



NATIONAL HEALTH SECURITY REVIEW
of
THE UNITED STATES OF AMERICA

2010–2014

U.S. Department of Health and Human Services



Executive Summary

The National Health Security Review is the Congressionally mandated inaugural quadrennial assessment of national health security, covering the period from 2010 to 2014. National health security is a state in which the nation and its people are prepared for, protected from, and resilient in the face of incidents with health consequences. This review describes, for Congress and the American people, the progress we made—and persistent challenges we faced—in national health security from 2010 to 2014, the quadrennial period of the inaugural *National Health Security Strategy* (NHSS).¹ Strategically, this review’s findings informed the strategic direction of the *NHSS 2015–2018* and *NHSS Implementation Plan (IP) 2015–2018*. Operationally, the findings and conduct of this review will inform evaluation efforts for the next quadrennial period.

In 2009, the U.S. Department of Health and Human Services (HHS) released the NHSS to provide strategic direction and ensure that efforts to improve health security nationwide are guided by a common vision, based on sound evidence, and carried out in an efficient, collaborative manner. The NHSS IP 2012–2014 augmented the NHSS by specifying activities that the federal government could do, with nonfederal collaborators, to achieve and sustain national health security. Because the initial IP focused on activities to be carried out by the federal government, many areas of progress and remaining challenges described in this review are federally oriented. However, the NHSS is a national strategy. Thus, in the next quadrennial review, the roles of nonfederal stakeholders in national health security will be addressed more fully, and the achievements of the full range of stakeholders will be featured more prominently.

During the 2010 to 2014 period, there were some influencing factors that both helped and hindered progress in health security. The release of the NHSS 2010–2014 itself helped diverse stakeholders gain a common understanding of such terms as *health security*, *community resilience*, and *situational awareness*. It also provided strategic direction, which enabled coordination of governmental and nongovernmental partners. The important contributions of health security to national security were reinforced by the reauthorization of the Pandemic and All-Hazards Preparedness Act, the most recent *National Security Strategy*, and several Presidential Directives and Executive Orders. However, during this period, the economic environment weakened the public health system and further strained the health care system. Reduced federal funding led to neglect and slower progress in areas of high need, including workforce training.

Overview of Progress

The inaugural NHSS laid out two goals for national health security: build community resilience, and strengthen and sustain health and emergency response systems. There has been significant progress in both of these objectives since 2010. The greatest improvement was seen in the areas of integration, planning, capability development, coordination, and community resilience:

- **Integration** of the public health, health care, and emergency management systems has improved in a number of important ways. Integration of these systems strengthens their

abilities to function consistently and effectively, and quickly mobilize when an incident occurs. The alignment of the Public Health Emergency Preparedness (PHEP) and Hospital Preparedness Program (HPP) cooperative agreements has encouraged cooperation and promoted efficiency between public health and health care awardees. Integration across sectors improved situational awareness by increasing the data and information available to inform health security decision-making and support intersectoral collaboration. Widespread use of regional planning alliances and health care coalitions for preparedness planning improved integration within the health care system.

- **Planning** has progressed at the federal, state, and local levels. Diverse stakeholders have come together to develop strategies and plans to address key issues in national health security, including strategies related to biosurveillance, public health and medical situational awareness, continuity of operations, medical countermeasures (MCMs), and non-pharmaceutical interventions.
- **Capabilities** of the national health security workforce improved. In particular, core competencies for the disaster medicine and public health workforces have been identified, and competency-based training courses have been developed and conducted. This helps ensure the proficiency and effectiveness of the health security workforce within a larger, coordinated response, in accordance with the National Incident Management System (NIMS). The PHEP and HPP programs also defined the community capabilities required for health security, and they developed associated performance measures. Awardees are required to assess their annual progress toward achieving and enhancing capabilities. These data provide valuable information on progress toward national health security.
- **Coordination** within government, and between government and the private sector, has improved. For instance, the Public Health Emergency Medical Countermeasures Enterprise (PHEMCE) has facilitated coordination between government and the private sector to improve research and development of MCMs. Federal investments contributed to new MCMs and the development of many more potential MCMs. To cite another example, following Hurricane Sandy, the HHS Administration for Community Living (ACL) worked through the Aging Networks in New York, New Jersey, and Connecticut to support the recovery of the elderly in their homes and to educate partners on post-incident recovery and preparedness. Expanded use of health information technology has facilitated coordination between public health and health care providers and improved health situational awareness.
- **Community resilience** gained more attention as a key element of national health security. Since 2009, national policies have increasingly focused on informed and empowered individuals and communities, which helps raise awareness of and prioritize community resilience. Many organizations and communities have led preparedness education to support community resilience and developed localized strategies and large-scale demonstrations. Federal agencies have developed training and practical tools to support individual and community resilience including the Federal Emergency Management Agency's (FEMA) Community Resilience System tool; the Department of Homeland

Security's (DHS) public-private Community Health Resilience Initiative; and the Department of Veterans Affairs' (VA) smartphone apps to help first responders administer "psychological first aid."

Progress Toward NHSS 2009–2014 Strategic Objectives

Ten strategic objectives were identified to support progress in national health security. Status reports for each objective are detailed below.

Objective 1: Foster Informed, Empowered Individuals and Communities

Since 2009, there has been an increased policy focus on informed and empowered individuals and communities, and many efforts demonstrate broader community engagement and improved stakeholder uptake of crucial preparedness information. Federal agencies have pursued numerous efforts focused on behavioral health, as well as individual and community resilience, before, during, and after incidents, emphasizing cross-sector relationships to support health security.

Objective 2: Develop and Maintain the Workforce Needed for National Health Security

Core competencies have been identified for the disaster medicine and public health workforce, along with targeted workforce competencies for different professions, roles, and experience levels. Many competency-based training courses have been developed and conducted, including training in point-of-dispensing (POD), worker safety, and environmental health during an incident. Progress was also made toward quantifying the number of staff and volunteers available and assessing the ability to notify and assemble them. The number of volunteers listed in the Emergency System for Advance Registration of Volunteer Health Professionals (ESAR-VHP) and Medical Reserve Corps (MRC) registries increased. Areas for future progress include ensuring that sufficient numbers of trained workers and volunteers are available to support health security efforts, evaluating the effectiveness of workforce training, and emphasizing personal and family preparedness planning for health security workers.

Objective 3: Ensure Situational Awareness

Ongoing efforts across the federal government helped clarify key definitions and concepts, including the relationship between Public Health and Medical Situational Awareness (PH&M SA) and biosurveillance for human health. The ability to provide strategic warning has improved for some types of incidents, such as infectious disease outbreaks, and systems to foster situational awareness have proven successful in several major incidents, including the Deepwater Horizon oil spill in 2010. The federal government is implementing improved technologies for surveillance and integrating new information sources for situational awareness. Improvements are needed to the data systems used to support health situational awareness, and a better understanding is needed of how to collect, aggregate, and process data from stakeholders at different levels of government and from nongovernmental sectors.

Objective 4: Foster Integrated, Scalable Health Care Delivery Systems

Health care organizations have become better integrated with community medical, public health, behavioral health, human services, emergency management, public safety, and other

organizations. Regional planning alliances and health care coalitions have proliferated, and the use of incident response exercises at the health care organization and coalition levels has been promoted extensively. Many agencies, including the Centers for Disease Control and Prevention (CDC), Centers for Medicare and Medicaid Services (CMS), and HHS Assistant Secretary for Preparedness and Response (ASPR), developed guidance, tools, and templates to strengthen surge capacity and help states and localities establish crisis standards of care. The access needs and functional needs of at-risk individuals are being incorporated into plans, tools, and resources. The adoption of electronic health records (EHR) is facilitating the integration of health care and partner organizations, although much work remains to improve data sharing and interoperability. Legal issues related to health care system preparedness continue to create challenges, particularly concerning medical liability.

Objective 5: Ensuring Timely and Effective Communications

Several efforts are underway to create new platforms for communication between government and the public during incidents, and to consolidate information from various sources. Federal agencies use social media and mobile applications, and they developed communications guidance and tools for state and local public health departments. The content and timeliness of messages is better, though progress has not been consistent. The Integrated Public Alert and Warning System (IPAWS) now covers most of the United States. Many states developed communication interoperability plans, and the Emergency Communications Preparedness Center (ECPC) provides a federal interagency point for interoperable communications coordination. Challenges remain in communication technology and interoperability.

Objective 6: Promote an Effective Countermeasures Enterprise

PHEMCE, a federal, multi-agency effort, guides coordination among government agencies and between public and private sectors. It provides the HHS Secretary with recommendations regarding MCM development, acquisition, and use. The PHEMCE Strategic National Stockpile (SNS) Annual Review, required by both statute and Presidential Directive, comprehensively examines the SNS formulary each year, including non-pharmaceutical MCMs and ancillary supplies. It identifies and prioritizes formulary gaps and recommends additions or modifications to the contents of the SNS, in alignment with the PHEMCE prioritization framework. In addition, the federal government has made substantial investments in MCM advanced research, development, and procurement—and these investments contributed to the development of new MCMs, new uses for existing MCMs, and measurable, earlier-stage progress in the development of many potential MCMs. MCM coverage is being expanded to better protect children, pregnant women, and other at-risk individuals, and states and localities improved their ability to receive, distribute, and dispense MCMs. Despite substantial progress, gaps remain in MCM resources such as point-of-care diagnostics for some high-level threats. Nonfederal stakeholders could be better engaged in the countermeasures enterprise.

Objective 7: Ensure Prevention or Mitigation of Environmental and Other Emerging Threats to Health

Surveillance, laboratory, and risk assessment capabilities have advanced, creating opportunities for faster, more accurate detection and diagnosis of environmental hazards and infectious diseases, as well as more informed planning for risk management activities. Multiple

efforts have been made to improve food safety in the United States, decrease antimicrobial resistance, and control and mitigate zoonoses. Federal agencies have also supported research to understand environmental and other emerging threats and their adverse impacts on health. Efforts to improve food safety notwithstanding, it appears that foodborne infections have not declined. Challenges include the uneven coverage of available surveillance data and the variety of data sources. Data are also needed to measure progress in the monitoring and tracking of long-term health effects on people affected by an incident, building capacity and capabilities of certain monitoring and laboratory systems, and achieving uniform progress in environmental and health indicators nationwide and reflecting all population groups. A major improvement in these areas is the wider acceptance and use of the multidisciplinary One Health approach.

Objective 8: Incorporate Post-Incident Health Recovery into Planning and Response

The federal government incorporated recovery into national policy and doctrine, including the National Disaster Recovery Framework and the PHEP and HPP capabilities. Federal agencies have expanded their capacity to provide technical assistance to state and local jurisdictions and human service partners during the recovery planning process and during incidents, and federal agencies are collaborating with nonfederal stakeholders to improve the use of lessons learned. Humanitarian agencies such as the American Red Cross continue to play an essential role in recovery efforts and serve as a means of channeling public support. Challenges include: limited understanding of the resources, services, and staff types that are required for recovery; lack of dedicated staff to support recovery capacity building; and lack of shared strategies to guide planning partnerships with nontraditional disaster partners (e.g., child care providers).

Objective 9: Work with Cross-Border and Global Partners to Enhance National, Continental, and Global Health Security

Federal agencies have strengthened interagency coordination, communication, and collaboration related to global health security. The federal government reports U.S. progress and compliance with the World Health Organization's (WHO) International Health Regulations (IHR 2005). We are working with global partners to help other countries build their own core capacities to detect, report, and respond to health threats of potential international concern. But, legal, regulatory, logistical, and other challenges continue to complicate responses to global health security threats, including the sharing of medical assistance (e.g., public health personnel, medical countermeasures).

Objective 10: Ensure that All Systems that Support National Health Security Are Based on the Best Available Science, Evaluation, and Quality Improvement Methods

Both governmental and nongovernmental stakeholders are improving the evidence base for national health security. HHS established an institutional review board—the Public Health Emergency Research Review Board (PHERRB)—for studies that will require specialized expertise and be conducted at multiple sites during incidents. For example, the Biomedical Advanced Research and Development Authority (BARDA), within ASPR, established a network of [five clinical research organizations](#) that will be available to developers of medical countermeasures—drugs, vaccines, and diagnostic tests needed in emergencies—to help these developers design and conduct the clinical studies needed to apply for approval from the Food and Drug Administration. Multiple sectors and government agencies collaborated to develop

prioritized research agendas, and several quality improvement programs related to national health security were initiated or expanded. Federal agencies improved the alignment and coordination of national health security investments and programs. New measures of national health security have been deployed, and additional measures are being developed and piloted. Experts across stakeholder categories collaborated on the developmental National Health Security Preparedness Index, and federal agencies participate in a new NHSS oversight model to coordinate research and evaluation activities.

Persistent Challenges

Despite our progress towards health security, numerous challenges remain.

First, the limited resources available to improve health security threatens the sustainability of current and future progress. Strategies must be developed to encourage and leverage investments by all sectors, not only the federal government. Funding streams must be coordinated and used as efficiently and effectively as possible. Activities must be strategically prioritized to decide which can and cannot be implemented.

Second, engaging and coordinating the full range of stakeholders in national health security can be challenging. The 2012–2014 IP took the initial step with a focus on coordinating federal activities. While nonfederal stakeholders such as the National Association of County and City Health Officials (NACCHO) and the National Governors Association (NGA) have been engaged, in the future additional stakeholders, including community-based organizations, private sector businesses, the scientific and academic community, and communities, must be engaged in order to increase buy-in and willingness to champion and share responsibility for specific activities.

Third, the science of evaluation in this emerging area of expertise is still relatively new; the nation's ability to objectively assess progress and identify barriers and facilitators is limited. Quantitative measures make it possible to track performance objectively, identify trends, and compare progress among groups or geographic areas. More-rigorous qualitative data can inform quality improvement. Measures also permit the assessment of programs and strategies to identify best practices that use resources in the most effective and efficient manner.

Review Informs Strategic Planning and Management Process

Lessons from this review are already being used to improve the strategic planning and management process for the second quadrennial cycle of the NHSS. Evaluation will occur throughout the cycle, with annual stakeholder updates, to support and refine implementation of the strategy. A chartered oversight model is being implemented to manage the iterative process, increase stakeholder engagement, facilitate collaboration among federal agencies and among nonfederal and nongovernmental partners, and facilitate decision-making. An evaluation framework for the next multi-year evaluation period is also being developed. To address the difficulty of obtaining local-level information that communities can use for quality improvement, a number of lessons learned are being incorporated into the next cycle to increase the community focus and improve the local data available. During the development of this review, an extensive campaign began to engage nonfederal stakeholders. The NHSS 2015–2018 and IP 2015–2018 both draw upon the information in this review to bolster progress already achieved. Many areas that were identified as priorities in the NHSS 2015–2018 are intended to address challenges identified in this evaluation. Subsequently, we will continually strive to achieve and sustain

national health security throughout all communities and to use the lessons learned during the first quadrennial cycle to ensure even greater successes in the future.

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I. Introduction

Since the terrorist attacks of September 11, 2001, communities within the United States have invested substantial effort and resources to strengthen national health security. Communities continue to cope with diverse human-caused and naturally occurring incidents. These incidents are due to both persistent and emerging threats, such as severe weather, infectious diseases, hazardous material exposures, and terrorism. Weak social networks, unprotected infrastructure, a lack of training and exercising, and an increase in antimicrobial resistance are examples of vulnerabilities that can exacerbate the impact of any incident. The changing landscape of threats and vulnerabilities—as well as the number and diversity of unique stakeholders responsible for ensuring the health security of the community—can be challenging for communities and the state, federal, and local governments and organizations that support them.

Definition of National Health Security

A state in which the nation and its people are prepared for, protected from, and resilient in the face of incidents with health consequences.

Due to the dynamic health security environment, continuous formative evaluation is necessary to inform both national and community strategic priorities. Assessment ensures that the most effective programs, policies, and practices are used to advance the outcomes associated with those strategic priorities. Furthermore, assessment and lessons learned enable communities to share ideas and assist one another. Evaluation results, and unanswered questions, also shape research portfolios and study questions to expand the evidence base for national health security.

This Congressionally mandated review is the inaugural quadrennial assessment of national health security. It contributes to health security in three ways:

1. Practically, it describes, for Congress and the American people, the progress we have made—and persistent challenges—to national health security from 2010 to 2014.²
2. Strategically, this review’s findings informed the direction of the NHSS 2015–2018 and NHSS IP 2015–2018.
3. Operationally, the findings and conduct of this review will inform the efforts for the next quadrennial evaluation period.

Contextual Factors Affecting Health Security Activities

Community and national efforts to improve health security from 2010 to 2014 occurred within a landscape of contextual factors. Understanding those factors and how they have changed since 2010 provides essential context to evaluating progress. Three factors that have been particularly relevant are the NHSS, the economic environment, and the federal and national policy landscapes.

Chiefly, the NHSS 2010–2014 was the first strategy to organize and focus the health components of national security in a manner such that improvements could be made within them by the diverse stakeholders that contribute to community and, thus, national security.³ It did this by defining key terms so stakeholders could communicate more effectively, familiarizing stakeholders with the concept of national health security, and providing a common vision so efforts were working toward the same ends. Previously, well intentioned efforts among

stakeholders, communities, and governments were divergent, duplicative, inefficient, or working toward different ends. The NHSS and the NHSS IP 2012–2014 served as the basis for much of the content for this review. The IP augmented the NHSS 2010–2014 by specifying federal activities (conducted solely or in collaboration with other stakeholders) to achieve national health security.⁴ A list of federal departments and agencies identified as leads or potential partners for the activities in the IP 2012–2014 is provided in Appendix A.

Economic conditions affected many stakeholders. They led to significant reductions in government funding for public health, particularly at the state, local, territorial, and tribal levels.⁵ Since 2009, more than 40,000 state and local public health jobs have been lost.⁶ Many federal departments and agencies whose missions and activities support national health security experienced funding reductions due to sequestration, constraining their ability to sustain and expand their contributions. Budgetary limitations underscored the need for approaches to strengthening national health security that make efficient use of existing resources and everyday practices and capabilities, both to sustain ongoing progress and to support new efforts. Competition among researchers and research organizations for funding was increasingly competitive. Training and travel in many organizations needed to improve the workforce and develop partnerships were reduced or eliminated. Further, financial strain in the health care sector has continued such that facilities do not have excess capacity available.

Federal and national policies evolved to promote an improved understanding of health security as a national issue and raise its prominence on the nation’s policy agenda. The *National Security Strategy* (NSS),⁷ *Presidential Policy Directive* (PPD) - 8,⁸ and the *National Preparedness Goal* (NPG) raised the prominence of health as a national security issue.⁹

Other national policy documents have focused attention on important subdomains of national health security, such as Executive Order 13527—Medical Countermeasures Following a Biological Attack.¹⁰ Congress reaffirmed the importance of the NHSS in the Pandemic and All-Hazards Preparedness Reauthorization Act. The Affordable Care Act and the Health Information Technology for Economic and Clinical Health (HITECH) Act created additional challenges and opportunities for health security in communities nationwide. Such laws and policies affect how health systems, communications networks, and the required workforces and infrastructure are sustained and integrated into health as a component of national security.

As shown in Exhibit I.1, national health security is one of four key overlapping areas that support security overall. In addition to supporting security, strengthening and sustaining national health security is a shared priority for the health, national, and homeland security sectors. To illustrate this point, consider that a breach to national or homeland security could negatively affect the health of the nation’s people through espionage, limiting access to health services in the case of mass migration, or in general creating a fearful environment. Conversely, any large-scale incident—such as a terrorist attack, natural disaster, or infectious disease pandemic—that affects the health of critical

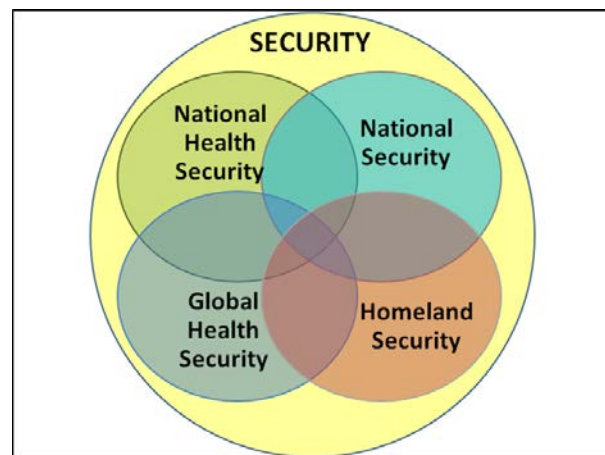


Exhibit I.1—Health Security in Relation to Other Key Domains

workers may compromise a society's ability to provide food, water, and other essential services including health care, hampers economic productivity and endangers the security and stability of that society. Even when an incident does not result in a large number of deaths or injuries, anxiety can cause some people to become ill or affect their economic and social behavior. There is also a close connection between national health security and global health security. As globalization increases, so does the connection among nations. This makes efforts to improve global health security critical to pursuing the national security objectives of the United States.

Review Methodology

This retrospective review used a descriptive study design to describe progress toward and gaps in health security, NHSS 2010–2014 implementation, and, as required by statute, funding levels and information based on benchmarks for the Hospital Preparedness Program (HPP) and the Public Health Emergency Preparedness (PHEP) cooperative agreement awards to 62 state, territorial, and local geopolitical jurisdiction health departments. All data were collected between 2012 and 2014.

Quantitative data were collected from several sources. HPP and PHEP funding data were obtained via public websites. The funding data included both budget period and supplemental funds. HPP and PHEP benchmark data were collected from public reports (e.g., the Government Accountability Office) and program officials. Non-programmatic quantitative data were obtained during an environmental scan and federal implementation reports.

Similar to the quantitative data, the qualitative data came from various sources. Over 200 literature sources were used. These comprised governmental and nongovernmental reports, peer-reviewed publications, Congressional testimony, policy reviews, and conference proceedings. Qualitative data sources include literature and policy reviews, governmental and nongovernmental key informants (i.e., semi-structured interviews, focus groups), and ongoing activity reports from the various federal agencies with a role in the NHSS 2010–2014. A key source of qualitative data was activity reports submitted via an online data collection system by federal workers that were responsible for conducting IP activities. Two formal data calls solicited activity reports. However, later in the data collection process, the online system was available at all times for activity updates. Semi-structured, one-on-one interviews were conducted with leaders in federal government and state and local government officials to discuss progress on national health security, as well as barriers and facilitators to further progress. Group interviews and focus groups with government and nongovernmental stakeholders were conducted on the same topics. Both quantitative and qualitative data were triangulated when possible. Implementation activity reports were not always easily synthesized and are presented in this review as examples. Results were subsequently grouped either by cooperative agreements or by NHSS 2010–2014 goals or strategic objectives. Themes were identified and then used to generate the key findings.

II. Progress on the Cooperative Agreements: HPP and PHEP

Congress, recognizing the importance of health security in communities and across states, requires this review to include the performance and funding levels of two instrumental cooperative agreement programs.¹¹ The PHEP and the HPP cooperative agreements, administered by HHS' Centers for Disease Control and Prevention (CDC) and the Office of the Assistant Secretary for Preparedness and Response (ASPR), respectively, are key federal investments in national health security and have catalyzed progress. The programs provide both financial and technical support to states, territories, and major metropolitan areas to strengthen public health and medical response systems and enhance community preparedness.

An important strength of the programs has been their adaptability. In place since 2002, they have continually evolved as needs have changed and the evidence base for national health security has increased. Since 2009, the programs have improved in several areas described below.

Program Alignment

An important accomplishment during the review period was the alignment of the two programs. In 2012, HPP and PHEP awarded grants jointly for the first time, encouraging cooperation between the health care and public health systems. Alignment also increases efficiency: The two programs now use the same processes for grant administration, technical assistance, and data management; have common measures and reporting requirements; and have compatible information technology systems.

Technical Assistance

CDC launched several initiatives to improve the technical assistance it provides to PHEP awardees. The 2009 H1N1 influenza pandemic response highlighted the need to help awardees receive, obligate, and account for funds and disperse the funds rapidly to communities. Working with the Association of State and Territorial Health Officials (ASTHO) and NACCHO, CDC identified administrative challenges facing awardee jurisdictions and developed practices for addressing them.¹² These practices include using standardized messages to develop templates and tools, delivering technical assistance via webinars and white papers, and anticipating and answering frequently asked questions.

CDC also increased its efforts to help awardees improve, measure, and sustain progress toward achieving national health security capabilities. CDC assesses each jurisdiction's public health capacity and capabilities, identifies areas needing improvement, and develops targeted interventions and training to support awardee needs.

ASPR launched several initiatives to improve technical assistance provided to HPP awardees in recent years. ASPR increased efforts to help awardees improve, measure, and sustain progress toward achieving national health security capabilities by assessing each awardee's health care capacity and capability, identifying improvement areas, and providing or linking awardees to technical assistance resources. ASPR also continues to host conference calls and webinars for national health care preparedness audiences, including HPP state awardees, hospitals, and others

in the U.S. health care arena on strategies for developing established health care capabilities and related national security topics.

Capability Development

The cooperative agreement programs contributed to national health security by defining community capabilities required for health security and developing associated performance measures. Capabilities-based planning brings together relevant stakeholders (e.g., public health, health care providers, community-based organizations, businesses) to identify gaps, determine jurisdictional priorities, and promote prepared and resilient communities. The capabilities also help ensure that federal preparedness cooperative agreements are directed to priority areas within jurisdictions. Awardees are required to assess their annual progress toward achieving and enhancing health security capabilities.

The capabilities were developed by drawing on preparedness literature and subject matter expertise.¹³ The public health preparedness and health care preparedness capabilities for communities align with and support the core capabilities outlined in the National Response Framework.¹⁴ CDC released the public health preparedness capabilities in March 2011. ASPR released health care preparedness capabilities, which are specifically relevant for health care coalitions and aligned with the public health preparedness capabilities, in January 2012 (see Exhibit II.1).

Exhibit II.1—Public Health Preparedness and Health Care Preparedness Capabilities, 2012

| Public Health Preparedness Capabilities (15 total) | Corresponding Health Care Preparedness Capabilities (8 total) |
|--|--|
| 1. Community Preparedness | Health Care System Preparedness |
| 2. Community Recovery | Health Care System Recovery |
| 3. Emergency Operations Coordination | Emergency Operations Coordination |
| 4. Emergency Public Information and Warning | N/A |
| 5. Fatality Management | Fatality Management |
| 6. Information Sharing | Information Sharing |
| 7. Mass Care | N/A |
| 8. Medical Countermeasures Dispensing | N/A |
| 9. Medical Materiel Management and Distribution | N/A |
| 10. Medical Surge | Medical Surge |
| 11. Non-Pharmaceutical Interventions (NPIs) | N/A |
| 12. Public Health Laboratory Testing | N/A |
| 13. Public Health Surveillance and Epidemiological Investigation | N/A |
| 14. Responder Safety and Health | Responder Safety and Health |
| 15. Volunteer Management | Volunteer Management |

Measure Development and Deployment

The public health preparedness and health care preparedness capabilities are helping to focus efforts to measure progress toward national health security. Since the PHEP and HPP began, the programs have fielded and reported on numerous measures, some of which have been revised or retired. The suite of measures has evolved and matured over time, moving from a focus on capacities (e.g., number of people trained, having a plan in place) to a greater focus on capabilities (e.g., time required to notify and assemble staff, time required to develop a risk communication message), providing information on a community’s ability to carry out specific disaster-related activities.

Evidence of Progress

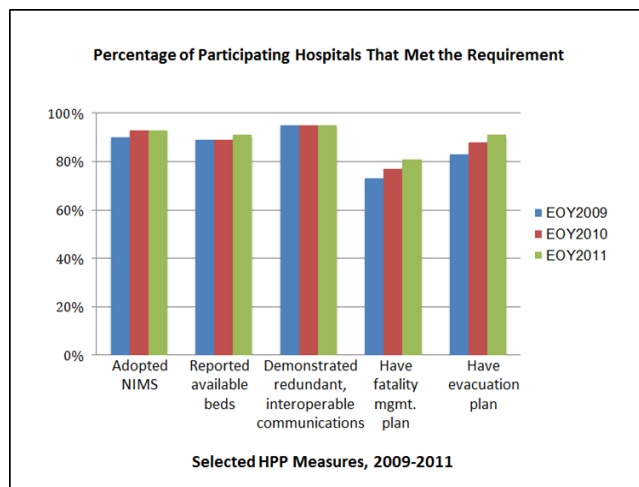
HPP and PHEP measures are providing evidence-based insights into the nation’s health security. HHS reports awardee progress in a number of areas.¹⁵

- Between 2010 and 2012, the ability of PHEP awardees to test for *Escherichia (E.) coli* and *Listeria* and report results to CDC’s PulseNet database improved. The total percentage of *E. coli*-positive test results analyzed and entered within four working days increased from 92% in 2010 to 94% in 2012. For *Listeria*, the percentage increased from 89% to 92%.
- Between 2009 and 2012, the percentage of Laboratory Response Network biological labs that could report significant test results to CDC’s Emergency Operations Center within two hours was very high, ranging from 93% to 99%.
- Since 2009, PHEP awardees have reduced the average time to notify and assemble staff during an incident from 57 minutes in 2009 to 30 minutes in 2011. The number of HPP awardees who can provide a verified list of available volunteer health professionals within 24 hours of receiving a request steadily increased since 2008. In FY 2011, 61 of the 62 awardees were able to submit a verified list of available volunteer professionals within 24 hours of a request being received.¹⁶
- Between 2009 and 2011, nearly all PHEP awardees (97–98%) were able to issue an initial risk communication message to the public during a real or simulated emergency.

HPP measures also show progress among awardees (see Exhibit II.2).

- From 2009 to 2011, approximately 95% of HPP-participating hospitals demonstrated redundant communication capabilities during every exercise they undertook.

Exhibit II.2—HPP-Participating Hospital Performance, Selected Measures, 2009—2011

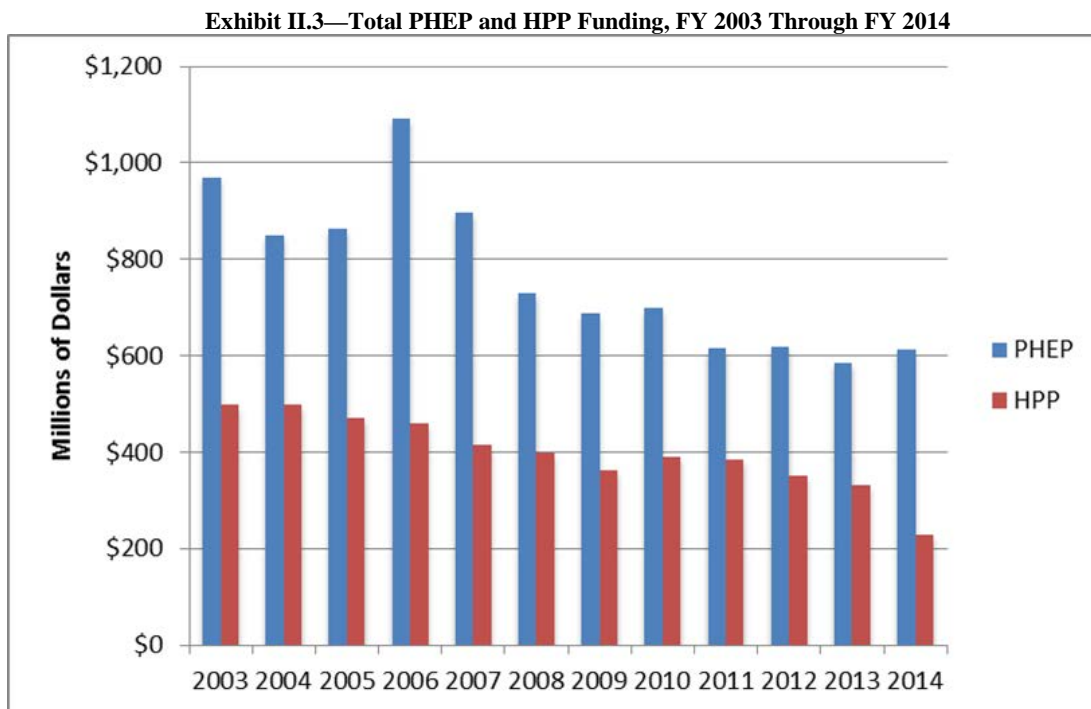


Source: HPP, analysis of performance measure data.

