning for integration. Additional discussion of biosurveillance concerns can be found in Section 2D of the report. It is particularly important that the Senate legislation calls for coordination with the Office of the National Coordinator for Health Information Technology and a review of existing and duplicative systems. The emergence of electronic health records (EHRs) presents tremendous new possibilities for outbreak detection and tracking.
- **Carryover of Grant Use, Coordination** (S. 1855 sec. 201, 202): We support the updates to the preparedness grant programs at Health and Human Services included in the Senate legislation, which would encourage flexibility and efficiency. Giving grantees limited ability to carryover funds will promote long-term planning currently impossible in an unpredictable fiscal environment. It is also beneficial that the language supports ongoing efforts at HHS to better align the hospital and the state and local preparedness grant processes.
- **Funding Levels** (S. 1855, H.R. 2405, throughout): While we recognize the difficult fiscal situation our nation faces, we are concerned both bills, which freeze public health preparedness funding at FY 2011 levels, would not provide sufficient resources to modernize public health systems and ensure we are prepared in the event of an emergency. TFAH recommends restoring PHEP and HPP funding to FY 03 levels. Over the last several years, public health preparedness funding has declined considerably—contributing to the loss of more than 45,700 state and local public health jobs. Many of these workers were trained in public health preparedness, emergency response, biosurveillance and epidemiology. We must fund public health preparedness with the same level of commitment as we have made to other national security priorities.
- **Children's Preparedness** (S. 1855 sec. 304, throughout): The Senate bill would take significant steps to consider the particular needs of pediatric populations in MCM research and development and creates an Advisory Committee on Children and Disasters. The language also calls for consideration of the needs of children, as an at-risk population, into the National Health Security Strategy, the National Disaster Medical System, the Medical Reserve Corps and the PHEP grants.

B. ASSURING SUFFICIENT, DEDICATED, STABLE FUNDS FOR PUBLIC HEALTH PREPAREDNESS

The United States made a significant investment to improve public health preparedness after the September 11, 2001 and anthrax tragedies. The main funding streams have included bolstering basic federal capabilities; improving national vaccine and medication development, stockpiling and distribution; improving state, local and hospital preparedness; and emergency supplemental funding to support pandemic flu preparedness.

While the funding has resulted in significant progress in the past decade, the *Ready or Not?* reports have documented a number of major gaps that still remain, particularly in maintaining a fully-staffed and trained workforce; vaccine and medical countermeasure research and production; biosurveillance programs; medical surge capacity; and providing support for communities to cope with and respond to crises.

Historically, the federal approach to preparedness has not provided a stable or sustained level of support for federal, state or local needs. The most consistent pattern in U.S. preparedness funding is inconsistency. These inconsistencies make it difficult for states to maintain programs, capabilities and sufficient employees—particularly trained scientific experts—for robust disaster preparedness and response systems.

Preparedness requires ongoing, stable, predictable funding dedicated to ensure that basic capabilities exist to respond to the threats public health departments face every day — and also to have trained experts and systems in place to quickly act in the face of major and unexpected emergencies.

Eleven years ago, the nation was caught off-guard when the public health system was unprepared for emergencies. Many core public health functions, including epidemiology, laboratories and outbreak surveillance were lacking. Reviews by the Institute of Medicine (IOM), CDC, Government Accountability Office (GAO) and other experts found the country's public health "infrastructure had greatly deteriorated."[70, 71, 72] On top of that, little groundwork was in place for hospitals and public health departments to respond to the massive influx of potential anthrax samples, and there was a lack of coordination, training, leadership and communication within the field and for public health departments to work with other first responders. Similar to military-readiness, public health emergency readiness necessitates ongoing planning, training and upgrading of systems and technology.

Basic preparedness involves:

- Rapid **detection** of and **response** to major disease threats, including those caused by nature and bioterrorism.
- Intensive **investigative and diagnostic** capabilities to detect an infectious disease outbreak or identify the biological or chemical agent used in an attack.
- **Surge capacity** for mass events, including adequate facilities, equipment, supplies and trained health professionals.
- **Mass containment strategies**, including pharmaceuticals needed for **antibiotic or antidote administration** and **isolation and quarantining** when necessary.
- Streamlined and effective **communication** channels so health workers can swiftly and accurately communicate with each other, other front line workers, and the public about 1) the nature of an emergency or attack, 2) the risk of exposure and how to seek treatment when needed, and 3) any actions they or their families should take to protect themselves.
- **Communication** that is culturally competent and is able to reach and take into consideration at-risk populations.
- Streamlined and effective **evacuation** of at-risk populations with special medical needs.
- An **informed and involved public** that can provide material and moral support to professional responders, and can render aid when necessary to friends, family, neighbors and associates.

Dedicated, predictable funding over time is needed to support the unique capabilities and training required to maintain adequate levels of emergency preparedness, including:

- **Leadership, planning and coordination:** An established chain-of-command and well-defined roles and responsibilities for seamless operation across different medical and logistical functions and among federal, state and local authorities during crisis situations, including police, public safety officials and other first responders.
- **Core public health capabilities:** Basic public health systems and equipment, including laboratory testing and communications that keep pace with advances in science and technology.
- **An expert and fully-staffed workforce:** Highly trained and sufficient numbers of public health professionals, including epidemiologists, lab scientists, public health nurses, doctors and other experts, in addition to back-up workers for surge capacity.
- **Modernized technology:** State-of-the-art laboratory equipment and information collection and health tracking systems.
- **Rapid development and ability to manufacture vaccines and medications:** A streamlined, safe, effective system to ensure rapid research, production and dispensing of medical countermeasures to protect people from emerging threats.
- **Safety protections for first responders:** Tested plans and safety precautions to mitigate potential harm to communities, public health professionals and first responders.
- **Immediate, streamlined communications capabilities:** Coordinated and integrated communications among all parts of the public health system, health care system, frontline responders, and the public. Communications capabilities must include back-up systems in the event of power loss or overloaded wireless channels.

It is also essential to consider the costs of responding to disasters and the toll it takes on health departments to find mechanisms to provide support for rebuilding after an incident and its response are over.

The current economic situation is compounding the problems created by the historic inconsistent funding for emergency preparedness. Combined federal, state and local budget cuts have resulted in the loss of core programs and functions as well as major staff losses. Even before the recession, federal support for preparedness began to decline. From FY 2005 to FY 2012, federal support from CDC for state and local activities decreased by 38 percent, adjusted for inflation.

A decade of progress in preparedness is at risk due to the cuts. Federal, state and local health departments will no longer be able to maintain basic functions needed to respond to emergencies.

For the future, this is likely to mean a reliance on emergency supplemental funding to try to quickly ramp up response efforts after an event has happened and would leave state and local health department around the country without the resources needed to respond to ongoing threats, like extreme weather events and disease outbreaks.

This puts states and localities in the position of trying to respond without core, ongoing capabilities—and trying to build capacity during an emergency response. In these situations, as was evident during the anthrax attacks and H1N1 outbreak, states and localities have to deal with contracting and bureaucratic restrictions, which often limit the ability to spend funds quickly or to enter into fast, short-term contracts. Developing emergency capacity as an event is unfolding is particularly challenging when health departments do not know how long they will have resources to sustain their capabilities to meet the need.

States and localities have reported it will take them longer to achieve the 15 national capabilities for public health preparedness due to limited and unstable resources.[73]

Many states and localities have taken creative approaches to budget and spending restrictions, such as making flexible use of their public health employees during disasters by reassigning individuals to other duties during emergencies. But in some cases, federal grants restrict this ability if the personnel are funded to support other specific programs, such as maternal and child health. CDC and ASPR are currently working with the states and localities to find ways to be able to make quick use of emergency supplemental funds easier, but emergency support cannot fill ongoing gaps.

RECOMMENDATIONS

In addition to dedicated and sustained support for preparedness, TFAH also recommends a series of actions to ensure preparedness funding is more predictable, to cut down on federal bureaucratic red tape and to ensure flexibility so that when emergencies happen, resources and emergency supplemental support can be used quickly and effectively. This effort requires:

- Establishing multi-year grant cycles with greater flexibility in states' retention and use of carry forward and unexpended funds;
- Creating a mechanism to fast track the awarding and programming of emergency supplemental funds into existing grant mechanisms without additional requirements;
- Granting authority to the Secretary of HHS to allow states to also use personnel that are part of other federal health programs in response to a public health emergency; and
- Improving coordination among emergency preparedness grant programs, including HHS and FEMA grants, through increased leadership and direction and by encouraging uniformity of guidelines and requirements to maximize efficiency in carrying out the memoranda of understanding (MOU) agreements into which the agencies have entered.

SOME MAJOR DISEASE AND INFECTION THREATS OF 2012

Public health departments around the country dealt with a series of unexpected threats — some examples included a serious tuberculosis (TB) outbreak in Florida, a major resurgence of West Nile virus and hundreds of fungal meningitis cases due to contaminated steroid injections.

2012 TB OUTBREAK IN FLORIDA

In April 2012, CDC issued a report to Florida health officials warning that Jacksonville was in the midst of the largest TB outbreak it had investigated in the U.S. in the last 20 years.[74] Nine days earlier, Governor Rick Scott had signed a bill to close A.G. Holley State Hospital—the state's only TB hospital.[75] The Duval County Health Department, Florida Department of Health and CDC conducted an investigation from February-March 2012, which identified 99 cases and 13 deaths since 2004 that were attributable to one TB strain. Of these 99 cases, 78 had a history of homelessness, incarceration, or substance abuse.[76] Researchers identified one homeless shelter, a jail and an outpatient mental health facility as the main points of TB transmission. Since the CDC investigation, state health officials have screened over 3,000 individuals who could have been exposed and have found 311 people who tested positive for latent TB exposure and one with active TB.[77]

TB is a lung-damaging disease caused by bacteria that are spread from person to person through the air. In most cases, TB is curable, but it can be fatal without proper treatment, which consists of six to nine months of antibiotics. Adhering to this long course of treatment can be difficult, and failure to complete treatment can breed new drug-resistant strains. In 2011, a total of 10,521 new TB cases were reported in the United States, an incidence of 3.4 cases per 100,000 population. Foreign-born persons and racial/ethnic minorities continue to be affected disproportionately—new or reactivated infections among foreign-born persons in the U.S. were 12 times greater than among U.S.-born persons.

WEST NILE VIRUS OUTBREAK

As of November 27, 2012, every state but Alaska and Hawaii has reported West Nile virus (WNV) infections in people, birds, or mosquitoes. A total of 5,245 cases of the disease in people and 236 deaths have been reported to CDC, half of which were classified as neuroinvasive (e.g., meningitis or encephalitis). The majority of cases—80 percent—have been reported from 13 states: Texas, California, Louisiana, Illinois, Mississippi, Michigan, South Dakota, Oklahoma, Nebraska, Colorado, Arizona, Ohio and New York. Texas has reported over a third of all cases. The 2012 outbreak has resulted in the highest number of cases reported to CDC since 2003.

WNV is a potentially serious illness that is spread by infected mosquitoes that contract the virus from feeding on infected birds. The easiest and best way to avoid WNV is to prevent mosquito bites by eliminating standing water and using a quality insect repellent.

The majority of individuals (80 percent) who contract WNV develop no symptoms. Up to 20 percent of infected individuals develop minor symptoms that last from a few days to several weeks. Possible symptoms include fever, headache, body aches, nausea, vomiting, swollen lymph glands and rashes on the trunk of the body.

A small portion of infected people (one in 150) will develop serious symptoms that can last several weeks and may result in permanent neurological effects. Possible symptoms include high fever, headache, neck stiffness, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, numbness and paralysis. There is no treatment for WNV, though those with severe symptoms can receive supportive care in a hospital setting.

FUNGAL MENINGITIS OUTBREAK[78]

As of December 3, 2012, CDC has reported 541 cases in 19 states of fungal meningitis caused by contaminated steroid injections. Thirty-two deaths have been reported.[79] Approximately 14,000 patients may have received spinal or joint injections with medication from the three implicated lots of methylprednisolone; so far, 97 percent have been contacted for follow-up. The FDA recalled the three lots on September 26, 2012.

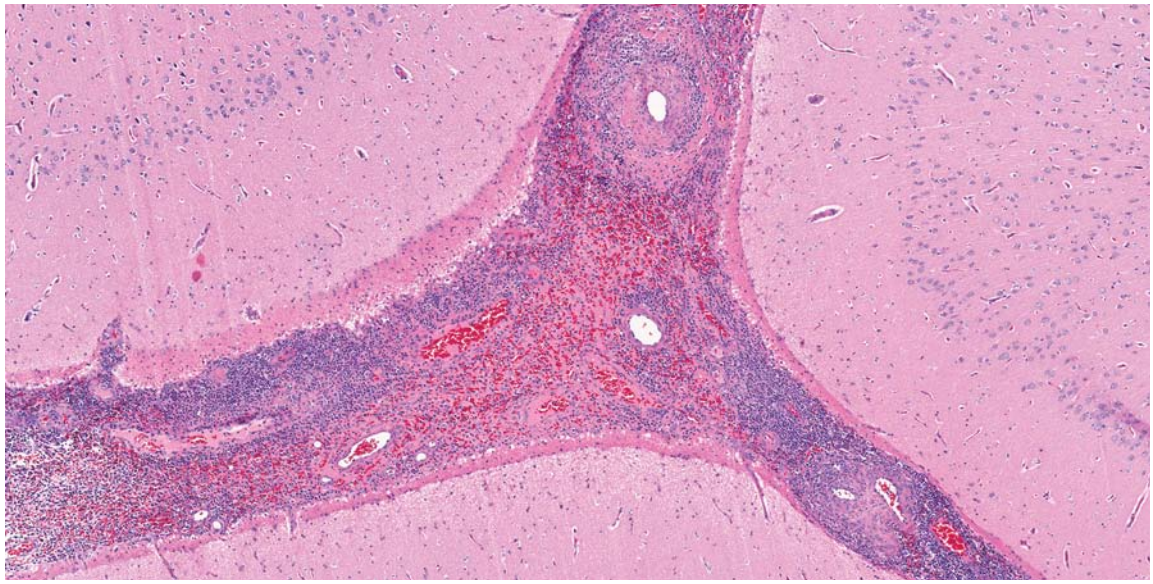
This form of meningitis is not contagious and is slow to develop—symptoms can manifest one to four weeks following injection. Fungal meningitis patients may experience a spectrum of symptoms ranging from headache, fever and neck stiffness to coma, seizures and death. Those who received joint injections are not thought to be at risk for fungal meningitis, but could develop joint infections.

