

Value-Based Models for Sustaining Emergency Preparedness Capacity and Capability in the United States

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EXECUTIVE SUMMARY

Emergency preparedness is a vital public resource in the United States. Since 2001, considerable public and private money has been invested in implementing the capacity and capability to respond to and recover from public health emergencies, large and small. However, this funding has dwindled considerably since 2008. The major issue facing emergency preparedness today is that the infrastructure that has been built to ensure national preparedness is threatened by these budget cuts, and likely cuts in the future.

In this paper, we discuss issues in funding a prepared nation, including the uncertainty surrounding the likelihood and cost of public health emergencies. We also focus on implementation, highlighting some of the practical problems that have arisen with the implementation of current systems. Preparedness funding often increases considerably after a public health emergency, only to wane during times of fiscal tightening, and when interest has diminished with time. This approach leads to inefficiencies and to planning problems due to the short time horizon of the funding. However, several promising models exist in which local communities have found ways to sustain preparedness through local taxes, public–private partnerships, and resource sharing. Some of these models are highlighted in this paper. Ultimately, the following seven recommendations aim to provide a roadmap for enhancing the sustainability of preparedness efforts in the United States.

Recommendation 1: The federal government should develop measures of emergency preparedness both at the community level and nationally. A research agenda that would help guide this effort is proposed.

Recommendation 2: Measures developed should be used to conduct a nationwide gap analysis of community preparedness.

Recommendation 3: Alternative ways of distributing funding should be considered to ensure that all communities can build and sustain local coalitions that can support sufficient infrastructure.

Recommendation 4: When monies are released for specific projects, there should be clear metrics of grant effectiveness.

Recommendation 5: There should be better coordination at the federal level, including funding and grant guidance.

Recommendation 6: Local communities should build coalitions or use existing coalitions to build public–private partnerships with local hospitals and other businesses with a stake in preparedness.

Recommendation 7: Communities should be encouraged to engage in creative ways to finance local preparedness efforts.

INTRODUCTION

Since the September 11, 2001, attacks, there have been periodic but unremitting public health emergencies across the United States. Weather events such as Hurricane Sandy, H1N1, the Boston marathon attack, and outbreaks of foodborne illness from *Salmonella* and *E. coli* serve as examples of major local and national public health emergencies demonstrating that no community is immune. These emergencies—in whatever form they appear—underscore the importance of preparedness to ensure that response is both swift and effective, and that communities have the resources they need to recover.

Swift and effective response and recovery requires multidisciplinary coordination across communities. When a coordinated response is required, it is always a complex undertaking, involving groups that do not work together on a daily basis, such as police, firefighters, emergency medical services providers, hospital-based physicians, nurses, administrators, and government officials. Since 2001, the nation has invested considerable resources in developing the infrastructure to handle these large-scale public health emergencies. This infrastructure has also bolstered the effectiveness of community response to more common day-to-day emergencies.

The major issue facing emergency preparedness and other traditionally government-funded services is that the infrastructure that has been built to ensure national preparedness is threatened by budget cuts and de-prioritization. Several recent papers commissioned by the Institute of Medicine (IOM) and other groups have explored issues of sustained preparedness funding. In 2009, an IOM white paper titled “Financing Surge Capacity and Preparedness” highlighted several issues in emergency preparedness funding.¹

These issues included

- Funding use restrictions, which were described as a major impediment to emergency preparedness and response—funds are released specifically for identified public health emergencies (e.g., H1N1), and not with the overall goal of improving preparedness.
- The need for collaborative planning and creation of partnerships on reimbursement strategies during disasters was identified as a major issue. Ensuring that the payer process continues uninterrupted is vital to sustaining providers and facilities during and after an emergency hits.
- Regional initiatives were identified as an area in which economies of scale might be achieved through sharing of resources and local coordination.
- Regulatory activity was identified as a lever to ensure that facilities are prepared and recover post-incident.
- Recovery strategies were highlighted as an area of the emergency surge continuum that was not adequately addressed. Specifically, the ability to return to normal working operations after a public health emergency was at that time not part of funding considerations.
- Finally, the ability to conduct gap analysis—specifically identifying areas of

¹ Available at <http://www.iom.edu/~media/Files/Activity%20Files/PublicHealth/MedPrep/Jun-10-11-2009-Commissioned%20Papers/Jun-10-11-2009-Commissioned-Paper-Financing-Surge-Capacity-and-Preparedness.pdf> (accessed December 6, 2013).

weakness and vulnerability—was identified as vitally important. There is a great need for “metrics of preparedness” to assess regulatory compliance, performance on exercises, and other elements of response and recovery.

In June 2011, a follow-on IOM paper titled “The Impact of State and Local Budget Cuts on Public Health Preparedness”² found that

- High levels of funding were needed to sustain all-hazards public health preparedness capabilities. This funding should be “steady, predictable, and robust” to enable the health infrastructure of biosurveillance and medical surge capacity. This is different from the current situation of large fluctuations (rapid increases in funding followed by rapid reductions).
- There were no specific plans to ensure that the rapidly aging workforce in this area will be replaced. The retirement of the workforce without sufficiently training new personnel will result in loss of institutional knowledge and a reduced ability to respond to public health emergencies.
- Lower investments in biosurveillance by state and local health departments will make the nation less secure from both intentional and unintentional public health incidents.
- Rural health departments, because of their exclusive dependence on federal funding for preparedness, are particularly vulnerable.

In the wake of these papers and others, the IOM Preparedness Forum commissioned the present white paper to provide a more detailed background on which programs specifically have been most impacted by budget cuts, to explore potential approaches to assessing the value of preparedness, and to detail how a handful of communities have found sustainable approaches to fund local preparedness efforts in an era of increasing fiscal austerity. In this paper, recommendations are made with the ultimate goal of sustaining the capacity and capability of the United States to be prepared for and respond to public health emergencies in the future and ensuring that no community is unprepared.

EMERGENCY PREPAREDNESS FUNDING SINCE THE SEPTEMBER 11, 2001, ATTACKS

We first provide a detailed history of federal preparedness funding in the United States. This section demonstrates the large ramp-up in funding that occurred in the years following the September 11, 2001, terrorist attacks. In addition, more recently, funding has decreased for emergency preparedness and response in the United States.