- The percentage of HPP awardees with evacuation and shelter-in-place plans increased from 83% in 2009 to 90% in 2011.
- Over the same period, the percentage with fatality management plans increased from 72% to 81%.

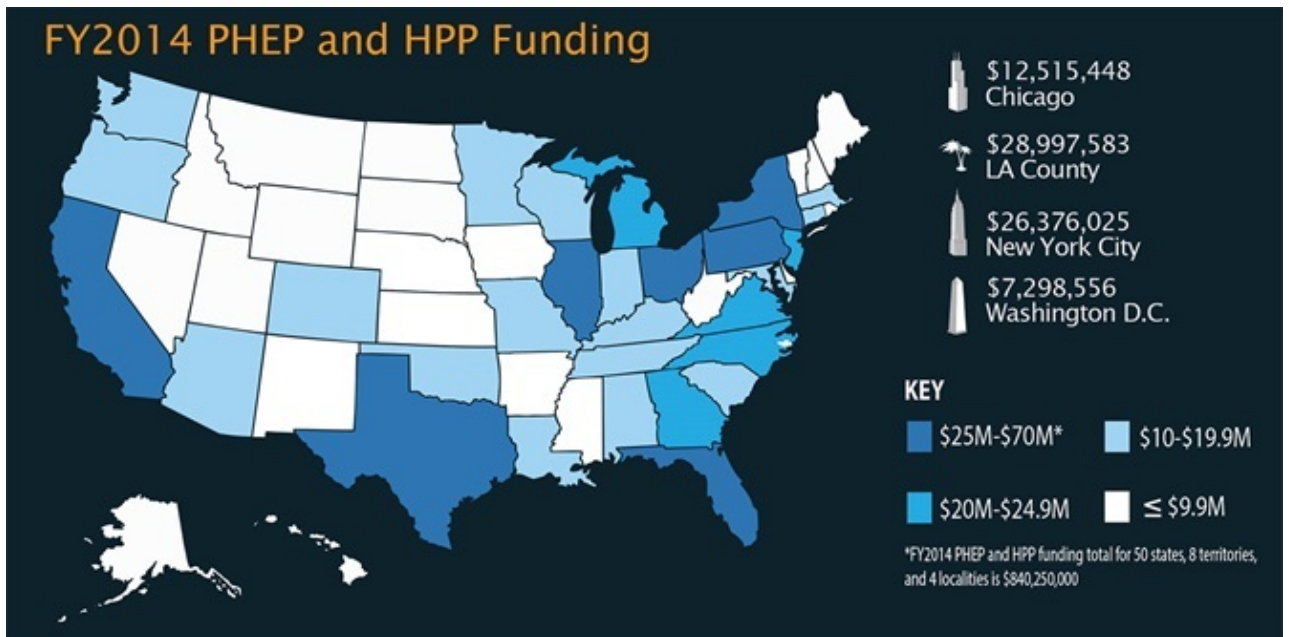
Funding for PHEP and HPP

Although the PHEP and HPP programs were reauthorized, their funding continues to decrease (see Exhibit II.3). PHEP awards decreased from a high of approximately \$1.1 billion in FY 2006 to \$611.75 million in FY 2014. Similarly, HPP awards decreased from a high of \$498 million in FY 2003 to \$228.5 million in FY 2014. Exhibit II.4 shows the state-by-state allocation of awards for the two programs combined for FY 2014. (State-by-state detail on PHEP and HPP funding over time is provided in Appendix B.) Reduced funding for these two grant programs means that awardees have fewer resources to maintain existing and to build new public health and health care capabilities. Recent reports provide evidence that local health departments have reduced exercising and training efforts as a result of budget cuts.¹⁷¹⁸



Source: PHEP data from CDC, *2013–2014 National Snapshot of Public Health Preparedness*, 2013. As of November 24, 2014: http://www.cdc.gov/phpr/pubs-links/2013/documents/2013_Preparedness_Report.pdf. HPP data provided by HPP.

Exhibit II.4—Combined FY 2014 HPP and PHEP Funding



Source: HHS, “HHS Grants Bolster Health Care and Public Health Disaster Preparedness,” July 2, 2014. As of November 24, 2014: <http://www.hhs.gov/news/press/2014pres/07/20140701a.html>

III. Progress Toward the NHSS 2010–2014 Goals and Strategic Objectives

The inaugural NHSS enumerated two goals for national health security and ten strategic objectives to support those goals (Exhibit III.A). This chapter of the review, which includes eleven sections, describes progress within the two goals and each objective.

Exhibit III.A—NHSS 2010–2014 Goals and Strategic Objectives

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| <p>Goals</p> <ol style="list-style-type: none">1. Build community resilience.2. Strengthen and sustain health and emergency response systems. <p>Strategic Objectives</p> <ol style="list-style-type: none">1. Foster informed, empowered individuals and communities.2. Develop and maintain the workforce needed for national health security.3. Ensure situational awareness.4. Foster integrated, scalable health care delivery systems.5. Ensure timely and effective communications.6. Promote an effective countermeasures enterprise.7. Ensure prevention or mitigation of environmental and other emerging threats to health.8. Incorporate post-incident health recovery into planning and response.9. Work with cross-border and global partners to enhance national, continental, and global health security.10. Ensure that all systems that support national health security are based upon the best available science, evaluation, and quality improvement methods. |
|--|

Source: HHS, *National Health Security Strategy*, Washington, D.C., December 2009.

Goal 1: Build Community Resilience

Since 2009, national policies have increasingly focused on informed and empowered individuals and communities, which raised awareness of and prioritized the importance of community resilience. Many organizations have led efforts related to preparedness education to support community resilience, including the Department of Homeland Security (DHS), the VA, the American Academy of Pediatrics, NACCHO, state-level departments of public health, the American Red Cross, the National Child Traumatic Stress Network, and ASPR. Several communities, including Los Angeles and Washington, D.C., as well as the Gulf States, are developing localized strategies and large-scale demonstration projects for building community resilience. Federal agencies have developed training and hands-on tools to support individual and community resilience: these efforts include the Federal Emergency Management Agency’s (FEMA’s) Community Resilience System tool; DHS’s public-private Community Health Resilience Initiative; and VA-developed smartphone apps to help first responders administer “psychological first aid.”

Goal 2: Strengthen and Sustain Health and Emergency Response Systems

Several efforts have improved the integration of public health, health care, and emergency management systems. Integration of these systems strengthens their ability to function effectively on a routine basis and scale up quickly when an incident occurs. The alignment of the PHEP and HPP cooperative agreements is strengthening relationships and cooperation and improving program efficiency. Since 2009, HPP has focused on developing and training community- and regionally-based health care coalitions, a critical enabler of effective state, local, territorial, and tribal public health and medical response to an incident. Many organizations, including the CDC, Centers for Medicare & Medicaid Services (CMS), ASPR, and the Institute of Medicine (IOM), have developed guidance, tools, and templates to strengthen the surge capacity of the health care system, as well as resources to help states and localities establish crisis standards of care (CSC). Core competencies have been identified for the disaster medicine and public health workforce, along with targeted workforce competencies for different professions, roles, and experience levels; and public health workers are better equipped to function within a larger, coordinated response, in accordance with the National Incident Management System (NIMS).

Objective 1: Foster Informed, Empowered Individuals and Communities

National health security rests on a foundation of informed and empowered individuals and communities. The IP 2012–2014 identified a vision for this objective: Individuals and communities have access to health and behavioral health information and are able to incorporate risk information into plans to support national health security. Community members, including at-risk individuals, utilize information about health threats and behavioral health risks to prevent, protect against, mitigate, respond to, and recover from incidents, and they know where to turn for help both for themselves and for their neighbors. Partnerships and integrated cross-sector plans are in place at the community level, and social networks are leveraged to enhance community education, awareness, and response.

Key Findings

- There has been an increased policy focus on informed and empowered individuals and communities.
- Many efforts demonstrate broader community engagement and improved stakeholder uptake of crucial preparedness information.
- Federal agencies have pursued numerous efforts to increase the inclusion of behavioral health in health security planning, as well as individual and community resilience, before, during, and after incidents.
- Federal agencies and other governmental and nongovernmental organizations have increased cross-sector partnerships, which are critical enablers of community resilience.
- Measures are needed to assess community engagement, stakeholder use of information, individuals' and communities' movement toward self-sufficiency, and the effectiveness of community partnership models. Data are also needed at the community level to determine readiness and capability to respond and recover effectively.
- A framework is needed to guide the integration of community education efforts, and a process is needed to monitor uptake and use of messages.

Findings

Increased Policy Focus on Informed and Empowered Individuals and Communities

Since 2009, national policies have increasingly focused on informed and empowered individuals and communities, which promotes awareness of and helps prioritize the importance of community resilience. The inaugural NHSS advanced the concept of community resilience by establishing a goal of building community resilience and emphasizing “whole community” planning. The latter concept was adopted by subsequent documents such as the National Disaster Recovery Framework (NDRF),¹⁹ the Federal Emergency Management Agency’s (FEMA’s) ¹ *A Whole Community Approach to Emergency Management: Principles, Themes, and Pathways for Action*, and the Administration for Children and Families’ (ACF) *Children and*

¹ FEMA defines *whole community* as “a means by which residents, emergency management practitioners, organizational and community leaders, and government officials can collectively understand and assess the needs of their respective communities and determine the best ways to organize and strengthen their assets, capacities, and interests.”

*Youth Task Forces in Disasters: Guidelines for Development*²⁰ in order to acknowledge the important contributions that organizations and individuals outside of government make to strengthen national health security.

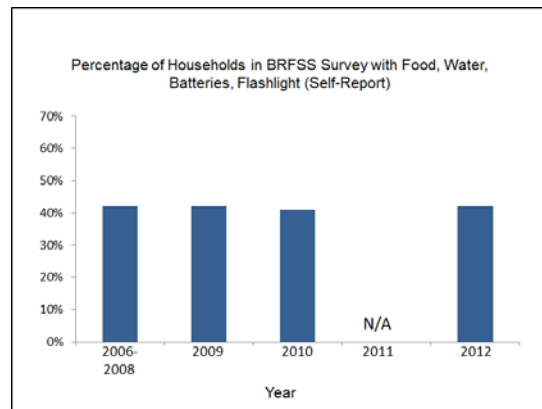
Improvements to Community Preparedness Education

Since 2009, federal agencies have led a number of efforts related to preparedness education:

- DHS’s *Ready* Campaign (<http://www.ready.gov>) educates diverse audiences about preparedness. As of 2012, more than 77 million *Ready* materials have been requested or downloaded from the website.²¹
- ASPR has convened regular meetings of the Community Resilience and Disaster Behavioral Health Preparedness Forum, a recurring, member-based group that discusses projects to promote preparedness and community resilience. The Forum was initially held quarterly and has now moved to semiannual recurrence; it currently has approximately 40 members representing 18 federal departments, agencies, and national associations active in disaster preparedness.
- In 2012, ASPR and DHS conducted an invitational Community Resilience Listening Session, which brought together approximately 100 representatives from community-based organizations, public health, emergency management, behavioral health, academia, volunteer organizations, and the private sector to focus on issues related to local public health.
- Many organizations have engaged in preparedness education and planning, including the VA,²² the American Academy of Pediatrics, NACCHO, the National Center for Post-Traumatic Stress Disorder (PTSD), state-level departments of public health, the American Red Cross, the National Child Traumatic Stress Network, and ASPR.

Although few measures are available to assess progress in educating communities, there are some measures of household preparedness. These suggest that the extent to which individuals and households are prepared for incidents has remained relatively constant since 2009. For example, as seen in Exhibit III.1.1, between 2008 and 2012, approximately 42% of households surveyed in the Behavior Risk Factor Surveillance System (BRFSS) reported having the basic preparedness items of food, water, batteries, and a flashlight. The rate of reported medication preparedness was much higher (Exhibit III.1.2).

Exhibit III.1.1—Percentage of Households with Four Preparedness Items



Source: CDC, Behavior Risk Factor Surveillance System, 2008–2012.

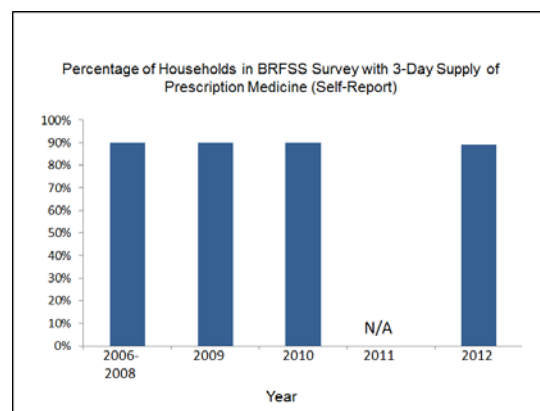
Broader Community Engagement to Strengthen Resilience

Several federally funded efforts to engage communities have contributed to progress on community resilience. Two large pilot projects in Los Angeles (since 2011) and the District of Columbia (since 2012), both funded by CDC,²³ have empowered those communities to participate in resilience-building activities. The Los Angeles County Community Disaster Resilience Project, which also received funding from the National Institute of Mental Health (NIMH) and the Robert Wood Johnson Foundation, has identified strategies to strengthen the Los Angeles Department of Health, the Emergency Network of Los Angeles, and community agency capacity and leadership.²⁴ The program has trained numerous community members to be health responders and community leaders and has helped map neighborhood resources.²⁵ Similarly, Resilient DC is a collaborative project sponsored by the District of Columbia Department of Health to bring together government and community-based partners to research best practices and discuss how best to leverage community assets in order to better prepare for incidents.²⁶ Both initiatives have established partnerships across government, nonprofit organizations, and the private sector. The Community Resilience System tool, piloted by FEMA in 2011 in seven communities, provides community leaders with a systematic way to organize efforts to build community resilience. The tool supports the whole-community approach and helps communities build resilience in six steps, including a step to assess vulnerabilities and risks.²⁷

Several efforts involve partnerships with nongovernmental organizations and communities:

- HPP helps ensure that community members across the health system are educated about community threats and engaged in mitigation activities through grants and cooperative agreements to states, territories, and municipalities.
- DHS leads the Community Health Resilience Initiative, a public-private project to develop a toolkit of resilience resources.
- DHS and FEMA sponsor projects related to resilience, such as the Community & Regional Resilience Institute (CARRI) resilience planning system. CARRI supports communities in their efforts to build resilience and also works with state, regional, and national stakeholders to create incentives and support for community resilience.²⁸
- CARRI, Meridian Institute, and FEMA are developing the Campus Resilience Enhancement System (CaRES) and will work with select colleges to determine the resources, processes, and tools that would be useful and effective in building campus resilience.²⁹
- DHS also leads America's PrepareAthon, which is a national, community-based campaign to increase preparedness and resilience through hazard-specific drills, group discussions, and exercises conducted at the national level every fall and spring.³⁰

Exhibit III.1.2—Percentage of Households with 3-Day Supply of Prescription Medication



Source: CDC, Behavior Risk Factor Surveillance System, 2008–2012.

- DHS coordinates Citizen Corps Councils, which engage in whole-community planning and connect with community volunteers to prepare for and respond to emergencies. In 2012, these councils served 63% of the U.S. population, an increase from 58% in 2011.³¹ 71% of these councils have supported local emergency planning activities within the past two years.³²
- The Medical Reserve Corps (MRC), originally managed by the Office of the Assistant Secretary for Health, but transitioned to ASPR in 2014, is a national network of local groups of volunteers that helps build resilience at the local level. MRC units are community-based, and volunteers donate their time and expertise to prepare for and respond to incidents and promote healthy living throughout the year. MRC's are often closely linked to and managed by local public health.

Several efforts have focused on at-risk individuals. ASTHO, NACCHO, and ASPR hosted a listening session of stakeholders representing state and local public health professionals, behavioral health professionals, and at-risk individuals on “Community Health Resilience: Addressing Social Connectedness, Behavioral Health, and Functional Needs.” Since FY 2010, HHS has promoted the use of the CMIST framework (which refers to communication, medical care, independence, supervision, and transportation) in funding opportunity announcements to emphasize the importance of identifying and meeting the access and functional needs of at-risk individuals.³³ In 2011, the National Center for Disaster Medicine and Public Health (NCDMPH) convened a Pediatric Disaster Preparedness Curriculum Development Conference to begin to address the unmet education and training needs of medical responders who care for children in a disaster.³⁴

ASPR hosted three resilience-related webinars, on the topics of (1) pediatric preparedness for health care coalitions, (2) consideration for the use of voluntary at-risk/special needs registries as emergency planning tools, and (3) the role of family caregivers in emergency preparedness. Finally, ACF has partnered with agencies and child-serving organizations to form state-led task forces to address the needs of children and youth. In 2013, ACF released guidance to assist state, local, territorial, and tribal governments in launching their own task forces prior to or following an incident.³⁵

Federal agencies have engaged in other activities to build community resilience:

- The Federal Community Health Resilience Coalition, convened by ASPR, brings together the federal interagency—including FEMA, DHS Office of Health Affairs, CDC, ACF, and ASPR—to share information and promising practices and develop collaborative approaches for assisting communities in building health resilience.
- CDC sponsors the Composite of Post-Event Well Being Project, which is developing a system to identify variables that can predict resilience.

Exhibit III.1.3—Who Are At-Risk Individuals?

At-risk individuals include children, senior citizens, and pregnant women. Other at-risk individuals include people who may need additional response assistance, such as those who have disabilities, live in institutionalized settings, are from diverse cultures, have limited English proficiency or are non-English speaking, are transportation disadvantaged, have chronic medical disorders, or have pharmacological dependency.

Sources: Public Health Service Act (PHS), as amended by the Pandemic and All-Hazards Preparedness Act (PAHPA), signed into law in December 2006 and again by the Pandemic and All-Hazards Preparedness Reauthorization Act (PAHPRA), in March 2013. As of November 25, 2014: <http://www.phe.gov/Preparedness/planning/abc/Pages/at-risk.aspx>

- The National Preparedness and Response Science Board (NPRSB), a federal advisory committee, has formed a Community Health Resilience Working Group to explore issues and make actionable recommendations regarding policies and actions that will build and help sustain community health resilience. The recommendations report was released in April 2014.
- A working group process was developed for Strategic Objective 1 of the NHSS 2015–2018 (Build and sustain health resilience); supporting efforts included gathering external stakeholder input through focus groups, convening the interagency to assess progress and priorities, reviewing the scientific literature, and establishing a draft definition of community health resilience.
- The Research Grantee Community Resilience Coalition, hosted by ASPR, is a recurring teleconference forum (which began in April 2014) for science investigators representing public health emergency and disaster preparedness, response, or recovery research grants sponsored by HHS. The coalition discusses community resilience science as it relates to health and well-being, engages with thought leaders in the field, and explores opportunities for collaboration.

Increased Inclusion of Behavioral Health in Health Security Planning

Federal agencies have pursued numerous efforts to increase the inclusion of behavioral health, as well as individual and community resilience, before, during, and after incidents. For example, ASPR provides subject matter expertise, education, and coordination to federal and non-federal stakeholders to help ensure that the access and functional needs of at-risk individuals and behavioral health issues are integrated into public health and medical emergency preparedness, response, and recovery activities. The VA has undertaken a Hurricane Sandy veteran resilience study and a veteran volunteerism initiative and has developed smartphone apps to help first responders administer “psychological first aid” and apply skills to support psychological recovery.

Prompted by a recommendation from the National Biodefense Science Board (NBSB) (renamed as the National Preparedness and Response Science Board [NPRSB] in 2014), ASPR convened a broad inter- and intra-agency working group and developed the *HHS Behavioral Health Concept of Operations (CONOPS)* in 2011. The CONOPS describes coordination and collaboration activities at local, state, and national levels and provides guidance related to promising intervention and triage strategies. The CONOPS was revised and updated in 2013. Implementation activities have included assigning one or more behavioral health subject matter experts to responses to ensure that emotional and stress mitigation needs are integrated into the public health and medical response for the survivors and responders. In addition, ASPR developed the requirement that all HHS responders (including National Disaster Medical System personnel) receive training in psychological first aid. More than 3,000 responders have received instruction online or in person.

HHS is examining alternative methods and piloting tools such as PsySTART to determine how to accomplish behavioral health triage, screening, and service provision for individuals affected by incidents. HHS has worked with academia to identify ways to identify individuals at greatest risk for adverse psychological distress or in need of more targeted interventions.

Cross-Sector Partnerships and Development of Community Preparedness Capabilities

Federal agencies and other governmental and nongovernmental organizations have increased cross-sector partnerships, which are critical to support community-level planning and exercises for health security:

- State, local, tribal, and territorial governments are increasingly engaging with community partners to develop localized, risk-informed mitigation plans. All 56 states and territories have completed or are on target to complete approved mitigation plans. As of 2014, the percentage of the population covered by local mitigation plans was 76%, up from approximately 71% in 2012.³⁶
- In 2013, IOM sponsored a multi-sector workshop on the response requirements faced by public health and health care systems dealing with an improvised nuclear device detonation.³⁷
- In the 2011 capabilities for the PHEP cooperative agreement, CDC established partnership requirements and measures for cross-sector collaboration in community preparedness and integrated planning.³⁸
- Capability 1 of the HPP cooperate agreement (Healthcare System Preparedness) encourages the development of essential partner memberships from the community's health care organizations and response partners.³⁹
- ASPR and the Veterans Emergency Management Evaluation Center (VEMEC) partnered to develop a toolkit for integrating homeless populations into disaster planning.
- NACCHO is examining the Mobilizing for Action through Planning and Partnerships (MAPP) process as a potential means to track and promote community health resilience. MAPP is a community-driven strategic planning process for improving community health.⁴⁰

Persistent Challenges

Future progress for this objective can be supported through improved assessment that uses standardized tools and definitions. Also, there is a need for additional measures that assess community engagement, stakeholder use of information, individuals' and communities' movement toward self-sufficiency, and the effectiveness of community partnership models. Community-level data is required to determine readiness and capability to respond and recover effectively.

Despite progress in preparedness education, several gaps in this area remain. Although there has been increased outreach to communities, improvements have not been seen in individual and household preparedness, based on the limited data available (Exhibits III.1.1 and III.1.2). A better understanding is needed of the extent to which individuals and communities are able to use preparedness information for recovery and other phases of an incident. The impact of community education and the effectiveness of national health security messages also need to be better understood. Locally, a framework is needed to guide the integration of community education efforts, and a process is needed to monitor uptake and use of messages.

Objective 2: Develop and Maintain the Workforce Needed for National Health Security

National health security depends on a highly competent and trained workforce with sufficient numbers of people to meet routine and incident demands. The IP 2012–2014 described the following vision for this objective: Staff and volunteers can perform their roles and responsibilities safely, efficiently, and effectively during all phases of an incident; and have received competency-based national health security training. Communities have an adequate number of staff and volunteers to provide national health security capabilities, can access and mobilize additional personnel as needed; and a systematic approach is in place to coordinate and manage health care delivery volunteers during an incident.

Key Findings

- Core competencies have been identified for the disaster medicine and public health workforce, along with targeted workforce competencies for different professions, roles, and experience levels.
- Many competency-based training courses have been developed and conducted, including training in point-of-dispensing (POD), safety, and environmental health during an incident.
- Progress has been made toward quantifying the number of staff and volunteers available and assessing the ability to notify and assemble them.
- The number of volunteers in the Emergency System for Advance Registration of Volunteer Health Professionals (ESAR-VHP) has increased annually to approximately 260,000 in 2012, and the Medical Reserve Corps (MRC) network has continued to expand.
- Areas for future progress include ensuring that sufficient numbers of trained workers and volunteers are available to support health security efforts, evaluating the effectiveness of workforce training, and emphasizing personal and family preparedness planning for health security workers.

Findings

Establishing Core Workforce Competencies

Many competencies have been identified for the disaster medicine and public health workforce, including core workforce competencies, as well as competencies focused on specific areas or disciplines.⁴¹ In 2010, CDC funded the American Medical Association (AMA) Center for Disaster Preparedness to develop an interdisciplinary preparedness competency model for health care and public health. This competency set was developed in 2010–2011 through a series of web-based surveys and expert work group meetings with representatives of diverse health fields (including clinical medicine, public health, adult education, and emergency management). The resulting competency set includes 11 foundational core competencies for the disaster medicine and public health workforce (see Exhibit III.2.1). This set is intended to serve as the foundation for more targeted competencies relevant to different professions, roles, and experience levels.⁴² This core set of competencies enables a broad training framework for national health security and helps ensure that the current and future national health security workforce is proficient and effective.

Exhibit III.2.1—Core Competencies for Disaster Medicine and Public Health

1. Demonstrate personal and family preparedness for disasters and public health emergencies
2. Demonstrate knowledge of one's expected role(s) in organizational and community response plans activated during a disaster or public health emergency
3. Demonstrate situational awareness of actual/potential health hazards before, during, and after a disaster or public health emergency
4. Communicate effectively with others in a disaster or public health emergency
5. Demonstrate knowledge of personal safety measures that can be implemented in a disaster or public health emergency
6. Demonstrate knowledge of surge capacity assets, consistent with one's role in organizational, agency, and/or community response plans
7. Demonstrate knowledge of principles and practices for the clinical management of all ages and populations affected by disasters and public health emergencies, in accordance with professional scope of practice
8. Demonstrate knowledge of public health principles and practices for the management of all ages and populations affected by disasters and public health emergencies
9. Demonstrate knowledge of ethical principles to protect the health and safety of all ages, populations, and communities affected by a disaster or public health emergency
10. Demonstrate knowledge of legal principles to protect the health and safety of all ages, populations, and communities affected by a disaster or public health emergency
11. Demonstrate knowledge of short- and long-term considerations for recovery of all ages, populations, and communities affected by a disaster or public health emergency

Source: Walsh L, Subbarao I, Gebbie K, Schor KW, Lyznicki J, Strauss-Riggs K, Cooper A, Hsu EB, King RV, Mitas JA 2nd, Hick J, Zukowski R, Altman BA, Steinbrecher RA, and James JJ, "Core Competencies for Disaster Medicine and Public Health," *Disaster Medicine and Public Health Preparedness*, Vol. 6, No. 1, 2012, p. 44.

Identifying Targeted Workforce Competencies

Targeted workforce competencies have also been developed for different professions, roles, and experience levels. Some noteworthy efforts from the period of this review include the following:

- CDC sponsored development of the Public Health Preparedness and Response Core Competency Model, which proposes a national standard of behaviorally based, observable skills for the preparedness and response public health workforce.^{43,44} The Association of Schools and Programs of Public Health (ASPPH) engaged experts to develop the model, which also benefited from the extensive collaboration and support of the NCDMPH within DoD's Uniformed Services University of the Health Sciences. In 2012, the public health preparedness and response core competencies and capabilities were incorporated into TRAIN, a national learning management network managed by the Public Health Foundation. As of 2013, TRAIN had over 750,000 registered learners.
- In 2009, the World Health Organization (WHO) and the International Council of Nurses (ICN) published a framework of disaster nursing competencies.⁴⁵
- NCDMPH collaborated in the development of an updated set of broadly vetted, interdisciplinary, and foundational all-hazards disaster health competencies (11 core and 33 sub-competencies).⁴⁶

- National standardized all-hazard disaster core competencies for acute care physicians, nurses, and emergency medical services (EMS) professionals have been developed.⁴⁷

The NCDMPH has proposed an approach, based on the core competency set discussed above, for aligning targeted workforce competency models.⁴⁸

Development of Competency-Based Training and Standards

The CDC-funded Preparedness and Emergency Response Learning Centers (PERLCs) have facilitated the development and provision of competency-based training for the public health workforce in state, local, territorial, and tribal authorities (Exhibit III.2.2). The PERLCs provide specialized training, education, and consultation to state, local, territorial, and tribal public health authorities within self-defined service areas. Targeted for mid-level public health workers, the trainings are based on the aforementioned ASPPH/CDC Public Health Preparedness and Response Core Competency Model.⁴⁹ Many other organizations and other entities have developed and conducted competency-based training courses on a variety of topics, including training on closed POD, safety for disaster workers, the use of environmental health information during an incident (including food safety, potable water, and responder safety), and ways to engage the assistance of bystanders at the site of an incident. For example, the National Disaster Life Support (NDLS) program’s core, basic, and advanced disaster life support courses are derived from an AMA-sponsored competency set⁵⁰ that was the precursor to the competency set shown in Exhibit III.2.1. NCDMPH conducted a workshop with academic and other collaborators to address key topics relating to the provision of competency-based disaster health education and training. NCDMPH also developed the web-based tool “Resources for Core Competencies in Disaster Health” to provide teaching and learning resources for educators and self-directed learners in support of the core competencies in disease medicine and public health.

Exhibit III.2.2—Locations of PERLCs



Source: CDC, “Preparedness and Emergency Response Learning Centers (PERLC),” last updated February 24, 2014. As of November 25, 2014: <http://www.cdc.gov/phpr/perlc.htm>

The Federal Education and Training Interagency Group (FETIG) provides infrastructure and support to federal agencies and other stakeholders to help ensure that workers and volunteers can fulfill their roles and responsibilities. While FETIG facilitates coordination, the Homeland Security Presidential Directive–21 (HSPD–21) authorized “action arm” for leading federal efforts in developing and propagating core curricula, training, and research in disaster medicine and public health is NCDMPH. With guidance from FETIG, NCDMPH coordinates public health and medical disaster preparedness and response core curricula, training, and education across federal agencies, departments, and other stakeholders.⁵¹ The Uniformed Services

University of Health Sciences (USUHS), the only federal health sciences university, continues to train and graduate professionals with competencies that both meet their respective profession's requirements and ensure operationally relevant skills needed to support national security (e.g., disasters).

The Division of the Civilian Volunteer MRC (DCVMRC) has provided support for training using MRC core competencies and MRC-TRAIN, a learning resource for public health professionals. National Voluntary Organizations Active in Disaster (VOAD) conducts tabletop exercises to identify gaps in communication and coordination among member organizations.

The National Highway Traffic Safety Administration (NHTSA) led the development of National EMS Education Standards for Emergency Medical Responder, Emergency Medical Technician, Advanced Emergency Medical Technician, and Paramedic.⁵²

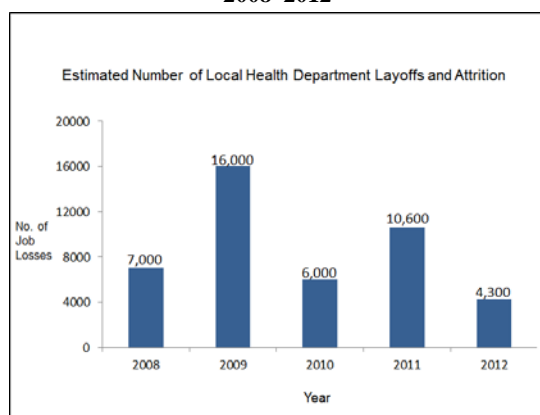
In 2013, CDC became the first federal agency to attain full accreditation of its emergency management program by the Emergency Management Accreditation Program (EMAP).⁵³ EMAP gives emergency management programs the opportunity to meet nationally set standards and promote consistent quality of emergency preparedness and response.⁵⁴ The process requires jurisdictions to assign responsibilities for public health and other sectors and to develop public communication plans.

Quantifying the National Health Security Workforce

A sufficient number of workers are needed to address all mission areas of national health security, from prevention and protection to mitigation, response, and recovery. Additionally, the geographic distribution of workers with specific skills must be known in order to coordinate functions, teams, and services during incidents. Therefore, enumerating the paid and volunteer workforce across all relevant occupations (e.g., critical care physicians, epidemiologists, laboratorians, emergency managers, paramedics) and at the federal, state, and local levels available to address national health security concerns is critical. Progress has been made on this endeavor since 2009.