The outbreak raised questions about the need to increase regulatory oversight of compounding pharmacies and the need for clarification of federal and state authority and resources to conduct oversight and inspections. It also tested the ability of health departments and private sector partners to track contaminated medications and the clinics and patients who received them. Legislation has been introduced to create a uniform system of tracing drugs once they are distributed.

PUBLIC HEALTH DEPARTMENT RESPONSE TO U.S. FUNGAL MENINGITIS OUTBREAK

In September 2012, a clinician in Tennessee found a case of fungal meningitis in a patient following an epidural steroid injection. This was the first sign of the multi-state outbreak of fungal meningitis. Public health departments around the country worked quickly and efficiently to identify the outbreak and notify patients. Below are descriptions of some of the specific actions taken by health departments during the response to the outbreak:[80]

- The Tennessee Department of Health identified the first case of fungal meningitis and quickly contacted CDC to begin the investigation into the unexplained case.
- The Virginia Department of Health laboratory was the first to identify the very rare fungal pathogen, Exserohilum. This discovery saved time and provided the nation with critical information to help with diagnostic and treatment recommendations.
- The Michigan Department of Community Health identified the first case of a joint infection associated with the products.
- State and local public health departments helped track down and contact over 14,000 exposed patients in 23 states with facilities that received the implicated medication.



EXPERT COMMENTARY

A Typical Day for the Los Angeles County Director of Emergency Preparedness and Response

By Alonzo Plough, M.A., M.P.H., Ph.D., Director of Emergency Preparedness and Response, Los Angeles County Department of Public Health

This is a typical day for me and my office in October. That said, "typical" doesn't exactly describe the day-to-day requirements of working in public health and emergency preparedness.

In fact, had I written this at the end of summer, the majority of my day might have been consumed with dealing with wild fires, a great public health risk. During that time of the year, when the Santa Ana winds start to blow, we are evaluating the placement of sanitation facilities and safety of base camps. In addition, we would be deploying nurses to staff shelters and environmental health personnel to monitor air quality. The risk of property damage and loss of life is dramatic, but wild fires also cause shifts in the air which can trigger asthma attacks and other negative health outcomes.

Every hour. Every day:
Los Angeles County Department of Public Health has a 24/7 emergency desk — every potential health-related emergency call comes through this hub. In addition, we have a standing incident response team available 24/7 that deploys on scene rapidly if there is an identified threat.

When you think of immediate preparedness response you think of anthrax, however these incidents run the gamut. For instance, recently there was a suspicious substance sprayed in a light rail line, which required evacuation. Our preliminary tests indicated it was possibly ricin, which requires the dispatching of more on-scene specialists and rigorous and rapid laboratory analysis. In this case we needed to contact the Centers for Disease Control and Prevention (CDC) for confirmatory analysis.

Not every threat is like this, sometimes our rapid field tests come back with the chemical indicating no toxic or biological hazard, but the deployment always happens and we are always ready.

In addition, we have a continually running syndromic surveillance system that analyzes data from 80 of the 109 county hospitals and includes real time tracking to identify patterns that could give an early identification of a pandemic or other emerging biological threat.

8:00 AM:
My day started with a morning meeting to plan the launch of a community-wide emergency preparedness campaign.

Immediately following that meeting, we had a briefing to address a new study that projects the health effects of climate change in Los Angeles County. The study suggests that climate change will result in rising sea levels and increasing heat, which will affect portions of our county differently and require different layers of response and planning.

Predominately, we're concerned with the likelihood of increasing temperatures. It has been projected that, over the next decade or two, there will be a tripling of the number of 100 degrees or hotter days in many areas of the county. We have to plan for this eventuality even though it seems far away. We've found the more resources and preparation you have in place before a public health emergency (which often isn't anthrax or earthquakes) our communities are better able to respond and bounce back.

9:45:
Roughly three times a week a suspicious substance call is routed through our public health preparedness hub. Today was no different.

Someone sent a letter to the Los Angeles Police Department with white powder in it and a note saying everyone is going to die. We immediately coordinated hazmat response from multiple agency responders, deployed the incident response team and utilized new equipment that can rapidly ascertain the nature of suspicious substances in a way that is consistent with what we do in our labs. Once we had the initial results we determined the field sample would have to go to our lab for further testing and verification. The laboratory testing would continue throughout the day.

In addition, we have an ongoing partnership and memorandum of understanding with the Federal Bureau of Investigation (FBI) because, ultimately, there will be criminal charges. So, we're in contact with FBI throughout the day.

A Typical Day

11:00:
A key to emergency preparedness is having resilient communities. An important piece to this puzzle is the work of community health nurses who provide outreach and engagement at the neighborhood level throughout the county. I had a meeting with the field-based nurses and other community partners to develop the launch of our new building resilient communities project. We have identified 16 communities where we can implement and evaluate a variety of approaches to building resiliency by supporting strategic partnerships and coalitions that can improve preparedness capabilities in communities as well as provide critical support in response during an emergency. Think about how a disaster can affect infrastructure and sever the elderly or disabled from the continuum of care they require. Our preparedness planning should have a special focus on vulnerable populations and insure that their special needs are identified in advance of an emergency and response and recover plans address how to meet these needs appropriately. If a community understands what resources can be provided at a community level through neighbor to neighbor support, we can add to our response capability for our most vulnerable populations.

Throughout this meeting, I received updates on the white powder testing.

1:00:
In the afternoon, I was part of a panel put together by county faith-based organizations on strategies the faith community can undertake to promote resilience. Over the years, faith-based organizations have been much more involved with emergency response, especially when it comes to being able to address the needs of disabled and vulnerable congregants. In addition to nurses, faith leaders can serve an important role in marshalling community resources and ensuring vulnerable populations receive a continuum of care in the aftermath of a disaster. We used this meeting to sign up volunteers for our Chaplain Corps of emergency responders.

4:00:
We have completed testing of the white powder substance and ruled out potential public health concerns going forward. However, regardless of the actual threat of a substance, the substance created a very real fear response in the people who were exposed.

When a biological threat occurs in a work place, there are residual psychological concerns of employees — people are not use to being threatened. Our department facilitates follow-up discussions with the affected employees and our clinical staff supports the employees to ensure they can recover from the trauma of the incident.

This was a random day. Often days are more hectic, rarely they are more relaxed. Los Angeles County experiences small earthquakes all the time, which trigger alerts and require intense checks of any potential structural damage of all public health facilities. We also get calls and are responsible if a power line falls which interrupts a standard of care or makes emergency response difficult.

Going forward, I expect climate change to require more resources and time. Somewhat connected, we are also seeing more and more vector and virus issues in recreational areas. As climates shift, the ecology of sectors is changing and this is impacting health across the county. Quite simply, in the future, there will be more concerns over zoonotic diseases.

Beyond how the heat has changed our ecosystem, it's an everyday health issue in and of itself. It has been far warmer than usual and much more humid in Los Angeles. This combination brings the heat index way up, so we have to do a number of daily heat alerts and open up cooling centers more than normal to ensure the elderly and people with disabilities can stay cool and safe.

On a daily basis, public health emergency preparedness is stretched. This is the culture we operate in, given the impossibility of fully predicting the next emergency. In addition, as populations and climates change, the nature of our work shifts. Consequently, we have to ensure our systems and resources are nimble enough to shift from an earthquake to a wild fire to a heat wave.

It's easy to forget that these are the roles and responsibilities of public health. We might make headlines when it comes to a massive earthquake or hurricane; however we save lives and prevent major disasters on a near daily basis. As the economy continues to be a major challenge and public health dollars are cut, we must preserve emergency preparedness funding or even routine white powder scares will test the limits and resources of our systems — to the point when a massive incident occurs we'll be unable to respond.

C. IMPROVING COMMUNITY RESILIENCE: HELPING COMMUNITIES COPE AND RECOVER BY SETTING UP BETTER ONGOING SUPPORT

Ensuring communities can cope with and recover from emergencies is a significant challenge to public health preparedness.

The most vulnerable members of a community, such as children, the elderly, people with underlying health conditions and racial and ethnic minorities, face special challenges that must be considered before disaster strikes.

The resilience of a community — including its ability to recover from disasters — is inextricably linked to the underlying health of that community and the basic, ongoing capabilities of that community's public health department or region. Without strong core capabilities, a public health department cannot be expected to meet additional demands that arise during emergencies. Dedicating and maintaining ongoing resources for these foundational public health capabilities, as measured in indicator one of this report, are tied to the ability of states and communities to be resilient in the face of unexpected and major threats.

Building community resilience is one of the two overarching goals identified by HHS in the release of the draft Biennial Implementation Plan for the National Health Security Strategy. It calls for fostering informed, empowered individuals and communities.

Establishing ongoing strong relationships between public health officials and the communities they serve as well as efforts to improve the overall health status of the community are both strongly tied to resilience. The aftermath of Hurricane Katrina provides a strong reminder of the importance to improve the underlying health of a community and to build ongoing communication and relationship channels with communities, particularly at-risk communities, so they are in place when crises arise. For instance, according to one study in the *Annals of Emergency Medicine*, 55.6 percent of individuals displaced in the aftermath of Hurricane Katrina had a chronic disease, such as hypertension, hypercholesterolemia, diabetes or pulmonary disease, which compounded the challenges of evacuation and support.[81] Similarly, during Hurricanes Gustav and Ike, 40 percent of evacuees were obese and many were unable to stay in local shelters because they were morbidly obese or on oxygen.[82] Currently, two-thirds of Americans are overweight or obese.

Experts recommend that improving resilience, particularly among vulnerable populations, requires:

- Improving the overall health status of communities so they are in better condition to weather and respond to emergencies. Initiatives and programs supported by the Prevention and Public Health Fund's Community Transformation Grants can assist in these efforts;
- Providing clear, accurate, straightforward guidance to the public;
- Health officials to develop ongoing relationships with members of the community, so they are trusted and understood when emergencies arise; and
- Engaging members of the community directly in emergency planning efforts.

To reach diverse communities, experts also recommend providing information through channels beyond the Internet, such as radio and racial and ethnic publications and television, and in languages other than English. In addition, idiomatic translations are important to reach specific cultural perspectives effectively, and messages should be delivered by trusted sources, such as religious and community leaders.

RECOMMENDATIONS

TFAH recommends that all federal agencies involved in emergency response should make improving community resiliency a top preparedness priority. In particular, federal partners must provide strong technical assistance to allow for the creation of models that can be adapted to meet the needs of specific communities across the United States. Models must incorporate core capabilities including:

- Incorporating preparedness activities into the ongoing work of public health departments in communities, which helps improve the overall health of the communities and builds strong relationships between health workers and at-risk communities. Established relationships are essential so that communication and trust is in place when emergencies occur;

- Identifying areas of vulnerable populations in communities, including knowing which communities have high rates of chronic diseases, high rates of poverty, low community engagement, limited English proficiency and limited access to transportation, so that health officials and emergency management officials have plans and mechanisms in place to provide assistance to these neighborhoods in times of crisis;
- Building relationships between public health and community-based organizations, communication and trust among leaders in the community, and plans for coordinating support and delivery of services during emergencies;
- Ensuring child-care facilities have appropriate disaster plans in place, which should be included in the reauthorization of the Child Care Development Block Grant; and
- Working with educators and parents to teach children how to be prepared—such as plans to reunify with teachers or parents—in a similar way to how fire safety exercises are taught.

MENTAL HEALTH AND EMERGENCIES

Disasters and emergencies can have a lasting effect on individuals and communities affected, as well as those who respond to the event. In recent years, policymakers, public health officials and scientists have started including mental health components to emergency preparedness practice; yet, mental health concerns remain among populations affected by disasters.

Having trauma-informed systems of care in place prior to a disaster is an important component of dealing with mental health issues. Trauma-informed organizations, programs and services are trained in addressing the consequences of trauma to the individual and are more supportive and aim to avoid re-traumatization.[83] While it is necessary to have competent mental health management in place before the disaster occurs, it is also important to have stable community and individual mental health prior to an emergency. Studies following Hurricane Katrina victims found that five years later individuals were still dealing with mental health issues, many of which were due to neighborhood conditions, chronic uncertainty and economic factors.[84]

A systems-view of improving community and individual resilience through better housing, lowering poverty, increasing access to health care as well as having a trauma-informed system in place to help individuals after an event has the ability to significantly improve mental health outcomes in the wake of a disaster.

EXPERT COMMENTARY

Prepare for Health! A Framework for Health-based Emergency Readiness Activities

By Ana-Marie Jones, Executive Director, CARD - Collaborating Agencies Responding to Disasters

Disasters, by their destructive and disruptive nature, critically stress people and the infrastructure systems that serve them. While media attention usually follows the more urgent and traumatic events, these disasters, their coverage, and the subsequent interventions provided to communities have a great impact on the overall health and well-being of the public. On October 17, 1989 at 5:04 pm, the Loma Prieta Earthquake struck the Oakland-San Francisco Bay Area. The damage and devastation was widespread throughout the area. In addition to the loss of lives and property, the Oakland Bay Bridge, Highway 17, and several other transit arteries were disrupted for many weeks — increasing stress, anxiety and commute times across the region.

By interrupting the 1989 World Series — called the "Battle of the Bay" because it was between the Oakland Athletics and the San Francisco Giants — the earthquake became the most documented disaster in recent history. Sports journalists covering the game became disaster historians. The entire world saw that — despite over 120 years of warning, great effort, and the immediate response of some of the most trained and experienced emergency services agencies in the world — we were unable to address the immediate, short-range and longer-term needs of the most vulnerable people in our community. We learned that an earthquake, or any disaster, doesn't have to destroy property or cause death or injury to have a far-reaching impact on health, wellness and our ability to thrive. Medically fragile and poor communities, for example, rely on vital services including Meals-on-Wheels or in-home healthcare service providers. If roads aren't open, if transit isn't available, or if the workers don't have proper credentials to get around road blocks, their clients become disaster victims whether or not the earthquake actually harmed them or their housing unit.

Quite simply, the earthquake showed the incredible vulnerability of the service industry infrastructure. There was no "Plan B" to assist seniors, children, people with disabilities and others without adequate resources.