² Institute of Medicine. The Impact of State and Local Budget Cuts on Public Health Preparedness. June 13, 2011 Available at: <http://iom.edu/~media/Files/Activity%20Files/PublicHealth/MedPrep/Impact%20of%20state%20and%20local%20budget%20cuts%20on%20PHP.pdf> (Accessed January 6, 2013)

The Rise in Federal Emergency Preparedness Funding (2002-2007)

Department of Homeland Security

The Department of Homeland Security (DHS) administered five key grant programs to state and local governments during the period 2002-2007. These programs were to include the Urban Areas Security Initiative (UASI), the State Homeland Security Program (SHSP), the Law Enforcement Terrorism Prevention Program (LETPP), the Metropolitan Medical Response System (MMRS), and the Citizen Corps Program (CCP). The total appropriation for these five programs increased from \$315.7 million in federal year (FY) 2002 to \$1.66 billion in FY 2007.

UASI targets eligible high-threat, high-density urban areas to help them prevent, protect, respond, and recover from acts of terrorism. Forty-five urban areas qualified in FY 2007 and 6 major cities received \$441 million of the total \$746.9 million allocated to UASI by DHS. From FY 2003 to FY 2007, UASI funding totaled \$3.57 billion dollars. According to David Muhlhausen of the Heritage Foundation, “there appears to be a virtual absence of independent, objective evidence indicating the effectiveness of UASI.”³ In response to these criticisms, UASI funds are now allocated based on DHS’s risk methodology and the anticipated effectiveness of proposed projects.

SHSP grants are DHS grants to states, the District of Columbia, and U.S. territories to improve their homeland security capabilities. Awards are based on a risk analysis formula, with each state guaranteed a minimum of 0.75 percent of the total funding available. Opponents of the formula have criticized the allocations, which result in decreased per capita funding for the most populated states, such as California and New York.⁴ However, supporters argue that terrorism risk is uniformly distributed in small and large populated areas alike.⁵ SHSP dollars were \$315.7 million in 2002 and peaked at \$2.06 billion in 2003. From 2002 to 2007, the federal government awarded more than \$6.15 billion in SHSP grants.

Department of Health and Human Services (HHS)

In addition to the five key DHS-funded programs, HHS administered the Public Health Emergency Preparedness (PHEP) program and the Hospital Preparedness Program (HPP). From FY 2006 to FY 2007, these programs received more than \$2.1 billion in grants to all 50 states in addition to U.S. territories and 4 metropolitan cities (New York, New York; Washington, DC; Los Angeles, California; and Chicago, Illinois). The primary source of public health funding for state, local, tribal, and territorial health departments has been the PHEP funds administered through the Centers for Disease Control and Prevention (CDC). Since 2002, PHEP has granted almost \$9 billion for health departments to strengthen their

³ Available at <http://www.homelandsecuritynewswire.com/many-dhs-grants-ineffective-lack-proper-oversight> (accessed December 8, 2013).

⁴ Cox, Christopher, “An Analysis of First Responder Grant Funding,” Chairman, House Select Committee on Homeland Security (2003). Available at <http://homelandsecurity.house.gov/files/FirstResponderReport.pdf> (accessed December 8, 2013).

⁵ Earle, Geoff. “Homeland Security Funding Part 1—Money Not Flowing to the Places in Danger.” *The Hill*, April 15, 2004. Available at <http://www.newsmax.com/archives/articles/2004/4/14/163610.shtml> (accessed December 8, 2013).

emergency preparedness and response capabilities. In addition, the Cities Readiness Initiative funded 72 high-risk jurisdictions through a PHEP carve-out.

HPP has addressed the preparedness capabilities of hospitals and communities in the areas of surge capacity, surveillance systems, and all-hazards planning. Since the enactment of the Pandemic and All-Hazards Preparedness Act (PAHPA) in 2006, the emphasis of HPP has shifted away from bioterrorism response and now focuses on emergency preparedness infrastructure and health care system workforce capacity and capability. The current focus of the HPP is on building and sustaining health care coalitions.

HPP and PHEP are different funding streams. HPP grant funds go to individual states and then to hospitals to improve surge capacity and enhance community and hospital preparedness for public health emergencies. For example, Missouri had purchased a mobile medical unit using HPP funds. When the tornado struck Joplin in 2011, and demolished a main hospital, the state's disaster medical assistance team (DMAT) and hospital staff members were able to set up the mobile medical unit at the hospital site to provide care.

Preparedness activities funded by the PHEP program target the 15 public health preparedness capabilities that promote safer and more resilient communities and are directed toward local public health departments. In Ohio, for example, the PHEP funds were used for core public health emergency preparedness and regional health planning.

Declining Funding for Emergency Preparedness and Response (2008-2013)

Department of Homeland Security

From FY 2008 to FY 2013, appropriations have been falling for emergency preparedness. For example, in FY 2010, Congress appropriated \$3.05 billion to the Federal Emergency Management Agency (FEMA) for preparedness grants to “strengthen our nations’ ability to prevent, protect, respond to, and recover from terrorist attacks, major disasters and emergencies.”⁶ In FY 2012, this appropriation was reduced to \$1.35 billion—a 56 percent cut. During the same period, FEMA pre-disaster mitigation grants declined from \$100 million to \$35.5 million—a 65 percent cut. SHSP funding was reduced from \$2.06 billion in FY 2003 to \$354.64 million in FY 2013—an 82 percent cut. UASI was less affected but nevertheless was reduced from \$596.35 million in FY 2003 to \$558.74 million in FY 2013. Funding for seven key initiatives in DHS totaled \$3.08 billion in FY 2003. By FY 2013, DHS funding was focused on only three categories of funding totaling \$968.38 million—a total percentage cut of almost 70 percent.