Budget cuts have reduced the state and local public health workforce as a whole. As noted earlier in this report, over 40,000 state and local public health jobs have been lost since 2008, representing approximately 21% of the state and local health department workforce (see Exhibit III.2.3).⁵⁵ The need to hire individuals with formal public health training at state and local agencies can be expected to increase, perhaps rapidly, as the public health workforce continues to age.

Exhibit III.2.3—Estimated Local Health Department Job Losses (Layoffs and Attrition), 2008–2012



Source: National Association of County & City Health Officials (NACCHO), "Project Public Health Ready," July 2013.

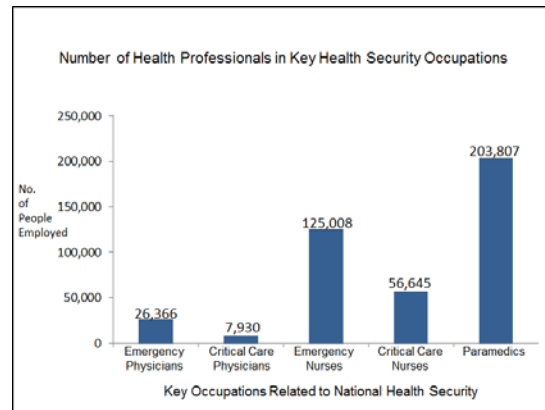
Through a cooperative agreement with the Public Health Foundation, CDC funded two Centers of Excellence (COEs) to stimulate public health workforce research. In 2010–2011, the COEs were charged with outlining options for developing a sustainable, systematic, and replicable plan for enumerating and characterizing the nation’s public health workforce; determining the data elements required to provide useful information about the public health workforce; and reviewing available data sources regarding the public health workforce to assess their usability for national enumeration.^{56, 57}

NCDMPH conducted a study to describe selected aspects of the health professions workforce who would respond to an incident. The number of paramedics and emergency and critical care physicians and nurses in 2011 is shown in Exhibit III.2.4.⁵⁸ This report also described the federal disaster health workforce, including personnel from HHS, DoD, VA, DHS, and the Department of Transportation (DOT). NCDMPH also conducted a “landscape analysis” of the disaster health workforce from the federal interagency level down to the local level (case study in Los Angeles County). The final report described the structure, from a federal agency perspective, of the disaster health workforce for domestic natural disasters.

The United States Public Health Service (USPHS) Commissioned Corp, one of the seven uniformed services, gained access to additional personnel through the establishment of the Ready Reserve Corp. The Affordable Care Act gave the USPHS the authority to create the Ready Reserve Corp to assist (through short-term assignments) the 6,800 full-time public health professionals in their mission to respond to public health crises and national emergencies. In recent years, Commissioned Corp emergency response teams have served on the frontlines of public health emergencies and incidents such as the 2010 Haiti earthquake, Superstorm Sandy, the Newtown Connecticut shooting, and the Ebola outbreak in West Africa.

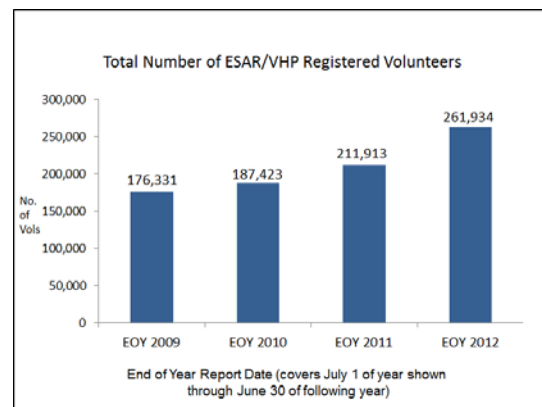
The number of volunteers in ESAR-VHP has increased annually (see Exhibit III.2.5). The community-based network of MRC units and volunteers has continued to expand as well, with approximately 75% of the U.S. land area and over 90% of the U.S. population covered by nearly 1,000 MRC units and over 205,000 volunteers. In FY 2013, MRC units conducted 14,760 activities to develop units, train volunteers and community members, strengthen public health, reduce vulnerability, build resilience, prepare

Exhibit III.2.4—Number of Health Professionals in Key Occupations Related to National Health Security (2011)



Source: Moriarty T, Chow L, Hovor C, Schor K, Altman A, Berry D, Luan D, and Zukowski R, “Report on the Domestic Natural Disaster Workforce,” National Center for Disaster Medicine and Public Health, Uniformed Services University, November 30, 2011.

Exhibit III.2.5—Increase in the Number of ESAR-VHP Registered Volunteers (includes health and non-health professionals)



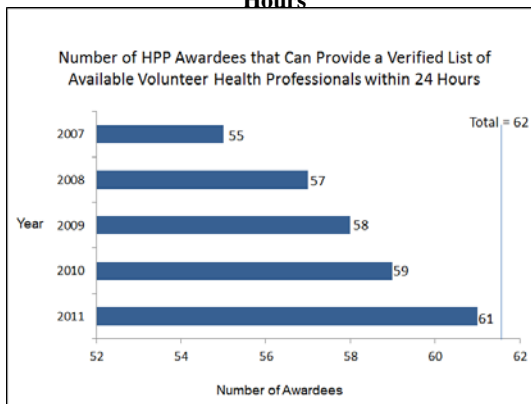
Source: HPP end of year (EOY) reports, 2009–2012.

communities, and respond to emergencies.

The ability to notify and assemble volunteers has improved; one measure is the number of HPP awardees who can provide a verified list of available volunteer health professionals within 24 hours of receiving a request. This number has steadily increased for five years (see Exhibit III.2.6). In FY 2011, 61 of the 62 awardees were able to submit a verified list of available volunteer professionals within 24 hours of a request being received.⁵⁹

A number of efforts are under way to coordinate personnel resources nationwide. ESAR-VHP and the National Disaster Medical System (NDMS) have created a dashboard that summarizes staff shortfalls and recruitment priorities and have also established a personnel recruiting system that services both organizations. ESAR-VHP has developed and implemented a secure web application to share volunteer credentials among states and health care facilities during an incident. MRC and ESAR-VHP continue to coordinate their efforts at the state level, with a large percentage of MRC members being included in the state ESAR-VHP databases.

Exhibit III.2.6—Number of HPP Awardees (Total = 62) That Can Provide a Verified List of Available Volunteer Health Professionals Within 24 Hours



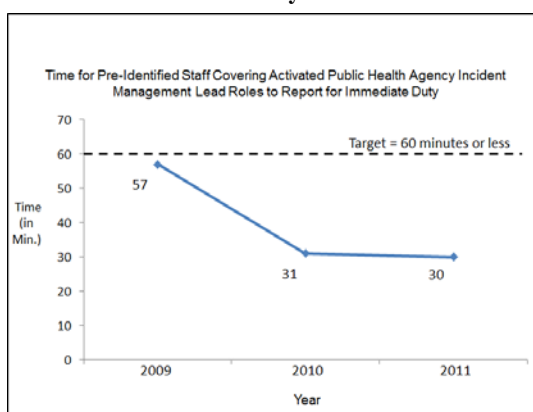
Source: GAO, *Improvements Needed for Measuring Awardee Performance in Meeting Medical and Public Health Preparedness Goals*, GAO-13-278, March 2013.

Improvement in Staff Performance

Public health workers with emergency response roles have improved their performance in reporting for duty. In 2011, the median time for pre-identified staff covering activated public health agency incident management roles to report for immediate duty was 30 minutes, with 47 of 50 states (94%) meeting the target of assembling staff in 60 minutes or fewer.⁶⁰ As shown in Exhibit III.2.7, performance on this measure already exceeds the target and continues to improve.

Workers are better equipped to function within a larger, coordinated response, in accordance with the National Incident Management System (NIMS). FEMA, the National Institute of Environmental Health Sciences (NIEHS), ASPR, and CDC all reported compliance with NIMS. FEMA established requirements for NIMS training and monitors compliance. In 2011, FEMA released an updated *NIMS Training Program*, which defines a national training curriculum and personnel qualifications and updates training guidance for NIMS courses.⁶¹

Exhibit III.2.7—Time for Pre-Identified Staff Covering Activated Public Health Agency Incident Management Lead Roles to Report for Immediate Duty



Source: CDC, *Public Health Preparedness: 2012 State-By-State Report on Laboratory, Emergency Operations Coordination, and Emergency Public Information and Warning*, 2012.

Persistent Challenges

Quantifying the workforce is challenging due to lack of consensus regarding the ideal mix of training, experience, and diversity needed to produce an effective national health security workforce. In addition, workforce needs may change due to the shifting needs of the national security landscape. Budget cuts have reduced the public health component of the national health security workforce. The nation can address these issues by ensuring that sufficient numbers of trained workers and volunteers with appropriate qualifications and competencies are available when needed.

To support future progress in this area, the nation needs to strengthen competency-based health security–related workforce training. Although many training courses have been developed and delivered on topics related to national health security, there is a need to evaluate the effectiveness of workforce training and to develop new training materials in areas where none currently exist. Lack of data limits the ability to target training resources towards the most effective curricula.

Managing the national health security workforce, including both staff and volunteers, also remains an area for further progress. There are multiple challenges with credentialing, licensure, and privileging of the workforce. Volunteers with clinical credentials typically cannot practice across state lines, prohibiting staff-sharing and improved surge capacity for border states and rural areas that may be closer to an urban facility in a different state than one in their own. Some hospitals and health care organizations also require additional privileging to practice in their facilities, a process that cannot be quickly completed when surge staff is needed immediately in an emergency. Retirees do not always keep current licenses and therefore may not be able to provide care in a disaster even when they are volunteers.

In addition, research has identified conditions under which local public health, health care and EMS workers are less likely to respond during an incident, which could pose a threat to all-hazards response capacity and health security. For example, in 2010, Barnett et al. found that the majority (52%) of EMS workers would stay home if they perceived a risk of disease transmission to their family.⁶² These findings imply that an emphasis on personal and family preparedness planning is strongly advisable for these workers: If their family was prepared to function in their absence, EMS workers were more than twice as willing to mobilize to another, more severely affected community.

Objective 3: Ensure Situational Awareness

Situational awareness in the context of national health security refers to the collection, analysis, and interpretation of information to support decision-making before, during, and after an incident with the potential for negative health consequences. Public health and medical situational awareness (PH&M SA) is a knowledge state that results from the process of active information gathering with appropriate analysis, integration, validation, and sharing of information related to health threats and the health of the human population. This information tied with health system and human services resources, and health-related response assets inform public health decision making, resource allocation, and other actions. Biosurveillance is a key information gathering activity that encompasses human disease surveillance, animal disease surveillance, environmental monitoring, and gathering of intelligence and other information for early warning and situational awareness. PH&M SA primarily overlaps with biosurveillance for human health; however, the broader set of biosurveillance information gathering activities include non-health information that could secondarily impact health; thereby contributing to PH&M SA. While there is some overlap between biosurveillance and PH&M SA, both ultimately contribute to overall health related situational awareness. Both biosurveillance and PH&M SA activities are critical before an incident to provide indicators and early warning of a routine or unusual incident that may require action, and during response and recovery operations by providing ongoing monitoring and characterization of the incident and forecasting the impacts of the incident to inform decision making. The IP 2012–2014 described the following vision for this objective: The nation has a common national approach to public health and health care situational awareness with near real-time awareness of evolving incidents and of the availability and location of personnel and other resources. Health-related situational awareness is coordinated effectively with scalability from the local to the national level and with multidirectional communication involving both the public and private sectors.

Key Findings

- Ongoing efforts across the federal government have helped clarify key definitions and concepts, including the relationship between situational awareness and biosurveillance.
- The ability to provide strategic warning has improved for some types of incidents, such as an outbreak of pandemic influenza.
- Systems for fostering situational awareness allowed near real-time situational awareness to be achieved during incident responses.
- The federal government is implementing improved technologies for surveillance and integrating new information sources for situational awareness.
- Strategic challenges include the need for improvement to the data systems used to support health situational awareness, and a better understanding of how to collect, aggregate, and process data from diverse stakeholders. Better measures are also needed, especially for prevention, mitigation, and recovery.
- States and localities face several challenges to ensuring the interoperability of systems.

Findings

Clarifying Key Situational Awareness Definitions and Concepts

Diverse agencies and organizations have helped to develop definitions and clarify concepts needed for a national approach to situational awareness. HHS coordinates with many agencies to

address and define policy affecting situational awareness as it relates to the NHSS, the *National Biosurveillance Strategy*, and PPD-8.⁶³ Other federal programs and initiatives to support a national approach to situational awareness include the Armed Forces Health Surveillance Center (AFHSC), the National Biosurveillance Integration Center (NBIC), the Public Health Information Network (PHIN) Program (Situational Awareness Branch, CDC), and the ASPR Fusion Cell.

The National Preparedness and Response Science Board (NPRSB) identified six overarching concepts for emphasis in HHS's *Public Health and Healthcare Situational Awareness Implementation Plan* for building a situational awareness capability (see Exhibit III.3.1).⁶⁴ The NPRSB also recommended actions that HHS should take to improve and modernize the nation's biosurveillance capabilities.⁶⁵

At the recommendation of NPRSB, HHS is establishing a central situational awareness authority to coordinate all public health and health care situational awareness data that have already been collected, processed, and analyzed from respective agencies on a national level. By requiring collaboration with multiple federal partners, this authority will help ensure compatibility, consistency, continuity, coordination, and integration of situational awareness systems and data.

National VOAD fosters improved situational awareness nationwide through the VOAD Leadership Engagement and Development Program, which provides tools to assist state and territorial VOADs in improving situational awareness and in fostering cooperation, communication, coordination, and collaboration. Together with Google, Salesforce, Visionlink, and Palantir, National VOAD deployed VOADNET, which provides a suite of services with robust information sharing capabilities.⁶⁶

Exhibit III.3.1—NPRSB Concepts for Emphasis in HHS's Public Health and Healthcare Situational Awareness Implementation Plan

- Assurance of a common and unified strategy among all stakeholders involved in public health and healthcare situational awareness efforts
- Identification of the specific questions to be answered in support of both public health and healthcare situational awareness
- Recognition that the system for data coordination must integrate the expertise and experience from across all levels and sectors
- Bidirectional communication of government agencies with all stakeholders, public and private
- Caution in developing common technological systems for situational awareness and biosurveillance
- Establishment of functional standards for data reporting to promote a common understanding of the target systems and capabilities.

Source: NBSB, *Final Report from the NBSB Situational Awareness Strategy and Implementation Plan Working Group*, April 2013. As of November 25, 2014:

<http://www.phe.gov/preparedness/legal/boards/nbsb/meetings/documents/final-nbsb-sa-wg-bsv.pdf>

Strategies and Other Efforts to Support National Approach to Situational Awareness

Several strategies focus on improving situational awareness on the national level. The *National Strategy for Biosurveillance* established guiding principles, core functions, and cross-cutting capabilities to support national biosurveillance needs for health security.⁶⁷ The accompanying *National Biosurveillance Science and Technology Roadmap*, released in 2013, prioritizes research and development needs.⁶⁸ The *Federal Health Information Technology Strategic Plan, 2011–2015* outlines federal health information technology (IT) goals that help

support situational awareness.⁶⁹ The *National Biosurveillance Strategy for Human Health V2.0* focuses on improving a “nationwide capability to manage health-related data and information for early warning of threats and hazards, early detection of events, rapid characterization, and overall situation awareness.”⁷⁰ Together, these strategies are providing consistent national guidance to build situational awareness.

Providing Warning

The ability to provide strategic warning has improved for some types of incidents. For example, the Defense Intelligence Agency’s National Center for Medical Intelligence (NCMI)—an organization providing health risk analysis and prediction for the whole of government – has established a process to warn policymakers about pathogens with pandemic potential and other health threats. The center scans and assesses the globe using both classified and open-source information. Federal experts from multiple departments and agencies are embedded in the NCMI to ensure timely collaboration in the assessment of significant health threats of foreign origin, independent of its cause. In addition, entities such as the U.S. Air Force School of Aerospace Medicine (USAFSAM) perform global, laboratory-based influenza surveillance through a sentinel system and provide the CDC with secure health information regarding global viral respiratory cases seen within the military health care network.

In August 2007, Congress established the National Biosurveillance Integration Center (NBIC) within the Department of Homeland Security to enhance the nation's capability to integrate biosurveillance efforts. The mission of the NBIC is fundamentally about the integration of biosurveillance information to enable early warning and shared situational awareness, and disseminate it to the appropriate people in a timely fashion.⁷¹

Providing Near-Real-Time Situational Awareness

Several major incidents have demonstrated the successful use of systems for fostering situational awareness:⁷²

- During the Deepwater Horizon oil spill in 2010, CDC worked in coordination with state and local health departments across five states. The key information technology (IT) systems BioSense and the National Poison Data System were used, as well as the HHS Secretary’s Operation Center (SOC).
- During the H1N1 influenza pandemic of 2009–2010, CDC partnered with the Public Health Informatics Institute and the International Society for Disease Surveillance to conduct situational awareness using the surveillance system, Distribute.
- During the response to the 2010 Haitian earthquake, CDC demonstrated the use of Internet-based systems to map available resources.⁷³ In the private and academic sectors, volunteers from Tufts University, the National Geographic Society, and other organizations used the open source mapping program Ushahidi to assist people in locating resources and to map requests for assistance.⁷⁴

Technological and Other Approaches for Improving Situational Awareness

The federal government is implementing improved technologies and integrating new information sources for situational awareness.

- NHTSA and NBIC are exploring the use of the National Emergency Medical System Information System (NEMSIS) for syndromic surveillance.⁷⁵

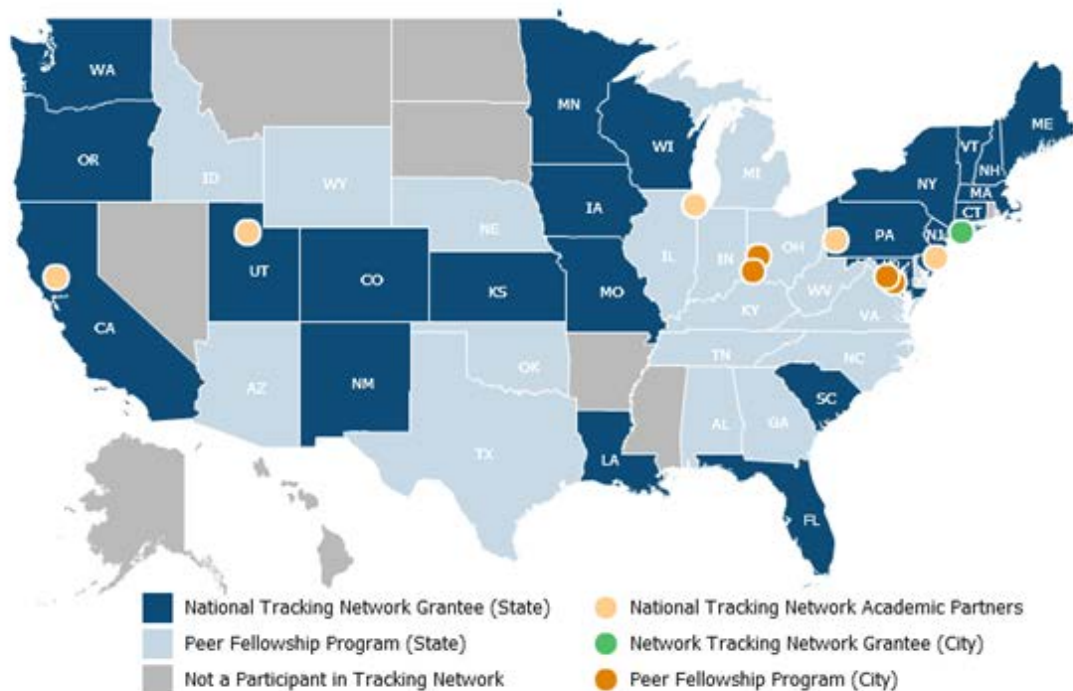
- The Military Health System (MHS) collects HIPAA-compliant health surveillance data from military medical treatment facilities (MTFs) and DoD public health labs and provides it to surveillance centers.
- The AFHSC supports several initiatives to improve information-sharing, including a mapping tool for the U.S. Pacific Command (USPACOM) to track health events and capacity-building. It also has the ability to share biosurveillance data with interagency partners and frequently engages in discussions with the DoD overseas laboratories, DoD WHO liaisons, and others to ensure DoD situational awareness while preserving critical host country relationships.
- DoD initiated the Biosurveillance Ecosystem, an innovative research effort that seeks to develop an interoperable environment that will dramatically accelerate capabilities to detect, identify, and respond to threats. It will draw from community-based reporting, among other sources, to connect people, data, and tools to provide relevant biosurveillance information.
- The NPRSB outlined principles to support IT for situational awareness, including standardization of data elements to promote interoperability and systematic planning at all levels and areas (public, private) to facilitate uniform data collection and utilization.⁷⁶
- MedMap is a secure geographic information system–based (GIS-based) electronic, interactive mapping application that incorporates information from numerous sources both internal and external to HHS. The current version (2.5) is incorporated into HHS’s planning, response, and recovery. MedMap displays and provides details on medical care sites, resources, and mobilization points; and, can provide analytical tools for planning and preparedness efforts.⁷⁷ Similarly, HealthMap, a freely available public website, utilizes open source data for disease outbreak monitoring and real-time surveillance of emerging public health threats. This tool affords public, private, and government stakeholders access to near-real time intelligence for decision making.⁷⁸

With federal support, states and localities are using various methods to improve situational awareness capabilities.

- HPP has encouraged health care coalition building in areas related to resource awareness, including communications systems, hospital bed availability reporting, and partnerships.⁷⁹
- PHEP requires states to report progress on sharing response-related information through memoranda of understanding with local law enforcement and their FBI Weapons of Mass Destruction coordinators.
- ASPR hosted a competition for state and local health officials to identify emerging threats using open source data from Twitter.
- The U.S. DHS National Operations Center (NOC) media monitoring center routinely monitors publicly available online forums, blogs, and websites to collect information to provide situational awareness and inform the Common Operating Picture. The program was initiated as part of the response to the 2010 earthquake in Haiti. The program is designed to keep officials abreast of major, developing events that the federal government might have to respond to.⁸⁰

- CDC has collaborated with federal, state, international, and private agencies to develop a dashboard of geospatial information to assist in mitigating disease and improving response and recovery.
- The National Biosurveillance Integration Center provides situational awareness to federal, state, local, tribal, and territorial authorities through Biosurveillance Event Reports produced in collaboration with National Biosurveillance Integration System interagency partners and made available through the DHS National Operations Center Common Operating Picture.
- Funded by CDC, health departments in 23 states and one city are implementing integrated local tracking networks to monitor environmental health (Exhibit III.3.2).

Exhibit III.3.2—National Environmental Public Health Tracking Network



Source: CDC, “National Environmental Public Health Tracking Network—Tracking in Action,” undated. As of November 25, 2014: <http://www.cdc.gov/nceh/tracking/flashmap.html>

New Measures

The PHEP program has collected information related to situational awareness from awardees since 2007 and has created new measures in domains such as public health laboratory testing, surveillance, and epidemiological investigation. Many of these measures focus on timeliness, which makes them useful for improving near-real-time situational awareness. For example, awardees report the time it takes laboratories to acknowledge receipt of an urgent message and the time it takes the first laboratorian to report for duty at the laboratory.⁸¹

Several new PHEP and HPP measures relevant to situational awareness will be reportable in 2014: (a) proportion of local health departments that can share basic epidemiological and/or clinical data with relevant health care organizations (HCOs); (b) percentage of Healthcare Coalitions (HCC) that can continuously monitor Essential Elements of Information (EEI) and

demonstrate the ability to electronically send data to and receive data from coalition members to inform a common operating picture; and (c) percentage of local partners that reported requested EEI to health and medical lead within the requested timeframe. These measures will provide a better understanding of data collection and sharing capabilities at the local level and can help target areas for improvement.

Persistent Challenges

Despite the progress in strategy development noted above, current situational awareness strategies do not fully meet the need for a common national approach.⁸² The lack of a common national approach to situational awareness creates several challenges:⁸³

- Difficulty in planning longer-term capability-building efforts because of uncertainty about longer-range funding for projects
- Difficulty with investment planning for basic capabilities that address multiple threats since many federal funding sources target specific threats
- Insufficient guidance and support for integrated and regional data-surveillance approaches
- Partnership issues, including differing priorities.

To address these issues, it will be important for the nation to continue to build and improve the data systems needed to support effective health situational awareness. Coordination across public and private stakeholders can be facilitated by creating a voluntary oversight body with representatives from key stakeholder groups. In particular, a better understanding is needed of how to collect, aggregate, and process data from various stakeholders.

Local data remain variable in quality, particularly in resource-poor areas. Poor-quality surveillance data were evident during the 2009–2010 H1N1 influenza pandemic, and the lack of high-quality data poses challenges for decision-making.⁸⁴ There is a need for better measures of situational awareness, especially focusing on the mission areas of prevention, mitigation, and recovery. To continue future progress, it will be critical to achieve a better understanding of the full range of health situational awareness needs across stakeholders and to understand how well current operational capabilities address these needs. Data collection and information creation activities also need to be responsive to evolving decision support requirements.

States and localities also face several challenges related to system interoperability.⁸⁵ True interoperability can be difficult to achieve due to changing technical standards as well as jurisdictions' autonomy in selecting systems. However, *functional compatibility* among systems—i.e., the ability for disparate systems to communicate with each other seamlessly—can be improved.

State policies sometimes constrain hiring, travel, and IT, even when federal funding is available. There are also concerns about sufficient resources being available, such as trained personnel, systems, and equipment, as well as leadership and planning challenges. Data collection and sharing across stakeholders can be informed by a better understanding of the barriers (e.g., barriers to surveillance, barriers to functional compatibility) and ways to address them.

Objective 4: Foster Integrated, Scalable Health Care Delivery Systems

An integrated, scalable health care delivery system represents a cornerstone of national health security. The IP 2012–2014 identified the following vision for this objective: Health care organizations are integrated with community medical, public health, behavioral health, human services, emergency management, public safety, and other systems and able to respond to a rapid, temporary increase in demand. State, local, territorial, and tribal governments promote regional emergency planning alliances and health care coalitions and actively engage those entities in developing ethical processes for the allocation of scarce resources during or after an incident. Planning alliances and health care coalitions engage regularly in exercising, measuring, and reporting their ability to surge during and after incidents. Barriers to health care integration have been identified and solutions are promoted.

Key Findings

- Health care organizations are better integrated into health care coalitions that include community medical, public health, behavioral health, human services, emergency management, public safety, and other partners, with a focus on responding to the need for a rapid, temporary increase in demand.
- Regional planning alliances and health care coalitions have proliferated: In 2011, 94.5% of acute care hospitals responding to a survey reported that they were participating in a health care coalition for emergency planning and response.
- The use of incident response exercises at the health care organization and health care coalition levels has been promoted extensively.
- Many organizations have developed guidance, tools, and templates to strengthen the surge capacity of the health care system; resources have also been developed to help states and localities establish CSC.
- The access and functional needs of at-risk individuals are being incorporated into plans, tools, and resources.
- Since 2009, adoption of EHR systems has increased significantly for hospitals, physicians, and CHCs, but further adoption is needed, and much remains to be done to improve data sharing and interoperability.
- Other challenges to health care delivery system integration include the need to develop measures of surge capacity and to assess the effectiveness of health care coalitions and alliances. Legal issues related to health care system preparedness also continue to create challenges, particularly concerning medical liability issues during incidents.

Findings

Integration of Health Care Delivery Systems and Partners

Several efforts have improved the integration of health care organizations into healthcare coalitions that include community medical, public health, behavioral health, human services, emergency management, public safety, and other partners to respond to a rapid, temporary increase in demand. The alignment of the PHEP and HPP cooperative agreements (described in Chapter II) is strengthening relationships and cooperation among the public health, health care, and emergency management systems. The VA has encouraged community and interagency collaboration by including measures that assess the integration of VA health care networks and hospitals with community public health, emergency management, and public safety systems in

the VA's Emergency Management Capability Assessment Program (EMCAP). DoD also plays a key supportive role in U.S. incidents both by participating actively in the HHS Healthcare and Public Health Coordinating Council and through Defense Support to Civilian Authorities (DSCA). ACF and ASPR developed the HHS Disaster Human Services CONOPS to incorporate lessons learned from past disaster human services missions into HHS emergency operations.

Since 2009, HPP has focused on developing community- and region-based health care coalitions, a critical enabler of effective state, local, territorial, and tribal public health and medical response to an incident. Health care coalitions have proliferated: In a 2011 survey, 451 of 477 acute care hospitals confirmed participation in preparedness coalitions.⁸⁶ Most responding coalitions indicated wide participation of both hospital and other stakeholders, such as public health agencies, EMS providers, and emergency management agencies. The National Healthcare Coalition Questionnaire (HCQ), a survey administered by ASPR to health care coalitions nationwide and that achieved a 94% response rate, found that over 75% of health care coalitions had established lead agencies, diverse memberships, participated in collaborations with other planning entities, and received federal funding.⁸⁷

Use of Exercises

Federal public health and medical initiatives to improve both resilience and readiness at the state, local, tribal, and territorial level are showing improvement through the use of exercises. The partners in the National Medical Disaster System, DHS/FEMA, DOD, VA, and HHS, have coordinated joint exercises for Federal Coordinating Centers through the Federal Coordinating Center Work Group. Efforts to encourage health care organizations and coalitions to exercise their response plans and validate their preparedness have proven successful. Recent full-scale exercises at the federal level have incorporated a whole of community approach and provided an environment to test and validate the full spectrum of a public health and medical response to a natural disaster. The National Level Exercise (NLE) 2011 and the Capstone 2014 exercise are congressionally mandated preparedness exercises designed to educate and prepare communities for incidents. These exercises specifically examined the shared responsibility of government, the private sector, and the general public to respond and recover from a catastrophic earthquake event and focused on the critical elements of all applicable plans and frameworks. The public health and medical focus on these exercises was to examine the ability to provide lifesaving medical treatment via emergency medical services and related operations and to avoid additional disease and injury by providing targeted public health and medical support and products to all people in need within the affected area. Also examined was the ability to restore and improve health and social services networks to promote the resilience, independence, health (including behavioral health), and well-being of the whole community.

Exercises are a key component of numerous federal programs designed to enhance health security at the state, local, tribal, and territorial levels. The HPP National Guidance for Healthcare System Preparedness emphasizes the use of exercises to improve health care response capabilities and highlights coordinated exercise and evaluation activities as a key function of health care coalitions.⁸⁸ PHEP awardees are encouraged to use exercises along with real incidents to test and report on their capabilities. Similarly, exercises are one category of allowable investments under the Homeland Security Grant Program (HSGP) funded by DHS. In addition, CMS has published a proposed rule that would require Medicare- and Medicaid-participating providers and suppliers to establish an emergency plan and conduct drills and exercises to test it.

Resources to Support Surge Capacity

Many organizations have developed guidance, tools, and templates to strengthen the surge capacity of the health care system:

- In 2010, CDC disseminated *Interim Planning Guidance for Preparedness and Response to a Mass Casualty Event Resulting from Terrorist Use of Explosives*⁸⁹ and also updated *In a Moment's Notice: Surge Capacity in Terrorist Bombings*, which provides templates to improve surge capacity for EMS, emergency medicine, intensive care units, and other disciplines.
- DoD and HHS have developed a proof of concept for DoD medical staffing of an HHS-operated Federal Medical Station, as a test to assess whether such a program should continue as a means to enhance surge capacity through Defense Support to Civilian Authorities, in support of ESF #8.
- CDC has been working with stakeholder groups to develop guidance, tools, and templates targeted to health care organizations, public health and emergency management, and other community stakeholders planning for medical surge capacity. Several tools are available at the CDC Healthcare Preparedness webpage (<http://www.cdc.gov/phpr/healthcare/planning.htm>).
- In January 2012, *Healthcare Preparedness Capabilities National Guidance for Healthcare System Preparedness*,⁹⁰ which included a medical surge capability, was released by HHS.
- In December 2013, CMS published proposed preparedness requirements for Medicare- and Medicaid-participating providers and suppliers in an effort to ensure that health care is available during emergencies. The proposed rule calls for providers to conduct risk assessments and use the results to inform the development of their emergency plans.⁹¹

To assess surge capacity, HHS developed a new measure: “percentage of health care coalitions that have a coordinated mechanism established that supports their members’ ability both to deliver appropriate levels of care to all patients (including pre-existing non-disaster related patients [both inpatient and outpatient] and disaster-specific patients), as well as to provide no less than 20% bed availability of staffed members’ beds, within 4 hours of a disaster.”⁹² This measure will support tracking of progress over time, quality improvement, and targeting of technical assistance.