In the aftermath, CARD (Collaborating Agencies Responding to Disasters) was created by local community agencies to address their unique emergency preparedness and disaster response needs. CARD's defined role remains to make all aspects of preparedness (response, planning, and recovery) accessible and sustainable so that a continuum of care will be provided in the face of whatever emergencies or disasters happen.

Over the years, thanks to the ongoing partnership of community agencies, we learned why so many agencies weren't able to embrace preparedness and disaster readiness. The whole preparedness message from disaster services agencies, which is heavily steeped in fear of future disasters, doesn't speak to service providers. For their clients, and for their agencies, it would be a luxury to worry about potential damage from an earthquake that could happen sometime in the next 30 years.

Emergency management experts were pushing service providers to prioritize unfunded preparation for earthquakes and other disasters over their day-to-day operations and other funded mission-critical efforts. Agencies are routinely pressed to take on this extra level of effort without extra funding, without culturally appropriate tools and content, and without the level of public support given to the larger, more traditional disaster services agencies. The greatest push for these preparedness efforts inevitably happens after a disaster, when the traditional approach and the most funded, validated disaster response players have failed.

Prepare for Health!

Over the years, spanning many disasters, using research from multiple fields, we worked directly with service providers to retool and reframe readiness as something that can be embraced and incorporated into daily routines. Our approach is to help agencies build their everyday brilliance into their disaster resilience. They are preparing to prosper, preparing to be able to accomplish their mission-centric goals in the face of whatever challenges arise.

Instead of fear- or threat-based interventions, when working with local health entities, CARD has focused on a "Prepare for Health" platform, in which the world of emergency readiness is viewed through a lens where robust individual and community health is the goal. With this lens, public health entities would be lead conveners of the full gamut of emergency services stakeholders. As such, their knowledge base would be a vital resource in helping a community become stronger, healthier and better able to respond to and rebound from an actual event. In so doing, they would also be better able to address chronic conditions, stress and other negative community health outcomes.

In the Prepare for Health framework, health-based preparedness messengers would never employ the one-size-fits-all, scattergun, fear and anxiety producing messages — so common in traditional emergency management — in an attempt to scare people into short-term action. Enough research has shown these fear-based messages do not work, rather they cause unintended negative consequences.

For a host of reasons, public health departments and related stakeholders are better positioned to be the frontrunners as public preparedness messengers. Public health entities, much more than emergency response agencies, need to know more about their communities to fulfill their primary missions. For example, in a fire, when the fire department arrives, performs a rescue, and puts out the fire — their primary mission has been fulfilled. They didn't need to know the eating habits, languages spoken, preferred communication methods, religious beliefs, mental and physical activity and ability levels, incomes, or social conventions of the people rescued. For public health professionals to achieve their primary missions, to improve health and wellness, to track disease, and to stop disease, they must understand those things and more about the people they serve.

Thankfully, this mirrors what the public more actively wants. Most people aspire to being healthier, stronger and better able to resolve stress-related issues and chronic conditions. Most people can readily embrace a vision of being healthy, free from pain and discomfort. By contrast, most people prefer to not even think about disasters. Across the United States, for over 100 years, we've spent billions telling the public that specially trained responders are ready to serve them in an emergency. We've given the public many good reasons to ignore traditional disaster preparedness messages.

In combining an alternative approach to emergency preparedness with traditional public health programs, we remove preparedness from the realm of the scary, terrible and earth-shattering and put it squarely into an empowering health initiative, where everyone is able to be strong and healthy and keep themselves and their loved ones safe and well.

A simple intervention is a safety whistle on key chains. Many people face fear just leaving their homes. If you are an elderly person, in a tougher neighborhood, having a whistle could help empower you to go out for a much needed walk or visit a clinic. It would also help them call for help during an earthquake. Having that whistle also means that they could be the rescuer for someone else in distress. One participant shared that she tripled the attendance in her senior walking group by showing seniors how to stop traffic with the whistle.

Further, when public health is the convener, it opens the conversation and draws connections that traditional emergency services agencies usually cannot make. The traditional way people are shown to Stop, Drop, Roll (if on fire) or Drop, Cover, and Hold On (in an earthquake or a physical attack) is for a physically able, small to medium sized, healthy person. It's easier for some people to do these actions. But what about the people who would be harmed if they tried? Public health can bring in injury and fall prevention specialists to show elderly and disabled participants how to modify the actions to stay safe, and can provide other helpful, accessible information.

Experienced traditional emergency management professionals also welcome public health agencies as the convener, because they know how hard

it is to bring the public into disaster preparedness. Staying healthy, safe and well in the face of disasters is a smaller piece of a larger framework of staying healthy, safe and well every day. Imbedding readiness into a comprehensive wellness strategy is much like hiding the emergency preparedness pill in the public health apple sauce. At public health fairs, for instance, health educators can do fun interactive trainings about hand washing and using hand sanitizers, teach the Dracula cough, show the benefits of proper hydration (as well as doing arm curls with bottles of water), and have participants program their phones with medical information and emergency contacts. Learning about vaccinations, and the distribution of medication at points of dispensing (PODS) is also fascinating for people who have never seen it.

Rather than the message being framed around preparing for the worst case scenario, this is about making people healthier every day, empowering them to be the leaders and role models in their circles, and having disasters be one of the many things they are better able to address — because they are stronger, healthier, and more united. Public health needs to break free of the limited traditional disaster conversations and embrace the bigger public health promise of helping people to avoid exposure to health threats, and building communities such that even if they are exposed, they are much less susceptible. Resilience and the much prized "bounced back" capacity, pales in comparison to the benefits offered by building robust health and avoiding the health hazards in the first place.

Placing public health at the center also provides a great opportunity for complementary and alternative medicine and health programs. As a keynote speaker at longer conferences, I ask the audience if anyone practices meditation, Reiki, yoga, or deep diaphragmatic breathing — and there is always someone. I invite the audience member to lead the room through some deep diaphragmatic breathing, some light stretching, shoulder rolls or a short meditation. If the audience does this a few times during a seven-hour meeting, by the end, many people share how great they feel.

Similarly, a public health sensibility when making menu choices — including fruits, veggies, nuts, hard boiled eggs, lean meats, salads, protein shakes, etc. — leaves everyone feeling better, rather than running (and crashing) on an empty sugar rush. The "Prepare for Health" recipe is clear: remove fear and threat, add heaps of empowerment, offer health and wellness that has been steeped and infused with readiness, mix with engaged, diverse communities, and serve with a commitment to building healthy, resilient people, living in united, empowered communities.

Conclusion

There is no equivocating; we must build healthier, more resilient communities. We must prepare our communities for a variety of public health emergencies. We know the traditional approach to emergency preparedness has not worked — despite billions of dollars invested, massive agreement from all the major disaster services agencies, and decades of their campaigns and efforts. While we cannot reach and track every person, we can reach, track and leverage relationships with nonprofits, faith agencies, and other committed service providers whose clients are among the most vulnerable people in any community. There is no need for any other community to spend decades fighting through the hard lessons we had to learn during CARD's early years.

We know that public health professionals cannot accomplish their readiness goals by being the harbingers of health-related doom — they must actively champion diverse communities getting what they need to be safe, healthy, and sustainably connected to their resources.

Health, like readiness, cannot be done in fits and starts, lurching forward only after a scare, receding back once the threat has passed. For communities that have embraced disaster readiness, the health conversation can be a welcomed, nuanced addition. For communities that have already embraced health and wellness, the addition of emergency readiness can increase their sense of safety and confidence. For the millions of residents not yet actively engaged in their own health and wellness, nor in their own emergency readiness, the idea that they can "Prepare for Health" could be both life-affirming and transformational.

BUILDING COMMUNITY RESILIENCE TO SECURE THE PUBLIC'S HEALTH

The following is a summary of a presentation by Nicole Lurie, MD, MSPH, Assistant Secretary for Preparedness and Response and Dr. Melinda Morton from ASPR to the Advisory Group on Prevention, Health Promotion, and Integrative and Public Health.

The National Health Security Strategy defines resilient communities as those with "healthy individuals, families, and communities with access to health care, both physical and psychological, with the knowledge and resources to know what to do to care for themselves and others in both routine *and* emergency situations." Building resilient communities is one of the two major foci of the U.S. Department of Health and Human Services' National Health Security Strategy. Originally a concept derived from the field of physics, the Merriam-Webster dictionary defines resilience as "the capability of a strained body to recover its size and shape after deformation caused especially by compressive stress," or "an ability to recover from or adjust easily to misfortune or change."[85, 86]

There are several domains of resilience - each offers important perspectives with regard to overall community resilience:

- **Physical** — Why does one building stand, but another collapse during an earthquake? Building codes, structural engineering and land use planning are key components.
- **Health** — Good health prior to disasters may support better resilience in the post-disaster setting[87]—healthier individuals are better able to withstand the associated stress.
- **Ecological** — A resilient ecosystem can retain its function even amid stressors such as an oil spill, overfishing, or climate change.
- **Organizational** — A resilient organization is able to retain its structure and function even in the face of significant adversity.
- **Psychological** — Resilience entails maintaining positive adaptation and mental health despite stressors in the immediate and broader environment.
- **Economic** — Communities with greater economic resources are often better able to recover and retain their function; the poor are more profoundly impacted by disaster.

In the face of a stressor, a community can either recover or cycle back to a less resilient state. The concept of resilience applies broadly, not just in disasters. Given that preparedness is a subset of prevention, a community with more robust prevention mechanisms will have a more effective response, and will also be more able to "build back better"— not only rebuilding systems after a disaster, but improving them.

The factors internal to a community that influence its resilience include baseline health status, local leadership and empowered individuals:

- Does the community's baseline health status reflect the 7 Priorities of the National Prevention Strategy, which includes tobacco-free living, preventing drug abuse and excessive alcohol use, healthy eating, active living, injury and violence-free living, reproductive and sexual health, and mental and emotional well-being?
- Local leadership influences resilience through its effective governance and its prioritization of disaster preparedness policies, including land use and building codes. Its level of communication with the public—to promote risk awareness, relay plans in advance of a disaster, and communicate during a disaster—all contribute to resilience. Finally, the ability to maintain essential services, such as utilities, water and roads/bridges profoundly impacts resilience.
- The strength and nature of social ties can also impact a community's resilience, as can its culture or proactivity and the level of education in the population. How likely are people to help others or volunteer during a crisis? During the heat wave in France and Spain in 2003, France suffered thousands of deaths, but Spain only a handful. Though they have similar economic resources, families and communities look out for each other more in Spain. In addition, an educated community may be more knowledgeable about its risk from disasters and is better able to access and use available information.

A community does not exist in isolation, but is affected by (and contributes to) its broader environment. Resilient communities cultivate their own independence and strength, but also link effectively to a supportive broader social-ecological system. A community can build resilience into its physical and health care environment through the following:

- Enhancing policies that support prevention (i.e., preparedness) by building strong day-to-day public health systems;
- Strengthening social ties within a community;
- Improving resilience through disaster recovery ("building back better" after a disaster);
- Building resilience into the physical environment (i.e., place-based policies);
- Improving community socio-economic status, resources, and access to information;
- Building effective collaborations and coalitions (including strong community social ties); and
- Building local and regional health care and public health system resilience.

PREVENTION AND PUBLIC HEALTH FUND: BUILDING PREPARED COMMUNITIES

The ACA included the creation of a Prevention and Public Health Fund to provide communities around the country $12.5 billion over the next 10 years to invest in effective, proven prevention efforts and to build the public health infrastructure. The Fund is being used to support community and clinical prevention efforts, strengthen state and local health departments and the public health workforce and support science and research.

The Fund has the potential to have a tremendous impact on the nation's preparedness. The Fund is helping to build resilient communities through investments in:

- **Laboratory and epidemiology capacity** — Prevention Fund money has been used to hire and train epidemiologists and laboratory scientists and expand the number of public health laboratories using electronic laboratory information systems.[88, 89] As part of public health infrastructure grants, HHS is also promoting the capacity of health departments to use electronic health records through participation in electronic laboratory reporting and training health information specialists. These specialized systems are critical to the public health system's ability to quickly detect, pinpoint and respond to an emergency such as an emerging infectious disease or foodborne outbreak.
- **Workforce training and fellowships** — Grants may help mitigate the devastating impact of budget cuts on the public health workforce, allowing more trained personnel to engage in preparedness and response activities.
- **Immunizations** — Grants have been allocated to improve the Immunization Information Systems (registries) and other immunization information technologies and to expand adult immunization programs and vaccination capacity in schools.[90] Growing the ability to quickly and accurately vaccinate the population and improving vaccine access and acceptance will be vital during an infectious pandemic that requires mass vaccination of the public.
- **Community prevention** — In addition to access to vaccines and clinical prevention, the Fund is supporting chronic disease prevention through community-level efforts to combat obesity, tobacco use, and poor nutrition. Individuals with chronic conditions are particularly vulnerable during a disaster because of the need for specialized equipment and medicines and difficulty with evacuation and sheltering. Healthy communities, with an informed population and strong connections between the public, health care system and public health, are better able to weather a disaster.

D. MODERNIZING BIOSURVIELLANCE

Public health needs to become more creative and agile in transforming biosurveillance for the 21st century. With the rise of electronic health records and other data sources and tightening health budgets, the time is right to radically alter the way we track and respond to disease threats. Multiple, overlapping systems must give way to integrated, two-way information sharing. Rather than tracking disease trends over time, a modern biosurveillance system must be able to detect outbreaks in real time and enable emergency and targeted response.

The release of the White House's National Strategy for Biosurveillance presents the opportunity to think more tactically about disease surveillance and its impact on emerging threats preparedness and response.

RECOMMENDATIONS:

TFAH believes biosurveillance needs to be dramatically improved to become a true real-time, interoperable system, able to quickly identify outbreaks and threats and implement containment and treatment strategies. To deliver the intended results to protect the health of communities, implementation of the new National Biosurveillance Strategy must include the following:

- **Health Information Technology (HIT):** EHRs have the potential to present public health with a trove of health data in real time as well as allow two-way communication between providers and health departments. The Office of the National Coordinator (ONC) must work with software developers, public health and providers to ensure information exchange is feasible and accessible while maintaining patient privacy. Governmental agencies should identify what health information is most relevant for public health purposes and ensure that public health agencies have ready access to these data.