In addition to budget cuts from Congress, some of the explanation for reduced funding rests with the decision to allocate federal funds based upon a risk-assessment formula. When the formula began in FY 2006, the methodology was primarily based on population. When the formula changed, most grantees lost federal funding. On top of all these cuts came the “sequester” cuts. On February 25, 2013, then-Homeland Security Secretary Janet Napolitano warned that sequester cuts will reduce disaster relief funding by almost \$1 billion and “lead to potential layoffs of state and local emergency personnel across the country.”⁷

⁶ Available at <http://www.emergencymgmt.com/health/Funding-Cuts-Threaten-Public-Health.html> (accessed December 8, 2013).

⁷ Available at <http://www.c-spanvideo.org/program/NapolitanoonB> (accessed December 8, 2013).

Department of Health and Human Services

In FY 2013, the 50 states and territories received \$584.69 million in PHEP funding—down from the \$619.44 million received in FY 2012. In 2008, PHEP funds totaled \$704.86 million. The decline in funding from 2008 to 2013 has been slightly more than 17 percent, with a total of 31 percent since FY 2004. Furthermore, there has been a \$35 million cut in PHEP alone, \$33 million of which is the result of sequestration.

The consequences of the loss of PHEP funds have been immediate and measurable. The emergency preparedness capability of the public health sector has been severely impacted. In the Trust for America's Health tenth annual report *Ready or Not? Protecting the Public from Diseases, Disasters*, 35 states and Washington, DC, scored a 6 or lower on 10 key indicators of public health preparedness.⁸ The report includes data indicating that 29 U.S. states have cut public health funding from FY 2010-2011 to FY 2011-2012, and that federal funds for state and local preparedness have been reduced 38 percent for the period 2005-2012.

The HPP program has suffered a similar fate, losing \$66.3 million between 2008 and 2013. This represents a 16.6 percent decrease in hospital and community funding for emergency preparedness and response. In FY 2008, the HPP program was funded at \$398.05 million. By 2013, the total HPP budget was reduced to \$331.75 million. The “sequester” resulted in a loss of \$17 million to HPP. This program is in further jeopardy as President Obama and the Senate have proposed an additional cut of \$114 million in FY 2014. These cuts have ominous consequences for a HPP budget, which is relatively small as a percentage of overall health expenditures. According to Dr. David Marcozzi, who leads the HPP program, the HPP FY2012 budget is less than 0.0001 percent of overall national health expenditures.⁹ The HPP program has proven effective and these funding cuts will reduce the capability and capacity of hospitals and communities to respond to disasters. In testimony delivered to the 2011 Senate Committee on Health, Education, Labor, and Pensions, it was reported that “76 percent of hospitals participating in HPP met 90% or more of all program measures for all-hazards preparedness in 2009.”¹⁰

Current Funding Sources and Opportunities

Although there are fewer funds available for emergency preparedness, response, and recovery, DHS did approve more than \$1.3 billion for FY 2012 for preparedness grants to further enhance critical infrastructure protection activities. In addition, HHS approved more than \$971 million in PHEP and HPP grants for this same fiscal year.

⁸ Available at <http://healthyamericans.org/report/101> (accessed December 8, 2013).

⁹ David Marcozzi, Director, National Healthcare Preparedness Programs, Office of Preparedness and Emergency Operations, Office of the Assistant Secretary for Preparedness and Response. Available at <http://www.reg8.org/Shared%20Documents/3-2013hospprepslideshow.pdf> (accessed December 8, 2013).

¹⁰ *A Nation Prepared: Strengthening Medical and Public Health Preparedness Response*, May 17, 2011, Senate Committee on Health, Education, Labor, and Pensions, 13. Available at <http://www.help.senate.gov/hearings/hearing/?id=d96479c8-5056-9502-5d05-00b223dd2f3b> (accessed December 8, 2013).

CHALLENGES TO THE CURRENT FUNDING MODEL

Given the large increase in funding followed by a large reduction in funding during the past several years, it is important to re-examine the current funding model itself in order to start to move toward a more value-based approach. At least two issues are of major significance:

1. Concepts and challenges in funding a “prepared” system, including the uncertainty surrounding the likelihood and cost of events.
2. The need to focus on implementation, highlighting some of the practical problems that have arisen with the implementation of current systems.

Finding the “Right” Level of Emergency Preparedness Funding

In a new age of fiscal austerity by federal, state, and local governments, one of the biggest challenges in designing and funding emergency preparedness programs is deciding exactly how much to invest in preparing for public health emergencies. Conceptually, investments in emergency preparedness are similar to investments in any activity that increases safety, such as police officers, firefighters, and emergency medical services (EMS). The optimal amount of investment in safety would ideally be driven by a rigorous assessment of the expected cost of a public health emergency and the effectiveness of the prevention activity compared with the cost associated with the activity. However, in the case of major public health emergencies, which are often defined according to their low probability but high costs, there are special challenges that make it difficult to measure the cost and benefits of preparedness activities.

Measuring Preparedness

One fundamental challenge of measuring the costs and benefits of preparedness is simply agreeing on a definition of what it means to be prepared. Part of the challenge is the wide range of activities that could potentially fall within the scope of improving emergency preparedness. This can include physical investments, changes to systems and processes, training, and many other activities. For instance, Nelson and co-authors define emergency preparedness in the public health setting as

the capacity of the public health and health care systems, communities, and individuals, to prevent, protect against, quickly respond to, and recover from health emergencies, particularly those whose scale, timing, or unpredictability threatens to overwhelm routine capabilities. Preparedness involves a coordinated and continuous process of planning and implementation that relies on measuring performance and taking a corrective action.¹¹

This diversity not only makes it challenging to devise a suitable definition, but also makes it more difficult to design a set of objective measures to use when evaluating the effectiveness of

¹¹ Nelson C, Lurie N, Wasserman J, Zakowski S. Conceptualizing and defining public health emergency preparedness. *Am J Public Health*. 2007 Apr;97 Suppl 1:S9-11.

investments in preparedness activities.