The HCQ, described above, includes some measures of surge capacity, finding that, in 2012, more than 70% of health care coalitions reported operations in place that enhanced medical surge (i.e., testing response systems, assisting surge capacity).⁹³

Resources to Support Crisis Standards of Care at the State and Local Levels

Additional resources have been developed to help states and localities develop CSC. The IOM developed *Guidance for Establishing Crisis Standards of Care (CSC) for Use in Disaster Situations*, which was released 2009.⁹⁴ Two follow-up reports, *Crisis Standards of Care: A Systems Framework for Catastrophic Disaster Response*⁹⁵ and *Crisis Standards of Care: A Toolkit for Indicators and Triggers*,⁹⁶ provide templates to guide state and local planning. These resources help position states to implement a framework for adopting crisis standards of care, such as those recommended by IOM, to allow for surge capacity through ethical altered standards of care during an emergency.

Incorporation of At-Risk Individuals into Emergency Plans

The access and functional needs of at-risk individuals during an incident are being incorporated into plans, tools, and resources. The VA and ASPR are collaborating on a toolkit for integrating homeless populations into disaster planning to promote dissemination of information about the health care needs of individuals experiencing homelessness during incidents. DOJ, DHS, and HHS have coordinated operations regarding Emergency Support Function (ESF) 6 (Mass Care, Emergency Assistance, Housing, and Human Services) and ESF 8 (Public Health and Medical Services Annex) for people with chronic medical needs. CMS, as well as other federal agencies, including the FDA, CDC, and NIH, participate in public-private planning/response partnerships, such as the Kidney Community Emergency Response Coalition (managed by the end-stage renal disease [ESRD] networks).⁹⁷ ASPR is also supporting the development, evaluation, assessment, and procurement of medical countermeasures for at-risk individuals.

Adoption of Electronic Health Record Systems

The adoption of EHRs by hospitals, community health centers (CHCs), and other health care organizations is advantageous during an incident and to enhance routine coordination of care. The Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 authorized incentive payments to eligible professionals and hospitals for the adoption and meaningful use of certified EHR technology.⁹⁸ The American Recovery and Reinvestment Act of 2009 (ARRA) and the Affordable Care Act also incentivized CHCs to adopt and use health IT, especially EHR.⁹⁹

Since 2009, adoption of EHR systems has increased significantly for hospitals, physicians, and CHCs:

- Hospital adoption of basic EHR systems—which include patient history, problem lists, medications, and physician clinical notes, among other features¹⁰⁰—has increased nearly five-fold since 2009. By 2013, nearly six in ten (59%) hospitals had adopted at least a basic EHR system—an increase of 34% from 2012 to 2013. By 2013, over nine in ten (93%) hospitals possessed a certified EHR technology (i.e., meets federal requirements for some or all of the hospital objectives of the CMS EHR Incentive Program), an increase of nearly 30% since 2011.¹⁰¹
- Use of any type of EHR system by office-based physicians increased from 48% in 2009 to 78% in 2013.¹⁰² Adoption of basic EHR systems by office-based physicians increased 21% between 2012 and 2013. In 2013, 48% of office-based physicians reported having a system that met the criteria for a basic system.
- The adoption of patient electronic health records by federally qualified CHCs more than doubled between 2009 and 2013.¹⁰³ Nearly all federally qualified health centers (93%) surveyed in 2013 reported having an EHR system, a 133-percent increase from 2009.

The VA and DoD are modernizing their EHR systems, known, respectively, as VistA and AHLTA. A current goal of the VistA improvements is to develop enhanced clinical capabilities by the end of 2014, while DoD is contracting for development of a new system to replace AHLTA, with a goal of beginning deployment of its new system by the end of FY 2016.¹⁰⁴ Although the agencies plan distinct EHR systems, they share a goal of interoperability.

Persistent Challenges

Many organizations have developed guidance, tools, and templates to strengthen the surge capacity of the national health security system; however, there are still no widely accepted, objective measures of surge capacity. Without such measures, it is difficult to assess surge capacity over time or across different geographic areas or hospital types.

Efforts are needed to ensure that the health care system is capable of addressing the needs of all individuals, including at-risk individuals. Communication strategies must be developed to integrate the access and functional needs of at-risk individuals. During an incident, many people with communication needs may not be able to hear announcements, see signs, understand messages, or verbalize their concerns. Health care coalitions have proliferated, strengthening organizational ties and bringing new sectors into planning and response activities. As a next step, more evidence is needed on whether coalitions (as opposed to other organizational relationships and structures or approaches) are associated with improved outcomes. If so, understanding which characteristics (e.g., organizational structure, composition) are associated with improved outcomes could inform guidance and improve health care system performance and resilience.

Despite the progress in adopting EHR systems, further adoption is needed, and much remains to be done to improve data sharing and interoperability. Comprehensive health information exchange and interoperability are needed to help coordinate both routine and emergency health care. The ability of these systems to function in an integrated fashion when an incident occurs can be improved by building on routine services so that the relationships and processes are in place and well understood when the systems move from baseline operations to crisis response mode. Interoperability issues across levels of government, across federal agencies, and with the private sector remain a challenge. The Trust for America's Health has recommended that the Office of the National Coordinator for Health Information Technology (ONC) work with software developers and public health and health care providers to ensure that information exchange is feasible and accessible while maintaining patient privacy.¹⁰⁵

Legal issues related to health care system preparedness also continue to create challenges, particularly medical liability issues during incidents. These include malpractice, acting beyond the scope of practice, patient abandonment, and privacy invasion and discrimination.¹⁰⁶ While the IOM guidance addresses legal considerations,¹⁰⁷ states need additional tools and resources to support the development and application of crisis standards of care guidelines.

Objective 5: Ensuring Timely and Effective Communications

Timely and effective communications, both with the public and among responders, are essential for coordinating an effective response to incidents. The IP 2012–2014 described the following vision of communication with the public and among responders. Information exchange with the public occurs on an ongoing basis; and accurate, credible, understandable, and actionable information is provided to the public in a timely way. Information is coordinated and consistent across response and recovery organizations, and culturally and linguistically appropriate information is exchanged with all segments of the target population, including at-risk individuals. Secure, sustainable, interoperable, and redundant communications systems and equipment are in place to support a response; and effective coordination and communication occur within and across response and recovery organizations.

Key Findings

- There are several efforts to create new platforms for communication between government and the public during incidents and to consolidate information from various sources.
- Federal agencies are using of social media and mobile applications for communications about threats or incidents.
- Federal agencies have developed communications guidance and tools for state and local public health departments, and the content and timeliness of messages has improved, though progress has not been consistent.
- The Integrated Public Alert and Warning System (IPAWS) now covers most of the United States.
- Public confidence in disaster information and warning plans has increased.
- Many states have developed communication interoperability plans, acting on the Federal Communications Commission (FCC) National Broadband Plan recommendation to develop a nationwide, interoperable public safety mobile broadband network.
- There remain challenges in communication technology and interoperability; and measures to evaluate communication processes and efficacy and to assess resulting behavior change.

Findings

New Ways to Achieve Coordinated Communication with the Public

There are several efforts to create new platforms for two-way communication between government and the public during incidents and to consolidate information from a variety of sources for the benefit of users. The PHE website (phe.gov) compiles and coordinates information related to national health security from a range of federal sources and makes the information available to the public. The public can also ask questions about ongoing incidents. The American Red Cross has also used online message boards during incidents as a forum for sharing and receiving information about suspected disaster victims.¹⁰⁸ FEMA offers emergency preparedness curricula for grades 1–12 to teach children what to do before, during, and after an incident and to foster critical skills such as problem solving, teamwork, creativity, leadership, and communication. CDC is developing a text message service to promote pediatric preparedness and a series of activity books to teach children how to prepare for emergencies.

Multiple Uses of Social Media and Mobile Applications

Many federal agencies are using social media such as Facebook and Twitter for communications concerning threats or incidents:¹⁰⁹

- The Social Media in Emergency Management hashtag (#smem) allows all members of the emergency management community to connect, including state, local, territorial, tribal, and federal emergency managers; technology volunteers; and private sector entities.¹¹⁰
- ASPR funded a competition called “Now Trending: #Health in My Community,” which enables state and local health officials to identify emerging threats using open source data from Twitter: nowtrending.hhs.gov.
- Federal agencies have identified mobile applications available to convey helpful information to the public about incidents. Major categories of applications support personal preparedness, provide reference material, and contribute to situational awareness.¹¹¹
- CDC has a robust, research-based process for monitoring and analyzing social media to inform the development of communications strategies for particular events. This process ensures that risk communication strategies and messages consider major themes, rumors, and inaccurate information in social media conversations.
- CDC has developed a working social media plan covering communication channels including the @CDCEmergency Twitter handle, which has 1.45 million followers; the CDC Emergency Preparedness and Response Facebook page; and the @CDCEmergencia Spanish-language Twitter handle.
- During Hurricane Sandy, CDC tested the use of targeted text messaging to subscribers interested in hurricane information.

Communications Guidance and Training Developed

Federal agencies have developed communications guidance for state and local public health departments. CDC released the *Public Health Preparedness Capabilities: National Standards for State and Local Planning* in 2011.¹¹² The guidance highlights the importance of building and engaging community networks¹¹³ and establishing mechanisms for receiving information from the public both routinely and during emergencies.¹¹⁴ USUHS has developed “just in time” customized information fact sheets that target a range of stakeholders impacted by disaster events. USUHS also provides guidance and training through the publication of textbooks, seminal journal articles, and partnerships with federal and private sector entities in the development and dissemination of textbooks and research articles.

The Crisis and Emergency Risk Communication (CERC) training program educates and trains public information officers, public health responders, health communicators, and health practitioners about crisis and emergency risk communication, including rumor control. These training courses have been delivered across the United States and internationally.

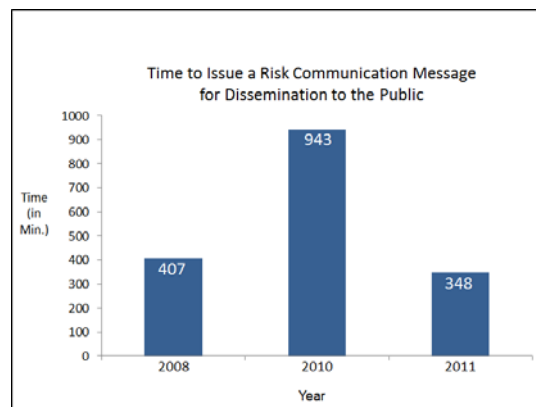
Improved Content and Timeliness of Risk Communication Messages

To improve the content of messaging, FDA has used consumer surveys and social media analyses to evaluate the public’s message reception in near real time. FDA has also launched the Internal Message Testing Network, which uses hundreds of FDA employees to test public risk communication messages rapidly. DoD's Center for Disaster Humanitarian Assistance Medicine

(CDHAM) is developing the Defense Medical Language Initiative, which aims to develop courses for Military Health System providers to enhance their health cultural competency and cross-cultural communication skills.

The speed of risk communication has improved, though progress has not been consistent from year to year (see Exhibit III.5.1). Still, between 2009 and 2011 nearly all PHEP cooperative agreement awardees (97%–98%) could develop a risk communication message for the public during an exercise or incident.¹¹⁵ Federal agencies have also experimented with developing understandable and memorable messages for the public—such as CDC’s 2011 “Zombie Preparedness” campaign¹¹⁶—and are better coordinating message development and dissemination.¹¹⁷

Exhibit III.5.1—Time to Issue a Risk Communication Message for Dissemination to the Public (in Minutes)



Source: GAO analysis of PHEP performance measure data (GAO, *Improvements Needed for Measuring Awardee Performance in Meeting Medical and Public Health Preparedness Goals*, GAO-13-278, March 22, 2013)

High Level of Coverage by Public Warning Systems

IPAWS now covers a large proportion of the United States. As of December 2013, 42 state and territorial emergency response organizations have adopted IPAWS.¹¹⁸ IPAWS enables authorities across multiple levels of government to warn their communities of hazards.¹¹⁹ As part of IPAWS, the FCC and FEMA have collaborated with the wireless industry to develop a system for delivering geographically targeted messages to cell phones. The percentage of the U.S. population that can receive public information and warning from commercial radio broadcast stations (in partnership with FEMA) increased from 67% in 2009 to 84% in 2011.¹²⁰

Community partners—public- and private-sector personnel responsible for national security, public safety, and public welfare during incidents—can gain priority use of telecommunications during incidents and other periods of high use via the Government Emergency Telecommunications Service (GETS) and Wireless Priority Service (WPS) programs.¹²¹ The number of state, local, territorial, tribal, and industry partners using these programs increased dramatically between 2005 and 2011. The system was used effectively during the response to the Boston Marathon bombings. According to the 2014 National Preparedness Report, “in the week following the bombings, the Government Emergency Telecommunications Service routed over 280 calls and had a call completion rate of 99 percent. Emergency responders completed 93 percent of calls made through the Wireless Priority Service.”¹²²

The *National Preparedness Report* notes that “state and urban area confidence in public information and warning plans has increased significantly since 2006.”¹²³ Thirty-one states and territories have established state-level public information procedures that mirror the federal government’s, and an additional 14 states and territories have published public information doctrine.¹²⁴ The 2010 *Nationwide Plan Review* provides some data indicating that “states’ and urban areas’ confidence in the ability of their communications plans to manage a catastrophic event more than doubled since 2006, with 75% of states and 72% of urban areas indicating confidence compared to 30% of states and 29% of urban areas in 2006.”¹²⁵

Better Communications Among Responders

The Emergency Communications Preparedness Center (ECPC), established in 2009, provides a federal interagency point for interoperable communications coordination.¹²⁶ ECPC priorities include improving alignment of emergency communications planning across all levels of government, investing in research and development for better communication technologies, and increasing efficiencies through resource sharing.

The nation is close to realizing a national public safety broadband network. In 2010, the FCC established the Emergency Response Interoperability Center (ERIC) to develop a technical and operational framework that will support nationwide operability and interoperability in wireless broadband communications for first responders.¹²⁷ The FCC released the National Broadband Plan in 2010 to improve public safety and homeland security by allowing first responders to send and receive video and data, to ensure that all Americans can access emergency services, and to improve the way Americans are notified about incidents.¹²⁸ The Middle Class Tax Relief and Job Creation Act of 2012 established a public safety broadband network, creating the First Responders Network Authority (FirstNet) within the Department of Commerce's National Telecommunications and Information Administration.¹²⁹

State Communication Plans and Capabilities

Many states have developed DHS-approved Statewide Communication Interoperability Plans and have participated in workshops to address emergency communications priorities. Most states and territories have also developed State Emergency Communications Plans.¹³⁰ The *National Preparedness Report* noted that 60 “high-risk” urban areas (i.e., high-threat, high-density areas) demonstrated their ability to provide response-level operational communications² within one hour of events involving multiple jurisdictions and agencies.¹³¹ As of April 2013, 90% of high-risk jurisdictions responding to a DHS survey were able to demonstrate the same capability.^{132, 133}

National VOAD has developed and disseminated tabletop exercises to help communities identify gaps in communication and coordination among disaster volunteers and to inform timely and effective communication during an incident.¹³⁴ National VOAD includes 112 member organizations in the U. S., serving in all 50 states, five territories, and the District of Columbia.

Persistent Challenges

There are several challenges to ensuring timely and effective communications. Additional measures and data are needed to evaluate communication processes and efficacy and to assess whether messaging results in actual behavior change. Developing shared definitions of terms such as “accurate” and “actionable” communications among state, local, and federal agencies and other stakeholders can support efforts to evaluate and improve the quality of messaging.

There are also technological challenges. For example, cities and towns with smaller populations typically struggle more than larger ones with implementing modern communication systems and keeping them updated. Furthermore, the autonomy that individual communities

² Response-level emergency communication refers to the capacity of individuals with primary operational leadership responsibility to manage resources and make timely decisions during an incident involving multiple agencies.

have in choosing technology has led to incompatible equipment and small-scale, inefficient markets for equipment and infrastructure. Proprietary technologies have also affected interoperability. Completing national broadband networks for public safety communications by extending them to the geographically most isolated portions of the U.S. population is an ongoing challenge. Technology and policy challenges must be addressed to ensure interoperable information and communications systems and support future progress. Future progress can also be supported through the development of standards, improved coordination among public safety agencies, and an oversight structure to administer a functionally compatible nationwide network.¹³⁵

Objective 6: Promote an Effective Countermeasures Enterprise

Countermeasures are often used to mitigate the effects of an incident. The IP 2012–2014 described the following vision for the discovery, production, distribution, and dispensing of medical countermeasures (MCM). The government collaborates strategically with manufacturers of MCM to ensure manufacturing surge capacity and the ability to produce novel MCM through the use of flexible manufacturing and an expanded product pipeline. There is support for innovation to produce more durable and easy-to-administer MCM. Repositories of MCM and ancillary supplies are adequately stocked and positioned. MCM dispensing policy addresses the full spectrum of dispensing strategies. Relevant multidisciplinary workforces possess expanded capabilities to support rapid, effective, and appropriate MCM dispensing. Improved education, communication, information-sharing, and transparency are used to help all citizens understand and participate in MCM dispensing and administration.

Key Findings

- The HHS PHEMCE has guided coordination among government (civilian and military) entities and the private sector. Several federal initiatives and entities contribute or are poised to contribute to the PHEMCE mission, including the Biomedical Advanced Research and Development Authority's (BARDA) Centers for Innovation in Advanced Development and Manufacturing, the NIH Concept Accelerator Program, FDA's Medical Countermeasures Initiative (MCMi) strategy, the DoD's Medical Countermeasures Advanced Development and Manufacturing capability, and the U.S. Army Medical Research Institute of Infectious Diseases.
- Federal agencies have made substantial investments in MCM advanced research, development, and procurement (e.g., HHS spent \$3.6 billion between FY 2010 and FY 2013).
- Federal investments have contributed to the development of new MCMs, new uses for existing MCMs, and measurable, earlier-stage progress in the development of many potential MCMs.
- MCM coverage is being expanded to better protect children, pregnant women, and other at-risk individuals.
- States and localities have improved their ability to receive, distribute, and dispense MCMs.
- Despite substantial progress, there remain gaps in MCM resources. For example, point-of-care diagnostics are PHEMCE priorities for advanced development but are not currently available for some high threats. The development process for MCMs is long-term, high-risk, and costly. The nation must further ensure that countermeasures are developed to address the needs of at-risk individuals. Operational safety with dispensing operations remains a continued concern.
- Although the PHEMCE has facilitated and strengthened interaction among federal stakeholders and between federal stakeholders and the private sector, nonfederal stakeholders could be better engaged.
- The ability to evaluate progress in promoting an effective countermeasures enterprise is hampered in some areas by insufficient data and measures. Systematic data are needed to evaluate which stockpiling strategies best ensure the availability of MCMs for distribution and dispensing. Measures are also needed to assess progress in education, communication, information-sharing, and transparency.

Findings

MCMs are used to limit the adverse health impacts of incidents. Medical countermeasures include both pharmaceutical interventions (e.g., vaccines, antimicrobials, antidotes, and antitoxins) and MCM non-pharmaceutical interventions (e.g., ventilators, diagnostics, personal protective equipment, and patient decontamination) that may be used to prevent, mitigate, or treat the adverse health effects of an intentional, accidental or naturally occurring public health

emergency.¹³⁶ The discovery and production of pharmaceutical MCMs involves clearly defining civilian needs and impacts on DoD needs, identifying MCM candidates with the potential to match unmet needs, developing candidates into products with the potential to meet regulatory requirements, and securing necessary manufacturing capabilities. The successful distribution and dispensing of MCMs require a range of supporting functions and capabilities, including procurement and stockpiling, response planning and guidance, operational capacity, and monitoring and evaluation for safety and performance.

Many federal agencies contribute to MCM research, development, production, stockpiling, distribution, and dispensing (see Exhibit III.6.1). The PHEMCE coordinates the MCM mission to protect civilian populations from national health security threats. Led by ASPR and comprised of officials from HHS, DoD, DHS, VA, and the U.S. Department of Agriculture (USDA), PHEMCE provides the HHS Secretary with recommendations regarding MCM development, acquisition, and utilization.

The Strategic National Stockpile (SNS) program, managed by CDC, has large quantities of medicines and medical supplies stored in strategic locations around the United States. The SNS also holds unique CBRN (chemical, biological, radiological, and nuclear) MCMs that are not otherwise available commercially but are intended for use in public health emergencies caused by these agents. These assets are intended to supplement state and local public health departments in the event of an incident requiring large numbers of MCMs that causes local supplies to run out.¹³⁷ The PHEMCE SNS Annual Review represents a continuous process for optimizing the contents of the SNS. The review, required by both statute and Presidential Directive, comprehensively examines the SNS formulary each year, including non-pharmaceutical MCMs and ancillary supplies; identifies and prioritizes formulary gaps; and recommends additions or modifications to the contents of the SNS, in alignment with the PHEMCE prioritization framework.¹³⁸ The program also works with CDC's Division of State and Local Readiness to provide technical assistance to ensure that states can request, receive, distribute, and dispense MCMs. A related program, the Cities Readiness Initiative (CRI), provided additional funding and technical

Exhibit III.6.1—PHEMCE Agency Lead Roles

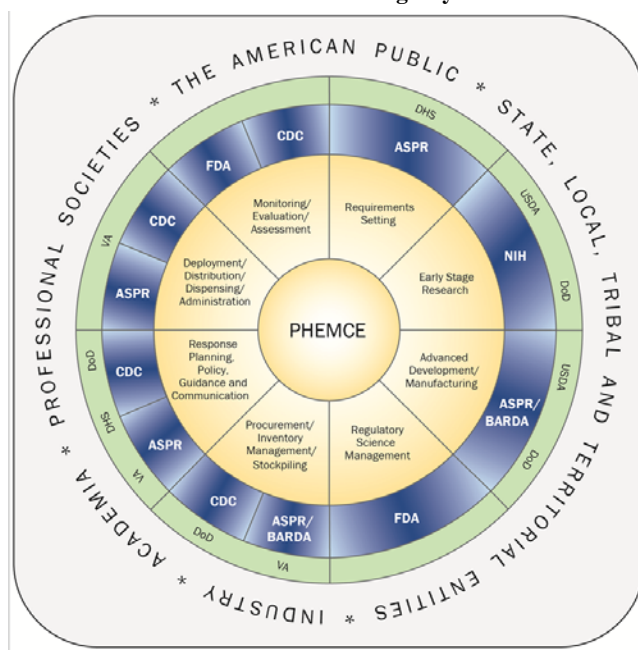


Figure 2: PHEMCE Agency Lead Roles

| | |
|--|---|
| Key | |
| PHEMCE Mission Components | Non-HHS PHEMCE Agencies |
| HHS PHEMCE Agencies | Non-Federal Stakeholders |
| Acronyms | |
| PHEMCE: Public Health Emergency Medical Countermeasures Enterprise | ASPR: Assistant Secretary for Preparedness and Response |
| DHS: Department of Homeland Security | BARDA: Biomedical Advanced Research & Development Authority |
| DoD: Department of Defense | CDC: Centers for Disease Control and Prevention |
| USDA: U.S. Department of Agriculture | FDA: Food and Drug Administration |
| VA: Department of Veterans Affairs | NIH: National Institutes of Health |
| HHS: Department of Health and Human Services | |

Source: U.S. Department of Health and Human Services, 2014 PHEMCE Strategy, 2014. As of November 26, 2014:

<https://www.phe.gov/Preparedness/mcm/phemce/Pages/default.aspx>

assistance to state and local health departments in 72 of the nation's largest metropolitan areas to receive, distribute, and dispense MCMs.

Federal Infrastructure to Support the MCM Enterprise Has Improved

The PHEMCE organization promotes coordination among government entities and between the government and private sector. Several federal initiatives contribute to the PHEMCE mission. The Biomedical Advanced Research and Development Authority (BARDA), DoD, and NIH provide infrastructure capabilities for MCM development. BARDA assists MCM developers with product testing, development, validation, and production.¹³⁹ NIH provides animal model development support, research facilities, manufacturing support, and advice on working with other federal agencies. The NIH's Concept Accelerator Program enables National Institute of Allergy and Infectious Diseases (NIAID) to create and coordinate teams of scientific, medical, and product development experts to guide investigators working on multi-use medical products for biodefense, drug resistance, and emerging diseases.¹⁴⁰ FDA's MCMi strategy enhances regulatory review processes, advances regulatory science, and modernizes regulation and policy tools related to MCMs.¹⁴¹

BARDA is positioned to provide a range of core services to assist MCM developers in various aspects of product testing, development, validation, and production. BARDA has established Centers for Innovation in Advanced Development and Manufacturing (CIADMs) and a Nonclinical Product Development Network to provide core services (e.g., product testing, animal model qualification, assay development) to product developers to ensure that scientific and regulatory requirements for approval and utilization of MCMs can be met.¹⁴²

In partnership with private industry, DoD is constructing the Advanced Manufacturing Center, a 165,000 square-foot facility to enhance MCM manufacturing capacity that will be able to work cooperatively with the BARDA CIADMs. The U.S. Army Medical Research Institute of Infectious Diseases is planning a center for drug discovery to enhance partnerships with industry for discovery of new therapeutic compounds for select agents. A similar program exists at the Walter Reed Army Institute of Research.

Federal Investments in Advanced MCM Research and Development

Federal agencies have invested substantially in advanced research, development, and procurement for MCMs. From FY 2010 through FY 2013, HHS invested \$3.6 billion in advanced research, development, and procurement of MCMs. The largest percentage (30%) was spent on MCMs for influenza, part of the federal response to H1N1 (Exhibit III.6.2).¹⁴³ Roughly 20% each was spent on smallpox and anthrax MCMs. Additional federal funding through NIH supports intramural and extramural basic research on biodefense and early countermeasure research. In addition, HHS and the DoD maximize national preparedness to respond to CBRN threats by aligning available MCM research and development and related infrastructure resources with PHEMCE public health emergency and DoD requirements and priorities.

Federal investments in MCM development have resulted in new MCMs, new uses for existing MCMs, and the development of several entirely new, FDA-approved drugs with biodefense, CBRN, and infectious disease applications.¹⁴⁴ For example, FDA approved an anthrax antitoxin, developed with Project BioShield support, in 2012¹⁴⁵ and a new antitoxin for botulism in 2013. The Project BioShield Act, enacted in 2004, authorizes expedited procurement, streamlined personnel appointments, expedited peer review, biomedical countermeasures procurement, emergency use of medical countermeasures, and other biodefense activities.¹⁴⁶

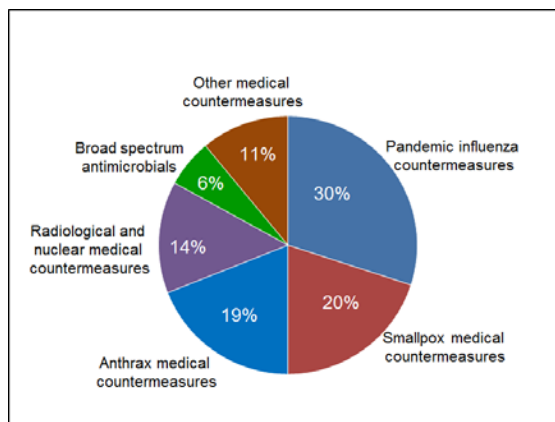
Among vaccines for which BARDA supported the advanced development, FDA approved the first seasonal recombinant influenza vaccine in January 2013 and the first adjuvanted avian influenza H5N1 pandemic influenza vaccine in November 2013. FDA has also approved a next generation portable ventilator and several influenza diagnostic tests.¹⁴⁷ In 2011, HHS contracted with SIGA Technologies, Inc., for late-stage development and acquisition of 1.7 million treatment courses of ST-246, an antiviral for the treatment of individuals with smallpox symptoms.¹⁴⁸ ST-246 demonstrates joint investment and coordination by HHS, DoD, and private industry, resulting in a drug that could be used during a declared emergency under emergency use authorization. FDA has also issued Emergency Use Authorizations (EUA) for diagnostic tests for the avian influenza A (H7N9) virus and Middle East Respiratory Syndrome coronavirus (MERS-CoV). An EUA allows unapproved medical products or unapproved uses of approved medical products to be used in an incident to diagnose, treat, or prevent serious or life-threatening diseases or conditions caused by CBRN threats when there are no adequate, approved, and available alternatives.¹⁴⁹

FDA continues to work with PHEMCE partners to prepare MCMs for potential use under EUA against a diverse array of threats, including smallpox, anthrax, and pandemic influenza.¹⁵⁰

Federal investments have also supported research on new uses of existing products.¹⁵¹ For example, FDA approved an existing drug, levofloxacin, for the treatment and prophylaxis of plague in adults and pediatric patients six months of age and older.¹⁵² FDA also expanded the approval for use of the influenza antiviral oseltamivir to treat children as young as two weeks of age.¹⁵³ In 2013, ASPR announced that FDA approval will be sought to use midazolam, a pre-operative sedative, to treat seizures caused by nerve agents.¹⁵⁴ ASPR also announced procurement of two cytokines (Neupogen and Leukine) to treat neutropenia associated with exposure to ionizing radiation. BARDA will support non-clinical studies for potential to treat acute radiation syndrome (ARS) and expansion of the label indication.

Federal investments have helped support early research and development of many MCM candidates. NIH supported the development of four anthrax antitoxin candidates, two smallpox antiviral candidates, and a smallpox vaccine candidate through Phase I and/or Phase II clinical

Exhibit III.6.2—Percentage of Advanced Research, Development, and Procurement Spending by Medical Countermeasure Type, FY2010 Through FY2013



Source: GAO, *National Preparedness: HHS Is Monitoring the Progress of Its Medical Countermeasure Efforts but Has Not Provided Previously Recommended Spending Estimates*, GAO-14-90, December 2013. As of November 25, 2014: <http://www.gao.gov/assets/660/659949.pdf>

research and transitioned these candidate MCMs to BARDA for further development.^{155,156} As of 2014, NIH is advancing candidate Ebola virus MCMs, including two in clinical trials, and a novel class of antibiotics and a broad-spectrum antiviral agent.¹⁵⁷ DoD is also investing in the development of MCMs. As just one example pertinent globally, DoD has supported the only malaria vaccine under advanced development. PHEMCE established a Pediatric and Obstetric Integrated Program Team in 2011 to assist in identifying and prioritizing MCM development efforts for children and pregnant women.^{158, 159}

MCM Development Priorities

Current PHEMCE MCM holdings and PHEMCE development priorities through FY 2018 are shown in Exhibit III.6.3. Some MCMs that are currently procured remain listed as advanced development priorities because there is interest in additional or improved MCMs in specific categories. In all, BARDA's portfolio of CBRN MCMs includes more than 80 candidate products addressing anthrax, plague, tularemia, melioidosis and glanders, the broader public health concern of antimicrobial resistance, smallpox, biodosimetry and biodiagnostic devices, radionuclides, hematopoietic, skin, lung and gastrointestinal injury from exposure to ionizing radiation, thermal and radiation burns, and chemical agents.¹⁶⁰ DoD has developed other MCMs that are FDA-approved but not procured by HHS, including diagnostics that are part of DoD's Joint Biological Agent Identification and Diagnostic System (JBAIDS). *In vitro* diagnostic kits that are FDA-cleared on JBAIDS include kits for anthrax, tularemia, plague, Q-fever, and H5 avian influenza; an influenza typing kit for pandemic influenza A and B; and an influenza A subtyping kit (seasonal influenza H1 and H3, swine influenza A, and influenza A/H1N1 pandemic). In addition, pre-emergency use authorization packages have been accepted for Ebola and Marburg viruses. DoD also has a vaccine in advanced development for Western, Eastern, and Venezuelan Equine Encephalitis (WEVEE) virus, as well as candidate MCMs in development for filoviruses, glanders, melioidosis, plague, and tularemia.