- **Disease Tracking and Community Resilience:** The biosurveillance strategy must also leverage improvements in tracking disease and chronic conditions in real time. The underlying physical and mental health of the community is a key component to resilience, as unhealthier populations are more vulnerable to disasters and disease outbreaks and present additional challenges for preparedness and response. A more complete picture of the health needs of the community, beyond the immediate detection of a disaster or outbreak, will help target a more appropriate response during the actual event. For example, understanding rates and distribution of diabetes in a community could help emergency responders stockpile appropriate amounts of insulin. Better surveillance of chronic conditions should also be used to help public health and community partners conduct interventions to improve the health of these at-risk populations, thereby building community resilience.

- **Capacity Building:** Although some health departments are able to receive and interpret data from electronic health records, many lack the hardware, software and staff training to take full advantage of this new data source. With the attrition of the public health workforce and infrastructure over the past five years, this capacity has been even further eroded. There must be a focused investment in and measurement of HIT capacity in health departments, such as through the Prevention and Public Health Fund, the public health accreditation process, and Public Health Emergency Preparedness and other federal infrastructure grant programs.

- **Interoperability:** The implementation plan must address interoperability issues across levels of government, across federal agencies and with the private sector. Private sector data sharing will be impossible without guarantees of reciprocity, data protection and value. Public health must also consider future barriers, such as the move toward clinical laboratory testing rather than public health laboratory testing, and the impact on public health surveillance. Because integration will require a culture shift due to historical ownership of individual systems, the White House needs to be the ultimate overseer of national biosurveillance.

- **Duplicative Systems:** Many individual disease surveillance systems have been set up over the years, with over 300 separate surveillance systems or surveys, according to the National Biosurveillance Advisory Subcommittee (NBAS). The White House must look across agencies to review overlapping and duplicative surveillance systems, combine systems where possible, and break down silos to allow for integration and interpretation of relevant data. In an era of modern HIT, it should be possible to gather and track information about a range of specific threats and concerns through a unified system, rather than having separate collection systems for different issues.

- **Other Strategies:** The implementation plan should take into account the recommendations of CDC's National Biosurveillance Strategy for Human Health, GAO's multiple reviews of national biosurveillance, and the NBAS.

EXPERT COMMENTARY

The Present and Future of Information Technology for Public Health Departments

By Joann Schaefer, MD, Chief Medical Officer, State of Nebraska, Director of Public Health, Nebraska Department of Health and Human Services

Public health is a progressive field that's constantly changing with the goal of improving and protecting the health of the people. Data drives much of that change. Health data is a valuable tool, a valuable resource. Think HITECH Act, Meaningful Use, electronic health records and health information exchanges, the landscape of how we move, receive and exchange data is also changing and we need to change how we do business along with it.

One of my priorities in Nebraska is to become a trusted source of health data. Part of that is understanding how we currently get data, its quality and how we're funded to support it and what statutes control it. We need to look toward the future of how our data systems will change and what we can do now to put new technology in place that will work for us today, tomorrow and in the years to come.

The state is in the process of implementing public health requirements under meaningful use. When meaningful use came along, the health care system and Medicaid were heavily funded, but public health was not. This lack of funding provides many challenges and has forced us to revisit how we use our resources such as utilizing current grants differently and coordinating across programs. This made it possible for us to make some funding available to begin the work for meaningful use while exploring potential dollars under Medicaid.

Right now, we have a meaningful use coordinator who is responsible for making sure changes associated with meaningful use are done in a coordinated fashion throughout our division and keep pace with changing requirements. That coordinator keeps the team moving in one direction together and cuts across silos.

Our statewide Health Information Exchange (HIE) is up and running and ever expanding. To date, we're able to exchange our electronic health record data, immunization registry data and provide the platform for the state's prescription drug monitoring program. We are currently piloting chronic disease syndromic surveillance data and our extensive electronic lab reporting will eventually be pulled through our HIE. Next on the horizon for meaningful use is data exchange with our cancer registry.

These evolving data exchange methods can be complicated, but it's important for states to try to move forward together before efforts and resources are duplicated or worse — wasted. Many states are doing so much of this already but at a slower pace, either on paper or with less responsive systems and antiquated technology.

As for funding, we're trying to get out of the stovepipe mentality and use our funding resources in a more blended approach so that our data integration is not just about preparedness but about quality assurance and disease surveillance in general. In today's world, different kinds of data must work together across the board to produce real results.

For example, we've been able to launch a successful cardiovascular surveillance program, where we harvest real-time, de-identified inpatient data through the clinical record to assist us in accurately detecting, tracking and analyzing cardiovascular disease events. This is end-point chronic disease surveillance out of a large hospital that we hope will become the model for the entire state and hopefully other parts of the country. We have daily numerator and denominator data for myocardial infarction, stent placement, angioplasty and coronary artery bypass grafting as well as lipids, hemoglobin A1c, smoking status, height, weight and many other data points. This requires an integrated IT approach now and in the future with help from our funders to sustain it. Quite simply, this is the beginning of real-time, chronic disease surveillance.

With more specialized technology comes a need for a skilled and trained workforce. This is a continual issue. Efforts to cross-train are on the horizon and the educational system is responding to the need for a workforce trained in both IT and public health — this can't come soon enough.

At the same time, the entire public health system will continue to change. It's going to be challenging both in policy and resources. At times, it's going to be painful and it's going to take a lot to pull off. Sometimes it feels like the train is running down the tracks as the tracks are being laid. But that train is coming so everyone needs to pay attention. We truly believe that the scope and richness of the data coming will be worth the time and investment. More importantly, we won't be able to fully carry out our public health mission without keeping pace with health information.

It's important to realize the true potential of health information. It plays a critical role in understanding the health of the population and the true illness burden in a real-time fashion. Data is safe and secure and in one place through one connection and link, i.e., with HIE. For us, one gateway to an HIE is far superior to 86 separate connections to hospitals — our information is unified and timely, not disparate, which could be one of the most important things before, during or after a public health emergency.

The bottom line is public health, health care and information technology are melding like never before and it's important for people in public health to be credible, trustworthy and technologically savvy players in this transformation.

E. ADDRESSING ANTIBIOTIC RESISTANCE

Since the 1940s, antibiotics and other antimicrobial agents have saved countless lives from infectious diseases. However, over 70 years, many bugs have learned to adapt to the drugs designed to kill them. Some have developed resistance to one drug and others to entire classes of antimicrobials, called multidrug-resistant or MDR strains. In a worst-case scenario, microorganisms can be resistant to all drug therapies and infected patients can be left with no treatment options. Patients suffering from drug-resistant infections have longer and more costly hospital stays and are more likely to die from their infection.[91]

Bacteria developing resistance to antimicrobials include Streptococcus pneumoniae, *Staphylococcus aureus, Salmonella, Escherichia coli, enterococci, Acinetobacter baumanii, Pseudomonas aeruginosa* and *Klebsiella* spp.[92]

Many federal departments and agencies are focusing on the growing problem of antimicrobial resistance. The Interagency Task Force on Antimicrobial Resistance was created in 1999 and released released its first *A Public Health Action Plan to Combat Antimicrobial Resistance* in 2001 and an update in 2012. Progress reports on the four focus areas: surveillance, prevention and control, research and product development are published annually.[93] In addition, CDC, in partnership with FDA and USDA, has been tracking antibiotic resistance in foodborne bacteria since 1996, through the National Antimicrobial Resistance Monitoring System (NARMS).[94]

Essential to reducing antimicrobial resistance is curbing overuse. Antibiotics are only effective against bacterial infections, not viral infections like colds or the flu, bronchitis, non-strep sore throats, or runny noses. Taking antibiotics to treat viral infections increases the likelihood the drug will be less effective when needed for a bacterial infection in the future.[95] CDC has implemented an educational campaign titled *Get Smart: Know When Antibiotics Work* targeted towards three different audiences: patients, health care settings and animal agriculture.[96]

Antimicrobials have long been used in livestock and poultry for the treatment, control and prevention of diseases, as well as to increase production (e.g., growth promotion). Continued exposure through medicated feed and water has resulted in a high prevalence of resistant bacteria in the feces of treated animals,[97] which can contaminate local produce farms and infect consumers. Humans can also become infected through contaminated animal products directly. Using the same classes of antimicrobials in food-production animals and humans increases the likelihood that infections borne from infected animals will be resistant to the standard treatment protocols for humans.[98]

In April 2012, the Food and Drug Administration recommended that certain antibiotics no longer be used for production purposes, such as to enhance growth or improve feed efficiency in an animal. Its guidance, *The Judicious Use of Medically Important Antimicrobial Drugs in Food-Producing Animals*, also recommends veterinary oversight of antimicrobials used for treatment or prevention of illness in animals.[99]

As existing antimicrobials become less effective, there is a need for new drug development. According to the Infectious Diseases Society of America, the dearth of new antibiotic drugs in the pipeline that would offer benefits over existing drugs or that could treat the pathogens that cause the majority of U.S. hospital infections is contributing to an impending public health crisis.[100] As Title 8 of the Food and Drug Administration Safety and Innovation Act, signed into law in July 2012, the Generating Antibiotics Incentives Now section encourages pharmaceutical companies to develop new antimicrobial drugs by providing an additional five years of market exclusivity and the opportunity for priority review and fast-track approval by FDA.[101] In September, FDA announced the Antibacterial Drug Development Task Force, which will develop guidance related to new antibiotic development.[102] This year, HHS's BARDA partnered with industry to develop a next-generation tetracycline antibiotic to treat anthrax, plague, tularemia and bacterial pneumonia.[103]

RECOMMENDATIONS

TFAH recommends policies that help curb antibiotic overuse and encourage new antibiotic development become high priorities:

- The Administration should place a high priority on the development of new antibiotics to be able to respond to new infectious threats and to address the growing problem of antibiotic resistance. FDA should implement a limited population medical use model, where drugs are approved for use among targeted groups with particular conditions or problems, to bring some antibiotics to market more quickly for infections where there is no other available treatment;

- The Administration should engage in a comprehensive strategy to combat antimicrobial resistance, such as recommended in the provisions of the STAAR Act[104] and the 2012 Public Health Action Plan to Combat Antimicrobial Resistance,[105] released by the Interagency Task Force on Antimicrobial Resistance. The Task Force stressed that strong Administration leadership is necessary to coordinate efforts across agencies and prioritize this pressing public health problem. Key components that a comprehensive campaign should address include:
  - Reduce Overprescribing: Center for Medicare and Medicaid Services (CMS), CDC, accrediting organizations, health care facilities and medical organizations must work together to reduce overprescribing and misuse of antibiotics by tracking and publicly reporting prescribing data as part of quality measurements, educating providers and patients about the harm of inappropriate prescribing, and providing clinical decision support through HIT;
  - Reduce Overuse in Agriculture: Mandatory guidance should be created for the use of antibiotics in food animals, but until then, the Administration should act to implement the voluntary FDA Guidance for Industry numbers 209 and 213 and Veterinary Feed Directive regarding the use of antimicrobials in food animals in a way that will lead to meaningful reduction of antibiotics critical to human health;
    - Clarify what constitutes appropriate "preventive use" of antibiotics. In this regard, FDA should make clear that using antibiotics in lieu of addressing animal overcrowding and sanitation is not a judicious use.
    - Establish the baseline data required to verify that antibiotic use in food animal production is significantly reduced, which should be the unambiguous goal of national efforts.
    - Verify and demonstrate that drug companies change labels to eliminate references to growth promotion as an approved use.
    - Verify that veterinarians are providing proper oversight in the dispensing of medically important drugs only for therapeutic purposes.
    - Publicly and regularly report progress and data on the above four steps.
  - Incentivize Development of New Antibacterial Drugs through BARDA and Other Mechanisms: TFAH supports initiatives such as the new FDA Antibacterial Drug Development Task Force and the recommendations issued by The Brookings Institution, in partnership with the FDA, for the need to reevaluate acceptable levels of risk and benefit in new treatments; harnessing novel statistical and methodological approaches; streamlining the clinical trials process; and prioritizing unmet need; and
  - Approve Limited Population Medical Use: FDA should have the authority to protect any new antimicrobials from losing their effectiveness through overuse. This should include having the authority to restrict the approved use of new antimicrobial drugs of limited use by targeted populations based on needs posed by specific threats.[106]

EXAMPLES OF ANTIBIOTIC-RESISTANT INFECTIONS

Antibiotic-resistant infections continue to be a problem globally and are causing more serious infections and increasing the frequency of treatment failure.

A deadly superbug at the National Institutes of Health has claimed its seventh victim in just over one year. The antibiotic-resistant strain of the bacterium *Klebsiella pneumoniae* arrived in August 2011 with a New York woman in need of a lung transplant and has infected at least 17 people since then and killed seven.[107] Even after taking serious efforts to protect against the infection, such as building a wall to isolate infected patients, ripping out plumbing that harbored the bacteria, hiring monitors to ensure doctors and nurses were properly scrubbing their hands and even blasting patients' rooms with vaporized disinfectant the bacteria reappeared in the seventh victim after six months with no new infections.[108]

Many cases of drug-resistant *Salmonella* have occurred in recent years. Early in 2012, 19 individuals fell ill due to tainted meat from Maine, and in 2011 a *Salmonella* outbreak of contaminated turkey reached 26 states, sickened 76 individuals and killed one.[109] Many of those infected had to be hospitalized due to the drug-resistant nature of the bacterial infection.