Another challenge to measuring the effectiveness of preparedness activities comes from the fact that major public health emergencies are rare. In principle, we could evaluate the effectiveness of an investment in preparedness with appropriate measures of outcomes such as response times, property saved, etc. But the infrequency and heterogeneity of major public health emergencies generally precludes the sort of large-scale empirical analysis that is needed to provide the kind of evidence used to evaluate effectiveness in other settings. This has forced evaluations of preparedness activities to rely on case studies and other qualitative methods. A review of the evidence on public health emergency preparedness activities from 1997 through 2008 found that the majority of work in this area lacked a rigorous design.¹² Other work has found that when measures do exist and are used, different measures sometimes provide highly inconsistent assessments of preparedness.¹³ All of this has contributed to a general lack of scientific consensus on the most effective strategies for improving preparedness.

This kind of scientific evidence on the relative cost and benefits of different preparedness activities is of critical importance to creating a value-based system. This approach could help improve the mix of funding to direct resources where they are most needed. An example of this kind of approach comes from recent work by Mueller and Stewart, who attempt to answer the question, Is the cost of emergency preparedness for preventing and mitigating acts of terrorism disproportionate to the risk from other natural threats?¹⁴ Although investment in protection against terrorism is politically popular, there are legitimate questions about the cost-effectiveness of these activities compared with others. As Mueller and Stewart note, “policy discussions of homeland security are driven not by rigorous analysis, but by fear, perception of past mistakes, pork-barrel politics, and insistence on an invulnerability that cannot be achieved.”⁵ These authors lay a foundation for quantifying and evaluating risks, establishing risk acceptance criteria, and determining the likely risk reduction from a new security measure. This kind of approach could prove extremely useful in setting the appropriate priorities in the allocation of preparedness funding.

Finally, there is little empirical work in understanding how investments in preparedness impact a community’s ability to handle everyday issues, such as crowding in emergency departments, or coordination of community efforts in other public health functions. Certainly, the spillover effects of the ability to have groups or coalitions that come together to discuss preparedness, an issue of clear mutual interest, are likely very important, but little empirical work has been done to value or measure how these groups contribute to broader everyday issues.

These issues have important consequences, because an accurate assessment of the benefits of investment is necessary to justify the steady and sustained investment required to maintain a given level of preparedness. As noted earlier, after the September 11, 2001, attacks, there was a great deal of public investment in the United States directed at improving our ability to respond to terrorist attacks. In the wake of this investment, there was a push to demonstrate the impact of the investments on our ability to respond to a public health emergency. However, these evaluation efforts have been hampered by a general lack of

¹² Savoia E., et al., Public health systems research in emergency preparedness: A review of the literature. *American Journal of Preventive Medicine*, 2009. 37(2):150-156.

¹³ Kaji AH, Langford V, Lewis RJ. Assessing hospital disaster preparedness: a comparison of an on-site survey, directly observed drill performance, and video analysis of teamwork. *Ann Emerg Med*. 2008. 52(3):195-201.

¹⁴ Mueller J and Stewart M. *Terror, Security, and Money* (Oxford: Oxford University Press, 2011).

evidence on the effectiveness of different activities.¹⁵ Some work has demonstrated the potential of evidence-based quality metrics to improve public response to a pandemic, but it also argued that more investment in improved measurement was needed to apply these concepts more broadly.¹⁶ More generally, as long as we lack the ability to demonstrate a positive return on investment from expenditures on emergency preparedness efforts, using hard data on outcomes such as lives saved or damages prevented, this funding will continue to be at risk.

Uncertainty About the Severity of an Event

Even if we had perfect information about the level of preparedness for a given emergency, there are other measurement issues that make it difficult to identify an optimal level of investment. This is because major public health emergencies are not only infrequent, but when they do occur they are also sometimes much more costly than was previously believed likely. Obvious examples of this include the September 11, 2001, terrorist attacks and the damage inflicted by Hurricane Katrina. In hindsight, both of these large public health emergencies certainly would have justified greater expenditures on prevention and mitigation efforts to protect life and property. However, beforehand, the perceived risk was not necessarily high enough to warrant such measures.

Having an accurate assessment of potential losses is important, because the optimal level of investment in safety is a function of expected cost of a public health emergency. The expected loss is equal to the probability that an event occurs multiplied by the magnitude of the losses that result. In private insurance markets, estimates of expected costs are routinely used to determine insurance premiums to cover against many sources of accident or injury, such as automobile crashes or workplace injuries. Although these events are relatively uncommon for any single individual, across large groups of people they occur frequently enough that companies are able to make reasonably accurate assessments of both the frequency and cost of events. But given the infrequency of major public health emergencies and the unpredictability of the damages that result, including psychological consequences, it can be difficult to come up with reliable estimates of expected losses. Trying to value the spillover effects on day-to-day preparedness is similarly challenging.

To understand just how difficult it is to accurately assess the potential damages of public health emergencies, it is useful to consider the problems they pose for private insurance markets. Much of the financial burden of the damages from the September 11, 2001, attacks was borne by private insurance companies, which led these companies to dramatically reassess terrorism as a potential source of liability.¹⁷ We would normally expect this to result in a rise in insurance premiums—as the expected cost of providing insurance rises, a natural market response would be for premiums to rise. However, companies were concerned that they lacked the ability to accurately forecast the cost of attacks, so they responded by withdrawing from the market until the government implemented the Terrorism Risk and Insurance Act (TRIA), which provided a

¹⁵ Nelson C, Lurie N, Wasserman J. Assessing public health emergency preparedness: Concepts, tools, and challenges. *Annu Rev Public Health*, 2007;28:1-18.

¹⁶ Lotstein D, et al., Using quality improvement methods to improve public health emergency preparedness: PREPARE for pandemic influenza. *Health Aff (Millwood)*. 2008. 27(5):w328-w339.

¹⁷ Dixon L and Kaganoff Stern R, *Compensation for Losses from the 9/11 Attacks*, 2004, RAND Corporation: Santa Monica, CA.

backstop that protected against unforeseen catastrophic losses.¹⁸ Similar problems have occurred in the wake of other disasters, such as the Northridge Earthquake or Hurricane Andrew, after which private insurers fled the market. From the standpoint of designing a preparedness system, the difficulty in measuring costs causes similar problems. If the expected cost of an event is unknown, then it is difficult to know how much to spend to eliminate or reduce that cost.