Exhibit III.6.3—PHEMCE Advanced Development Priorities and Current HHS Holdings (as of 2014)

| Medical Countermeasure Category | Advanced Development Priorities Through FY 2018 (Yes/No) | Current HHS Holdings as of 2014 (Yes/No) |
|---|---|---|
| Anthrax Antitoxin | Yes | Yes |
| Anthrax Vaccine | Yes | Yes |
| Botulism Antitoxin | Yes | Yes |
| Broad Spectrum Antimicrobials | Yes | Yes |
| Cyanide Antidote | Yes | No |
| Diagnostics—Bioassay | Yes | No |
| Diagnostics—Biodosimetry | Yes | No |
| Diagnostics—Biological Agents | Yes | No |
| Diagnostics—Pandemic Influenza | Yes | No |
| Diagnostics—Volatile Nerve Agents | Yes | No |
| Nerve Agent Antidote | Yes | Yes |
| Nuclear Agents—Acute Radiation Syndrome (ARS)—Gastrointestinal (GI), Skin, and/or Lung Therapeutics | Yes | No |
| Nuclear Agents—ARS—Hematopoietic Therapeutics | Yes | Yes |
| Nuclear Agents—Antiemetics | No | Yes |
| Nuclear Agents—Thermal Burn Therapeutics | Yes | Yes |
| Pandemic Influenza Antivirals | Yes | Yes |
| Pandemic and Pre-Pandemic Influenza Vaccine | Yes | Yes |
| Patient (Chemical) Decontamination | Yes | No |
| Radiological Agents—Decorporation/Blocking Agents | Yes | Yes |
| Respiratory Protective Devices | Yes | Yes |
| Smallpox Antivirals | Yes | Yes |
| Smallpox Vaccine | Yes | Yes |
| Ventilators | Yes | Yes |
| Viral Hemorrhagic Fever Antivirals | Yes | No |
| Viral Hemorrhagic Fever Vaccine | Yes | No |

Source: U.S. Department of Health and Human Services, 2014 Public Health Emergency Medical Countermeasures Enterprise (PHEMCE) Implementation Plan, 2014.

Improvements in State and Local Capacity to Receive, Distribute, and Dispense MCMs

Increasing the number and availability of MCMs to address various threats requires significant efforts to dispense and administer these products. DHS and HHS have worked with partners to identify the range of individuals whose actions may be critical to MCM delivery, preserving infrastructure and continuity, and protecting the health and safety of others during or after an incident.

The legacy Technical Assistance Review (TAR), developed by CDC for the SNS and CRI programs, was used during the period covered by this review to evaluate the abilities of states and localities to receive, distribute, and dispense MCMs. The TAR assessed capacities in 12 functional areas for metropolitan areas³ and 13 functional areas for states, as shown in Exhibit III.6.4. According to TAR data, states and localities improved their abilities to receive, distribute, and dispense MCMs since 2009–2010. As Exhibit III.6.5 shows, the national median for state TAR scores was 98 (out of 100) in 2011–2012, up from 95 in 2009–2010. (A score of 89 or higher indicated that a state performed in an acceptable range). The table shows similar improvement for metropolitan statistical areas (MSAs) and directly funded localities. Scores for insular areas, though consistently lower, also showed improvement (from 61 in 2009–2010 to 67 in 2011–2012). During the 2009 H1N1 response, this progress was demonstrated in the delivery of antivirals and respirators from the SNS and delivery and dispensing of H1N1 vaccine.¹⁶¹

CDC is currently implementing a new method of reviewing state and local MCM operational readiness through the use of the Operational Readiness Review (ORR), which replaces the legacy TAR assessment tool.¹⁶²

Exhibit III.6.4—TAR Functional Areas for States

- Developing an SNS plan
- Management of SNS/command and control
- Requesting SNS
- Tactical communications
- Public information and communication
- Security
- Receipt, store, and stage (RSS)
- Controlling inventory
- Repackaging (state only)
- Distribution
- Dispensing
- Hospitals/alternate care facilities coordination
- Training, exercise, and evaluation.

Exhibit III.6.5—TAR Scores, 2009–2010 to 2011–2013

| Score (out of 100) | 2009–2010 | 2010–2011 | 2011–2012 |
|---|-----------|-----------|-----------|
| Median State TAR Score | 95 | 97 | 98 |
| Median MSA Score | 88 | 91 | 93 |
| Median Directly Funded Locality TAR Score | 97 | 96 | 100 |
| Median Insular Area TAR Score | 61 | 62 | 67 |

Source: CDC, *Public Health Preparedness: 2013–2014 National Snapshots*, 2013. As of November 25, 2014: http://www.cdc.gov/phpr/pubs-links/2013/documents/2013_Preparedness_Report.pdf

³ As defined by metropolitan statistical areas (MSAs).

Addressing MCM Needs for All Sectors of the American Civilian Population

PHEMCE has made significant gains in addressing the needs of at-risk individuals in advanced development and manufacturing, regulatory science management, procurement and stockpiling, and distribution and dispensing. At-risk individuals, who make up a significant proportion of the American civilian population at any given time, may have diverse and unique vulnerabilities and MCM needs. At-risk individuals, such as children, pregnant women, older adults, and those with underlying medical conditions, potentially have differences in susceptibility to CBRN agents and/or altered disease severity following exposure. In many cases, the first-line treatments for CBRN agents have not been tested or are not recommended for use with at-risk individuals. The PHEMCE Pediatric and Obstetric Integrated Program Team is working to specifically address the MCM needs of pediatric populations.

Persistent Challenges

Even with substantial progress, there remain gaps in available MCM resources. For example, point-of-care diagnostic tools are PHEMCE priorities for advanced development but are not currently available for some high priority threats. Important gaps exist in the scientific knowledge regarding the use of MCMs in at-risk individuals.¹⁶³

There are also several challenges to progress in developing MCMs. The development process for MCMs is long-term, high-risk, and costly, much like the development of drugs, vaccines, biologics, and diagnostics for other medical uses. Engaging large pharmaceutical companies and improving the capacity of smaller ones—the entities that sponsor, perform, and analyze clinical research for most new biomedical products—remain challenging for both scientific and financial reasons.¹⁶⁴

To support future progress, public health and emergency management professionals at all levels of government must consider the full range of countermeasures options available and determine where the most effective and sustainable investments can be made. The nation must further ensure that countermeasures are developed to address the needs of all segments of the population, including the access and functional needs of at-risk individuals. Effective implementation of non-pharmaceutical interventions (NPIs) requires planning and preparation to identify effective interventions, the situations in which they should be deployed, and methods for monitoring their effects.

PHEMCE has facilitated and strengthened interaction among federal stakeholders and between federal stakeholders and the private sector, although nonfederal stakeholders could be better engaged. Moving forward, additional efforts are needed to facilitate the engagement of the full range of essential nonfederal stakeholders.

According to a 2011 IOM report on repositioning antibiotics, operational safety with dispensing operations remains a continued concern, including personal safety at overcrowded PODs and postal worker safety for postal dispensing options.¹⁶⁵ The report also identified public adherence to MCM regimen, transportation, and site selection as challenges facing MCM dispensing planning and implementation.¹⁶⁶

An additional challenge lies in addressing the needs of populations speaking diverse languages and persons with cognitive and physical limitations. Some persons may not trust public messages about MCMs or believe in their efficacy.¹⁶⁷ These issues are being addressed by the new requirements under the Pandemic and All-Hazards Preparedness Reauthorization Act (PAHPRA), Public Law No. 113-5, and by the 2013 HHS Language Access Plan.

The ability to evaluate progress in promoting an effective countermeasures enterprise is hampered in some areas by insufficient data and measures. TAR data have been useful in measuring jurisdictions' capacity, but there are generally fewer data to evaluate operational capability (i.e., the use of capacities to engage in response activities). Systematic information is needed to evaluate which stockpiling strategies best ensure the availability of MCMs for distribution and dispensing to the public. Measures are needed to assess progress in education, communication, information-sharing, and transparency to help citizens understand and participate in community-governed MCM dispensing and administration.

Objective 7: Ensure Prevention or Mitigation of Environmental and Other Emerging Threats to Health

Preventing or mitigating environmental and other emerging threats is critical to national health security. The increasing mobility and density of human populations increase the odds of disease spread by bringing more people in contact with new environments and with each other. The IP 2012–2014 identified four key elements of this objective: (1) enhanced use of risk analysis research to improve understanding and anticipation of threats, (2) enhanced ability to detect and report threats early and to characterize them fully, (3) improved mechanisms to prevent and mitigate threats, and (4) improved ability to respond to and recover effectively and efficiently from incidents.

Key Findings

- Surveillance, laboratory, and risk assessment capabilities have advanced, creating opportunities for faster, more accurate detection and diagnosis of environmental hazards and infectious diseases as well as more informed planning for risk management activities; however, data are limited to determine whether increased capabilities have resulted in quicker detection and response.
- Multiple efforts—legislative, regulatory, and technological—have been made to improve food safety in the United States, decrease antimicrobial resistance, and control and mitigate zoonoses.
- Federal agencies have supported research to understand environmental and other emerging threats and their adverse impacts on health.
- Efforts to improve food safety notwithstanding, it appears that foodborne infections have not declined.
- Challenges to evaluating progress for this objective include the uneven coverage of available surveillance data, the variety of data sources. Data are needed to determine whether progress had been made in monitoring and tracking of long-term health effects; building capacity and capabilities of certain monitoring and laboratory systems; and achieving uniform progress in environmental and health indicators across the entire nation and for all population groups.
- The data challenge is exacerbated by workforce shortages in surveillance-related professions, including public health nurses, epidemiologists, laboratory workers, and health informatics and environmental health professionals.

Findings

Surveillance, Laboratory, and Risk Assessment Capabilities

Surveillance, laboratory, and risk assessment capabilities have advanced, creating opportunities for faster, more accurate detection and diagnosis of environmental hazards and infectious diseases, as well as more informed planning for risk management activities. However, data are limited to determine whether increased capabilities have resulted in quicker detection and response.

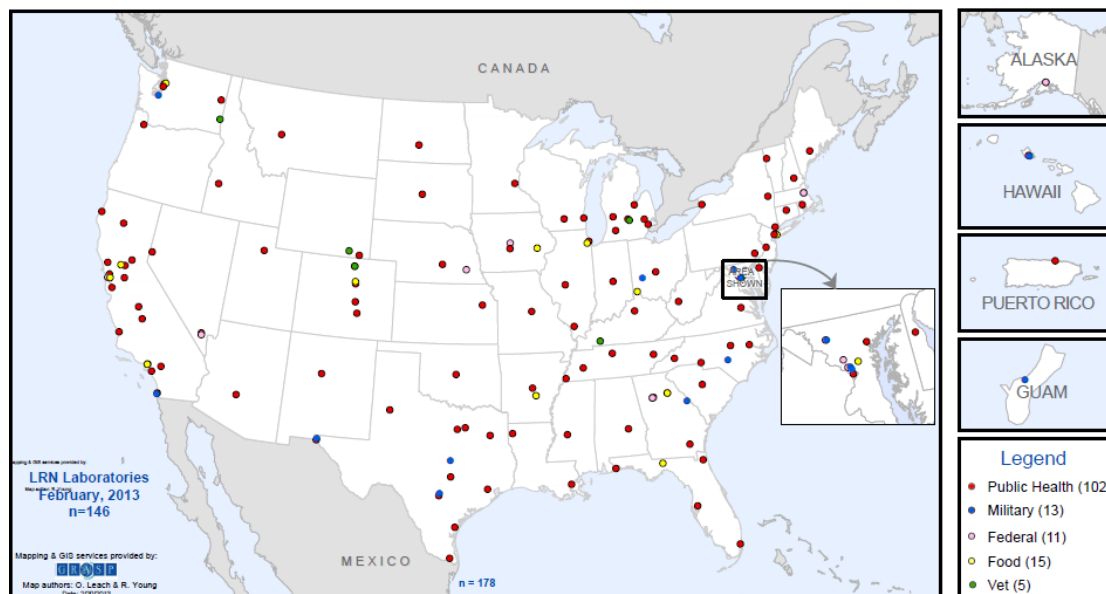
Surveillance. From 2007 to 2010, the number of states with fully operational electronic surveillance systems for general communicable diseases increased from 40 to 47, the number with integrated systems increased from 23 to 34, and the number reporting outbreak management capabilities increased from 8 to 22.¹⁶⁸ However, states vary in the characteristics and quality of their respective surveillance systems, presenting a challenge to national progress.¹⁶⁹ (More information on surveillance is discussed under Strategic Objective 3, Situational Awareness.)

Federal surveillance systems—such as the DHS BioWatch program¹⁷⁰ and the CDC BioSense program—are being used more often.¹⁷¹ The number of outpatient and emergency department patient visits under surveillance in the BioSense program has increased, indicating that the number of participating sites is growing. During the same period, the response (e.g., public health investigation or intervention) time following an alert has fallen slightly.¹⁷² DoD initiated research and development of the Biosurveillance Ecosystem, an innovative system that seeks to accelerate the ability to detect, identify, and respond to emerging infectious diseases.¹⁷³ DoD's Force Readiness and Health Assurance office is in the process of developing the Individual Longitudinal Exposure Records program, where virtual records will be part of the Electronic Health Record documenting service members' exposure information and ambient environmental monitoring data where service occurred. Thus far, the DoD/VA Data Transfer Agreement is complete.

Laboratories. Exhibit III.7.2 lists all members of the DHS-sponsored Integrated Consortium of Laboratory Networks. The goal of this consortium is to create “a system of laboratory networks capable of integrated and coordinated response to and consequence management of acts of terrorism and other major incidents requiring laboratory response capabilities.”¹⁷⁴ State, local, federal, and international laboratories in CDC's Laboratory Response Network (LRN) have increased their capabilities for timely and accurate detection, quantification, confirmation, and communication of high-priority biological and chemical agents (Exhibit III.7.1).¹⁷⁵ Between 2009 and 2011, more than 90% of LRN laboratories passed proficiency testing in identifying biological agents. The most advanced LRN laboratories cut processing time from 12 minutes to 5 minutes per sample. Moreover, sophisticated LRN chemical labs have increased the number of methods for detecting chemical agents, growing from 6.7 methods per lab in 2009 to almost 9 in 2010. In addition, CDC developed and maintains rapid and accurate laboratory methods to detect substances, including 150 chemical threat agents, priority radionuclides, anthrax, botulism, and ricin. These methods help identify exposed people and guide medical treatment in the event of a chemical, radiological, or biological threat incident.

Progress in laboratory capabilities has also been demonstrated by the Environmental Response Laboratory Network (ERLN), EPA's national network of laboratories dedicated solely to testing environmental samples. The ERLN maintains mobile chemical warfare agent laboratories. In 2009 the network initiated a Phase Two rollout, adding additional public and private sector laboratories. EPA also reports the development of a method—rapid viability polymerase chain reaction (RV-PCR)—for detecting and identifying *Bacillus anthracis* spores (anthrax) in environmental samples. CDC has emphasized the importance of developing human expertise to sustain and enhance public health surveillance, including the need to clarify or redefine surveillance workforce needs, roles, and disciplines.¹⁷⁶ Public health workforce shortages exist for many disciplines that perform surveillance functions, including public health nurses, epidemiologists, laboratory workers, and health informatics and environmental health professionals.¹⁷⁷

Exhibit III.7.1—Coverage of the Laboratory Response Network in the United States



Source: CDC, “Map of Coverage of the Laboratory Response Network in the United States,” February 2013. As of November 24, 2014: <http://www.bt.cdc.gov/lrn/usmap.asp>

Risk assessments. All levels of government increasingly use risk analyses to inform planning. States are required to conduct threat and hazard identification and risk assessments as a condition for receiving most preparedness grant funding and to set hazard-based targets as the context for their State Preparedness Report capability assessments.¹⁷⁸ States are integrating a wide range of relevant agencies into their risk assessment processes. The 2014 NPR indicates that on average, participants involved over 45 government agencies in the Threat and Hazard Identification and Risk Assessment efforts.¹⁷⁹ State and local health departments must perform jurisdictional risk assessments to identify capability gaps as a requirement of the PHEP cooperative agreement with CDC.¹⁸⁰

Federal agencies have also incorporated risk analyses into decision-making for a variety of purposes (e.g., grading critical infrastructure, informing eligibility for preparedness assistance, prioritizing health and safety risks):

- The National Center for Medical Intelligence does international risk assessments and develops predictions on environmental and other emerging threats that affect international and DOD health security.
- Several DoD organizations perform risk and threat assessments using environmental sampling information stored on the Defense Occupational and Environmental Health Readiness System (DOEHRS). DHS’s 2011 *Strategic National Risk Assessment* (SNRA) identified the types of incidents that pose the greatest threat to the nation’s homeland security.¹⁸¹
- DHS has improved understanding of risks associated with the illicit use of biological

Exhibit III.7.2—Participating Networks in the ICLN

- CDC Laboratory Response Network (LRN)
- USDA National Animal Health Laboratory Network (NAHLN)
- National Plant Diagnostic Network (NPDN)
- USDA/FDA Food Emergency Response Network (FERN)
- EPA Environmental Response Laboratory Network (ERLN)
- DoD Laboratory Network (DLN)

agents via the Bioterrorism Risk Assessment (BTRA). Developed in coordination with federal partners, the BTRA integrates information from the intelligence, scientific, and public health communities to help inform prevention, mitigation, response, and recovery activities.

Federal agencies are increasingly participating in and coordinating terrorism risk assessments. DHS develops all its risk assessment products—including the BTRA, Chemical Terrorism Risk Assessment, Radiological/Nuclear Risk Assessment, and Integrated CBRN Terrorism Risk Assessment—through the use of interagency working groups. In addition, DHS and HHS have agreed to develop Material Threat Assessments and Terrorism Risk Assessments jointly. BARDA and DHS S&T have agreed to cooperate in the modeling of biological terrorism incidents.

Improving Food Safety, Decreasing Antimicrobial Resistance, Addressing Zoonoses

Efforts have been made to improve food safety in the United States, decrease antimicrobial resistance, and control and mitigate zoonoses, both through legislative and regulatory actions and through technological advancements. In 2012, FDA recommended phasing out production uses (such as growth promotion and feed efficiency) of certain antibiotics in food-producing animals and bringing under veterinary oversight the remaining therapeutic uses of such drugs in the feed and water of food-producing animals.¹⁸² The FDA Safety and Innovation Act of 2012 includes incentives for pharmaceutical companies to develop antimicrobial drugs. In 2009 Walter Reed Army Institute of Research (WRAIR) and US Army MEDCOM established the Multidrug-Resistant Organism Repository & Surveillance Network (MRSN). Through phased implementation the program is expanding to cover the entire Army and eventually all three services.

The release of an Executive Order and National Strategy on Combating Antibiotic-Resistant Bacteria by the White House in 2014 identifies combating the rise of antibiotic resistance as a top national security and public health priority.¹⁸³¹⁸⁴ The strategy outlines priorities and coordinates investments to prevent, detect, and control outbreaks of resistant pathogens recognized by CDC as urgent or serious threats. Next steps include the development of a National Action Plan for Combating Antibiotic-Resistant Bacteria, co-chaired by HHS, USDA, and DoD, to detail specific steps that agencies are taking or will take to implement the strategy. In addition, the NIH and BARDA are co-sponsoring a \$20 million award to facilitate the development of rapid, point-of-care diagnostic tests for health care providers to identify highly resistant bacterial infections¹⁸⁵.

The capabilities of food surveillance systems to detect harmful contaminants have increased through use of tools such as the USDA/FDA Food Emergency Response Network (FERN), a nationwide network that integrates federal and state food testing laboratories (see Exhibit III.7.2).¹⁸⁶ Laboratory surge capacity in the event of terrorist attack on the food supply increased to achieve target goals of 2,500 radiological and 2,100 chemical samples per week.¹⁸⁷ Other key tools for detecting foodborne disease are PulseNet and FoodNet (Foodborne Diseases Active Surveillance Network).

The U.S. Food Safety Working Group (FSWG) has several efforts underway to improve food safety.¹⁸⁸

- Reduce pathogens in food through new rules intended to control *Salmonella Enteritidis*, *Campylobacter*, *Escherichia coli O157:H7*, and *Listeria monocytogenes* contamination

- Improve surveillance systems and reporting registries
- Increase domestic and international collaborations to improve the safety of food imports
- Establish a coordinated incident command system between the HHS and USDA to facilitate communication during foodborne illness outbreaks and aid decision-making (completed in 2010)
- Develop new forms of communication to alert and inform the public (e.g., mobile applications, and the foodsafety.gov website).

CDC and FDA supported the formation of the Council to Improve Foodborne Outbreak Response (CIFOR),¹⁸⁹ which developed guidelines and a toolkit to facilitate collaboration and quality improvement at the state and local levels. The guidelines and toolkit are improving foodborne disease response capabilities.¹⁹⁰

Trends in Foodborne Illness

Different data are used to estimate the presence of pathogens in the food supply and the foodborne illnesses they cause. USDA’s Food Safety and Inspection Service performs safety inspections at over 6,000 establishments nationwide and publishes quarterly reports on the presence of pathogens such as salmonella and campylobacter in tested raw meat and poultry samples.¹⁹¹ CDC’s FoodNet relies on diagnoses of foodborne illness confirmed in clinical laboratories; it does not capture data on foodborne pathogens that are not identified in clinical laboratories, such as norovirus.¹⁹²

Efforts to improve food safety notwithstanding, it appears that foodborne infections have not declined. Compared with 2010–2012, the 2013 incidence was significantly lower for *Salmonella* (9% decrease), higher for *Vibrio* (32% increase), and not significantly changed for *Campylobacter*, laboratory-confirmed *Listeria*, Shiga toxin-producing *Escherichia coli* (STEC) O157, and *Yersinia* infections¹⁹³ (see entries in the third column of Exhibit III.7.3).

Exhibit III.7.3—Rate of Foodborne Infections for Key Disease Agents, 2013 Progress Report

| Disease Agent | Percentage Change in 2013 compared with 2010-2012 | 2013 Rate per 100,000 Population | 2020 Target Rate Per 100,000 Population |
|------------------------------|---|----------------------------------|---|
| <i>Campylobacter</i> | No change | 13.8 | 8.5 |
| <i>Escherichia coli</i> 0157 | No change | 1.15 | 0.6 |
| <i>Listeria</i> | No change | 0.26 | 0.2 |
| <i>Salmonella</i> | 9% decrease | 15.19 | 11.4 |
| <i>Vibrio</i> | 32% increase | 0.51 | 0.2 |
| <i>Yersinia</i> | No change | 0.36 | 0.3 |

Source: Crim et al., “Incidence and Trends of Infection with Pathogens Transmitted Commonly Through Food—Foodborne Diseases Active Surveillance Network, 10 U.S. Sites, 2006–2013,” *Morbidity and Mortality Weekly Report*, Vol. 63, No.15, April 18, 2014, pp. 328–332. As of November 25, 2014:
http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6315a3.htm?s_cid=mm6315a3_w

Research to Characterize Environmental and Other Emerging Threats

Research to understand the environmental and other emerging threats to public health has been conducted by different agencies and used to aid in decision-making. Two-thirds of non-classified national health security-related research focused on biological threats, including bioterrorism, foodborne illness, and pandemic influenza.¹⁹⁴ Forty-one percent of funded projects were related to understanding environmental and other emerging threats.

NIH¹⁹⁵ and FDA¹⁹⁶ have described improved methods and tools for dose-response evaluations and measurement of human exposure to contaminants, including development of environmental sampling methods, animal models, personal sensors, and biomarkers. CDC¹⁹⁷ and the Agency for Toxic Substances and Disease Registry (CDC/ATSDR)¹⁹⁸ report progress in understanding relationships between exposure to hazardous substances and adverse health effects and in measuring environmental chemicals in human blood and urine.

Persistent Challenges

Challenges to evaluating progress for this objective include the uneven coverage of available surveillance data and the variety of data sources. Data limitations hamper the evaluation of progress in key areas. Data are needed to determine whether progress had been made in monitoring and tracking of long-term health effects, building capacity and capabilities of certain monitoring and laboratory systems, and achieving uniform progress in environmental and health indicators across the entire nation and for all population groups.

The data challenge is exacerbated by workforce shortages in surveillance-related professions, including public health nurses, epidemiologists, laboratory workers, and health informatics and environmental health professionals. To support future progress, the nation needs to improve surveillance systems, coordination of laboratory systems, and data-sharing with respect to all hazards. Attention is also needed to ensure that sufficient numbers of trained workers and volunteers with appropriate qualifications and competencies are available in surveillance-related professions.

GAO has indicated that recovery receives less attention in research and practice than do other phases of national health security, making it difficult to characterize the impact of environmental threats on health outcomes.¹⁹⁹ Long-term recovery may be especially difficult to track as there are currently few tools available for collecting the baseline data needed for subsequently linking health outcomes that might not occur until years later.

Objective 8: Incorporate Post-Incident Health Recovery into Planning and Response

In the aftermath of a large-scale incident and initial response efforts, the recovery of affected individuals, families, and communities is critical. The IP 2012–2014 identified a vision for this objective that includes the following: promotion of recovery planning, assessment, education, partnerships, and scientific preparedness (e.g., developing empirically based recovery approaches); coordinated access to health care, behavioral health care, and human services recovery resources after an incident; and evaluation of health care, behavioral health, and human services recovery efforts, both to ensure that needs are met and to identify lessons learned.

Key Findings

- Federal agencies have incorporated recovery into national policy and doctrine, including the National Disaster Recovery Framework and the PHEP and HPP capabilities.
- Federal agencies have expanded their capacity to provide technical assistance to state and local jurisdictions and human service partners in the recovery planning process and during incidents that require long-term health and social services recovery coordination.
- Federal and nonfederal stakeholders are collaborating to improve the use of evaluation results and the documentation of lessons learned about recovery.
- Humanitarian agencies such as the American Red Cross continue to play an essential role in recovery efforts and serve as a means of channeling public support.
- Many relationships between governmental and nongovernmental organizations and individuals have been developed to support and facilitate recovery.
- Although recent initiatives have aimed to improve recovery assessment, additional measures and data are needed to assess progress in incorporating recovery planning into emergency planning and response.
- Challenges to incorporating post-incident health recovery into planning and response include limited understanding of the resources, services, and staff types that are required as the focus of responders shifts from response to recovery activities and the importance of initiating recovery activities when response begins; lack of dedicated staff to support recovery capacity building; and the lack of shared strategies to guide disaster recovery planning partnerships with nontraditional disaster partners (e.g., child care providers). In addition, lessons learned from recovery need to be documented in a more systematic manner.

Findings

Recovery Incorporated into Key Federal Policies

Federal agencies have incorporated recovery considerations into national policy and doctrine:

- Recovery operations were described in the *Federal Response Plan* (1999), the *National Response Plan* (2004), and the *National Response Framework* (2008).
- The NDRF (2011)²⁰⁰ advanced the national approach to long-term recovery by identifying the full range of recovery partners. The NDRF promotes collaboration and coordination²⁰¹ and articulates key recovery concepts, principles, and capabilities.
- Under the PPD-8 federal interagency operational plans (FIOP) have been developed for each mission area. The FIOP for recovery includes a description of critical tasks and responsibilities and other information to operationalize the NDRF.²⁰²

- The NPG includes a recovery mission area and four recovery-focused core capabilities: economic recovery, health and social services, housing, and natural and cultural resources.²⁰³ The NPG also includes one response/recovery-focused capability: infrastructure systems. Recovery also includes two of the cross-cutting core capabilities, (i.e., operational coordination and planning).
- Both the PHEP and HPP cooperative agreements include recovery-related capabilities (Community Recovery in PHEP and Healthcare System Recovery in HPP).²⁰⁴

Technical Assistance Capacity to Support States and Localities

ASPR provides technical assistance to state and local jurisdictions in the recovery planning process and during incidents that require long-term health and social services recovery coordination. ASPR has partnered with the National Institute of Environmental Health Science Worker Education and Training Program to deploy environmental health recovery resources in support of both the Deepwater Horizon and Hurricane Sandy recovery efforts.

ACF has expanded its capabilities to provide technical assistance in recovery to human service partners (e.g., child care, Head Start, foster care, domestic violence shelters, and child support enforcement). ACF has offered this assistance during several incidents, including the 2011 Joplin, Missouri, tornado, Hurricane Isaac, and Hurricane Sandy.

Following Hurricane Sandy, HHS's Administration for Community Living (ACL) worked through the Aging Networks in New York, New Jersey, and Connecticut to support the recovery of the elderly in their homes and to educate partners on post-incident recovery and preparedness. ACL also facilitated the development of after-action reports with the State Units on Aging and other elderly network partners and is currently working with the New York City Senior Center Association to develop a post-incident volunteer program.

Programs to Support Post-Incident Behavioral Health Recovery

States have deployed the Substance Abuse and Mental Health Services Administration (SAMHSA)/FEMA Crisis Counseling Program in multiple incidents to help address behavioral health care recovery needs. HRSA gathers key information through the Health Professional Shortage Area (HPSA) data collection program, which enables SAMHSA both to predict how much assistance would be needed following an incident and to connect state-level partners proactively.

The post-incident treatment needs of substance abusers are receiving increased attention. Following Hurricane Katrina, SAMHSA worked with providers to use electronic medical records (EMR) to enable "guest dosing" and "certified home dosing" for individuals receiving methadone treatment. Disaster medicine curriculum guidelines now focus on addressing the behavioral health needs of patients requiring methadone treatment.²⁰⁵ In addition, USUHS conducts conferences and work group activities on critical areas relevant to stakeholders involved in wide range of issues in disaster behavioral health. A work group on stigmas and barriers to care led to development of a set of recommendations in the areas of education, training, leadership, and research that will help overcome the stigma and barriers to care for populations exposed to war, disaster, and terrorism to support the Forum on Health and National Security.

In September 2013, NIMH released a funding opportunity announcement for disaster research. This initiative aimed to facilitate cooperation among disaster response agencies and researchers, and to determine whether bringing evidence-based interventions into existing mental health response and recovery services would result in better mental health outcomes for the broader community and improve care for those with pre-existing mental illness. The initiative employed a flexible funding mechanism to allow for pre-planning (in advance of large-scale emergencies) between researchers and disaster response providers to develop rigorous research evaluations.²⁰⁶ Although no grants were awarded in response to this specific funding opportunity, researchers are pursuing other grant mechanisms to partner with response agencies on related research projects focused on improving disaster mental health services.

Improving Documentation and Developing Lessons Learned

Since 2009, HHS has begun several activities to improve the use of evaluation results and the documentation of lessons learned:

- ACF developed guidelines that describe how emergency management, human services, and public health professionals can best support children's needs during and after an incident.²⁰⁷
- ACF and ASPR collaborated on the HHS Disaster Human Services CONOPS, which is designed to incorporate lessons learned from past disaster human services missions into HHS emergency operations, including recovery missions.
- Independently, ACF developed an evidence-based assessment tool for the Disaster Case Management Program to assess vulnerabilities, capabilities, and unmet needs after an incident.²⁰⁸
- In 2012, ACF used lessons from its 2011 Disaster Case Management missions to develop a new Concept of Operations to support future recoveries.
- ACF has also begun working with ASPR and FEMA Individual Assistance and Public Assistance to identify the best ways to facilitate data sharing among social service recovery programs.

Other federal agencies are also compiling lessons learned:

- In 2011, SAMHSA shared lessons from states on best practices to support preparedness for recovery, both through a webinar series in 2012 and online.
- After Hurricane Sandy, ACL, in partnership with ASPR, collaborated with the Senior Services of Eastern Virginia (Virginia Beach Area) to conduct a national webinar using best practices to inform the Aging Network about storms and disasters.
- CDC has developed a tool to help PHEP awardees document key community recovery activities and outcomes. The data will help focus technical assistance and identify promising recovery practices.
- Since 2012, DoD departments and agencies have participated in the Joint Lesson Learned Program (JLLP), which spans the full spectrum of joint operations and collects global, strategic, and operational observations from exercises and real-world events.