A recent outbreak at a high school in New Jersey highlights the susceptibility of athletes to MRSA, an antibiotic-resistant staph infection. Over the course of one month the school saw 11 cases of MRSA.[110] Fortunately for the school, there have been no reports of fatalities or severe complications, as of mid-November. Another story from a few years earlier reports that 9 percent of the St. Louis Rams National Football League team was infected with MRSA.[111] Scientists recently found MRSA in four U.S. wastewater plants, which were specifically chosen because their waste material is used as reclaimed wastewater for landscape irrigation or manmade snow.[112]

In Malaysia, antibiotic resistance is becoming a very serious problem with powerful antibiotics no longer being effective for six out of 10 patients.[113] *Streptococcus pneumoniae* showed resistance to antibiotics over 30 percent of the time in 2010, compared to 21.9 percent of the time in 2003.[114]

MULTI-DRUG RESISTANT TUBERCULOSIS (MDR-TB)

While most strains of TB bacteria are susceptible to drugs, drug-resistant strains are on the rise—most often because of the misuse or mismanagement of drugs used to treat TB. Multidrug-resistant TB is resistant to the two most potent TB drugs—isoniazid and rifampin. Extensively drug-resistant TB (XDR TB) is the most dangerous type of multidrug-resistant TB. It is resistant to isoniazid and rifampin, plus any fluoroquinolone and at least one of three injectable second-line drugs.[115] A 2012 study found that MDR-TB cases were more common than previously thought. Of 1,278 patients in Estonia, Latvia, Peru, Philippines, Russia, South Africa, South Korea and Thailand, nearly 44 percent of patients were resistant to at least one second-line drug and 6.7 percent had XDR TB. Prior treatment with second-line drugs was the strongest risk factor for subsequent resistance—increasing the risk of XDR tuberculosis by more than four times.[116]

While cases of MDR-TB and XDR-TB are relatively infrequent in the U.S. (1.3 percent of cases in 2011[117]), they are a serious public health threat.[118] According to CDC, "while drug-resistant TB is generally treatable, it requires extensive chemotherapy (up to 2 years of treatment) with second-line anti-TB drugs that are more costly than first-line drugs, and which produce adverse drug reactions that are more severe, though manageable."[119] According to Kenneth Castro, the U.S. Assistant Surgeon General and Director of CDC's Division of Tuberculosis Control, in 2007, in-patient costs alone for XDR-TB averaged $500,000 per case, while the cost of treating MDR-TB was about $2,500.[120] The cost of treating regular TB is a few hundred dollars.[121] The added cost of treating MDR-TB and XDR-TB may be too much for burdened public health systems in developing countries. The WHO has appealed to the world's wealthiest nations for a four-fold increase in anti-TB funding to address the problem.

F. IMPROVING MEDICAL COUNTERMEASURE RESEARCH, DEVELOPMENT AND MANUFACTURING

Anthrax vaccine, botulinim antitoxin and smallpox vaccine all have something in common: the government is the only real customer for these products. As a result of the lack of a natural marketplace, the U.S. government has invested in the research, development and stockpiling of emergency medical countermeasures for a pandemic, bioterror attack, emerging infectious disease outbreak, or chemical, radiological or nuclear events.

Development of medical products for the nation's biodefense is a key piece of any public health emergency response. By preparing for a bioterror attack with adequate supplies of countermeasures that can be rapidly deployed and administered, the nation can effectively neutralize that threat. A successful domestic MCM enterprise will prepare the nation for new threats, expected or unexpected, by building the science, policy and production capacity in advance of an outbreak.

Congress created Project BioShield in 2004 to spur development and procurement of MCMs and authorized BARDA in 2006 to speed up the development of MCMs by supporting advanced research, development, and testing; working with manufacturers and regulators; and helping companies devise large-scale manufacturing strategies. BARDA bridges the funding gap between early research and commercial production.

The Public Health Emergency Medical Countermeasures Enterprise (PHEMCE), created in 2006 by HHS, is made up of federal partners responsible for protecting the nation from the health effects associated with chemical, biological, radiological and nuclear (CBRN) threats, through the use of MCMs. This year, ASPR released the 2012 PHEMCE Strategy and the PHEMCE Implementation Plan, which together provide the blueprint the PHEMCE will follow in the near, mid- and long-term to achieve its strategic goals, which include developing new MCMs, establishing clear regulatory pathways, developing operational plans for use, and addressing gaps—all while prioritizing investments in the most efficient ways possible — and plans for making sure they are available, distributed and used when needed in an incident.[122]

PEDIATRIC MCMS

Several federal departments and agencies are attempting to tackle the numerous and complex ethical challenges associated with the development of medical countermeasures so they are safe for use by children:

- In October 2010, the National Commission on Children and Disasters released a report to the President and Congress on the state of children during disasters. It found chronic gaps in disaster preparedness for children and highlighted the need for access to pediatric medical countermeasures for the range of CBRN threats;[123]
- In 2010, HHS established the Children's HHS Interagency Leadership on Disasters (CHILD) Working Group to integrate disaster planning activities and operations for children both within HHS and across the federal government;
- Also in 2010, on behalf of the PHEMCE, ASPR convened a Pediatric Medical Countermeasure Roundtable for National Health Security to engage pediatric public- and private-sector subject matter experts in discussions on pediatric MCM requirements, preparedness and response issues;[124]
- In 2011, the Anthrax Vaccine Working Group of the National Biodefense Science Board, which was created under the authority of PAHPA, concluded that attempting to gather the safety and immunogenicity data about Anthrax Vaccine Adsorbed post-exposure prophylaxis in children prior to an anthrax event—rather than waiting for a future crisis—would be in the best interests of parents, children and the federal government;[125]
- In 2011, a Pediatrics and Obstetrics Integrated Program Team was created to guide the PHEMCE and prioritize gaps related to pediatric and obstetric MCM needs;[126]
- In February 2012, FDA held a Public Workshop on Ethical and Regulatory Challenges in the Development of Pediatric Medical Countermeasures to consider the scientific, ethical and regulatory issues involved in addressing pediatric MCMs as part of public health preparedness;[127] and
- Also throughout 2012, the Presidential Commission for the Study of Bioethical Issues has been examining the ethical considerations of conducting clinical trials of MCMs for children—specifically whether to conduct a pre- and post-event study of an anthrax vaccine as a part of treatment for exposed children.[128]

Clinical efforts underway with HHS support include developing safe and effective pediatric formulations of Radiogardase (Prussian Blue) for radiation poisoning in children less than two years of age, and clinical studies to support a pediatric indication for midazolam to treat nerve-agent seizures, as well as animal model studies to test its efficacy against said seizures.

INNOVATIONS FOR FDA AND MEDICAL COUNTERMEASURES

FDA is responsible for getting lifesaving drugs and devices to market as quickly as possible while ensuring safety. The spectrum of the MCM enterprise includes vaccines, antiviral, and other lifesaving drugs and devices such as diagnostics that are used to determine if someone has been exposed to a biologic, chemical, radiological or nuclear (CBRN) threat.

MCMs pose unique challenges, since it is often impossible or unethical to safely test these products on humans. While it is possible to test a product for safety in humans, it is not feasible to expose people to the threat itself to test whether the vaccine or the treatment works. It is essential that new vaccines, antiviral medications, and devices intended to save lives do not cause unintentional harm and endanger the health of Americans, but it is also essential to have effective countermeasures in place to respond to man-made and natural threats.

FDA must take steps to minimize red tape, maximize innovation, and maintain safety when it comes to reviews and standards for MCMs. Additional coordination with BARDA and private industry is essential to understand priorities and to find ways to improve processes to make them less burdensome on companies.

The agency is developing new scientific and analytic tools to speed the approval of lifesaving drugs and devices. Innovative approaches can be used to more efficiently manage the movement of potential treatments from idea to reality.

In August 2010, the agency launched a new Medical Countermeasures Initiative (MCMi), which was first limited to preparing for responding to a flu pandemic.[129] In April 2011, Congress enacted legislation to allow the project to also address CBRN threats.[130]

Examples of the efforts FDA is taking to expand and be more flexible in testing and review of products include:

- Developing genetically modified animals for testing, such as an engineered mouse to test the smallpox vaccine and potential side effects;
- Expanding the use of testing on lab-created cell cultures as an option to testing directly on humans or animals as well as more research into how humans are likely to react differently than animals or lab-created materials or rodents;
- Implementing supercomputing and IT enhancements to better simulate the effect of MCMs on humans;
- Creating research models, such as biomimetrics, which create artificial models that mimic natural biology;
- Researching adjuvants to maximize the amount of vaccine available during crises;
- Advancing treatment for acute radiation syndrome;
- Enhancing the ability to test for multiple pathogens simultaneously;
- Improving the ability to rapidly and accurately test for new potential threats; and
- Focusing significant research on the impact of MCMs on children and other at risk patients.

Examples of FDA efforts to expand and be more flexible to ensure life-saving drugs and devices are sped to market and available for use in crises include:

- Enhancing clarity and flexibility for emergency use authorization (EUA), which permits FDA to 1) approve the emergency use of drugs, devices, and medical products (including diagnostics) that were not previously approved, cleared, or licensed by the agency, or 2) allow the off-label use of approved products in certain well-defined emergency situations;
- Issuing an EUA so doxycycline can be used as prophylaxis for people exposed to anthrax;
- Expanding the shelf-life extension program to use drug stockpiles beyond formal expiration dates when safe;
- Improving risk-benefit analyses; and
- Developing models for predicting and mitigating the potential for shortages of MCM drugs, biologics and devices during emergencies.

"The mission of the FDA should continue to ensure that new devices and drugs reaching the public in the U.S. are safe and effective. We encourage fostering innovation, without lowering evidence standards or putting the public at risk."[131]

--Testimony from America's Health Insurance Plans (AHIP) to the House Oversight and Government Reform Committee in June 2011

RECOMMENDATIONS

TFAH recommends that the United States place a higher priority on research and development of MCMs, including vaccines, medicines and technology. Policymakers must ensure that the public health system is involved in this process, from initial investment through distribution and dispensing. The nation's MCM enterprise could be advanced through the following activities:

- The entire medical countermeasure enterprise, from initial research through dispensing, must receive robust federal funding to ensure continuation of the pipeline, provide assurances to industry that the government will be a reliable partner in development and procurement of new products, and ensure products reach the intended recipients.
- As of FY 2014, the Project BioShield Special Reserve Fund (SRF) and supplemental funds from the H1N1 pandemic will be exhausted. In addition, the Budget Control Act prevents programs like BioShield from receiving advance appropriations, which are necessary to incentivize the biomedical industry to develop new medical countermeasures. The entire enterprise should receive additional funding, most notably no-year funding in the SRF for procurement and annual funding for advanced development at BARDA in addition to funds for the MCM Strategic Investor to provide financial support and business expertise to newly emerging businesses; the Strategic National Stockpile at CDC to enable storage and distribution of appropriate MCMs; and regulatory science in FDA's MCM initiative to promote safe pathways to approval for new products.
- The MCM enterprise could benefit from a series of measures, including improved White House leadership and definition and coordination of roles and responsibilities, increased transparency of contracting and decision-making process at HHS, long-term funding, streamlined contracting process, and continued progress in clear regulatory pathways at FDA, as was recommend in a report by the Alliance for Biosecurity and MD Becker Partners.[132]
- There has never been sufficient attention paid to the needs of adapting the use of medical countermeasures to ensure they are safe and effective for children. The federal government should set a goal to increase the development and procurement of pediatric medical countermeasures so that the right countermeasure, in the right dose and formulation, at the right time can be safely delivered to all children during an emergency.
- The government should continue to prioritize new influenza products, such as vaccines that can be developed faster, in greater supply and with higher efficacy, including working toward a universal influenza vaccine and new diagnostics.

THE STRATEGIC NATIONAL STOCKPILE

From 2003-2010, the *Ready or Not?* report tracked states' plans to receive and distribute emergency vaccines, antidotes, pharmaceuticals and medical supplies from the SNS. In 2003, only two states had adequate plans based on a CDC evaluation. Now, based on CDC's technical assistance review (TAR), all 50 states and DC have adequate plans to receive and distribute supplies from the SNS. It should be emphasized that the scoring system assesses **planning and management of the stockpile.** It does not reflect the actual capacity of the state to deploy countermeasures and other supplies from the SNS.

State and local health departments plan and train in order to 1) receive SNS assets from the federal government; 2) distribute, or move, those assets from the storage facility to the point of dispensing (POD); and 3) dispense (or provide or administer) the medical countermeasure to the affected person(s).

The SNS maintains a variety of critical pharmaceuticals and medical supplies including antibiotics such as ciprofloxacin and doxycycline, chemical nerve agent antidotes like atropine and pralidoxime, antiviral drugs such as Tamiflu® and Relenza®, pain management drugs such as morphine, vaccines for agents like smallpox and radiological countermeasures such as Prussian blue and DTPA. In addition to pharmaceuticals, the SNS contains supportive care supplies like endotracheal tubes and IV supplies, burn and blast supplies such as sutures and bandages, ventilators, personnel protective equipment such as N-95 respirators and surgical gloves and other life-saving medical materiel. While this list is not comprehensive, it is representative of the items contained in the SNS.

The SNS is positioned in undisclosed locations throughout the United States and is configured to provide a flexible response strategy. Included in the stockpile are a dozen 12-hour Push Packages, which contain over 50 tons of pharmaceuticals and medical materiel. These assets are pre-configured in deployable containers and strategically located to enable rapid delivery to the site of a national emergency within 12 hours of the federal decision to deploy.

The majority of the SNS formulary is maintained in managed inventory. Like the 12-hour Push Packages, these assets are also strategically located around the nation. They provide the ability to configure and deliver significant quantities of pharmaceuticals and medical materiel as an initial response if the nature of the public health emergency is well defined, or as follow-on to a Push Package delivery. Delivery of assets from managed inventory are planned to begin arriving within 24 to 36 hours after the federal decision to deploy them. Quantities in the SNS change based on national planning guidance and prioritization, modeling scenarios, and standard inventory management procedures.

According to the PHEMCE Implementation Plan, current HHS holdings include: anthrax antitoxin, anthrax vaccine, botulism antitoxin, broad spectrum antimicrobials, cyanide antidote, nerve agent antidote, nuclear agents — ARS — hematopoietic therapeutics, nuclear agents — thermal burn therapeutics, pandemic influenza antivirals, pandemic and pre-pandemic influenza vaccine, radiological agents — decorporation/blocking agents, smallpox antivirals, smallpox vaccine and ventilators.[133]

The SNS also has a supply of countermeasures that could be used during an influenza pandemic. In fact, during the 2009 H1N1 pandemic flu response, the U.S. government distributed both antivirals and personal protective equipment from the SNS to state and local health departments. As of June 17, 2010, the total quantity of antiviral drugs in the stockpile was 68 million treatment courses.[134] CDC reports that the antiviral drugs, including pediatric formulations, have been replenished and increased. It is unclear what plans CDC has to replenish the supplies, including N95 respirators and surgical masks, which were deployed during the H1N1 pandemic.

The federal government is also continuing to explore approaches that partner with the public sector to strengthen the deployment of countermeasures, such as those that were used during the H1N1 outbreak.

G. IMPROVING HEALTH SYSTEM PREPAREDNESS AND ENHANCING SURGE CAPACITY

The ability of our health care system to quickly provide care for major emergencies is critical, particularly, when hospitals and health care providers can experience a mass influx of patients and continuity of operations may be disrupted. For instance, recent events, such as the Joplin tornadoes and Superstorm Sandy, required evacuation and relocation of patients during a time when power and other systems in the surrounding areas were also down.