Public Attitudes

Awareness and engagement of the public and policy makers is critical to ensuring adequate and sustained funding for preparedness. Ideally, the public and policy makers would be highly engaged and willing to allocate sufficient resources to maintain preparedness on an ongoing basis. But in reality, people tend to focus on risks that are more immediate and more salient. This phenomenon is sometimes referred to as the “availability bias,” in which people tend to weigh more heavily information that is more memorable and more salient, even at the expense of information that is more accurate. Viscusi notes how mistakes and biases that individuals make in terms of their own risk perceptions or assessments can lead society to respond inconsistently to different health risks.¹⁹ In particular, society is likely to focus investments on, and sometimes overinvest in, high-profile risks that grab individual attention. This could lead to patterns of investment that place disproportionate importance on protecting against certain types of events. For example, a terrorist act might increase willingness to invest in protection from intentional events (terrorism), but might not increase (or may even detract from) willingness to protect against unintentional (natural) events (e.g., earthquake or floods).²¹ In the wake of a major emergency, policy makers often feel like they must “do something” in order to prevent or mitigate future events. The usual response is disbursement of funds to help not only in the response, but also in investment to protect communities from future major public health emergencies.

This willingness to invest, but only after a major emergency occurs, leads to inconsistent patterns of investment over time. Individuals and policy makers might place a high level of importance on adequate public health emergency funding in the aftermath of a catastrophic event, but as time passes and memories fade, less value is placed on these investments. This means that resources will be directed elsewhere or that previous investments will be allowed to depreciate. This sort of behavior can make it particularly difficult to justify spending resources on preparedness that often go unused or that are never used for that specific event. But here we have developed a recycling policy to avoid waste). Consider the housing of medication for use in an emergency—when the medication goes unused and expires, this could be viewed as a waste, despite the fact that it can be of crucial importance to have these medications on hand when an emergency actually occurs.

These issues are intrinsic to the nature of catastrophic risk and human behavior. Unfortunately, this means that there are no easy solutions. Ultimately, solving these issues requires both an investment in our ability to make accurate predictions about potential losses from an event and public education about the need to remain vigilant and achieve personal protection. This will require the creation of additional knowledge in this area by developing a research agenda to address these measurement issues in emergency preparedness and assess the

¹⁸ Chalk P et al., *Trends in Terrorism: Threats to the United States and the Future of the Terrorism Risk Insurance Act*, 2005, RAND Corporation: Santa Monica, CA.

¹⁹ Viscusi WK. Sources of inconsistency in societal responses to health risks. *Am Econ Rev.* 1990;80(2):257-2.

right level of funding. Until this is accomplished, emergency preparedness will always be vulnerable to insufficient and misallocated funding, particularly in times when government revenues are low and there is strong competition for limited resources. In addition, it is important to point out that even with considerable investment in emergency preparedness, there is also a real risk that any major public health emergency may overwhelm resources and not be effective in mitigating its impact or effects.

Implementation Problems and Challenges

Even if we believe that we know what the right level of funding should be, there are practical difficulties to implementing an ideal system that need be addressed. One of the key challenges comes from coordination. Part of the problem is that emergency preparedness is a multifactorial process that usually involves many jurisdictions and agencies. Institutional barriers and general coordination problems can arise that make both funding and implementing a system challenging.

One of the key challenges to implementing and maintaining an effective level of preparedness is interagency coordination. There is often a lack of sufficient coordination between public health departments and other agencies responsible for responses to public health emergencies. This has been documented in previous work.^{20,21} In practice, unfortunately there is a great deal of systemic disharmony in the development of public health initiatives and emergency preparedness for public health emergencies. However, this dysfunction is not always recognized. If the essential relationships and general concordance between public health and preparedness were more widely recognized, more collaborative and coordinated funding decisions could be made. This would allow us to take advantage of synergies among different agencies and departments, avoiding repetitive systems and allowing for limited resources to be allocated more effectively.

Problems with coordination can be exacerbated for large-scale public health emergencies that span multiple jurisdictions, since the preparedness efforts of one community can affect outcomes for another. However, communities will most likely focus on their own needs and may not recognize the spillover benefits to other communities. In addition, no area can be permitted to be isolated. Overlapping communities are resources that are vital to public health preparedness and resilience to a public health emergency. Failure to recognize these issues could lead to too little investment in preparedness from an overall societal perspective. Although, as noted above, it is difficult to measure the effectiveness of preparedness activities, there is some evidence suggesting that targeted efforts to improve regional coordination across agencies can lead to enhanced preparedness.^{22,23}

There can also be spillovers across levels of government. Rural jurisdictions lack many of the resources to provide adequate preparedness on their own, making them more reliant on state or federal support. This means that cuts to federal funding can have significant adverse

²⁰ Available at <http://www.gwumc.edu/hspi/events/phem303.cfm> (accessed December 8, 2013).

²¹ Rubin SE and Roszak AR. Improving community resilience through public health preparedness partnerships. *J Public Health Manag Pract*. 2013 Jul-Aug;19(4):388-90.

²² Higgins W, et al., Assessing hospital preparedness using an instrument based on the Mass Casualty Disaster Plan Checklist: Results of a statewide survey. *Am J Infect Ctrl*, 2004; 32(6):327-332.

²³ Braun BI, et al., Hospital bioterrorism preparedness linkages with the community: Improvements over time. *Am J Infect Con*, 2004. 32(6):317-326.

impacts on preparedness in some areas, particularly poor and rural areas. If these cuts lead to inadequate preparation, individuals in these areas will be more likely to suffer in the event of a public health emergency due to the reduction in funding. These problems have become worse during the past decade, as increases in federal funding were met with decreases in state and local funding.²⁴

Hospitals provide an excellent example of both the importance and the challenges of adequate coordination in preparedness activities. Hospitals are vital to any emergency preparedness plan because they will be called on to provide medical treatment in the event of any casualties that occur.²⁵ Because hospitals must cooperate with multiple organizations, including EMS, law enforcement, fire departments, etc., there must be an effective system for communicating and coordinating across the different agencies.