The University of North Carolina, Columbia University, RAND, IOM, the National Academy of Sciences, and ASPR are collaborating to analyze health care and social service recovery in disasters, such as Hurricane Sandy²⁰⁹; to track progress forward; and to develop tools such as checklists to support pre-disaster recovery planning. NACCHO, ASTHO, and ASPR are collaborating to engage state and local health partners in sharing best practices.

Humanitarian Organizations Play Essential Roles in Recovery Efforts

Humanitarian organizations continue to play a key role in recovery efforts and serve as a means of channeling public support. American Red Cross recovery services include assisting disaster-affected households in bridging the gap between what they can accomplish on their own and what is necessary to allow them to move through government-funded recovery programs; assisting and supporting community leaders, government, and relief agencies to organize and execute an effective recovery strategy; providing value to partner agencies and being supportive of their efforts on behalf of disaster-affected families; and ensuring that American Red Cross assistance aligns with and complements governmental disaster relief programs. Following Hurricane Sandy, the American Red Cross received \$309 million in donations to support emergency response and long-term recovery services and had spent or committed \$287 million by the end of 2013 (see Exhibit III.8.1).

National VOAD, a member organization composed of humanitarian and nongovernmental organizations, established a Long-Term Recovery Groups Committee to build capacity among these organizations for post-incident health recovery. In 2012, National VOAD published a Long Term Recovery Guide to assist member units in accessing recovery resources.²¹⁰

Relationships Are Being Developed to Support and Facilitate Recovery

Following Hurricane Sandy in October 2012, federal partners including FEMA, the U.S. Army Corps of Engineers, and ASPR built and reinforced relationships to support and facilitate recovery. EPA and ASPR developed principles of “sustainable communities” and “environmental justice” to support improved access to health care and social services following a disaster.

Federal agencies are also partnering with organizations outside the federal government. For example, state health care associations (e.g., Hospital Association of New York State, Greater Hospital Association of New York, Primary Care Development Corporation, and Community Health Center Association of New York State) are working with ASPR to advance integration with emergency management recovery programs following incidents. HRSA and the National Association of Community Health Centers are working to integrate community health centers into pre-/post-disaster recovery planning.

Exhibit III.8.1—Response and Recovery Activities Provided by the American Red Cross after Hurricane Sandy

- Provided 74,000 overnight stays in shelters along the North Atlantic coast
- Distributed 7 million relief items and 17 million meals and snacks
- Provided 113,000 emotional support and health contacts
- Continued ongoing recovery programs, which provide case management services to address people’s recovery needs
- Issued nearly \$20 million to nearly 3,500 households through the Red Cross Move-In Assistance Program (as of Jan. 2014)
- Provided disaster preparedness services to help storm-affected communities work together in preparation for future incidents
- Awarded more than \$78 million in grant support to non-profit organizations for mold remediation, housing repair and rebuilding, issuing direct financial assistance, and providing health and mental health services

Research and Measure Development

There are currently only a few measures related to recovery. Two measures focus on nursing homes (existence of emergency plan and staff training in emergency procedures); two others focus on shortages of primary care providers and behavioral health professionals.²¹¹ To begin to address this gap in recovery assessment, HHS is working with FEMA and DHS’s Science and

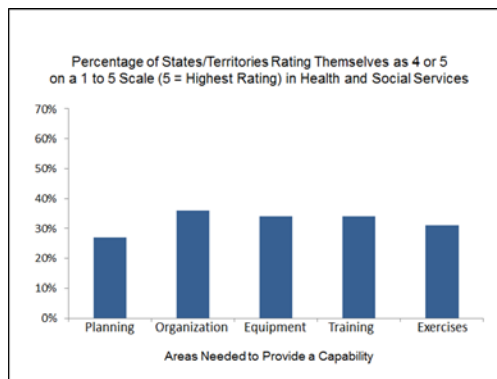
Technology Directorate to establish measures for post-incident recovery of health care and social service networks. In 2013, FEMA also funded researchers at the University of North Carolina to develop a tool to measure disaster recovery. The tool will feature a set of community recovery indicators that will assist practitioners at the community, state, and federal levels to document what they did as part of recovery, measure the impact of those actions, and understand the key features of high quality disaster recovery and healthy post-disaster communities.²¹²

CDC has fielded a measure to capture how many of the essential 11 community sectors are engaged in developing or reviewing a recovery plan.²¹³ The measure will highlight the importance of building pre-disaster partnerships across the range of sectors and provide data on the type of partnership models that are most effective for coordinating between government and nongovernmental organizations.

The number of scientific studies related to recovery is growing. Since 2008, scientific studies on recovery have addressed behavioral health²¹⁴; recovery financing²¹⁵; interventions to improve recovery^{216,217}; and recovery measurement at the individual^{218,219,220} and household levels.^{221,222}

Many agencies and organizations have begun to support studies of recovery. Federal agencies doing so include USUHS, FEMA, SAMHSA, NIH, CDC, and ASPR. Following the British Petroleum oil spill, SAMHSA partnered with NIH/NIEHS to support a research consortium for the Gulf region, incorporating behavioral health tracking into the study. The USUHS Center for the Study of Traumatic Stress (CSTS) is conducting field research to build the evidence base on behavioral health in incidents, mortuary affairs, and recovery workforce stressors. CSTS helped the NPRSB Disaster Mental Health Subcommittee develop guidelines on behavioral health in disasters. In 2011, the Corporation for National and Community Service (CNCS) began tracking the number of individuals who received assistance from CNCS-supported programs in disaster recovery.²²³ NCDMPH is also conducting research on long-term community recovery after disasters, specifically surrounding the level of education and training needed by the health- and health-related workforce to better support recovery services in future incidents.²²⁴ CDC and ASPR funded several organizations to conduct research on incident recovery (and advance science preparedness) following Superstorm Sandy.

Exhibit III.8.2--Average Self-Assessed State and Territorial Preparedness Level: Health and Social Services Capability



Source: FEMA, State Preparedness Report (SPR) Data, 2013.

Persistent Challenges

As states work to improve preparedness, progress in public health recovery-related capabilities is lagging. Despite progress in developing planning approaches to support recovery, states and territories continue to rate recovery capabilities among their least-prepared areas. According to 2013 *State Preparedness Report (SPR)*⁴ assessment data, three of the five lowest-rated capabilities—economic recovery,

⁴ The SPR is an annual capability assessment required by the Post-Katrina Management Reform Act of 2006 which requires an SPR from any state or territory receiving federal preparedness assistance administered by DHS. States rate current capabilities against identified targets and provide context for the assessment.

housing, and natural and cultural resources, are in the recovery mission area.²²⁵ The other core recovery capability—health and social services—was rated somewhat higher. Exhibit III.8.2 shows the percentage of states that rated themselves highly for health and social services across the five areas needed to provide the capability: planning, organization, equipment, training, and exercises.

Other challenges to incorporating post-incident health recovery into planning and response include the following:

- Limited understanding of the resources, services, and staff types that are needed as the focus of responders gradually shifts from response to recovery activities and the importance of initiating recovery activities when response begins^{226 227 228}
- Lack of dedicated funding and staff to support recovery capacity building and long-term recovery efforts^{229 230}
- Lack of shared strategies to guide disaster recovery planning partnerships with nontraditional disaster partners (e.g., child care providers).^{231 232}

In addition, although activities are underway to evaluate and document lessons learned from recovery efforts, this has not been occurring in a systematic manner. Future progress can be supported through the development of guidelines for how to identify, document, and act on lessons learned about long-term recovery, as well as new tools to support exercises, drills, and other practice-based learning on recovery.²³³

Although the number of scientific studies on recovery is growing, more research is needed to inform several issues. These include the level and quality of recovery planning, recovery communication strategies, the contributions of nongovernmental organizations, and coordination between government and nongovernmental organizations.²³⁴

Objective 9: Work with Cross-Border and Global Partners to Enhance National, Continental, and Global Health Security

The health security of each nation depends on the health security of others. The IP 2012–2014 described a vision for global health security in which there is effective communication, coordination, and collaboration between the United States and bilateral and multilateral partners.

Key Findings

- Federal agencies have strengthened interagency coordination, communication, and collaboration related to global health security.
- Federal agencies are reporting U.S. progress and compliance with the WHO International Health Regulations (IHR 2005).
- The U.S. government is working with global partners to help other countries build their core capacities to detect, report, and respond to health threats of potential international concern, in fulfillment of each country's obligations under the IHR.
- Legal, regulatory, logistical, and other challenges continue to complicate responses to global health security threats, including the sharing of medical assistance (e.g., public health personnel, MCMs).
- Future engagement will require increased prioritization globally and across sectors in order to develop the necessary capacities to ensure the ability to address new and emerging threats.
- A broader suite of IHR indicators and associated checklist of measures is needed to support future progress in building and maintaining global health security capacity.

Findings

Federal Agencies Have Strengthened Interagency Coordination, Communication, and Collaboration Related to Global Health Security

Interagency coordination, communication, and collaboration related to global health security are becoming more robust and effective. Various federal agencies contribute on an ongoing basis to the U.S. government's collaboration with multi-country groups organized around health security interests of mutual concern, including bilateral (e.g., with Mexico or Canada individually), trilateral (with both Mexico and Canada), quadrilateral (US, UK, Canada, Australia), and larger (involving the 9-member Global Health Security Initiative—G7 countries plus Mexico, the European Union, and WHO):

- The International Bioengagement Working Group, which involves the Departments of Defense, Agriculture, and State, along with the U.S. Agency for International Development (USAID) and HHS, coordinates U.S. international efforts in the biological sciences, public health, and security to meet U.S. global biodefense and public health priorities.²³⁵
- The White House National Security Council convenes interagency policy groups to address and coordinate U.S. policy on topics including global health security.
- Several federal agencies contribute to U.S. efforts related to international treaties pertaining to global health security, such as the Biological and Toxins Weapon Convention (BWC). At the 2011 BWC Review Conference, experts discussed health security topics of mutual interest, including international cooperation and assistance, developments in science and technology, how countries can keep up with rapid

- advances in the life sciences, and how countries can work domestically to prevent pathogens from being used as weapons.²³⁶
- DoD NCMI provides all-source intelligence in the form of risk assessments, early warning of emerging threats (e.g., H1N1), timely alerts of unfolding events, and detailed reports on foreign infectious disease and environmental health threats. The NCMI is responsible for understanding each country's medical capabilities and maintains DoD databases that characterize overseas medical facilities, including hospitals, clinics, labs, blood banks, and pharmaceutical production facilities.²³⁷

WHO's International Health Regulations Underpin Health Security Efforts Globally

The WHO *International Health Regulations* (IHR)²³⁸ establish the international framework for health security. The United States is a signatory to the IHR. This legally binding agreement contributes to global health security by providing a framework for coordinating the management of events that may constitute a public health emergency of international concern (PHEIC), and it calls for countries to improve their capacities to detect, assess, notify, and respond to public health threats. In particular, Article 44 of the IHR (2005) encourages states to share technical, logistical, and financial resources through bilateral and multilateral channels in order to develop, strengthen, and maintain public health capacities.²³⁹ The federal government is helping the United States maintain and strengthen its own core capacities while also helping other countries with their similar efforts.

The U.S. has developed guidelines and standard operating procedures for assessing and notifying WHO of potential PHEIC that arise in the United States. In addition to the required IHR (2005) annual compliance reporting to WHO, the federal government is also aligning U.S. measures with IHR (2005) core capacities. ASPR maintains a unit dedicated to U.S. IHR-related activities, including all IHR (2005) official communications to WHO.

Federal programs overseas focus on helping countries build four of the eight IHR core capacities—those related to human resources, surveillance, laboratory, and response. A U.S. interagency process developed measures to further prioritize and support U.S. programs helping partner countries build their IHR core capacities, specifically focusing on infectious disease threats. The federal government is tracking U.S. efforts to help countries build their IHR core capacities for reporting to WHO.

The U.S. Government Works with Multiple Partners to Help Countries Strengthen Our Collective Core Capacities for Health Security

Building health capacity abroad has become a central pillar of U.S. foreign policy; this has increased the visibility and political importance of health issues on a global basis. The United States collaborates extensively with partner governments, international organizations, and civil society to contribute to a healthier and safer world. These collaborations are bilateral, regional, and global. In 2014, the U.S. spearheaded the development of the Global Health Security Agenda, an initiative aiming to elevate health security as not only a top health but also a top national security priority internationally; cutting across multiple sectors of government. Since the initial launch of this effort, over 40 countries have agreed to 100 new commitments to implement one or more lines of effort outlined by the Agenda, domestically, regionally and/or internationally. This effort includes participation by international organizations and public and private stakeholders collaborating to build global health security capacity in the next several

years in support of health security. Some examples of health security investments are highlighted below.

North America

Over the past four years, the United States has invested in a regional approach to health preparedness, working closely with Canada and Mexico to improve North American preparedness and response to public health threats. Examples include the following:

- In April 2012 at the North American Leaders Summit, the United States began collaboration with Canada and Mexico on the North America Plan for Animal and Pandemic Influenza (NAPAPI) to strengthen preparedness and response for a pandemic either originating in or spreading to North America.²⁴⁰ The plan recognizes the need for interconnected systems for surveillance and early warning, joint epidemiological investigations, mutual assistance, and protocols for transportation of laboratory samples during a response. It also addresses integration of human and animal health, development of border policies, and protection of critical infrastructure. The key agencies HHS, DHS, DOS, and USDA, with support from DoD and DOT, contribute to U.S. participation.
- The Army has trained approximately 85 Public Health Emergency Officers (PHEOs) from 2009 to 2014. As a result, PHEOs are present at 12 Army installations worldwide and, among other functions, advise the Installation Commander during public health emergencies and work with the local communities to advance coordinated response planning.
- The United States–Canada “Beyond the Border” joint declaration articulates a shared approach to security in which both countries work together to address threats, while expediting lawful trade and travel. Beyond-the-border health security activities include risk assessments, information exchange, cross-border partnerships, and interoperability such as the exploration of barriers to sharing medical countermeasures and medical and public health response personnel during an emergency. DHS and Public Safety Canada, in close collaboration with the health sectors of each country, lead the Beyond the Border Joint Action Plan (2011).²⁴¹ Led by DHS Health Affairs, HHS, DOD, DOS, and other federal partners are also participating in the Beyond the Border Health Work Group.

DoD Medicine has participated in various tabletop exercises and real world events with multiple organizations (Operation Tomadachi, Indonesian tsunami, Haitian earthquake).

Activities were carried out to build IHR (2005) core capacities:

- ASPR partnered with Mexico’s Ministry of Health and the U.S.-Mexico Foundation for Science to strengthen epidemiological surveillance and early warning capacity for biological threat agents and pandemic influenza. This project has supported the following activities:
 - Design and inauguration of the first BSL-3 laboratory at the Instituto Nacional de Diagnóstico y Referencia (InDRE)
 - Development and implementation of AlertaMex, an automated early warning infectious disease surveillance system
 - Training of public health personnel in emergency preparedness, surveillance and epidemiology-related activities

- ASPR has partnered with the Gorgas Memorial Institute to enhance regional preparedness and response capabilities. ASPR and CDC collaborated with Mexico's national reference laboratory to provide laboratory training to the Gorgas Memorial Institute in Panama, which covers Central America.
- The HHS ATSDR has supported emergency response and preparedness activities along the U.S./Mexico Border. ATSDR has provided technical environmental health expertise for the Joint Response Team co-chaired by the U.S. Coast Guard/EPA and the Mexican Navy. EPA has strengthened adjacent cities ("Sister Cities") along the U.S./Mexico border by providing equipment, training, and exercises. ATSDR staff has participated in annual Sister Cities exercises of local community abilities to respond to a hazmat event.

Bilateral, Multilateral, and Regional Engagements Beyond North America

- To accelerate progress toward a world safe from health security threats and to promote global health security as an international security priority, the United States, working with at least 30 partner countries, launched the Global Health Security Agenda²⁴² in 2014.
- Several federal agencies participate in the Biosecurity Engagement Program (BEP), which aims to prevent the misuse of life science expertise, equipment, or materials, and to advance U.S. biological nonproliferation objectives. Since 2009, BEP has provided biorisk management training and rapid physical security upgrades to institutions in the Middle East, Africa, South and Southeast Asia, and Central and South America. These successes have led to new partnerships and additional biological threat reduction activities in these regions.
- ASPR and DoD co-organized three international workshops in the Republics of Georgia (2010 and 2011) and Moldova (2010) which aimed (a) to strengthen IHR (2005) core capacities and existing national measures to deter, prevent, and respond to biological incidents or threats; and (b) to promote national, regional, and international intersectoral cooperation, coordination, and synchronization related to infectious disease outbreaks.²⁴³
- The United States is currently working with the G7 countries, Mexico, the European Commission, and WHO to develop an operational framework for the sharing of smallpox vaccines. This operational framework will serve as the first step in developing a more general framework for the sharing of all MCMs with WHO and among countries during a medical emergency. These countries are currently reviewing challenges to international MCM sharing and working to develop potential policies and solutions to overcome these barriers.
- USAID and CDC support regional disease surveillance networks to improve global public health capacity and health security.
- PulseNet International is a cooperative effort to track foodborne infections worldwide; each PulseNet laboratory utilizes standardized genotyping methods and shares information in near real-time.
- In 2013, CDC began pilot projects in Vietnam and Uganda focused on building and strengthening capacities related to infectious disease, including disease surveillance and laboratory capacity, and developing and strengthening emergency operations centers to coordinate responses to health threats.

- As part of the U.S. commitment to the Global Health Security Agenda, CDC, in partnership with DoD Defense Threat Reduction Agency, has expanded global health security projects to an additional 10 countries beginning in 2014.
- DoD has collaborated with partner countries to support the Global Health Security Agenda through existing missions and activities of force protection, threat reduction, and biodefense.
- ASPR is collaborating with the Institut Pasteur International Network to strengthen laboratory capacity in Cambodia, Cameroon, the Central African Republic, and Senegal.

Global

The U.S. is collaborating with other nations to improve health security through relationships with WHO, international organizations, and partner countries. The U.S. signed a Memorandum of Understanding in Global Health Security with WHO to facilitate future joint cooperation. The HHS Office of Global Affairs (OGA) facilitates these engagements and coordinates the overall U.S. relationship with WHO.

Efforts are underway to identify and disseminate lessons learned and best practices. National VOAD works with partners such as Interaction and delegations from other countries to improve national, continental, and global health security and to encourage the sharing of best practices. Federal agencies identified lessons learned about international partnerships during the 2009 H1N1 influenza pandemic, especially regarding the sharing of MCMs.

Persistent Challenges

International cooperation and assistance—both from and into the United States—are important during a significant domestic or international incident and require ongoing effort. To support future progress, it will be important for the United States to continue to develop and strengthen partnerships for global development of core public health capacities to support the IHR 2005, the World Organisation for Animal Health, and the Food and Agriculture Organization.

Legal, regulatory, and logistical issues continue to complicate responses to global health security threats, including the sharing of medical assistance (e.g., public health personnel, MCMs). The emergency cross-border deployment of MCMs, both into and out of the United States, continues to pose challenges, particularly for products that are not approved for use by the FDA. The deployment of medical and public health personnel during an incident faces similar legal and regulatory issues, including concerns about worker compensation protection during incidents. Moving forward, the United States can strengthen its ability to respond to PHEIC by developing infrastructure for emergency communications and incident response systems, and frameworks and policies for the international sharing of resources.

New challenges continue to emerge, such as difficulties with sharing samples of emerging diseases rapidly among critical laboratories around the world. The 2009 H1N1 influenza pandemic exposed global vulnerabilities in adequate prevention, detection, and rapid response to health threats. Future engagement will require increased prioritization globally and across sectors in order to develop the necessary capacities to ensure the ability to address new and emerging threats. Additional issues important to global health security include the emergence and spread of new microbes, globalization of travel and food supply, drug resistant pathogens,

dual use research of concern, and potential terrorist acquisition and use of biological agents. Some of these challenges can be addressed through efforts to develop novel diagnostics and strengthen laboratory systems; to develop and link global networks for biosurveillance; and to promote the development of biosafety and biosecurity systems, frameworks for food and drug safety, and mechanisms to address weaknesses in the medical supply chain.

Currently available measures pertaining to global health security—from CDC’s GDD program and HHS’s Healthy People 2020 (HP2020) measures—are too few. They show annual progress in the number of new regional centers, persons trained, and diagnostic tests, but these activities represent only a slice of the full breadth of U.S. engagements to strengthen global health security and only a slice of countries’ needed capacities and capabilities related to their health security. Clear indicators with a versatile set of accompanying measures to assess the achievement of IHR core capacity development and maintenance internationally are needed to demonstrate and thus support future progress.

Objective 10: Ensure That All Systems that Support National Health Security Are Based on the Best Available Science, Evaluation, and Quality Improvement Methods

The nation's preparedness efforts will be most effective if they reflect the best available information about threats to health security and ways to prepare for, respond to, and recover from incidents with negative health consequences. The IP 2012–2014 identified a vision for this objective: Efforts to improve the evidence base are developed through meaningful interagency, inter-sector collaborations. National health security is increasingly informed by an evidence base, and can be measured, evaluated, studied, and improved via a coordinated set of performance measures and standards. Key stakeholders develop and use tools to ensure continuous improvement of systems supporting national health security.

Key Findings

- Both governmental and nongovernmental stakeholders are improving the evidence base for national health security by promoting research.
- Multiple sectors have collaborated to develop prioritized research agendas and improve the evidence base for national health security. Several quality improvement programs related to national health security have been initiated or expanded: Emergency Management Accreditation Program (EMAP), Project Public Health Ready (PPHR), and ASPR's Corrective Action Program.
- Federal agencies have improved the alignment and coordination of national health security investments and programs.
- New measures of national health security have been deployed, and additional measures are being developed and piloted.
- Public health, emergency management, the private sector, government, nonprofits, and academia stakeholders have developed the National Health Security Preparedness Index (NHSPI), released in 2013, which uses extant measures to assess preparedness of the nation by looking at the performance of states.
- Federal agencies participate in a new NHSS oversight model to coordinate activities related to research and evaluation.
- Better national-level measures of health security are needed to gauge progress and identify effective strategies for improving national health security.

Findings

Research to Improve the National Health Security Evidence Base

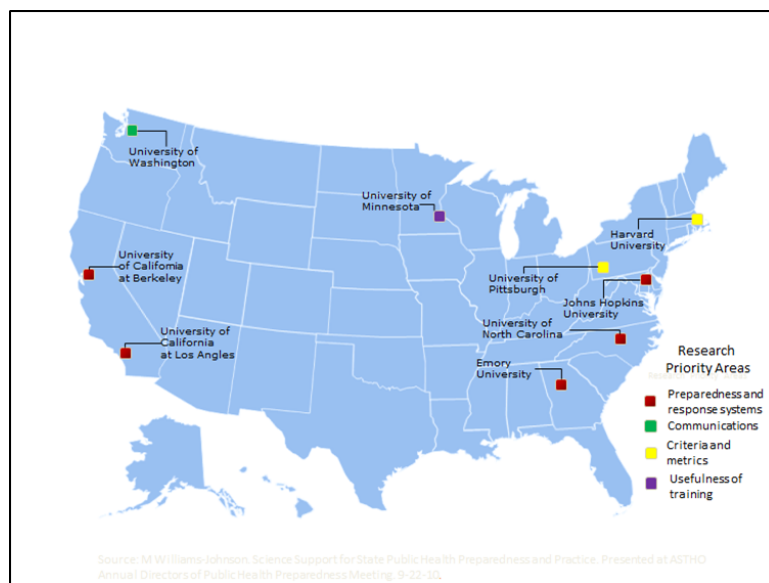
Both governmental and nongovernmental stakeholders are improving the evidence base for national health security. HHS established a Public Health Emergency Research Review Board (PHERRB) as a central institutional review board for studies that will require specialized expertise and that will be conducted at multiple sites during incidents.²⁴⁴ PHERRB exemplifies efforts to enhance “science preparedness,” to ensure that data from human subject research requiring institutional review board (IRB) oversight can be collected and rapidly analyzed to shape response, improve recovery, and identify the long-term health consequences of incidents.

ASPR received more than \$11.9 million to support research grants to aid long-term recovery in areas impacted by Hurricane Sandy. ASPR is administering the grants through the Disaster Relief Appropriations Act of 2013. The grants, which represent the first time HHS has funded evidence based disaster research needed by local communities to support long-term recovery

efforts, are being coordinated with others administered by CDC and the National Institute of Environmental Health Sciences. The grants require that researchers share their findings with each other and the impacted communities. This approach will bring together networks of community members and organizations needed to foster a strong recovery and to improve resilience as impacted communities continue to move forward rebuilding. The findings will help community leaders make evidence-based decisions about recovery plans and policies and improve resilience across the United States.²⁴⁵

In 2008, CDC established nine Preparedness and Emergency Response Research Centers (PERRCs) to conduct multidisciplinary research on preparedness and response capabilities (Exhibit III.10.1). The PERRCs have developed over 200 practice and policy tools, including articles, research briefs, and guidelines. Five PERRCs have documented the translation of research findings into practice, including changes at the state and local health department levels and improvements in services to at-risk individuals during and after incidents.²⁴⁶

Exhibit III.10.1--Preparedness and Emergency Response Research Centers



Source: <http://www.cdc.gov/phpr/perlc.htm>

Reviews of national health security research have been conducted to identify knowledge gaps and facilitate coordination across funders. In 2012, an inventory was published of unclassified, civilian national health security research funded by the federal government.²⁴⁷ This effort analyzed the research portfolios of numerous agencies and made recommendations to better

align research efforts and priorities. In 2013, ASPR began a separate effort to develop an applied research agenda for national health security that engaged federal and nonfederal funders, researchers, and users of research. Finally, numerous agencies—including NIMH, FEMA, SAMHSA, ACF, and the American Red Cross—are cooperating to shape a research agenda for disaster mental health, with the goal of producing new NIMH research grants to study disaster mental health interventions. Identified research needs will likely include rigorous evaluations of current response practices.

Quality Improvement Efforts

During the 2010–2014 period, several quality improvement programs related to national health security have been initiated or expanded:

- EMAP gives government jurisdictions the opportunity to meet standards related to emergency preparedness and response.²⁴⁸ As of 2013, EMAP has accredited 46 state, local, territorial, and tribal government emergency management programs.²⁴⁹
- NACCHO’s Project Public Health Ready (PPHR) assesses local health department capacity and capability to plan for, respond to, and recover from incidents. As of

2014, nearly 400 local health departments have been recognized as meeting all the PPHR requirements individually or working collaboratively as a region.²⁵⁰ PPHR gives tools to local health departments to plan, train, and exercise using a continuous improvement model.²⁵¹

- The Public Health Accreditation Board (PHAB) defines expectations for public health departments by standardizing capabilities related to timely investigations of health hazards, urgent communications, and emergency operations planning.²⁵² PHAB has accredited health departments serving 5% of the U.S. population, and health departments serving 62% of the U.S. population have begun the accreditation process.²⁵³
- ASPR has developed a Corrective Action Program to address recommendations presented in the after action reports of federal responses to major incidents.
- ASPR is establishing a standard process for incorporating lessons learned from exercises and incidents into ASPR policymaking. ASPR's Office of Emergency Management is working with federal stakeholders to document lessons learned from disaster recovery operations and research.

Alignment and Coordination of Federal Preparedness Investments and Programs

Establishing inter-sector coordination is important to support science, evaluation, and quality improvement in national health security. Federal agencies have improved the alignment and coordination of national health security investments and programs. ASPR and CDC aligned many aspects of the HPP and PHEP cooperative agreement programs, including capabilities and measures (see Chapter II). In addition, multiple agencies coordinated efforts for the development of the PHEMCE Strategy and IP.²⁵⁴ PHEMCE, which comprises HHS, DoD, DHS, VA, and USDA officials, serves as a coordinating body and provides oversight to plan and advise the HHS Secretary on MCMs. PHEMCE convened Integrated Program Teams to share information and coordinate partners in near real time. NIH is aligning its biodefense and infectious disease research with PHEMCE goals and objectives.

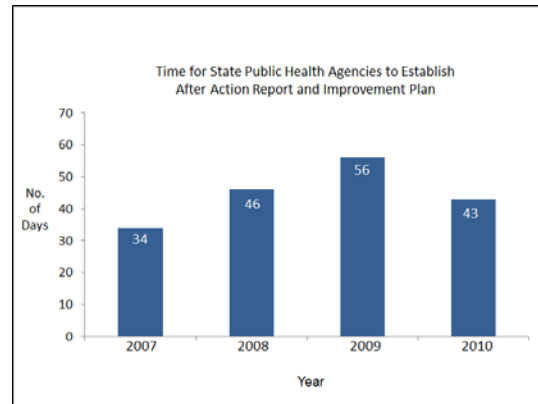
Tools to Monitor and Evaluate National Health Security

Measures related to national health security are in various stages of development and use. As part of HPP and PHEP cooperative agreements, ASPR and CDC have developed and tested new measures of national health security. In 2012, CDC released 47 measures to assess awardee performance. In addition, ASPR monitors progress on the implementation activities from all the agencies in the federal government that have a defined role in the IP 2012–2014.

Public health, emergency management, the private sector, government, nonprofits, and academic stakeholders have collaborated on the developmental National Health Security Preparedness Index (NHSPI), released in 2013, that uses extant measures to assess state preparedness.²⁵⁵ Measures from 35 sources were aggregated by the index during 2013.²⁵⁶ Future work will include determining what the state scores mean and whether the measures are valid indicators of preparedness. Also, preparedness measures that address behavioral health, environmental health, and pre-event community status will be added.²⁵⁷

Only one national measure of performance in health security focuses on quality improvement and the use of evidence: the time (in days) required for state public health agencies to establish after action reports and improvement plans (Exhibit III.10.2). This measure captures an important activity related to the development of quality improvement tools, but has some limitations. For example, it focuses on speed rather than the quality of plans or use of plans to change practice. As the figure shows, state and territorial health department performance on this measure has varied over the past five years.²⁵⁸ To support quality improvement, HHS has developed a National Framework for Public Health Quality that outlines a vision, definition, public health quality aims, and priority areas for improvement of quality.²⁵⁹ The framework incorporates elements such as transparency, equity, and population-centeredness and can serve as guide for assessing and improving the quality of health security policies and programs.

Exhibit III.10.2—Time (in Days) for State Public Health Agencies to Establish After Action Report and Improvement Plan



Source: HP2020 PREP-4

Steps to Institutionalize Research and Evaluation Activities for National Health Security

In 2013, HHS unveiled a new oversight model to coordinate activities for national health security. An interagency strategic guidance board of leaders provides vision and overall direction. Workgroups for evaluation, implementation, and research will engage federal and nonfederal stakeholders to support measurement, preparedness science, and quality improvement. Through a process of ongoing evaluation, this structure will allow health security stakeholders to make needed corrections to strategy and implementation as challenges arise. Through the implementation of the oversight model, a focused effort on the issues within Strategic Objective 10 is assured. Additionally, “fidelity to the evidence base” and “continuous quality improvement” have been put forth as guiding principles for the NHSS 2015-2018 and IP 2015-2018.

Persistent Challenges

Progress toward this objective is hampered by the lack of sufficient national-level measures of health security and implementation data. A recent GAO report found that between 2007 and 2011, ASPR and CDC lacked comprehensive measurement systems with consistent measures and corresponding targets and milestones. The lack of consistency precluded the identification of trends.²⁶⁰ Better national-level measures of health security are needed to gauge progress and identify effective strategies for improving national health security.

Because incidents are diverse, unpredictable, and transient, they challenge deliberate research processes. Research projects tend to be developed, funded, and implemented too slowly to obtain timely, valid data on response and recovery efforts, and data collection tools are not standardized to facilitate comparisons across incidents. Efforts to develop a rapid, scientific research preparedness and response capability in support of evidence-based decision-making can address many of the barriers.