During a severe health emergency, the health care system would be stretched beyond normal limits. Patients would quickly fill emergency rooms and doctors' offices, exceed the existing number of available hospital beds and cause a surge in demand for critical medicines and equipment. In addition, it is important for hospitals to have fundamental, ongoing systems functioning, ranging from electronic medical records and maintaining safe conditions, to have a secure foundation to build upon.

The challenge of how to equip hospitals and train health care staff to handle the large influx of critically injured or ill patients who show up for treatment after or during a public health emergency remains the single, most challenging issue for public health and medical preparedness.[135]

In public health emergencies, such as a new disease outbreak, a bioterror attack, or catastrophic natural disaster, U.S. hospitals and health care facilities are on the front lines providing triage and medical treatment to individuals. In the best of times, however, most emergency rooms and intensive care units must confront bed shortages and staffing issues; in a mass casualty event—particularly a pandemic influenza or mass bioterror attack—the situation could quickly spiral out of control.

CRISIS STANDARDS OF CARE

"'Crisis standards of care' is defined as a state of being that indicates a substantial change in health care operations and the level of care that can be delivered in a public health emergency, justified by specific circumstances."[136]

A mass casualty event, such as a bioterrorist attack, earthquake or severe influenza pandemic, can quickly overwhelm the health care system if large numbers of patients all seek treatment at the same time. Under these circumstances, resources—including staff, supplies and space—would be strained and health care providers would face serious obstacles in attempting to provide care to patients according to normal operating procedures. In a disaster, medical care must shift from focusing on the individual to that of using scarce resources in a manner that can achieve optimal outcomes for the population as a whole.

To help encourage more planning and development of crisis standards of care, the IOM released *Guidance for Establishing Crisis Standards of Care (CSC) for Use in Disaster Situations* in September 2009.[137] The report describes five key elements of crisis standards of care protocols based on a review of existing state plans, which include the following:

- A strong ethical grounding;
- Integrated and ongoing community and provider engagement, education and communication;
- Assurances regarding legal authority and environment;
- Clear indicators, triggers and lines of responsibility; and
- Evidence-based clinical processes and operations.

In 2012, HHS and Veterans Affairs, along with the National Highway Transportation Safety Administration, asked the IOM committee to reconvene to examine the effect of the 2009 report and create guidance for all stakeholders responsible for CSC implementation and planning.

The Crisis Standards of Care: A Systems Framework for Catastrophic Disaster Response recommends a "systems" approach that incorporates CSC into the broader context of disaster planning at all levels and among all actors—emergency management, public safety, emergency medical services (EMS), public health, health care organizations and coalitions, and community-based health practitioners. It encourages the integration of CSC into surge capacity planning and exercises, as well as federal preparedness and response grants, contracts, and programs. In addition, it highlights the importance of federal facilitation of state and tribal planning efforts, as well as state support of and collaboration with local governments. Within the Framework are separate volumes that outline specific functions and tasks for allocating scarce resources in a disaster for four key stakeholder group—state and local governments, EMS, hospitals and acute care facilities, and out-of-hospital and alternate care systems. The FY 2012 HPP grant guidance refers grantees to the IOM report to develop crisis standards planning in their own jurisdictions.[138]

RECOMMENDATIONS

Health system preparedness capabilities have been one of the most persistent problems in public health preparedness and require increased agreement and implementation on crisis standards of care, improved integration of preparedness concerns into overarching health care systems and improved coordination across public health and health care providers. To help improve surge capacity concerns, TFAH recommends:

- Public health and health systems should engage in strategic planning, including regional coordination, to better prepare for disasters. This is particularly important given the limited funding available through the Hospital Preparedness Program.
  - States should implement a framework for adopting crisis care standards, such as those recommended by IOM, which includes considerations for integrated planning for coordinated response by state and local governments, EMS, health care organizations and health care providers.[139]
  - Health systems should begin consideration of an Immediate Bed Availability framework that would enable facilities to immediately assess bed availability, discharge non-critical patients, and quickly intake disaster victims. Transitioning to such a system will require hospital and health system administrators to have continuous situational awareness, even during non-disasters, as well as seamless communication with public health and between facilities.
  - Public health and health care facilities should work toward increasing the strength of health care coalitions as part of the Hospital Preparedness Program. Coalitions should incorporate non-hospital facilities, emergency management, and public health in planning processes. The program should also continue to refine guidance for creating successful coalitions, release state-by-state data and measures of progress in creation of health care coalitions, and ensure that all states are adopting successful models.[140]
- Public health and health care providers should find ways to integrate preparedness in reforming health system structures. For instance, preparedness could be promoted in Accountable Care Organizations (ACOs) through 1) performance measures; 2) surge capacity requirements; 3) requirements to integrate an ACO's Health Information Technology system to interface with public health and larger systems to track community concerns while protecting patient privacy; and 4) requirements to include emergency preparedness in their evaluation of the health needs of their beneficiaries within the context of the larger population. As another example, CMS should include emergency planning into Medicaid health home requirements, for instance, which could help establish channels for support and communication for at-risk and vulnerable members of the community during emergencies.

MEDICAL RESERVE CORPS READINESS

The Medical Reserve Corps (MRC) is a national network of community-based groups that engage civilian volunteers to strengthen public health, emergency response, and community resilience. MRC volunteers include professionals from public health, medicine and allied health fields, as well as non-health professionals who work on administration, logistics, communications, and other support tasks.

The MRC network is supported by the Division of the Civilian Volunteer Medical Reserve Corps (DCVMRC), which is run out of the Office of the U.S. Surgeon General. As of November 6, 2012 there were over 206,000 volunteers enrolled in 985 MRC units in all 50 states, Washington, D.C., and most U.S. territories. In fiscal year 2012, 450 units (38 percent) reported at least one activity per quarter, and eight states had a majority ($\geq$ 50% of units per state) of units reporting at least once per quarter.

Local governmental services can be quickly overtaxed in a major public health emergency, during which MRC volunteers can help deliver essential medical care and other services. For example, Homeland Security Presidential Directive 21 (HSPD-21) emphasizes the need for state and local jurisdictions to have a cadre of trained volunteers who can come to the aid of their fellow community members. This presidential directive envisions a country "where local civilian leaders, citizens, and families are educated regarding threats and are empowered to mitigate their own risk, where they are practiced in responding to events, where they have social networks to fall back upon, and where they have familiarity with local public health and medical systems."[141] Groups such as MRC fulfill this vision and "will significantly attenuate the requirement for additional assistance."[142]

The local MRC units are a crucial part of our nation's public health emergency response workforce. These men and women serve their communities throughout the year and are ready when needed if an emergency—whether a pandemic H1N1 or a natural disaster—strikes. Ensuring a robust MRC capability provides communities with a local safety net that can be activated in times of need which increases public health resilience and helps to further states' and our nation's national health security.

PUBLIC HEALTH CONCERNS IN THE WAKE OF SUPERSTORM SANDY

Superstorm Sandy left behind many health problems in its wake. As the initial impact of the storm recedes, the damage and health problems left by it remain. Some continuing public health threats in areas affected by the storm include:[143,144, 145, 146]

- Contaminated flood water
- Compromised sewage treatment plants
- Unsafe drinking water
- Carbon monoxide poisoning and fire
- Food poisoning and access to food
- Toxic mold
- Asbestos
- Exposure to cold
- Injuries
- Chronic disease management
- Long-term mental health impacts
- Treating evacuated hospital patients, including newborns
- Electrical hazards
- Temperature-related injury
- Destruction of healthcare safety net

The storm highlights the importance of the need for emergency preparedness, especially for hospitals. Following Hurricane Katrina and Irene, hospitals shored up their emergency preparedness plans, but many hospitals still encountered major problems due to Superstorm Sandy. Hospitals in the New York City area had to make difficult decisions whether to stay put or evacuate before the storm. At Bellevue hospital in Lower Manhattan, the decision to stay through the storm proved untenable as water levels began to rise in the building and fuel pumps were flooded. With the loss of power, food and water in short supply and the lifespan of the generators questionable, the decision was made to evacuate Bellevue.[147] Patients were carried down many flights of stairs and taken to other hospitals in the area with limited medical records and information.[148] Situations similar to this occurred at both the New York University Langone Medical Center as well as Coney Island hospital after they were unable to ride out Hurricane Sandy when they experienced backup power failures.[149]

THE PUBLIC HEALTH RESPONSE TO HURRICANE SANDY

Following the destruction caused by Hurricane Sandy, many health departments and public health organizations responded with support and resources for individuals and communities. Below are examples of actions taken by public health departments and organizations.

- New Jersey has seen a range of coordination and response to Sandy among public health officials, volunteers, health care professionals and first responders. Many health care workers in the state worked overtime at hospitals and nursing homes and volunteers helped in shelters to provide medical care and assistance to those in need.[150]
- Staff from Hoboken University Medical Center and Palisades Medical center, two centers that were evacuated in Hudson County, moved with patients to other hospitals and remained there to help. At Newark Beth Israel Medical Center and St. Barnabas Medical Center six life-saving transplants were performed while on generator power.[151]
- The New Jersey Department of Health's Consumer, Environmental and Occupational Health Service worked tirelessly to answer hundreds of calls from individuals and businesses regarding concerns about mold, food safety and drinking water.[152]
- The New Jersey Newborn Screening lab was able to stay operational throughout the storm and keep up with hundreds of specimens thanks to the dedication and hard work of staff.[153]
- To date, 27 states have deployed over 2,500 personnel and equipment through the Emergency Management Compact (EMAC), which is a national interstate mutual aid agreement allowing states to share resources across state lines during disasters.[154]
- The New York Department of Health put together an online resource for individuals who have been affected by Superstorm Sandy. The website offers a variety of information including drinking water advisories, insurance plan information, mobile medical van deployments and phone numbers for help lines.[155]
- Following Superstorm Sandy, ASTHO has been monitoring federal conference calls and briefings as well as collecting situation reports from affected states and sharing information.[156]

H. READYING FOR WEATHER-RELATED THREATS

Climate change is expected to affect the health of all Americans. In order to mount an effective response, public health officials at the federal, state and local level need to be involved in climate change policy decisions. Currently, however, public health officials are not playing a central role in climate change policy and action. At the federal level, public health is not a central consideration of the current research agenda, nor is there substantial funding to help state and local health departments build capacity to prevent and prepare for the effects of climate change. At the state level, public health officials often are absent from climate change commissions and have not contributed to state climate change planning. These gaps must be addressed in order for the United States to develop a comprehensive climate change agenda that both seeks to prevent and to prepare for climate change.

To improve public health preparedness for extreme weather and climate change-related events, TFAH recommends:

- Improving coordination, including ensuring public health agencies at all levels are working with environmental and other agencies to undertake initiatives to reduce known health threats from food, water and air, and educate the public about ways to avoid potential risks;
- Ensuring every state has a comprehensive climate change adaptation plan that includes a public health assessment and response. State and local health agencies should engage in public education campaigns and establish relationships with vulnerable populations as part of any plan;
- Expand a National Environmental Health Tracking Network. Congress should provide full funding for CDC's environmental public health tracking program. The program currently funds 23 states and New York City. CDC should be provided with the mandate and resources to expand the network so it can become a centralized, nationwide health tracking center, and each state should receive the necessary funding to fully conduct health tracking activities, including tracking chronic diseases such as cancer and asthma and environmental risks. A fully funded tracking network should demonstrate interoperability with the larger health information technology system to facilitate two-way communication with clinicians and state and local public health officials; and
- Building resilience to climate-related health effects at the state and local level. Congress should provide significantly increased funding to CDC's Climate Ready States and Cities Initiative to build capacity at the state and local level to understand the impact of climate change and apply this to long-range health planning.

I. FIXING FOOD SAFETY

Annually, 48 million Americans suffer from foodborne illnesses. These illnesses send 128,000 people to the hospital and kill approximately 3,000.[157] Virtually all of these illnesses could be prevented if the right measures are taken to improve the U.S. food safety system.

Every year, approximately one million Americans who are stricken with foodborne illnesses will suffer from long-term chronic complications.[158] Foodborne illnesses take a high health and financial toll. For instance, Salmonella infections, which are responsible for an estimated $365 million in direct medical costs annually, have not decreased over the past 15 years and have increased by 10 percent recently.[159]

Foodborne diseases caused by major pathogens alone are estimated to cost up to $44 billion annually in medical costs and lost productivity.[160, 161] Major outbreaks can also contribute to significant economic losses in the agriculture and food retail industries, which account for approximately 13 percent of the U.S. gross domestic product (GDP) and are the largest industries and employers in the United States.[162] Americans spend more than $1 trillion on food annually.

RECOMMENDATIONS

To improve food safety in the United States, TFAH recommends:

- **Fully Fund and Implement the FDA Food Safety Modernization Act.** Although the FDA Food Safety Modernization Act passed in 2011, the White House has yet to finalize key rules to implement the law, including preventive controls for food and feed facilities, produce safety, and a foreign supplier verification program.[163] Congress and the Administration should also provide enough funding to FDA, CDC and relevant state agencies to be able to implement and enforce the law.
- **Improve Inspection Capacity.** There are insufficient resources to support enough inspectors for foods regulated by FDA, and there is not enough authority for FDA to have oversight over state and third party inspections.
- **Move Toward a Unified Government Food Safety Agency.** The government currently does not have a coordinated, cross-governmental approach to food safety. Right now, food safety activities are siloed across a range of agencies, and many priorities and practices are outdated. As a first step, food safety functions should continue to be unified within the FDA, and a plan with a set timeline should be developed for how to restructure food safety functions across the federal government into a single, unified food safety agency to carry out a prevention-focused, integrated food safety strategy. This same type of coordinated, cross-governmental approach to food safety is also needed at the state level.
- **Examine an Industry User-Fee Model for Food Safety.** User fees for food and beverage industries, similar to those employed for drugs and devices at FDA, should be reviewed as a potential new model for raising additional resources to support modernized, more efficient food safety inspection practices.
- **Improve Surveillance of Foodborne Illnesses.** Currently, foodborne illnesses are radically underreported in the United States and the quality of reporting varies dramatically by state. New standards and requirements should be put in place to incentivize states to improve reporting and penalize states for underreporting. Surveillance for foodborne illness outbreaks should be fully integrated with other HIT systems, which will help improve tracking and identification of the scope of problems as well as sources of outbreaks. FDA and CDC should also have a plan for requiring clinics to send cultures from rapid response tests showing problems to public health labs to allow for subtype pathogen testing.
- **Curb Overuse of Antimicrobials in Livestock and Poultry.** Antimicrobials have long been used in livestock and poultry for the treatment, control and prevention of diseases, as well as to increase production. Using the same classes of antimicrobials in food-production animals and humans increases the likelihood that infections borne from infected animals will be resistant to the standard treatment protocols for humans.[164] FDA and USDA must take action to drastically reduce the misuse of medically-important antimicrobials in agriculture, measure rates of use, and verify that industry is complying with all guidance and regulations.
- **Prevent the Tainting of Food by Environmental Contaminants.** Measures should be implemented to prevent the tainting of food by environmental contaminants, such as untreated sewage or manure that enter waters and pollute crops downstream. Requirements should be established to strengthen controls on air and water discharges of mercury and other common pollutants that are widely found in the food supply. FDA should set limits for certain contaminants, such as arsenic in rice products and apple juice.[165]

APPENDIX A: PUBLIC HEALTH PREPAREDNESS BACKGROUND

ALL-HAZARDS APPROACH TO EMERGENCY PUBLIC HEALTH THREATS

The U.S. public health system is responsible for protecting the American people from a range of potential health threats.