The importance of ensuring extensive integrated coordination with hospitals and other agencies in the event of an emergency remains a significant problem.^{26,27} Assessments of the capacity of hospitals to deal with emergencies have often shown that they are inadequately prepared. Past work has found that hospitals lack the ability to respond properly to a chemical or biological intentional or unintentional public health emergency.^{28,29} A study of hospital preparedness in Los Angeles County found that disaster preparedness was primarily limited more by poor interagency training and cooperation than the actual availability of resources.³⁰

All this indicates that adequate investment in preparedness means more than just providing money for equipment and supplies. It also requires investment and commitment to ensure that the different agencies that are involved are able to work together and coordinate if a public health emergency occurs. This kind of coordination can be costly and time-consuming, meaning that it will require financial commitment. But, just as funding for preparedness has been declining, in the wake of the economic crisis, government funding has become tighter for all agencies, especially in state and local governments. As the budgets for non-preparedness activities tighten, administrators facing difficult choices will probably be more likely to focus on more immediate concerns and even less likely to prioritize preparing for a disaster. This could further undermine the ability of these local agencies and hospitals to effectively respond to a disaster if and when it occurs.

Technical Issues with Distribution of Emergency Preparedness Funding

Along with overall funding issues, several challenges exist in the logistics of how funding is distributed to communities. Specifically, communities often have major difficulties that stem from federal, state, and local processes involved in resource allocation

²⁴ Kaji AH, Koenig KL, Lewis RJ. Current hospital disaster preparedness. *JAMA* 2007;298(18):2188-2190.

²⁵ Desforges JF, Waeckerle J. Disaster planning and response. *New Eng J Med*, 1991. 324(12):815-821.

²⁶ Quarantelli EL. Delivery of emergency medical services in disasters: Assumptions and realities. New York: Irvington Publishers, 1983.

²⁷ Tierney KJ. Emergency medical preparedness and response in disasters: The need for interorganizational coordination. *Pub Admin Rev*. 1985; 45:77-84.

²⁸ Wetter DC, Daniell WE, Treser CD. Hospital preparedness for victims of chemical or biological terrorism. *Am J Publ Health* 2001;91(5): 710.

²⁹ Greenberg MI, Jurgens SM, Gracely EJ. Emergency department preparedness for the evaluation and treatment of victims of biological or chemical terrorist attack. *J Emerg Med* 2002; 22(3):273-278.

³⁰ Kaji, AH, Lewis. RJ Hospital disaster preparedness in Los Angeles county. *Acad Emerg Med* 2006; 13(11):1198-1203.

and fund dispersal.^{31,32} A recent study pointed to three problems that have diminished the effectiveness of DHS grant programs:³³

1. Delays in distribution of funding to the emergency services sector. Some localities faced significant legal challenges and unreasonable delays in accessing grant funds.
2. Allocation formulas are not directly linked to threat, vulnerability, or consequences of terrorist acts. As previously pointed out, SHSP, LETPP, and CCP included a two-part allocation formula, while UASI grants were discretionary and limited.
3. The “small state minimum” feature of the SHSP grants. The minimum is much larger than any other existing federal grant program. These high minimum grants mean rural, less-populated states like Wyoming and Idaho receive the same minimum funding as highly populated states like New Jersey or Massachusetts.

Summary of Issues in Emergency Preparedness Funding

The expenditure of public resources rightly requires justification about the appropriateness of the expenditure. In recent years, most public agencies have faced increasingly tight budgets and growing pressure to provide the maximum value for their expenditures. In the absence of hard data on the effectiveness of preparedness activities, it can be difficult to convince policy makers of the pressing need to invest in the appropriate resources. This means that alternative priorities such as investments education, health care, or infrastructure will often seem like a more immediate problem. But a failure to invest adequately in emergency preparedness can have terrible consequences if and when a public health emergency does occur. In addition, failure to distribute allocated funds effectively can diminish the effectiveness of preparedness efforts. Broadly, additional research is needed to better understand how best to measure preparedness at the local, state, and federal levels, and the best way to ensure that resources and capabilities are distributed to reduce redundancy and administrative barriers, and to ensure that no community is unprepared and isolated from the greater level of preparedness associated within the region, states or country when a public health emergency occurs.

The Association of State and Territorial Health Officials (ASTHO) and CDC recently completed a collaborative project to develop a National Health Security Preparedness Index (NHSPI). The new index combines different preparedness criteria into one composite set of measures that can be used to determine relative health preparedness capabilities over time. The NHSPI will also measure and help guide activities that support implementation of the National Health Security Strategy. According to the ASTHO website, this index is needed because

there is no standardized, national assessment of health emergency preparedness. State and local agencies have made significant investments in health emergency preparedness, yet levels of preparedness vary across the country. The index will provide benchmarks of

³¹ Massin-Short S, Fisher VS, Bakker G, Nieratko J, Morgan S, Herrmann J, Savoia E. Administration of emergency preparedness Department of Health and Human Service funds: The experience of state and local health departments. *J Public Health Management and Practice*. 2013 Mar-Apr;19(2):192-5.

³² Administrative Preparedness Authorities: Suggested Steps for Health Departments. NAACHO. Available at http://www.naccho.org/topics/emergency/upload/authorities_report_041913.pdf (accessed December 8, 2013).

³³ Brunet, *Grant Funding to State and Local Governments and Systematic Assessment of Vulnerability*, Center for Risk and Economic Analysis of Terrorism Events, University of Southern California: 2005.

health emergency preparedness and allow communities to track their preparedness levels over time. The index will help identify useful practices that can be shared across jurisdictions.³⁴

The index could also become a valuable tool in helping set the research agenda for developing a value-based model for funding emergency preparedness and response.

SAMPLE MODELS OF EMERGENCY PREPAREDNESS AND FUNDING

With declining funding, it is vital to make better use of the funds that are available and to present potential ways for communities to develop emergency preparedness programs that are self-sustaining. Several promising models of communities that are implementing successful preparedness efforts exist, whether they have tested a new approach or have found a way to be sustainable. Many of these programs are not entirely reliant on public funding and have developed creative approaches to ensuring that local communities are prepared by creating economies of scale through collaboration with other regions (i.e., regionalization), and have engaged the business community as a partner.