IV. Conclusion

Overall, national health security has improved since 2010. There have been advances in integration, planning, capability development, and coordination. First, integration of the public health, health care, and emergency management systems has improved in a number of important ways. The alignment of the PHEP and HPP cooperative agreements has encouraged cooperation and promoted efficiency between public health and health care awardees. Integration among sectors has improved situational awareness by increasing the data available to inform health security decision-making. Second, widespread use of regional planning alliances and health care coalitions has expanded preparedness planning within the health care system. Third, important advances have improved the capabilities of the national health security workforce. In particular, core competencies have been identified, and competency-based training courses developed and conducted. This has ensured that the current and future workforces are proficient and effective. Additionally, diverse tools and resources (e.g., guidance documents for implementing both non-pharmaceutical interventions and crisis standards of care) have been developed to support the workforce and build their capabilities. Fourth, the PHEMCE has facilitated coordination between the federal government and the private sector to improve research and development of MCMs. Federal investments have contributed to new—and the development of many potential—MCMs.

The improvements in integration, planning, capability development, and coordination have been noted in incident response. Responses to incidents over the past four years, such as the H1N1 influenza pandemic, Hurricane Sandy, and the Boston Marathon bombings, demonstrate that community capabilities are more responsive, integrated, and effective than they were a decade ago. Each incident has also served as a catalyst for further progress in areas where shortfalls were uncovered. Moreover, health security has become more understood, valued, and integrated with other national security concerns. For example, conversations regarding how to achieve national security and community resilience now give prominence to the role of health.

Despite the nation's progress toward achieving health security, numerous challenges remain. One key challenge will be to obtain the resources needed to sustain and improve health security, particularly in workforce and practice-based research. This was especially difficult during the last recession, when communities had limited or declining resources. In a recovering economy, it is important to ensure that sufficient resources are dedicated to building and maintaining national health security. Strategies must be developed to encourage and leverage investments by all sectors, not only by government. Funding streams must be used as efficiently and effectively as possible. The return on investments can be improved by coordinating the various funding streams to create synergies of effort. Lastly, strategic prioritization must occur to indicate which activities are most critical to implement at this time and which can receive emphasis later.

Another challenge is engaging and coordinating the full range of stakeholders in national health security. The IP 2012–2014 took the initial step with a focus on coordinating federal activities, but now non-federal stakeholders in sectors among communities and states should be engaged. Engaging these stakeholders in the implementation of the NHSS 2015–2018 will increase buy-in and willingness to champion and share responsibility for specific activities.

Another challenge is to improve the nation's capability to assess health security and evaluate

progress. This initial review faced limitations in data, measures, and other evidence to demonstrate the effects of accomplishments and to corroborate impressions of improvement. As newly developed measures are deployed and more data become available, the evidence base for assessing national health security will grow. The PHEP and HPP cooperative agreement programs have taken important steps in this direction by fielding measures of awardee capabilities. However, stakeholders have stated that measures should be driven through disciplines, professions and accrediting bodies to have greater impact. Quantitative measures make it possible to track performance objectively, identify trends, and compare progress among groups or geographic areas. More rigorous qualitative data can inform quality improvement. Measures also permit the assessment of programs and strategies to identify best practices that use resources in the most effective and efficient manner.

There are limitations of this review. First, some data were self-reported and could not be independently verified. Second, federal coordinators were used to drive and coordinate implementation for each of the strategic objectives, but a more robust process might have generated more uniform data. Third, because the IP was not released until 2012, this review was conducted retrospectively rather than having been driven by a proactive evaluation plan and there was less time to both implement and assess progress for the congressional deliverable. Fourth, while the IP 2012–2014 was federally focused, it includes some nonfederal (other than cooperative agreement) activities and outcomes where information was available but it is not comprehensive. Lessons from this review are also being used to improve the strategic planning and management of the second quadrennial cycle of the NHSS. Evaluation will occur throughout the cycle, with annual stakeholder updates, to support and refine implementation of the strategy. A chartered oversight model is being implemented to: manage the iterative process; increase stakeholder engagement; facilitate collaboration among federal agencies and among non-federal and nongovernmental partners; and to facilitate decision-making. An evaluation framework for the next multi-year evaluation period is also being developed. To address the difficulty in obtaining community-level information that communities can use for quality improvement, a number of lessons learned are being incorporated into the next cycle to increase the community focus and improve the community level data available.

As a result, for the next quadrennial cycle, the linkages among strategy, implementation, and evaluation have been tightened, and more explicit connections have been made between objectives, priorities, and activities to ensure that efforts to improve national health security will have maximal impact. The NHSS 2015–2018 and IP 2015–2018 draw upon the information in this review to build upon the progress made and address the challenges that have been encountered since 2010. Many of the areas identified as priorities in the NHSS 2015–2018 are intended to address challenges identified in this review. Although the NHSS builds on lessons learned during the 2010–2014 period, the NHSS is fundamentally prospective, focused on what stakeholders nationwide should and can do to further strengthen and improve national health security in the future. The IP 2015–2018 uses lessons learned to select, shape, and guide implementation activities over the subsequent four years. Monitoring and evaluating these activities will provide a valuable core of evidence to inform the next review, while the changing landscape of national health security will continue to be a key factor in evaluation for course corrective action. In the spirit of collaboration, NHSS-related processes and information are being used to help inform other subordinate or topical strategies in areas such as MCMs, situational awareness and influenza.

Appendix A: Federal Departments and Agencies Identified as Leads and/or Potential Partners in the NHSS Implementation Plan 2012–2014

| Department | Agencies or Programs Within the Department |
|---|--|
| Office of the Director of National Intelligence (ODNI) | N/A |
| The White House | Office of Science and Technology Policy (OSTP) |
| Interagency Workgroups | Federal Education and Training Interagency Group (FETIG) |
| U.S. Department of Agriculture (USDA) | National Animal Health Emergency Response Corps (NAHERC) Animal and Plant Health Inspection Service (APHIS) Agricultural Research Service (ARS) Food Safety and Inspection Service (FSIS) Food and Nutrition Service (FNS) |
| U.S. Department of Defense (DoD) | Office of the Secretary of Defense/Health Affairs Office of the Secretary of Defense/Homeland Defense & Americas' Security Affairs National Center for Disaster Medicine and Public Health (NCDMPH) |
| U.S. Department of Education (DOE) | N/A |
| U.S. Department of Health and Human Services (HHS) | Office of the Secretary <ul style="list-style-type: none"> • Office of the Assistant Secretary for Public Affairs (ASPA) • Office of the Assistant Secretary for Administration (ASA): Office of Security and Strategic Information (OSSI) • Office of the Assistant Secretary for Legislation (ASL) • Office of the Assistant Secretary for Planning and Evaluation (ASPE) • Office of the Assistant Secretary for Preparedness and Response (ASPR) • Office of the Assistant Secretary for Preparedness and Response (ASPR), Office of the Civilian Volunteer Medical Reserve Corps (OCV-MRC) • Office of the National Coordinator for Health Information Technology (ONC) • Office of Global Affairs (OGA) • Center for Faith-Based and Neighborhood Partnerships (CFBNP) • Office of Civil Rights (OCR) • Office on Disability (OD) Administration for Children and Families (ACF) Administration on Aging (AOA) Centers for Disease Control and Prevention (CDC) Centers for Medicare and Medicaid Services (CMS) Food and Drug Administration (FDA) Indian Health Service (IHS) National Institutes of Health (NIH) Public Health Emergency Research Review Board (PHERRB) Health Resources and Services Administration (HRSA) Agency for Healthcare Research and Quality (AHRQ) Substance Abuse and Mental Health Services Administration (SAMHSA) |
| U.S. Department of Homeland Security (DHS) | Federal Emergency Management Agency (FEMA) |
| U.S. Department of Interior (DOI) | N/A |
| U.S. Department of Justice (DOJ) | N/A |
| U.S. Department of Labor (DOL) | N/A |

| Department | Agencies or Programs Within the Department |
|---|--|
| U.S. Department of State (DOS) | U.S. Agency for International Development (USAID) |
| U.S. Department of Transportation (DOT) | National Highway Traffic Safety Administration (NHTSA) |
| U.S. Department of Veterans Affairs (VA) | N/A |
| U.S. Environmental Protection Agency (EPA) | N/A |
| U.S. Federal Communications Commission (FCC) | N/A |

Appendix B: State, City, and Territory Cooperative Agreement Funding

Exhibit B.1—FY 2003-2014 Hospital Preparedness Program Awards, in \$1,000s

| Awardee | FY 2003 | FY 2004 | FY 2005 | FY 2006 | FY 2007 | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 | FY 2013 | FY 2014 |
|--------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Alabama | \$7,762 | \$7,762 | \$7,326 | \$7,155 | \$6,330 | \$6,073 | \$5,529 | \$5,959 | \$5,868 | \$5,422 | \$5,119 | \$3,237 |
| Alaska | \$1,959 | \$1,959 | \$1,484 | \$1,458 | \$1,349 | \$1,312 | \$1,233 | \$1,295 | \$1,282 | \$1,231 | \$1,186 | \$913 |
| American Samoa | \$602 | \$602 | \$350 | \$335 | \$323 | \$320 | \$313 | \$319 | \$318 | \$318 | \$314 | \$278 |
| Arizona | \$9,030 | \$9,030 | \$8,964 | \$8,754 | \$8,317 | \$7,973 | \$7,242 | \$7,820 | \$7,698 | \$7,082 | \$6,676 | \$4,007 |
| Arkansas | \$5,078 | \$5,078 | \$4,634 | \$4,531 | \$4,063 | \$3,906 | \$3,574 | \$3,837 | \$3,781 | \$3,503 | \$3,318 | \$2,004 |
| California | \$38,774 | \$38,774 | \$39,203 | \$38,325 | \$34,107 | \$32,626 | \$29,486 | \$31,967 | \$31,445 | \$28,752 | \$27,010 | \$23,324 |
| Chicago | \$5,069 | \$5,069 | \$4,596 | \$4,738 | \$4,104 | \$3,945 | \$3,608 | \$3,874 | \$3,818 | \$3,276 | \$3,105 | \$2,696 |
| Colorado | \$7,705 | \$7,705 | \$7,402 | \$7,222 | \$6,526 | \$6,260 | \$5,698 | \$6,142 | \$6,049 | \$5,679 | \$5,360 | \$3,223 |
| Connecticut | \$6,197 | \$6,197 | \$5,783 | \$5,652 | \$4,943 | \$4,747 | \$4,332 | \$4,660 | \$4,591 | \$4,181 | \$3,954 | \$2,478 |
| Delaware | \$2,205 | \$2,205 | \$1,740 | \$1,709 | \$1,582 | \$1,534 | \$1,433 | \$1,513 | \$1,496 | \$1,425 | \$1,368 | \$1,068 |
| District of Columbia | \$2,868 | \$2,868 | \$1,854 | \$1,824 | \$1,737 | \$1,708 | \$1,590 | \$1,683 | \$1,663 | \$1,120 | \$1,081 | \$951 |
| Federated States of Micronesia | \$704 | \$704 | \$451 | \$410 | \$387 | \$381 | \$368 | \$378 | \$376 | \$360 | \$354 | \$276 |
| Florida | \$25,776 | \$25,776 | \$26,311 | \$25,638 | \$23,433 | \$22,422 | \$20,280 | \$21,973 | \$21,617 | \$19,861 | \$18,667 | \$11,649 |
| Georgia | \$13,719 | \$13,719 | \$13,671 | \$13,330 | \$12,371 | \$11,848 | \$10,739 | \$11,615 | \$11,431 | \$10,476 | \$9,861 | \$5,970 |
| Guam | \$738 | \$738 | \$486 | \$492 | \$457 | \$448 | \$429 | \$444 | \$441 | \$436 | \$425 | \$353 |
| Hawaii | \$2,857 | \$2,857 | \$2,407 | \$2,346 | \$2,130 | \$2,058 | \$1,906 | \$2,026 | \$2,001 | \$1,901 | \$1,814 | \$1,218 |

| Awardee | FY 2003 | FY 2004 | FY 2005 | FY 2006 | FY 2007 | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 | FY 2013 | FY 2014 |
|--------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|---------|
| Idaho | \$2,998 | \$2,998 | \$2,572 | \$2,522 | \$2,359 | \$2,277 | \$2,103 | \$2,241 | \$2,212 | \$2,114 | \$2,015 | \$1,219 |
| Illinois | \$15,876 | \$15,876 | \$15,578 | \$14,951 | \$13,164 | \$12,606 | \$11,423 | \$12,358 | \$12,161 | \$10,937 | \$10,293 | \$8,743 |
| Indiana | \$10,271 | \$10,271 | \$9,897 | \$9,661 | \$8,504 | \$8,151 | \$7,403 | \$7,994 | \$7,870 | \$7,177 | \$6,765 | \$4,116 |
| Iowa | \$5,437 | \$5,437 | \$4,965 | \$4,847 | \$4,280 | \$4,114 | \$3,761 | \$4,040 | \$3,981 | \$3,637 | \$3,444 | \$2,084 |
| Kansas | \$5,089 | \$5,089 | \$4,631 | \$4,526 | \$4,004 | \$3,850 | \$3,522 | \$3,781 | \$3,727 | \$3,438 | \$3,257 | \$2,078 |
| Kentucky | \$7,157 | \$7,157 | \$6,745 | \$6,585 | \$5,832 | \$5,597 | \$5,099 | \$5,493 | \$5,410 | \$4,969 | \$4,693 | \$2,874 |
| Los Angeles County | \$15,583 | \$15,583 | \$15,582 | \$15,084 | \$13,111 | \$12,556 | \$11,378 | \$12,309 | \$12,113 | \$10,611 | \$9,987 | \$9,156 |
| Louisiana | \$7,765 | \$7,765 | \$7,319 | \$7,139 | \$5,936 | \$5,696 | \$5,188 | \$5,590 | \$5,505 | \$5,168 | \$4,880 | \$3,150 |
| Maine | \$2,944 | \$2,944 | \$2,480 | \$2,434 | \$2,175 | \$2,102 | \$1,945 | \$2,069 | \$2,043 | \$1,868 | \$1,784 | \$1,077 |
| Marshall Islands | \$582 | \$582 | \$331 | \$333 | \$322 | \$318 | \$312 | \$317 | \$316 | \$318 | \$314 | \$267 |
| Maryland | \$9,150 | \$9,150 | \$8,855 | \$8,646 | \$7,619 | \$7,306 | \$6,640 | \$7,166 | \$7,055 | \$6,446 | \$6,079 | \$4,944 |
| Massachusetts | \$10,686 | \$10,686 | \$10,257 | \$9,984 | \$8,661 | \$8,301 | \$7,539 | \$8,141 | \$8,014 | \$7,243 | \$6,827 | \$4,229 |
| Michigan | \$16,141 | \$16,141 | \$15,788 | \$15,395 | \$13,298 | \$12,735 | \$11,539 | \$12,484 | \$12,285 | \$10,678 | \$10,050 | \$6,066 |
| Minnesota | \$8,543 | \$8,543 | \$8,173 | \$7,983 | \$7,050 | \$6,762 | \$6,150 | \$6,633 | \$6,532 | \$5,962 | \$5,625 | \$3,526 |
| Mississippi | \$5,327 | \$5,327 | \$4,870 | \$4,760 | \$4,190 | \$4,027 | \$3,682 | \$3,955 | \$3,898 | \$3,556 | \$3,367 | \$2,169 |
| Missouri | \$9,530 | \$9,530 | \$9,152 | \$8,951 | \$7,907 | \$7,581 | \$6,889 | \$7,435 | \$7,320 | \$6,667 | \$6,287 | \$3,780 |
| Montana | \$2,370 | \$2,370 | \$1,892 | \$1,857 | \$1,698 | \$1,645 | \$1,533 | \$1,621 | \$1,603 | \$1,519 | \$1,456 | \$918 |
| Nebraska | \$3,603 | \$3,603 | \$3,138 | \$3,067 | \$2,742 | \$2,643 | \$2,434 | \$2,599 | \$2,564 | \$2,381 | \$2,265 | \$1,373 |
| Nevada | \$4,174 | \$4,174 | \$3,899 | \$3,818 | \$3,664 | \$3,524 | \$3,229 | \$3,462 | \$3,413 | \$3,281 | \$3,109 | \$1,928 |
| New Hampshire | \$2,906 | \$2,906 | \$2,453 | \$2,404 | \$2,167 | \$2,093 | \$1,938 | \$2,061 | \$2,035 | \$1,856 | \$1,772 | \$1,113 |

| Awardee | FY 2003 | FY 2004 | FY 2005 | FY 2006 | FY 2007 | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 | FY 2013 | FY 2014 |
|---------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| New Jersey | \$13,879 | \$13,879 | \$13,601 | \$13,270 | \$11,560 | \$11,073 | \$10,040 | \$10,856 | \$10,684 | \$9,554 | \$8,995 | \$5,821 |
| New Mexico | \$3,771 | \$3,771 | \$3,343 | \$3,277 | \$2,978 | \$2,869 | \$2,637 | \$2,820 | \$2,782 | \$2,621 | \$2,490 | \$1,518 |
| New York | \$18,020 | \$18,020 | \$17,748 | \$16,938 | \$14,561 | \$13,942 | \$12,628 | \$13,666 | \$13,448 | \$12,037 | \$11,325 | \$9,825 |
| New York City | \$12,858 | \$12,858 | \$12,350 | \$12,445 | \$10,914 | \$10,455 | \$9,482 | \$10,251 | \$10,089 | \$8,919 | \$8,399 | \$7,841 |
| North Carolina | \$13,417 | \$13,417 | \$13,251 | \$12,949 | \$11,728 | \$11,233 | \$10,184 | \$11,013 | \$10,838 | \$10,319 | \$9,714 | \$6,183 |
| North Dakota | \$1,963 | \$1,963 | \$1,461 | \$1,436 | \$1,306 | \$1,271 | \$1,195 | \$1,255 | \$1,242 | \$1,193 | \$1,150 | \$875 |
| Northern Marianas Islands | \$613 | \$613 | \$362 | \$363 | \$347 | \$342 | \$333 | \$340 | \$339 | \$300 | \$297 | \$270 |
| Ohio | \$18,235 | \$18,235 | \$17,844 | \$17,397 | \$15,051 | \$14,410 | \$13,050 | \$14,125 | \$13,898 | \$12,380 | \$11,647 | \$7,443 |
| Oklahoma | \$6,250 | \$6,250 | \$5,826 | \$5,681 | \$5,037 | \$4,838 | \$4,414 | \$4,749 | \$4,678 | \$4,363 | \$4,125 | \$2,606 |
| Oregon | \$6,256 | \$6,256 | \$5,899 | \$5,768 | \$5,192 | \$4,985 | \$4,547 | \$4,893 | \$4,820 | \$4,445 | \$4,202 | \$2,534 |
| Palau | \$529 | \$529 | \$279 | \$279 | \$275 | \$274 | \$272 | \$273 | \$273 | \$272 | \$270 | \$255 |
| Pennsylvania | \$19,617 | \$19,617 | \$19,254 | \$18,777 | \$16,271 | \$15,576 | \$14,103 | \$15,267 | \$15,022 | \$13,581 | \$12,774 | \$8,118 |
| Puerto Rico | \$6,808 | \$6,808 | \$0 | \$500 | \$5,479 | \$5,260 | \$4,795 | \$5,162 | \$5,085 | \$4,337 | \$4,100 | \$2,503 |
| Rhode Island | \$2,603 | \$2,603 | \$2,132 | \$2,090 | \$1,853 | \$1,794 | \$1,667 | \$1,767 | \$1,746 | \$1,584 | \$1,517 | \$952 |
| South Carolina | \$7,147 | \$7,147 | \$6,790 | \$6,632 | \$5,978 | \$5,737 | \$5,225 | \$5,629 | \$5,554 | \$5,263 | \$4,969 | \$3,107 |
| South Dakota | \$2,147 | \$2,147 | \$1,659 | \$1,630 | \$1,491 | \$1,448 | \$1,355 | \$1,428 | \$1,413 | \$1,338 | \$1,287 | \$860 |
| Tennessee | \$9,700 | \$9,700 | \$9,360 | \$9,139 | \$8,156 | \$7,818 | \$7,103 | \$7,668 | \$7,549 | \$7,035 | \$6,632 | \$4,049 |
| Texas | \$33,338 | \$33,338 | \$34,045 | \$33,177 | \$30,301 | \$28,988 | \$26,204 | \$28,404 | \$27,941 | \$26,394 | \$24,797 | \$15,859 |
| Utah | \$4,448 | \$4,448 | \$4,066 | \$3,979 | \$3,733 | \$3,590 | \$3,288 | \$3,527 | \$3,477 | \$3,346 | \$3,171 | \$1,918 |

| Awardee | FY 2003 | FY 2004 | FY 2005 | FY 2006 | FY 2007 | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 | FY 2013 | FY 2014 |
|---------------------|----------|----------|----------|----------|----------|---------|---------|---------|---------|---------|---------|---------|
| Vermont | \$1,928 | \$1,928 | \$1,439 | \$1,415 | \$1,291 | \$1,256 | \$1,182 | \$1,241 | \$1,228 | \$1,144 | \$1,105 | \$900 |
| Virgin Islands (US) | \$685 | \$685 | \$0 | \$250 | \$388 | \$382 | \$369 | \$379 | \$377 | \$363 | \$356 | \$340 |
| Virginia | \$11,890 | \$11,890 | \$11,702 | \$11,387 | \$10,189 | \$9,762 | \$8,857 | \$9,572 | \$9,422 | \$8,739 | \$8,231 | \$6,189 |
| Washington | \$10,069 | \$10,069 | \$9,799 | \$9,563 | \$8,608 | \$8,251 | \$7,493 | \$8,092 | \$7,966 | \$7,425 | \$6,998 | \$4,212 |
| West Virginia | \$3,725 | \$3,725 | \$3,246 | \$3,176 | \$2,805 | \$2,704 | \$2,488 | \$2,659 | \$2,623 | \$2,408 | \$2,290 | \$1,384 |
| Wisconsin | \$9,180 | \$9,180 | \$8,800 | \$8,589 | \$7,544 | \$7,234 | \$6,576 | \$7,096 | \$6,986 | \$6,356 | \$5,995 | \$3,642 |
| Wyoming | \$1,747 | \$1,747 | \$1,260 | \$1,242 | \$1,153 | \$1,124 | \$1,063 | \$1,111 | \$1,101 | \$1,080 | \$1,045 | \$841 |

Note: Funding for each year is shown in dollars from that year.

Exhibit B.2—FY 2003-2014 Public Health Emergency Preparedness Cooperative Agreement Awards, \$1,000s

| Awardee | FY 2003 | FY 2004 | FY 2005 | FY 2006 | FY 2007 | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 | FY 2013 | FY 2014 |
|----------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Alabama | \$15,599 | \$12,911 | \$12,810 | \$16,408 | \$12,952 | \$10,241 | \$9,985 | \$10,049 | \$8,634 | \$9,103 | \$8,610 | \$8,943 |
| Alaska | \$6,503 | \$5,205 | \$5,210 | \$6,768 | \$5,839 | \$5,015 | \$5,015 | \$5,165 | \$5,178 | \$4,198 | \$3,988 | \$4,185 |
| American Samoa | \$576 | \$444 | \$448 | \$735 | \$548 | \$386 | \$383 | \$390 | \$374 | \$380 | \$374 | \$364 |
| Arizona | \$17,586 | \$16,470 | \$17,067 | \$21,710 | \$17,682 | \$14,228 | \$13,658 | \$14,048 | \$11,895 | \$11,931 | \$11,209 | \$11,813 |
| Arkansas | \$11,391 | \$9,339 | \$9,302 | \$11,995 | \$9,390 | \$7,655 | \$7,280 | \$7,394 | \$6,470 | \$6,741 | \$6,439 | \$6,655 |
| California | \$64,204 | \$59,319 | \$61,339 | \$78,752 | \$65,303 | \$50,962 | \$49,342 | \$4,931 | \$41,662 | \$42,840 | \$39,704 | \$42,354 |
| Chicago | \$11,378 | \$12,563 | \$12,817 | \$15,255 | \$15,703 | \$12,002 | \$10,700 | \$10,640 | \$10,410 | \$9,847 | \$9,578 | \$9,820 |
| Colorado | \$15,509 | \$13,654 | \$13,938 | \$17,500 | \$14,010 | \$11,943 | \$10,637 | \$10,875 | \$9,398 | \$9,811 | \$9,260 | \$9,768 |
| Connecticut | \$13,146 | \$10,829 | \$10,802 | \$14,016 | \$11,324 | \$9,298 | \$8,704 | \$8,720 | \$7,553 | \$7,917 | \$7,519 | \$7,767 |
| Delaware | \$6,889 | \$5,519 | \$5,596 | \$7,263 | \$5,911 | \$5,000 | \$5,000 | \$5,150 | \$5,423 | \$4,410 | \$4,309 | \$4,390 |
| District of Columbia | \$11,361 | \$11,985 | \$11,931 | \$8,198 | \$9,898 | \$6,699 | \$6,461 | \$6,616 | \$6,731 | \$6,337 | \$6,278 | \$6,347 |
| Florida | \$43,832 | \$37,584 | \$39,221 | \$51,714 | \$42,468 | \$34,233 | \$32,907 | \$33,482 | \$27,688 | \$29,548 | \$27,467 | \$29,286 |
| Georgia | \$24,936 | \$21,575 | \$22,322 | \$28,600 | \$23,156 | \$19,467 | \$18,146 | \$18,482 | \$15,654 | \$16,225 | \$15,156 | \$16,049 |
| Guam | \$680 | \$516 | \$551 | \$1,009 | \$772 | \$555 | \$547 | \$545 | \$501 | \$519 | \$501 | \$487 |
| Hawaii | \$7,910 | \$6,385 | \$6,381 | \$8,268 | \$6,418 | \$6,611 | \$5,145 | \$5,250 | \$5,260 | \$4,918 | \$4,763 | \$4,887 |
| Idaho | \$8,132 | \$6,588 | \$6,630 | \$8,657 | \$6,637 | \$5,406 | \$5,330 | \$5,495 | \$5,182 | \$5,072 | \$4,905 | \$5,036 |
| Illinois | \$28,316 | \$23,719 | \$24,044 | \$30,467 | \$24,576 | \$20,709 | \$19,986 | \$19,497 | \$16,846 | \$17,315 | \$16,172 | \$16,860 |
| Indiana | \$19,531 | \$16,263 | \$16,461 | \$21,111 | \$16,966 | \$14,135 | \$12,979 | \$12,996 | \$11,147 | \$11,642 | \$10,943 | \$11,449 |

| Awardee | FY 2003 | FY 2004 | FY 2005 | FY 2006 | FY 2007 | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 | FY 2013 | FY 2014 |
|------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Iowa | \$11,954 | \$9,817 | \$9,725 | \$12,466 | \$9,779 | \$7,961 | \$7,540 | \$7,565 | \$6,596 | \$6,889 | \$6,588 | \$6,786 |
| Kansas | \$11,409 | \$9,354 | \$9,297 | \$12,182 | \$9,549 | \$7,598 | \$7,447 | \$7,530 | \$6,595 | \$6,871 | \$6,558 | \$6,771 |
| Kentucky | \$14,650 | \$12,105 | \$12,049 | \$15,591 | \$12,441 | \$9,751 | \$9,511 | \$9,456 | \$8,276 | \$8,665 | \$8,207 | \$8,501 |
| Los Angeles | \$27,857 | \$27,070 | \$27,933 | \$34,079 | \$30,712 | \$22,852 | \$22,523 | \$22,220 | \$20,405 | \$20,059 | \$19,078 | \$19,842 |
| Louisiana | \$15,602 | \$12,914 | \$12,790 | \$16,530 | \$13,243 | \$10,396 | \$9,756 | \$9,999 | \$8,632 | \$9,047 | \$8,558 | \$8,927 |
| Maine | \$8,046 | \$6,601 | \$6,607 | \$8,504 | \$6,527 | \$6,723 | \$5,183 | \$5,259 | \$5,206 | \$4,776 | \$4,646 | \$4,723 |
| Marshall Islands | \$562 | \$434 | \$446 | \$737 | \$550 | \$390 | \$387 | \$388 | \$373 | \$380 | \$373 | \$380 |
| Maryland | \$17,774 | \$14,757 | \$15,291 | \$19,974 | \$16,047 | \$13,038 | \$12,690 | \$12,721 | \$11,057 | \$11,448 | \$10,765 | \$11,284 |
| Massachusetts | \$20,181 | \$17,640 | \$17,872 | \$22,259 | \$18,040 | \$15,367 | \$14,324 | \$15,230 | \$13,460 | \$13,216 | \$12,467 | \$13,011 |
| Michigan | \$28,732 | \$26,897 | \$27,106 | \$33,292 | \$26,993 | \$22,492 | \$20,124 | \$20,143 | \$16,544 | \$17,123 | \$16,057 | \$16,674 |
| Micronesia | \$653 | \$498 | \$497 | \$860 | \$649 | \$461 | \$456 | \$450 | \$421 | \$430 | \$419 | \$425 |
| Minnesota | \$16,822 | \$14,702 | \$15,004 | \$18,722 | \$15,592 | \$14,831 | \$12,055 | \$12,912 | \$10,843 | \$11,303 | \$10,710 | \$11,161 |
| Mississippi | \$11,782 | \$9,671 | \$9,608 | \$12,350 | \$9,722 | \$7,630 | \$7,468 | \$7,527 | \$6,565 | \$6,826 | \$6,530 | \$6,731 |
| Missouri | \$18,370 | \$15,953 | \$16,322 | \$20,586 | \$16,566 | \$13,029 | \$12,476 | \$12,572 | \$10,718 | \$11,189 | \$10,527 | \$10,947 |
| Montana | \$7,147 | \$5,776 | \$5,752 | \$7,452 | \$5,983 | \$5,023 | \$5,019 | \$5,166 | \$5,179 | \$4,366 | \$4,269 | \$4,346 |
| Nebraska | \$9,079 | \$7,377 | \$7,347 | \$9,470 | \$7,324 | \$6,851 | \$5,774 | \$5,876 | \$5,235 | \$5,421 | \$5,225 | \$5,373 |
| Nevada | \$9,975 | \$8,928 | \$9,268 | \$11,785 | \$9,340 | \$7,652 | \$7,293 | \$7,512 | \$6,586 | \$6,825 | \$6,516 | \$6,756 |
| New Hampshire | \$7,987 | \$6,465 | \$6,527 | \$8,422 | \$6,448 | \$6,182 | \$5,244 | \$5,349 | \$5,399 | \$4,881 | \$4,743 | \$4,830 |
| New Jersey | \$25,186 | \$21,047 | \$21,953 | \$27,697 | \$22,338 | \$18,789 | \$18,248 | \$18,016 | \$16,185 | \$16,033 | \$14,993 | \$15,671 |

| Awardee | FY 2003 | FY 2004 | FY 2005 | FY 2006 | FY 2007 | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 | FY 2013 | FY 2014 |
|--------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| New Mexico | \$9,342 | \$8,803 | \$8,810 | \$11,070 | \$8,691 | \$7,588 | \$6,853 | \$7,644 | \$6,526 | \$6,717 | \$6,495 | \$6,651 |
| New York | \$31,676 | \$28,494 | \$28,293 | \$35,407 | \$28,875 | \$22,519 | \$22,171 | \$22,932 | \$19,285 | \$19,927 | \$18,688 | \$19,787 |
| New York City | \$23,586 | \$25,875 | \$26,070 | \$31,208 | \$28,823 | \$23,609 | \$20,674 | \$20,603 | \$19,244 | \$18,658 | \$17,841 | \$18,535 |
| North Carolina | \$24,462 | \$20,433 | \$20,547 | \$26,604 | \$21,306 | \$16,696 | \$16,224 | \$16,552 | \$14,020 | \$14,977 | \$14,008 | \$14,927 |
| North Dakota | \$6,510 | \$5,223 | \$5,194 | \$6,718 | \$5,840 | \$5,203 | \$5,023 | \$5,022 | \$5,180 | \$4,198 | \$3,988 | \$4,185 |
| Northern Mariana Islands | \$585 | \$450 | \$466 | \$790 | \$593 | \$423 | \$419 | \$377 | \$358 | \$358 | \$354 | \$360 |
| Ohio | \$32,013 | \$27,627 | \$27,902 | \$35,469 | \$28,838 | \$21,982 | \$21,312 | \$20,948 | \$17,609 | \$18,538 | \$17,282 | \$18,044 |
| Oklahoma | \$13,229 | \$10,899 | \$10,840 | \$13,905 | \$11,102 | \$8,740 | \$8,537 | \$8,487 | \$7,510 | \$7,895 | \$7,500 | \$7,806 |
| Oregon | \$13,238 | \$10,907 | \$11,155 | \$14,499 | \$11,469 | \$10,646 | \$8,885 | \$8,871 | \$7,830 | \$8,146 | \$7,730 | \$8,052 |
| Palau | \$522 | \$407 | \$411 | \$642 | \$472 | \$331 | \$330 | \$329 | \$323 | \$325 | \$323 | \$325 |
| Pennsylvania | \$34,179 | \$30,735 | \$30,977 | \$38,373 | \$31,307 | \$24,209 | \$22,975 | \$22,809 | \$19,775 | \$20,201 | \$18,810 | \$19,685 |
| Puerto Rico | \$14,103 | \$11,641 | \$11,574 | \$14,611 | \$11,445 | \$8,868 | \$8,666 | \$8,514 | \$7,474 | \$7,505 | \$7,141 | \$7,271 |
| Rhode Island | \$7,513 | \$6,048 | \$6,240 | \$7,947 | \$6,074 | \$5,686 | \$5,000 | \$5,150 | \$5,302 | \$4,574 | \$4,447 | \$4,516 |
| South Carolina | \$14,634 | \$12,092 | \$12,109 | \$15,644 | \$12,549 | \$9,969 | \$10,097 | \$11,035 | \$9,309 | \$9,765 | \$9,290 | \$9,713 |
| South Dakota | \$6,798 | \$5,441 | \$5,426 | \$7,033 | \$5,879 | \$5,000 | \$5,000 | \$5,150 | \$5,170 | \$4,198 | \$4,075 | \$4,185 |
| Tennessee | \$18,636 | \$15,488 | \$15,459 | \$20,080 | \$16,418 | \$12,845 | \$12,496 | \$12,711 | \$10,846 | \$11,424 | \$10,743 | \$11,289 |
| Texas | \$55,685 | \$51,804 | \$53,590 | \$67,920 | \$56,223 | \$44,155 | \$42,817 | \$43,195 | \$37,546 | \$37,552 | \$34,758 | \$37,455 |
| Utah | \$10,404 | \$8,502 | \$8,561 | \$11,210 | \$8,879 | \$7,444 | \$7,019 | \$7,329 | \$6,464 | \$6,664 | \$6,368 | \$6,637 |
| Vermont | \$6,454 | \$5,199 | \$5,187 | \$6,703 | \$5,844 | \$5,041 | \$5,043 | \$5,193 | \$5,192 | \$4,198 | \$3,988 | \$4,185 |

| Awardee | FY 2003 | FY 2004 | FY 2005 | FY 2006 | FY 2007 | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 | FY 2013 | FY 2014 |
|-----------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Virgin Islands (U.S.) | \$639 | \$488 | \$497 | \$861 | \$651 | \$462 | \$457 | \$453 | \$424 | \$433 | \$422 | \$423 |
| Virginia | \$22,068 | \$19,925 | \$20,475 | \$26,207 | \$21,301 | \$18,587 | \$16,614 | \$17,063 | \$14,484 | \$15,099 | \$14,188 | \$14,931 |
| Washington | \$19,214 | \$16,979 | \$17,351 | \$21,957 | \$17,736 | \$14,193 | \$13,562 | \$13,732 | \$11,711 | \$12,243 | \$11,495 | \$12,128 |
| West Virginia | \$9,271 | \$7,540 | \$7,499 | \$9,624 | \$7,412 | \$5,933 | \$5,839 | \$5,898 | \$5,337 | \$5,426 | \$5,243 | \$5,356 |
| Wisconsin | \$17,821 | \$14,812 | \$14,975 | \$19,199 | \$15,869 | \$12,188 | \$12,178 | \$13,276 | \$11,236 | \$11,728 | \$11,129 | \$11,521 |
| Wyoming | \$6,171 | \$4,909 | \$4,907 | \$6,372 | \$5,748 | \$5,000 | \$5,000 | \$5,000 | \$5,170 | \$4,198 | \$3,988 | \$4,185 |

Note: Funding for each year is shown in dollars from that year.