EXAMPLES OF MAJOR EMERGENCY PUBLIC HEALTH THREATS

Agroterrorism: The "…deliberate introduction of an animal or plant disease with the goal of generating fear, causing economic losses, and/or undermining stability."[166] Agroterrorism can be considered a subcategory of "bioterrorism" and foodborne diseases.

Bioterrorism: The intentional or deliberate use of germs, biotoxins, or other biological agents that cause disease or death in people, animals, or plants. Examples include anthrax, smallpox, botulism, *Salmonella* and *E. coli*.

Blast Injuries: Explosions, whether deliberate or accidental, can cause multi-system, life threatening injuries among individuals and within crowds. In addition, blunt and penetrating injuries to multiple organ systems are likely when an explosion occurs and unique injuries to the lungs and central nervous system occur during explosions.

Chemical terrorism: The deliberate use of chemical agents, such as poisonous gases, arsenic, or pesticides that have toxic effects on people, animals, or plants in order to cause illness or death. Examples include ricin, sarin, and mustard gas.

Chemical incidents and accidents: The non-deliberate exposure of humans to harmful chemical agents, with similar outcomes to chemical terrorism.

Foodborne diseases: Food-borne illness is caused by harmful bacteria, viruses, parasites or chemicals that are found in food and beverages and enter the body through the gastrointestinal tract. CDC estimates there are approximately 76 million pathogen-induced cases of food-borne diseases each year in the United States, causing approximately 127,000 hospitalizations and 3,000 deaths. Examples include botulism, *Salmonella, E.coli* 0157:H7, shigella and norovirus.

Natural disasters: Harm can be inflicted during and after natural disasters, which can lead to contaminated water, shortages of food and water, loss of shelter, and the disruption of regular health care. Examples include hurricanes, earthquakes, tornados, mudslides, fires and tsunamis.

Pandemic flu: A novel, potentially lethal strain of the influenza against which humans have no natural immunity. The H1N1 flu was the first pandemic flu of the 21st century. Historically, pandemic flu occurs two to three times every hundred years or so. In the 20th century the world experienced the 1918, 1957/58, and 1968 pandemic flu, although the severity of the disease varied greatly among them.

Radiological threats: Intentional or accidental exposure to radiological material. For example, a terrorist attack could involve the scattering of radioactive materials through the use of explosives ("dirty bomb"), the destruction of a nuclear facility, the introduction of radioactive material into a food or water supply, or the explosion of a nuclear device near a population center.

Vector-borne diseases: Diseases spread by vectors, such as insects. Examples include Rocky Mountain spotted fever and malaria.

Water-borne diseases: Diseases spread by contaminated drinking water or recreational water, such as typhoid fever and cholera. According to CDC, more than 4,100 persons become ill from contaminated drinking water and more than 13,000 persons become ill from recreational water disease outbreaks annually in the United States.[167, 168]

Zoonotic/Animal-borne diseases: Animal diseases that can spread to humans and, in some cases, become contagious from human to human. Examples include Avian flu, West Nile virus and SARS. In 2000, WHO identified more than 200 diseases occurring in humans that were known to be transmitted through animals.[169] Experts believe that the increased emergence of zoonotic diseases worldwide can be attributed to population displacement, urbanization and crowding, deforestation and globalization of the food supply.

WHAT DOES ALL-HAZARDS PREPAREDNESS LOOK LIKE?

THE GOALS OF 24/7 PUBLIC HEALTH EMERGENCY RESPONSE INCLUDE:

- Rapid **detection** of and **response** to emergency disease threats, including those caused by bioterrorism.
- Intensive **investigative** capabilities to quickly diagnose an infectious disease outbreak or to identify the biological or chemical agent used in an attack.
- **Surge capacity** for mass events, including adequate facilities, equipment, supplies and trained health professionals.
- **Mass containment strategies,** including medicines and vaccines to stop the spread of a disease and isolation and quarantine when necessary.
- Streamlined and effective **communication** channels so health workers can swiftly and accurately communicate with each other, other front line workers, and the public about 1) the nature of an emergency or attack, 2) the risk of exposure and how to seek treatment when needed, and 3) any actions they or their families should take to protect themselves.
- **Communications** must also be able to reach and take into consideration at-risk populations.
- Streamlined and effective response to address **at-risk populations**, particularly those with special medical needs.
- **An informed and involved public** who can provide material and moral support to professional responders, and can render aid when necessary to friends, family, neighbors and associates.

What it will take to achieve basic levels of preparedness:

- **Leadership, planning and coordination:** An established chain-of-command and well defined roles and responsibilities for seamless operation across different medical and logistical functions and among federal, state and local authorities during crisis situations, including police, public safety officials, and other first responders.
- **Well-funded core public health infrastructure:** Basic public health systems and equipment, including laboratory testing and communications that keep pace with advances in science and technology.
- **An expert and fully-staffed workforce:** Highly trained and adequate numbers of public health professionals, including epidemiologists, lab scientists, public health nurses and doctors, and other experts, in addition to back-up workers for surge capacity needs.
- **Modernized technology:** State-of-the-art laboratory equipment, information collection and health tracking systems.
- **Rapid development and ability to manufacture vaccines and medications:** A streamlined, safe, effective system to ensure rapid research and production of medical countermeasures to protect people for emerging threats.
- **Pre-planned, safety-first rapid emergency response capabilities and precautions:** Tested plans and safety precautions to mitigate potential harm to communities, public health professionals, and first responders.
- **Immediate, streamlined communications capabilities:** Coordinated, integrated communications among all parts of the public health system, all frontline responders, and with the public. Must include back-up systems in the event of power loss or overloaded wireless channels.

ECONOMICS AND PUBLIC HEALTH PREPAREDNESS

In addition to the health toll that diseases, disasters, and bioterrorism can take, they also have major economic implications. For example:

- **September 11, 2001 Tragedies:** The total economic loss has been estimated at roughly $80 billion, of which $32.5 billion was insurable.[170] The insurance industry paid the $32.5 billion in insured losses from business interruption, property, workers' compensation, aviation liability, and other liability costs.[171] In addition, World Trade Center workers received a $625 million settlement for their exposure to toxic dust exposure.[172]

- **Anthrax Attacks:** According to a report in *The Washington Post* and the U.S. Federal Bureau of Investigations (FBI), the clean up from the 2001 anthrax attacks exceeded $1 billion.[173] A reported $42 million was spent to decontaminate the Hart Senate Office Building and other Capitol Hill offices and it cost in excess of $200 million to decontaminate the Brentwood and Hamilton Township, New Jersey postal facilities.[174] This does not include the cost of the public health response and laboratory testing of specimens around the country.

  - According to a report in *The New York Times,* under a hypothetical scenario developed by the U.S. Department of Homeland Security involving an anthrax attack, if terrorists were to spray aerosolized anthrax from a van in three cities initially, followed by two more cities shortly afterward, casualties could well exceed 13,000, and result in a loss of billions of dollars.[175] Other estimates are that anthrax could result in more than 13,000 deaths in a single city.

  - According to a study by Towers Perrin Consulting, one anthrax attack in New York City could lead to $90 billion in workers' compensation losses, which would be three times greater than the entire $30 billion workers' compensation industry.[176]

  - Risk Management Solutions (RMS), a leading risk consulting firm, believes an attack on downtown New York City could result in 173,000 casualties. In this scenario, anthrax is weaponized and dispersed in aerosol form, resulting in inhalation of anthrax by approximately one million people. Incredibly, RMS estimates economic losses of $91 billion from workers compensation alone.[177]

- **Nuclear, Biologic, or Chemical Attacks and the Insurance Industry:** In 2005, the CEO of Allstate Corp, a leading insurance company, stated that nuclear, biological or chemical terrorist attacks "could literally destroy the entire capital base of the insurance industry."[178] As a point of reference, the capital base for the insurance industry in 2003 was $347 billion.[179]

- **Foodborne Illness and Agroterrorism:** Agriculture represents 1.2 percent of the U.S. gross domestic product, or $173 billion a year.[180] Agriculture and the food sector employed approximately 12.5 million workers in 2008, or nearly nine percent of the total U.S. workforce.[181]

  - In 2001, a foot-and-mouth disease outbreak in Britain led to an estimated economic loss of $6 to $18 billion, and led to the destruction of four million animals.[182] A 1999 report estimated that an outbreak of foot-and-mouth in California would lead to economic losses of $6 billion.[183]

  - Over the last few decades, the United Kingdom has battled bovine spongiform encephalopathy (BSE), better known as "mad cow" disease. As of March 2005, 149 people who were infected with the disease have died, and nearly four million cows have been slaughtered.[184] If a significant outbreak of BSE occurred in the United States, the U.S. Food and Drug Administration estimates that there would be a loss of $15 billion, resulting from a 24 percent decline in domestic beef sales and an 80 percent decline in beef and live cattle exports. Slaughter and disposal costs of at-risk cattle could be additional $12 billion.[185]

  - In 1978, the Arab Revolutionary Council engaged in bioterrorism, using mercury to poison Israeli oranges. A dozen children in Holland and West Germany were hospitalized as a result. Ultimately, this act helped sabotage the Israeli economy, resulting in a 40 percent reduction in orange exports.[186] At the time, oranges accounted for about a tenth of all Israeli exports.[187] The United States produces over 20 percent of the world's citrus, or approximately 15.6 million tons in 2004.[188] U.S. citrus exports are roughly $1 billion, while U.S. consumers spend more than $3 billion on citrus products (orange and grapefruit juice and fresh fruit).[189]

- **New Infectious Disease Outbreak:** In 2003, Severe Acute Respiratory Syndrome (SARS) swept through Southeast Asia, infecting over 8,000 people and leaving 774 dead.[190] Its reach demonstrates the tremendous speed in which disease can spread. Originating in China, the SARS outbreak eventually infected individuals from 29 nations around the world. Overall, the economic losses, due to deaths, quarantines, and lost tourism dollars, may have been $30 to $50 billion, according to some estimates.[191] In Toronto alone (many thousands of miles away from the initial outbreak), more than 27,000 people in and around the city were forced into quarantine during two outbreaks, which led to an estimated economic loss of nearly $1 billion.[192]

- **Severe Pandemic Flu Outbreak:** A severe pandemic flu similar to the 1918 could lead to a drop in the U.S. Gross Domestic Product of more than 5.5 percent — totaling around $683 billion in losses.[193]

- **Gulf Coast Oil Spill:** There was an estimated $1.2 billion loss in economic output and 17,000 jobs in 2010 according to an analysis from Moody's Analytics.[194]