Regionalization

Regionalization of public health preparedness programs is a subject that has received substantial attention in recent years. The National Association of City and County Health Officials (NACCHO) has categorized regionalization at three levels: coordination, standardization, and centralization.³⁵ Coordination involves “deliberate” action to work together on activities such as training or exercises. Standardizing creates uniformity across health departments to ensure that services are delivered in a consistent form. Centralization is the organized sharing of information and professional expertise across geopolitical jurisdictions.

Regionalization has the impact of improving effective workforce capacity. In Nebraska, the shift to a regional public health system has improved the public health workforce infrastructure by spreading specialized human resources across the state.³⁶ In California, a regional approach to preparedness planning avoided duplication of resources, allowing local health departments to more efficiently use personnel to provide traditional public health services.³⁷

Regionalization also has the impact of improving surge capacity, which is the ability of health departments to handle emergencies within boundaries of normal resource constraints. The National Capital Region (NCR) provides evidence that surge capacity is enhanced through

³⁴ Available at <http://www.astho.org/Programs/Preparedness/National-Health-Security-Preparedness-Index/Frequently-Asked-Questions---9/19/12> (accessed December 6, 2013).

³⁵ National Association of County and City Health Officials. Planning Beyond Borders. *NACCHO* 2007: 11-13.

³⁶ A Regional Approach to Organizing Local Public Health Systems and the Impact on Emergency Preparedness: The Nebraska Experience. Public Health Reports. Available at: <http://www.publichealthreports.org/issueopen.cfm?articleID=2085> (accessed 8 December 2013)

³⁷ Regionalization in Local Public Health Systems. California Public Health Policy Forum. Available at: <http://www.cahpf.org/GoDocUserFiles/412.RegionalizationIssueBriefFinal.pdf> (accessed 8 December 2013)

regional cooperation in two key areas.³⁸ First, recently developed regional capacities facilitated a more effective response to public health emergencies. Second, state and local public health staff from the entire NCR work collaboratively on developing plans for addressing surge capacity issues.

Regionalization may also help improve public health surveillance. As an example, through its regional efforts, Nebraska built a uniform system that can conduct and coordinate surveillance and epidemiology activities.³⁴ In the NCR, a regional epidemiology center that improved communication among health departments led to a quick resolution of anthrax and tularemia false alarms in 2005.³⁶

Regionalization also offers the potential for improvement in local health department mass-vaccination capability. Massachusetts Region 4b set up regional clinics during the flu vaccine shortage in 2004.³⁹ These clinics expeditiously coordinated the movement of vaccines to alleviate shortages. During the flu vaccine shortage in 2005, Northern Illinois Public Health Consortium members coordinated media and public information to ensure a consistent message in the Chicago metropolitan area and implemented plans for sharing vaccine supplies.⁴⁰ In the absence of this kind of regional cooperation, each local health department must independently address and resolve vaccination shortages.

Bay Area Center for Regional Disaster Resilience: A Case Study #1 in Regionalization

The Bay Area Center for Regional Disaster Resilience (CRDR) is a nonprofit Section 501(c)(3) public benefit corporation established to empower and enable stakeholder collaborative action to improve all-hazards disaster resilience. The Bay Area CRDR is currently partnering with the Association of Bay Area Governments (ABAG) and regional stakeholders to develop a San Francisco Bay Area Disaster Resilience Action Plan Initiative focusing on recovery and long-term restoration. ABAG is strategically focused on resilience with the specific mission of reducing the time between disaster and recovery. ABAG has developed a regional hazard mitigation plan, a recovery toolkit for local governments, and a model ordinance toolkit for disaster resilience.

A significant accomplishment of the Bay Area CRDR has been the Bay Area Regional Disaster Resilience Action Plan Initiative. This initiative was a 14-month project focusing on recovery and long-term restoration and involved businesses, critical infrastructure, government services, community institutions/social services, housing, and other essential services and assets. Funding for this initiative was provided by a UASI grant with private-sector and other contributions. Key partners included ABAG (9 counties, 101 cities, and 40 special districts) along with hundreds of private-sector and nonprofit organizations, regional agencies, and associations.

The guiding principles of the success of the Bay Area CRDR have been

³⁸ Regionalization in Local Public Health Systems: Public Health Preparedness in the Washington Metropolitan Area. Public Health Reports. Available at: <http://www.publichealthreports.org/issueopen.cfm?articleID=2059> (accessed 8 December 2013)

³⁹ Koh HK, Elqura LJ, Judge CM, Stoto MA. Regionalization of local public health systems in the era of preparedness. *Annu Rev Public Health*. 2008;29:205-18.

⁴⁰ Regionalization in Local Public Health Departments: The Northern Illinois Public Health Consortium. Public Health Reports. Available at: <http://www.publichealthreports.org/issueopen.cfm?articleID=2087> (accessed 8 December 2013)

- Collaboration must be fundamentally a stakeholder-driven, collaborative process.
- The outcome of the action plan is a strategy to improve community and regional resilience.
- No unfunded mandates and respect for jurisdictional and organizational authorities, missions, and interests.
- Provide templates and tools to enable communities to undertake the process at low cost with local resources.

The National Capital Region: Case Study #2 in Regionalization

The NCR has served as a model for how a regional collaboration to share regional resources can improve community wide preparedness. Two examples of this are the Northern Virginia Hospital Alliance (NVHA) and Northern Virginia Emergency Response System (NVERS).

NVHA was incorporated in October 2002, about 1 year after the September 11, 2001, attacks. NVHA is a forum in which member hospitals, initially 12 and now 15, can come together to make strategic decisions about how to respond to disasters. The mission of NVHA is to “coordinate emergency preparedness, response and recovery activities for the member hospital and healthcare systems in cooperation with Local, Regional, State and Federal response partners.”⁴¹ NVHA is governed like a normal hospital association and has workgroups and taskforces. The operational work comes from these groups. NVHA serves as the fiscal agent for preparedness funding and provides many services that are of value to local stakeholders. This includes (1) training and education, (2) logistics support to manage inventories of regional stockpiles, (3) local planning and policy coordination, and (4) a regional hospital coordinating center, which would help coordinate across facilities in response to a disaster. Key to the success of these programs is the way that they are sustained. In NVHA, member hospitals contribute dues to help fund operations. NVHA also receives some HPP and UASE funding, but that is only about 40 percent of the total revenue.