Exhibit B.3—Phase I-Phase IV H1N1 Funding, \$1,000s

| Awardee | Phase I | Phase II | Phase III | Phase IV | Total |
|----------------------|----------------|-----------------|------------------|-----------------|--------------|
| Alabama | \$3,934 | \$3,982 | \$13,144 | \$0 | \$21,060 |
| Alaska | \$573 | \$1,862 | \$3,624 | \$320 | \$6,378 |
| American Samoa | \$49 | \$531 | \$640 | \$0 | \$1,221 |
| Arizona | \$5,275 | \$4,827 | \$16,942 | \$0 | \$27,045 |
| Arkansas | \$2,405 | \$3,017 | \$8,811 | \$0 | \$14,233 |
| California | \$22,677 | \$15,804 | \$66,238 | \$18,027 | \$122,747 |
| Chicago | \$2,424 | \$2,529 | \$7,866 | \$0 | \$12,818 |
| Colorado | \$4,066 | \$4,065 | \$13,518 | \$0 | \$21,650 |
| Connecticut | \$2,998 | \$3,391 | \$10,493 | \$0 | \$16,882 |
| Delaware | \$730 | \$1,961 | \$4,068 | \$0 | \$6,759 |
| District of Columbia | \$497 | \$1,314 | \$2,409 | \$0 | \$4,220 |
| Florida | \$15,475 | \$11,261 | \$45,836 | \$0 | \$72,572 |
| Georgia | \$8,010 | \$6,553 | \$24,691 | \$0 | \$39,254 |
| Guam | \$146 | \$592 | \$914 | \$0 | \$1,653 |
| Hawaii | \$1,100 | \$2,194 | \$5,115 | \$0 | \$8,408 |
| Idaho | \$1,254 | \$2,291 | \$5,554 | \$353 | \$9,452 |
| Illinois | \$8,553 | \$6,895 | \$26,229 | \$0 | \$41,677 |
| Indiana | \$5,401 | \$4,907 | \$17,299 | \$0 | \$27,607 |
| Iowa | \$2,551 | \$3,109 | \$9,226 | \$550 | \$15,436 |
| Kansas | \$2,365 | \$2,991 | \$8,698 | \$0 | \$14,054 |
| Kentucky | \$3,598 | \$3,770 | \$12,192 | \$0 | \$19,560 |
| Los Angeles | \$8,510 | \$6,368 | \$25,106 | \$0 | \$39,984 |
| Louisiana | \$3,668 | \$3,814 | \$12,390 | \$0 | \$19,872 |
| Maine | \$1,131 | \$2,213 | \$5,202 | \$0 | \$8,546 |
| Marshall Islands | \$52 | \$533 | \$646 | \$0 | \$1,231 |
| Maryland | \$4,804 | \$4,530 | \$15,608 | \$2,774 | \$27,716 |
| Massachusetts | \$5,507 | \$4,973 | \$17,599 | \$0 | \$28,079 |
| Michigan | \$8,636 | \$6,947 | \$26,464 | \$2,797 | \$44,844 |
| Micronesia | \$92 | \$558 | \$762 | \$0 | \$1,412 |

| Awardee | Phase I | Phase II | Phase III | Phase IV | Total |
|--------------------------|----------------|-----------------|------------------|-----------------|--------------|
| Minnesota | \$4,420 | \$4,288 | \$14,521 | \$4,262 | \$27,491 |
| Mississippi | \$2,490 | \$3,070 | \$9,053 | \$0 | \$14,613 |
| Missouri | \$4,998 | \$4,653 | \$16,158 | \$0 | \$25,809 |
| Montana | \$808 | \$2,010 | \$4,289 | \$747 | \$7,853 |
| Nebraska | \$1,513 | \$2,454 | \$6,285 | \$0 | \$10,252 |
| Nevada | \$2,135 | \$2,847 | \$8,047 | \$0 | \$13,029 |
| New Hampshire | \$1,125 | \$2,210 | \$5,186 | \$0 | \$8,521 |
| New Jersey | \$7,463 | \$6,208 | \$23,141 | \$3,913 | \$40,725 |
| New Mexico | \$1,672 | \$2,555 | \$6,736 | \$0 | \$10,963 |
| New York | \$9,488 | \$7,485 | \$28,878 | \$3,622 | \$49,473 |
| New York City | \$7,027 | \$5,432 | \$20,905 | \$6,716 | \$40,081 |
| North Carolina | \$7,576 | \$6,279 | \$23,461 | \$0 | \$37,316 |
| North Dakota | \$544 | \$1,843 | \$3,541 | \$0 | \$5,928 |
| Northern Mariana Islands | \$71 | \$544 | \$700 | \$0 | \$1,315 |
| Ohio | \$9,819 | \$7,693 | \$29,814 | \$2,670 | \$49,996 |
| Oklahoma | \$3,062 | \$3,431 | \$10,673 | \$621 | \$17,788 |
| Oregon | \$3,166 | \$3,497 | \$10,968 | \$1,088 | \$18,718 |
| Palau | \$18 | \$511 | \$550 | \$0 | \$1,079 |
| Pennsylvania | \$10,642 | \$8,213 | \$32,146 | \$0 | \$51,001 |
| Puerto Rico | \$3,360 | \$3,619 | \$11,518 | \$0 | \$18,497 |
| Rhode Island | \$913 | \$2,076 | \$4,587 | \$0 | \$7,576 |
| South Carolina | \$3,697 | \$3,832 | \$12,471 | \$0 | \$20,000 |
| South Dakota | \$669 | \$1,922 | \$3,895 | \$0 | \$6,486 |
| Tennessee | \$5,166 | \$4,758 | \$16,633 | \$0 | \$26,558 |
| Texas | \$20,110 | \$14,185 | \$58,964 | \$0 | \$93,259 |
| Utah | \$2,181 | \$2,876 | \$8,179 | \$1,321 | \$14,557 |
| Vermont | \$534 | \$1,837 | \$3,512 | \$0 | \$5,882 |
| Virgin Islands (U.S.) | \$93 | \$559 | \$763 | \$0 | \$1,415 |
| Virginia | \$6,538 | \$5,624 | \$20,520 | \$0 | \$32,682 |
| Washington | \$5,471 | \$4,951 | \$17,498 | \$0 | \$27,921 |
| West Virginia | \$1,556 | \$2,481 | \$6,407 | \$0 | \$10,443 |

| Awardee | Phase I | Phase II | Phase III | Phase IV | Total |
|----------------|----------------|-----------------|------------------|-----------------|--------------|
| Wisconsin | \$4,753 | \$4,498 | \$15,465 | \$0 | \$24,716 |
| Wyoming | \$441 | \$1,778 | \$3,248 | \$0 | \$5,466 |

Source: CDC, "Public Health Emergency Response (PHER) H1N1 Funding," January 8, 2011. http://www.cdc.gov/phpr/documents/PHER_Funding_Totals_by_Awardees_v2.pdf

Appendix C: Glossary

Affordable Care Act

Comprises two pieces of legislation—the Patient Protection and Affordable Care Act (P.L. 111-148) and the Health Care and Education Reconciliation Act of 2010 (P.L. 111-152)—that were signed into law in March 2010 and that aim to expand access to private and public health insurance while improving quality and lowering health care costs.²⁶¹

All-hazards approach

An approach for prevention, protection, preparedness, response, and recovery that addresses a full range of threats and hazards, including domestic terrorist attacks, natural and manmade disasters, accidental disruptions, and other emergencies.²⁶²

At-risk individuals

Persons who, before, during, and after an incident, may have additional needs in one or more of the following functional areas: communication, medical care, maintaining independence, supervision, and transportation. Includes individuals specifically recognized as “at-risk” in the Pandemic and All-Hazards Preparedness Act (i.e., children, senior citizens, and pregnant women), individuals who may need additional response assistance including persons who have disabilities, live in institutionalized settings, are from diverse cultures, have limited English proficiency or are non-English-speaking, are transportation disadvantaged, have chronic medical disorders, and have pharmacological dependency.²⁶³

Biosafety

Development and implementation of administrative policies, work practices, facility design, and safety equipment to prevent transmission of biologic agents to workers, other persons, and the environment.²⁶⁴

Biosecurity

Protection of high-consequence microbial agents and toxins, or critical relevant information, against theft or diversion by those who intend to pursue intentional misuse.²⁶⁵

Biosurveillance

The process of gathering, integrating, interpreting, and communicating essential information related to all-hazards threats or disease activity affecting human, animal, or plant health to achieve early detection and warning, contribute to overall situational awareness of the health aspects of an incident, and to enable better decision-making at all levels.²⁶⁶

Capability

“Provides the means to accomplish a mission or function resulting from the performance of one or more critical tasks, under specified conditions, to target levels of performance. A capability may be delivered with any combination of properly planned, organized, equipped, trained, and exercised personnel that achieves the desired outcome mission.”²⁶⁷

Community health resilience

The ability of a community to use its assets to strengthen public health and health care systems and to improve the community’s physical, behavioral, and social health to withstand, adapt to, and recover from adversity.

Community Resilience Approach

An approach which encourages actions that build preparedness while also promoting strong day-to-day systems and addressing the underlying social determinants of health.

Continuous quality improvement

An ongoing effort to achieve measurable improvements in the efficiency, effectiveness, performance, accountability, outcomes, and other indicators of quality services or processes.²⁶⁸

Electronic health record (EHR)

A digital version of a patient’s paper medical chart.²⁶⁹

Emergency management system

Coordination of systems and multidisciplinary personnel (e.g., police, fire, emergency managers) to address all phases of an incident.²⁷⁰

Emergency Medical Services (EMS)

A system of coordinated response, involving private and public agencies and organizations, that provides emergency medical care after an incident that causes serious illness or injury.²⁷¹

Global health security

Prevention of, protection from, mitigation of, response to, and recovery from serious incidents that are cross-border in nature and that pose a risk to security, destabilize economies, disrupt social cohesion, and affect the critical business of government.²⁷²

Healthcare coalition

A single functional entity of healthcare facilities and other healthcare assets to organize and implement the mitigation, preparedness, response, and recovery actions of medical and healthcare providers in a jurisdiction's healthcare system.²⁷³

Healthcare system

The broader, community-wide health system that includes hospitals, skilled nursing facilities, nursing homes, hospices, community health centers, home care, physician and other ambulatory care providers; specialty services like dialysis centers, poison control centers, and emergency medical services; and an array of other healthcare providers at the state and local levels.²⁷⁴

Health situational awareness

A knowledge state that results from the process of active information gathering (both domestic and international) with appropriate analysis, integration, interpretation, validation, and sharing of information related to health threats and the health of the human population, as well as health system and human services resources, health-related response assets, and other information that could impact the public's health to inform decision-making, resource allocation, and other actions.²⁷⁵

Incident

An occurrence, natural or manmade, that requires a response to protect life or property.²⁷⁶

Incident command

Organizational element responsible for overall management of an incident and consisting of the Incident Commander (either single or unified command structure) and any assigned supporting staff.²⁷⁷

Medical Countermeasures

MCMs include both pharmaceutical interventions (e.g., vaccines, antimicrobials, antidotes, and antitoxins) and non-pharmaceutical MCM interventions (e.g., ventilators, diagnostics, personal protective equipment, and patient decontamination methods) that may be used to prevent, mitigate, or treat the adverse health effects of a public health emergency.²⁷⁸

Medical surge

The capability to rapidly expand the capacity of the existing health care system in order to provide triage and subsequent medical care.²⁷⁹

National health security

A state in which the nation and its people are prepared for, protected from, and resilient in the face of health threats or incidents with potentially negative health consequences.

Pandemic and All-Hazards Preparedness Reauthorization Act

Law signed in March 2013 (Public Law No. 113-5) to reauthorize certain programs under the Public Health Service Act and the Federal Food, Drug, and Cosmetic Act with respect to public health security and all-hazards. Authorizes funding for public health and medical preparedness programs; amends the Public Health Service Act to grant state health departments flexibility in dedicating staff resources to meeting critical community needs in a disaster; authorizes funding for buying medical countermeasures under the Project BioShield Act; and increases the flexibility of BioShield to support advanced research and development.²⁸⁰

Public health

The science and practice of protecting and improving the overall health of the community through disease prevention and early diagnosis, control of communicable diseases, health education, injury prevention, sanitation, and protection from environmental hazards.²⁸¹

Public health emergency of international concern (PHEIC)

An extraordinary event that is determined to constitute a public health risk to other states through the international spread of disease and to potentially require a coordinated international response.²⁸²

Resilience/Community resilience

The ability of communities to withstand and recover—in both the short and long term—from adversity, such as a natural disaster or terrorist attack.

Appendix D: Abbreviations

| | |
|---------------|---|
| ACA | Patient Protection and Affordable Care Act of 2010 |
| ACF | Administration for Children and Families |
| ACL | Administration for Community Living |
| AFHSC | Armed Forces Health Surveillance Center |
| AMA | American Medical Association |
| ARC | American Red Cross |
| ARRA | American Recovery and Reinvestment Act |
| ASPPH | Association of Schools and Programs of Public Health |
| ASPR | Assistant Secretary for Preparedness and Response |
| ASTHO | Association of State and Territorial Health Officials |
| ATSDR | Agency for Toxic Substances and Disease Registry |
| BARDA | Biomedical Advanced Research and Development Authority |
| BEP | Biosecurity Engagement Program |
| BRFSS | Behavioral Risk Factor Surveillance System |
| BTRA | Bioterrorism Risk Assessment |
| BWC | Biological and Toxins Weapons Convention |
| CaRES | Campus Resilience Enhancement System |
| CARRI | Community & Regional Resilience Institute |
| CBRN | Chemical, Biological, Radiological, and Nuclear |
| CDC | Centers for Disease Control and Prevention |
| CERC | Crisis and Emergency Risk Communication |
| CHC | Community Health Center |
| CIADM | Center for Innovation in Advanced Development and Manufacturing |
| CIFOR | Council to Improve Foodborne Outbreak Response |
| COE | Center of Excellence |
| CONOPS | Concept of Operations |
| CRI | Cities Readiness Initiative |
| CSC | Crisis Standards of Care |
| CSTS | Center for the Study of Traumatic Stress |
| DCVMRC | Division of Civilian Volunteer Medical Reserve Corps |
| DHS | U.S. Department of Homeland Security |
| DIHS | (ASPR) Division of International Health Security |
| DoD | U.S. Department of Defense |
| DOEHRS | Defense Occupational and Environmental Health Readiness System |
| DOJ | U.S. Department of Justice |
| DOT | U.S. Department of Transportation |
| ECPC | Emergency Communications Preparedness Center |
| EI | Essential Element of Information |

| | |
|-----------------|---|
| EHR | electronic health record |
| EMAP | Emergency Management Accreditation Program |
| EMCAP | Emergency Management Capability Assessment Program |
| EMS | Emergency Medical Services |
| EOP | Evaluation of Progress |
| EPA | U.S. Environmental Protection Agency |
| ERIC | Emergency Response Interoperability Center |
| ESAR-VHP | Emergency System for Advance Registration of Volunteer Health Professionals |
| ESF | Emergency Support Function |
| ESRD | end-stage renal disease |
| EUA | Emergency Use Authorization |
| FCC | Federal Communications Commission |
| FDA | U.S. Food and Drug Administration |
| FEMA | Federal Emergency Management Agency |
| FERN | Food Emergency Response Network |
| FETIG | Federal Education and Training Interagency Group |
| FirstNet | First Responders Network Authority |
| FSWG | U.S. Food Safety Working Group |
| FY | fiscal year |
| GAO | Government Accountability Office |
| GDD | Global Disease Detection |
| GETS | Government Emergency Telecommunications Service |
| GIS | Geographic Information System |
| HCQ | Healthcare Coalition Questionnaire |
| HHS | U.S. Department of Health and Human Services |
| HP2020 | Healthy People 2020 |
| HPP | Hospital Preparedness Program |
| HPSA | Health Professional Shortage Area |
| HRSA | Health Resources and Services Administration |
| HSGP | Homeland Security Grant Program |
| HSPD | Homeland Security Presidential Directive |
| HUD | U.S. Department of Housing and Urban Development |
| IHR | International Health Regulations |
| IPAWS | Integrated Public Alert and Warning System |
| HCC | health care coalition |
| HCO | health care organization |
| HITECH | Health Information Technology for Economic and Clinical Health |
| IP | National Health Security Strategy Implementation Plan |
| IOM | Institute of Medicine |
| IT | information technology |
| JBAIDS | Joint Biological Agent Identification and Diagnostic System |
| LRN | Laboratory Response Network |
| MAPP | Mobilizing for Action through Planning and Partnerships |
| MCM | Medical Countermeasure |

| | |
|----------------|--|
| MOU | Memorandum of Understanding |
| MRC | Medical Reserve Corps |
| MSA | Metropolitan Statistical Area |
| NACCHO | National Association of County and City Health Officials |
| NAPAPI | North American Plan for Avian and Pandemic Influenza |
| NBIC | National Biosurveillance Integration Center |
| NBSB | National Biodefense Science Board (see NPRSB) |
| NCDMPH | National Center for Disaster Medicine and Public Health |
| NCMI | National Center for Medical Intelligence |
| NDLS | National Disaster Life Support |
| NDMS | National Disaster Medical System |
| NDRF | National Disaster Recovery Framework |
| NEMESIS | National Emergency Medical System Information System |
| NHSPI | National Health Security Preparedness Index |
| NHSR | National Health Security Review |
| NHSS | National Health Security Strategy |
| NHTSA | National Highway Traffic Safety Administration |
| NIAID | National Institute of Allergy and Infectious Diseases |
| NIEHS | National Institute of Environmental Health Sciences |
| NIH | National Institutes of Health |
| NIMH | National Institute of Mental Health |
| NIMS | National Incident Management System |
| NPG | National Preparedness Goal |
| NPRSB | National Preparedness and Response Science Board (renamed from NBSB in 2014) |
| NSS | National Security Strategy |
| OGA | Office of Global Affairs |
| ONC | Office of the National Coordinator for Health Information Technology |
| ORR | Operational Readiness Review |
| PAHPA | Pandemic and All-Hazards Preparedness Act |
| PAHPRA | Pandemic and All-Hazards Preparedness Reauthorization Act |
| PERRC | Preparedness and Emergency Response Research Center |
| PERLC | Preparedness and Emergency Response Learning Center |
| PHAB | Public Health Accreditation Board |
| PHEIC | Public Health Incident of International Concern |
| PHEMCE | Public Health Emergency Medical Countermeasures Enterprise |
| PHEP | Public Health Emergency Preparedness |
| PHERRB | Public Health Emergency Research Review Board |
| PHIN | Public Health Information Network |
| POD | point of dispensing |
| PPD | Presidential Policy Directive |
| PPHR | Project Public Health Ready |
| PTSD | post-traumatic stress disorder |
| SAMHSA | Substance Abuse and Mental Health Services Administration |

| | |
|----------------|---|
| SNRA | Strategic National Risk Assessment |
| SNS | Strategic National Stockpile |
| SOC | Secretary's Operation Center |
| TAR | Technical Assistance Review |
| TIIDE | Terrorism Injuries Information Dissemination and Exchange |
| USAID | U.S. Agency for International Development |
| USPACOM | U.S. Pacific Command |
| USDA | U.S. Department of Agriculture |
| USUHS | Uniformed Services University of the Health Sciences |
| VA | U.S. Department of Veterans Affairs |
| VEMEC | Veterans Emergency Management Evaluation Center |
| VOAD | (National) Voluntary Organizations Active in Disaster |
| WHO | World Health Organization |
| WMD | Weapons of Mass Destruction |
| WPS | Wireless Priority Service |

Endnotes

¹ The statutory authority and requirements for the EOP are found in the Public Health Service Act (PHS), as amended by the Pandemic and All-Hazards Preparedness Act (PAHPA), signed into law in December 2006 and again by the Pandemic and All-Hazards Preparedness Reauthorization Act (PAHPRA), in March 2013.¹ According to Section 2802 (42 U.S.C. § 300hh-1), the NHSS must include an evaluation of progress made by federal, state, local, and tribal officials based on benchmarks and standards established for the Public Health Emergency Preparedness (PHEP) and Hospital Preparedness Program (HPP) cooperative agreement programs.

² The statutory authority and requirements for the EOP are found in PHS, as amended by PAHPA, signed into law in December 2006 and again by PAHPRA, in March 2013.² According to Section 2802 (42 U.S.C. § 300hh-1), the NHSS must include an evaluation of progress made by federal, state, local, and tribal officials based on benchmarks and standards established for the PHEP and HPP cooperative agreement programs.

³ U.S. Department of Health and Human Services (HHS), *National Health Security Strategy*, Washington, D.C., December 2009. As of May 28, 2013: <http://www.phe.gov/Preparedness/planning/authority/nhss/Pages/default.aspx>

⁴ HHS, *Implementation Plan for the National Health Security Strategy of the United States of America*, Washington, D.C., May 2012. As of May 28, 2013: <http://www.phe.gov/Preparedness/planning/authority/nhss/ip/Documents/nhss-ip.pdf>

⁵ Trust for America's Health, *Investing in America's Health: A State-by-State Look at Public Health Funding and Key Health Facts*, April 2013. As of June 13, 2014: <http://healthyamericans.org/report/105/>

⁶ Association of State and Territorial Health Officials (ASTHO), "Budget Cuts Continue to Affect the Health of Americans," updated December 2012. As of May 24, 2013: <http://www.astho.org/budget-cuts-Dec-2012/>

⁷ The White House, *National Security Strategy*, Washington, D.C., May 2010. As of May 3, 2013: http://www.whitehouse.gov/sites/default/files/rss_viewer/national_security_strategy.pdf

⁸ U.S. Department of Homeland Security, *Presidential Policy Directive / PPD-8: National Preparedness*, March 30, 2011. As of December 18, 2013: <http://www.dhs.gov/presidential-policy-directive-8-national-preparedness>

⁹ Federal Emergency Management Agency (FEMA), *National Preparedness Goal*, 2011. As of February 26, 2014: <http://www.fema.gov/national-preparedness-goal>

¹⁰ The White House, Executive Order 13527, Medical Countermeasures Following a Biological Attack, December 30, 2009. As of March 19, 2014: <http://www.whitehouse.gov/the-press-office/executive-order-medical-countermeasures-following-a-biological-attack>

¹¹ Section 2802 of PHS, as added by PAHPA, signed into law in December 2006 and amended by PAHPRA, in March 2013.

¹² Communication from CDC, "Technical Assistance Strategies: 2011–2013," September 26, 2013.

¹³ For more information about the Public Health Preparedness Capabilities (e.g., definitions of the capabilities), go to <http://www.cdc.gov/phpr/capabilities/>. For more information on the Healthcare Capabilities, go to <http://www.phe.gov/Preparedness/planning/hpp/reports/Documents/capabilities.pdf>.

¹⁴ FEMA, "National Response Framework," last updated February 3, 2014. As of June 13, 2014: <http://www.fema.gov/national-response-framework>

¹⁵ CDC, *Public Health Preparedness: 2012 State-By-State Report on Laboratory, Emergency Operations Coordination, and Emergency Public Information and Warning*, 2012. As of June 13, 2014: http://www.cdc.gov/phpr/pubs-links/2012/documents/2012%20State-By-State_Preparedness_Report.pdf. CDC, *2013–2014 National Snapshot of Public Health Preparedness*, 2013. As of June 13, 2014: http://www.cdc.gov/phpr/pubs-links/2013/documents/2013_Preparedness_Report.pdf

¹⁶ GAO, *Improvements Needed for Measuring Awardee Performance in Meeting Medical and Public Health Preparedness Goals*, GAO-13-278, March 2013. As of June 13, 2014: <http://www.gao.gov/products/GAO-13-278>

¹⁷ Bevington F, "NACCHO's 2013 National Profile of Local Health Departments Shows Continued Funding Cuts for Preparedness," January 28, 2014. As of June 27, 2014: <http://nacchopreparedness.org/?p=1199>

¹⁸ Institute of Medicine, *The Impact of State and Local Budget Cuts on Public Health Preparedness*, June 2011. As of November 20, 2014:

<http://www.iom.edu/~media/Files/Activity%20Files/PublicHealth/MedPrep/Impact%20of%20state%20and%20local%20budget%20cuts%20on%20PHP.pdf>

¹⁹ FEMA, *National Disaster Recovery Framework*, last updated July 30, 2013. As of June 13, 2014:

<http://www.fema.gov/national-disaster-recovery-framework>

²⁰ The guidelines can be accessed here:

https://www.acf.hhs.gov/sites/default/files/ohsepr/childrens_task_force_development_web.pdf (HHS, Administration for Children and Families, Office of Human Services Emergency Preparedness and Response, *Children and Youth Task Force in Disasters: Guidelines for Development*, September 4, 2013).

²¹ FEMA, “Ready Campaign,” fact sheet, July 5, 2012. As of June 13, 2014:

http://www.ready.gov/sites/default/files/documents/files/Ready_Factsheet_20120705.pdf

²² Information about an ASPR/VA workshop on disaster preparedness for people experiencing homelessness (March 2013) can be found here: http://arc4em.org/special_workshop.php (Advancing and Redefining Communities for Emergency Management, “Incorporating Homeless Populations into Disaster Preparedness, Planning and Response,” undated), as of March 9, 2014.

²³ The Los Angeles project also leverages funding from the National Institute of Mental Health (NIMH) and the Robert Wood Johnson Foundation.

²⁴ See the following three articles in *American Journal of Public Health*, July 2013: Kenneth B. Wells, Jennifer Tang, Elizabeth Lizaola, Felicia Jones, Arleen Brown, Alix Stayton, Malcolm Williams, Anita Chandra, David Eisenman, Stella Fogleman, and Alonzo Plough, “Applying Community Engagement to Disaster Planning: Developing the Vision and Design for the Los Angeles County Community Disaster Resilience Initiative,” *American Journal of Public Health*, July 2013, Vol. 103, No. 7, pp. 1172–1180; Anita Chandra, Malcolm Williams, Alonzo Plough, Alix Stayton, Kenneth B. Wells, Mariana Horta, and Jennifer Tang, “Getting Actionable About Community Resilience: The Los Angeles County Community Disaster Resilience Project,” *American Journal of Public Health*, July 2013, Vol. 103, No. 7, pp. 1181–1189; and Alonzo Plough, Jonathan E. Fielding, Anita Chandra, Malcolm Williams, David Eisenman, Kenneth B. Wells, Grace Y. Law, Stella Fogleman, and Aizita Magaña, “Building Community Disaster Resilience: Perspectives From a Large Urban County Department of Public Health,” *American Journal of Public Health*, July 2013, Vol. 103, No. 7, pp. 1190–1197.

²⁵ Jewel Edwards, “Resilient DC: Creating Community Infrastructure to Mitigate Disaster,” *Asian Fortune News*, July 24, 2013. As of June 16, 2014: <http://www.asianfortunenews.com/2013/07/resilient-dc-creating-community-infrastructure-to-mitigate-disaster/>

²⁶ Facebook: <https://www.facebook.com/ResilientDc>; e-mail: community.resilience@dc.gov; e-mail: communityresilience@rand.org.

²⁷ Community and Regional Resilience Institute, “Community Resilience System,” undated. As of June 27, 2014: <http://www.resilientus.org/recent-work/community-resilience-system/>

²⁸ Community and Regional Resilience Institute, “What We Do,” undated. As of June 16, 2014: <http://www.resilientus.org/about-us/what-we-do/>

²⁹ Community and Regional Resilience Institute, “CaRES,” undated. As of June 16, 2014: <http://www.resilientus.org/recent-work/cares/>

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FOR MORE INFORMATION, CONTACT:

United States Department of Health and Human Services
Office of the Assistant Secretary for Preparedness and Response
Hubert H. Humphrey Building, Room 638G
200 Independence Ave., SW
Washington, D.C. 20201

(202) 205-2882

www.hhs.gov

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