APPENDIX B: CDC AND ASPR PREPAREDNESS GRANTS BY STATE

ALL-HAZARDS PREPAREDNESS FUNDING BY SOURCE AND YEAR								
FY 2011				FY 2012				% Change FY 11 - FY 12
State	CDC	ASPR	Total	State	CDC	ASPR	Total	
Alabama	$8,633,983	$5,386,508	$14,020,491	Alabama	$9,103,210	$5,422,089	$14,525,299	3.6%
Alaska	$5,177,600	$1,211,937	$6,389,537	Alaska	$4,197,971	$1,231,384	$5,429,355	-15.0%
Arizona	$11,894,861	$7,051,765	$18,946,626	Arizona	$11,931,236	$7,082,390	$19,013,626	0.4%
Arkansas	$6,469,981	$3,486,575	$9,956,556	Arkansas	$6,741,223	$3,502,762	$10,243,985	2.9%
California	$41,661,534	$28,666,533	$70,328,067	California	$42,839,937	$28,752,455	$71,592,392	1.8%
Colorado	$9,397,930	$5,550,503	$14,948,433	Colorado	$9,810,527	$5,678,980	$15,489,507	3.6%
Connecticut	$7,553,479	$4,223,889	$11,777,368	Connecticut	$7,916,637	$4,180,544	$12,097,181	2.7%
Delaware	$5,422,932	$1,406,825	$6,829,757	Delaware	$4,409,756	$1,424,677	$5,834,433	-14.6%
D.C.	$6,730,903	$1,558,756	$8,289,659	D.C.	$6,336,749	$1,119,644	$7,456,393	-10.1%
Florida	$27,687,829	$19,720,658	$47,408,487	Florida	$29,547,908	$19,861,267	$49,409,175	4.2%
Georgia	$15,653,814	$10,449,266	$26,103,080	Georgia	$16,224,868	$10,476,179	$26,701,047	2.3%
Hawaii	$5,260,290	$1,865,852	$7,126,142	Hawaii	$4,918,135	$1,900,815	$6,818,950	-4.3%
Idaho	$5,181,907	$2,058,131	$7,240,038	Idaho	$5,072,309	$2,114,269	$7,186,578	-0.7%
Illinois	$16,845,953	$11,113,877	$27,959,830	Illinois	$17,315,437	$10,936,885	$28,252,322	1.0%
Indiana	$11,146,909	$7,208,168	$18,355,077	Indiana	$11,641,890	$7,176,908	$18,818,798	2.5%
Iowa	$6,595,869	$3,668,490	$10,264,359	Iowa	$6,888,712	$3,637,084	$10,525,796	2.5%
Kansas	$6,595,020	$3,436,853	$10,031,873	Kansas	$6,871,271	$3,438,092	$10,309,363	2.8%
Kentucky	$8,275,695	$4,968,989	$13,244,684	Kentucky	$8,664,857	$4,968,606	$13,633,463	2.9%
Louisiana	$8,632,297	$5,055,790	$13,688,087	Louisiana	$9,046,664	$5,168,389	$14,215,053	3.8%
Maine	$5,206,160	$1,904,184	$7,110,344	Maine	$4,775,927	$1,867,923	$6,643,850	-6.6%
Maryland	$11,057,196	$6,466,757	$17,523,953	Maryland	$11,447,761	$6,445,505	$17,893,266	2.1%
Massachusetts	$13,459,602	$7,339,572	$20,799,174	Massachusetts	$13,215,674	$7,242,636	$20,458,310	-1.6%
Michigan	$16,543,509	$11,226,706	$27,770,215	Michigan	$17,122,558	$10,678,003	$27,800,561	0.1%
Minnesota	$10,842,711	$5,990,088	$16,832,799	Minnesota	$11,303,489	$5,961,891	$17,265,380	2.6%
Mississippi	$6,565,242	$3,592,473	$10,157,715	Mississippi	$6,826,045	$3,555,672	$10,381,717	2.2%
Missouri	$10,717,722	$6,707,932	$17,425,654	Missouri	$11,189,315	$6,667,295	$17,856,610	2.5%
Montana	$5,178,911	$1,503,679	$6,682,590	Montana	$4,366,055	$1,518,883	$5,884,938	-11.9%
Nebraska	$5,234,954	$2,378,867	$7,613,821	Nebraska	$5,421,224	$2,380,735	$7,801,959	2.5%
Nevada	$6,585,802	$3,151,521	$9,737,323	Nevada	$6,824,877	$3,280,981	$10,105,858	3.8%
New Hampshire	$5,398,877	$1,897,087	$7,295,964	New Hampshire	$4,881,449	$1,855,678	$6,737,127	-7.7%
New Jersey	$16,184,853	$9,769,919	$25,954,772	New Jersey	$16,033,232	$9,553,742	$25,586,974	-1.4%
New Mexico	$6,526,120	$2,576,778	$9,102,898	New Mexico	$6,716,529	$2,620,507	$9,337,036	2.6%
New York	$19,284,669	$12,285,085	$31,569,754	New York	$19,926,605	$12,036,626	$31,963,231	1.2%
North Carolina	$14,020,450	$9,910,111	$23,930,561	North Carolina	$14,976,630	$10,319,477	$25,296,107	5.7%
North Dakota	$5,180,405	$1,175,614	$6,356,019	North Dakota	$4,197,971	$1,192,623	$5,390,594	-15.2%
Ohio	$17,618,925	$12,695,478	$30,314,403	Ohio	$18,538,073	$12,380,094	$30,918,167	2.0%
Oklahoma	$7,509,542	$4,302,943	$11,812,485	Oklahoma	$7,895,438	$4,363,077	$12,258,515	3.8%
Oregon	$7,829,790	$4,432,087	$12,261,877	Oregon	$8,145,629	$4,445,174	$12,590,803	2.7%
Pennsylvania	$19,774,638	$13,718,265	$33,492,903	Pennsylvania	$20,201,109	$13,580,693	$33,781,802	0.9%
Rhode Island	$5,302,058	$1,634,345	$6,936,403	Rhode Island	$4,574,482	$1,583,915	$6,158,397	-11.2%
South Carolina	$9,308,851	$5,091,363	$14,400,214	South Carolina	$9,764,874	$5,263,121	$15,027,995	4.4%
South Dakota	$5,169,600	$1,330,796	$6,500,396	South Dakota	$4,197,971	$1,338,429	$5,536,400	-14.8%
Tennessee	$10,845,628	$6,916,279	$17,761,907	Tennessee	$11,424,097	$7,035,110	$18,459,207	3.9%
Texas	$37,545,665	$25,477,218	$63,022,883	Texas	$37,551,857	$26,394,469	$63,946,326	1.5%
Utah	$6,464,082	$3,209,463	$9,673,545	Utah	$6,664,430	$3,346,201	$10,010,631	3.5%
Vermont	$5,192,031	$1,162,908	$6,354,939	Vermont	$4,197,971	$1,144,377	$5,342,348	-15.9%
Virginia	$14,483,987	$8,620,629	$23,104,616	Virginia	$15,098,787	$8,739,318	$23,838,105	3.2%
Washington	$11,711,066	$7,295,589	$19,006,655	Washington	$12,242,591	$7,424,816	$19,667,407	3.5%
West Virginia	$5,336,731	$2,432,140	$7,768,871	West Virginia	$5,425,674	$2,408,182	$7,833,856	0.8%
Wisconsin	$11,235,615	$6,403,834	$17,639,449	Wisconsin	$11,727,640	$6,356,361	$18,084,001	2.5%
Wyoming	$5,169,600	$1,047,196	$6,216,796	Wyoming	$4,197,971	$1,080,412	$5,278,383	-15.1%
	CDC Total FY 11*	ASPR Total FY 11*	Grant Total FY 11*		CDC Total FY 12*	ASPR Total FY 12*	Grand Total FY 12*	Grand Total Percent Change FY 11 - FY 12
	$553,303,778	$321,736,271	$875,040,049		$560,553,232	$322,135,345	$882,688,577	0.9%

* Note that totals do not include funds for three major U.S. metropolitan areas, Chicago, Los Angeles and New York City, U.S. Territories, such as Puerto Rico and Guam, and Freely Associated States of the Pacific such as the Marshall Islands. Source: 1) Public Health Emergency.gov http://www.phe.gov/Preparedness/planning/hpp/Documents/phep-2012-funding.pdf 2) Public Health Emergency.gov http://www.phe.gov/Preparedness/planning/hpp/Documents/hpp-2012-funding.pdf

APPENDIX C: FEDERAL FUNDING FOR PUBLIC HEALTH PREPARENDESS FY 2003-2012

OFFICE OF ASSISTANT SECRETARY FOR PREPARDNESS AND RESPONSE FUNDING TOTALS AND SELECT PROGRAMS

	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013 (Requested)
ASPR Totals	--	--	--	--	$632,000,000	$694,280,000	$632,703,000	$788,191,000	$891,446,000	$913,418,000	$925,612,000	$981,863,000
HPP ^	$135,000,000	$514,000,000	$515,000,000	$487,000,000	$474,000,000	$474,030,000	$423,399,000	$393,585,000	$425,928,000	$383,858,000	$379,639,000	$255,000,000
BARDA	--	--	--	$5,000,000	$54,000,000	$103,921,000	$101,544,000	$275,000,000	$304,948,000	$415,000,000	$415,000,000	$546,671,000
Bioshield Special Reserve Fund	--	--	$5,600,000,000*	--	--	--	--	--	--	--	--	

* One-time Funding
^ HPP moved from HRSA to ASPR in 2007P

Source: HPP FY 2002: http://archive.hhs.gov/budget/04budget/fy2004bib.pdf, p. 14
Source: HPP FY 2003: http://archive.hhs.gov/budget/05budget/fy2005bibfinal.pdf, p. 16
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Source: HPP FY 2005: http://archive.hhs.gov/budget/07budget/2007BudgetInBrief.pdf, p. 20
Source: BARDA FY 2005-06: http://www.hhs.gov/asrt/ob/docbudget/2010phssef.pdf, p. 45.
Source: FY 2006: http://www.hhs.gov/asfr/ob/docbudget/2008budgetinbrief.pdf, p. 109
Source: FY 2007: http://www.hhs.gov/budget/09budget/budgetfy09cj.pdf, p. 288
Source: FY 2008-09: http://www.hhs.gov/asfr/ob/docbudget/2010phssef.pdf, p. 8
Source: FY 2010-11: http://www.hhs.gov/asfr/ob/docbudget/2011operatingplan_phssef.pdf
Source: FY 2012-13: http://www.hhs.gov/budget/safety-emergency-budget-justification-fy2013.pdf

CDC OFFICE OF PUBLIC HEALTH PREPAREDNESS AND RESPONSE FUNDING TOTALS AND SELECT PROGRAMS

	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013 (Requested)
CDC Total*	$1,747,023,000	$1,533,474,000	$1,507,211,000	$1,622,757,000	$1,631,173,000	$1,472,553,000	$1,479,455,000	$1,514,657,000	$1,522,339,000	$1,415,416,000	$1,329,479,000	$1,275,136,000
State and Local Preparedness and Response Capability**	$940,174,000	$1,038,858,000	$918,454,000	$919,148,000	$823,099,000	$766,660,000	$746,039,000	$746,596,000	$760,986,000	$664,294,000	$657,418,000	$641,917,000
SNS	$645,000,000	$298,050,000	$397,640,000	$466,700,000	$524,339,000	$496,348,000	$551,509,000	$570,307,000	$595,661,000	$591,001,000	$533,792,000	$486,220,000

* CDC Total also includes CDC Preparedness

*Includes Public Health Emergency Preparedness (PHEP) cooperative agreements, Centers for Public Health Preparedness, Advanced Practice Centers (FY2004-09), Cities Readiness Initiative, U.S. Postal Service Costs (FY 2004), All Other State and Local Capacity, and Smallpox Supplement (FY 2003)

CDC Funding
Source: FY 2002-09: http://www.cdc.gov/phpr/publications/2010/Appendix3.pdf
Source: FY 2010-11: U.S. Centers for Disease Control and Prevention. "2011 Operating Plan." http://www.hhs.gov/asfr/ob/docbudget/2011operatingplan_cdc.pdf.
Source: FY 2012-13: http://www.cdc.gov/fmo/topic/Budget%20Information/appropriations_budget_form_pdf/FY2013_CDC_CJ_Final.pdf

APPENDIX D: METHODOLOGY FOR STATE PUBLIC HEALTH BUDGETS

TFAH conducted an analysis of state spending on public health for the last budget cycle, fiscal year 2011-2012. For those states that only report their budgets in biennium cycles, the 2011-2013 period (or the 2010-2012 and 2011-2012 for Virginia and Wyoming respectively) was used, and the percent change was calculated from the last biennium, 2009-2011 (or 2008-2010 and 2009-2010 for Virginia and Wyoming respectively).

This analysis was conducted from September to October of 2012 using publicly available budget documents through state government web sites. Based on what was made publicly available, budget documents used included either executive budget document that listed actual expenditures, estimated expenditures, or final appropriations; appropriations bills enacted by the state's legislature; or documents from legislative analysis offices.

"Public health" is defined to broadly include all health spending with the exception of Medicaid, CHIP, or comparable health coverage programs for low-income residents. Federal funds, mental health funds, addiction or substance abuse-related funds, WIC funds, services related to developmental disabilities or severely disabled persons, and state-sponsored pharmaceutical programs also were not included in order to make the state-by-state comparison more accurate since many states receive federal money for these particular programs. In a few cases, state budget documents did not allow these programs, or other similar human services, to be disaggregated; these exceptions are noted. For most states, all state funding, regardless of general revenue or other state funds (e.g. dedicated revenue, fee revenue, etc.), was used. In some cases, only general revenue funds were used in order to separate out federal funds; these exceptions are also noted.

Because each state allocates and reports its budget in a unique way, comparisons across states are difficult. This methodology may include programs that, in some cases, the state may consider a public health function, but the methodology used was selected to maximize the ability to be consistent across states. As a result, there may be programs or items states may wish to be considered "public health" that may not be included in order to maintain the comparative value of the data.

Finally, to improve the comparability of the budget data between FY 2010-2011 and FY 2011-2012 (or between biennium), TFAH adjusted the FY 2011-2012 numbers for inflation (using a 0.9764 conversion factor based on the U.S. Dept. of Labor Bureau of Labor Statistics; Consumer Price Index Inflation Calculator at http://www.bls.gov/cpi/).

After compiling the results from this online review of state budget documents, TFAH coordinated with the Association of State and Territorial Health Officials to confirm the findings with each state health official. ASTHO sent out emails on October 26, 2012 and state health officials were asked to confirm or correct the data with TFAH staff by November 9, 2012. ASTHO followed up via email with those state health officials who did not respond by the November 9, 2012 deadline and were given until November 16, 2012 to respond. The states that did not reply by that date were assumed to be in accordance with the findings.

APPENDIX E: SAVE THE CHILDREN REPORT METHODOLOGY

Definitions and Applications for Save the Children's Report Card Standards

In Save the Children's annual *National Report Card on Protecting Children During Disasters,* a state is not considered to meet a particular standard unless (1) the substance of the standard meets national guidelines; (2) the standard is mandated; and (3) all regulated child care providers—or in the case of standard No. 4, all schools—are subject to the standard. Substantive descriptions of the standards are presented below. A rule is considered mandated if it is (1) in statute, (2) in regulation, or (3) provided by the relevant agency as mandatory guidance. Mandatory guidance includes forms, templates, and technical assistance that are provided to child care providers and are required to be completed or implemented.

Standard 1: A Plan for Evacuating Children in Child Care

The state must require that all child care providers have a written plan for evacuating and safely moving children to an alternate site. The plan must include provisions for multiple types of hazards. Many states have different licensing requirements and regulations for different kinds of providers. To meet the standard, a requirement must be in place for all categories of child care providers.

Standard 2: A Plan for Reuniting Families after a Disaster

The state must require that all child care providers to have a written plan for emergency notification of parents and reunification of families following an emergency. Again, a state may have multiple classes of child care with separate regulations and the standard must apply to all regulated child care providers.

Standard 3: A Plan for Children with Disabilities and Those with Access and Functional Needs

The state must require that all child care providers have a written plan that accounts for children with disabilities and those with access and functional needs. This standard must go beyond specific classes of special needs that may exist elsewhere in state code — it must include a specific requirement indicating how all children with special needs will be included in the emergency plan. The requirement must apply to all regulated child care providers.

Standard 4: A Multi-Hazard Plan for K–12 Schools

The state must require that all schools have a disaster plan that addresses multiple types of hazards and covers a number of responses, including evacuation, shelter-in-place, and lockdown situations. Mandating fire or tornado drills alone is not sufficient for states to meet the standard since these activities do not address other types of hazards. The state standard should apply to all schools, including public charter schools as well as private schools.

Endnotes

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