According to Zachary Corrigan, the executive director of NVHA, if public funds diminish, the core capabilities of the program, including the core communication and information systems, will be sustained by small increases in dues from the hospitals.⁴² In addition, programs that lie within member hospitals will need to be transferred to their local funding. According to Corrigan, a key success factor in these programs is executive engagement. In the NCR, many hospital executives remember the September 11, 2001, attack on the Pentagon and anthrax attacks. He also emphasized the importance on demonstrating return on investment from these programs. As described in earlier sections, this is one of the key factors that will be required for sustained engagement from the private sector, particularly as local large-scale events impacting a community become more remote.

Another example is NVERS, which is a broad umbrella program similar to NVHA and includes hospitals as well as law enforcement, firefighters, and EMS. NVERS was developed from the Metropolitan Medical Response System in 2005 and “supports a regional approach to coordinated preparedness, response, mitigation, and recovery across jurisdiction and discipline

⁴¹ Available at <http://www.novaha.org> (accessed December 8, 2013).

⁴² Interview of Zachary Corrigan by Jesse Pines, July 2013.

boundaries during day-to-day emergencies and multi-jurisdictional and/or multi-disciplinary incidents through strategic planning, priority-setting, information sharing, training, exercises, equipment acquisition, and policy-making.”⁴³ It serves as a way to connect local and state governments with the private sector to build the emergency preparedness capabilities of the local community in northern Virginia, and also with local governments in the nearby District of Columbia and Maryland.

According to Jim Schwartz, the chief of the Arlington County (Virginia) Fire Department, to successfully engage in regionalization efforts at a local level requires first defining the region.⁴⁴ In the NCR, this can be defined by geography, shared economic base, and shared transportation infrastructure. When a disaster strikes, it rarely impacts just one jurisdiction. Therefore, coordination is needed across multiple jurisdictions to ensure an effective response. Having a regional network in place that can serve as the communications hub is vital to response. When large-scale public health emergencies strike within one jurisdiction, it is similarly important for outside communities to be able to provide aid. This was especially true during the September 11, 2001, attacks, when New York City required aid from outside communities.

NVERS brings multidisciplinary groups together to ensure that if a public health emergency strikes the NCR, there will be a more coordinated response across jurisdictions. In addition, as opposed to funding going to individual hospitals or local jurisdictions, monies can be distributed to a regional body, which creates economies of scale. NVERS focuses on the development of regional capabilities that are cross-jurisdictional.

Currently, NVERS is entirely funded through UASE funds. With funding cuts looming, a process is starting to share staff between NVHA and NVERS, and also to diversify revenue streams. These strategies will include public-private partnerships with businesses and seeking local tax revenue to support activities. NVERS is in the process of developing a 501(c)(3) organization that would gain nonprofit status, which would allow it to apply for other government grant funding.

Public-Private Partnerships

The term “public-private partnership” covers a variety of relationships ranging from single-purpose short-term ventures to long-term relationships that may require changes in governance, management, and operational roles. The objectives of a public-private partnership may include developing a strategy for service delivery, strengthening a particular service, or improving the delivery of a service.

As funding has declined, local health departments have cultivated relationships with nontraditional partners to maintain funding for essential public health services. These partnerships have traditionally involved nonprofit organizations, but more recently public health has turned to private industry to look for ways to increase funding. It should be noted that these partnerships have raised questions about objectivity from both public health organizations and the public.⁴⁵

For example, in King County, Washington, the public health department has partnered

⁴³ Available at <http://www.nvers.org/about> (Accessed January 8, 2013)

⁴⁴ Interview of Jim Schwartz by Jesse Pines, July 2013.

⁴⁵ Available at <http://blogs.plos.org/publichealth/2013/07/08/public-private-partnerships-a-contentious-issue-that-demands-discussion> (accessed December 8, 2013).

with the Eastside Human Services Forum to assure a stable network of health and human services for the benefit of all East King County residents.⁴⁶ The partnership takes advantage of public and private energy incentives and grants to provide funding to support personnel to work in the impoverished east-side community. Unfortunately, there are only a limited number of examples in which public–private partnerships have extended the public health workforce capacity. Many of the partnerships have been short-lived because they ignored the key public health principles of equity and quality.⁴⁷ Private funding often comes with restrictions that compromise one or both of these principles.

However, with regard to surge capacity, there are excellent examples in which public–private partnerships have enhanced public health’s ability to respond to emergencies. Public health surge capacity refers to the capacity to perform core public health services such as mass vaccinations, community-wide communication, and epidemiologic investigations under extreme emergency conditions. Local health departments have negotiated mutual aid agreements with private and nonprofit hospitals for material management issues (ranging from refrigeration of pharmaceuticals to maintaining paper supplies, computers, and copiers in functioning order).⁴⁸ Local health departments have also worked successfully with public–private partners to integrate different facilities and agencies in an overall community response to a potential or actual public health emergency.⁴⁹

Examples of successful public health surveillance partnerships also come from the public health–hospital relationships established around emergency preparedness issues. In collaboration with the local health department, Milwaukee, Wisconsin, hospitals established a regional emergency medicine Internet system to securely share real-time ambulance diversion information.⁵⁰ This system provides real-time information to public health officials regarding environmental hazards, communicable disease outbreaks, or terrorist events. In tracking outbreaks in a community, the most important partnerships are the relationships among physicians, hospital laboratory staffs, and the epidemiology/influenza coordinators in the local health department. Consequently, there must be public–private partnerships for this surveillance network to succeed.

Mass-vaccination capability is also an area in which there are numerous examples of public–private partnerships. In Snohomish County, Washington, a public–private partnership successfully vaccinated more than 25,000 people for H1N1 influenza in 2 days of mass immunizations. In Louisiana, more than 100 hospital and community volunteers assisted the public health department in providing more than 11,000 immunizations for children during a 3-day period.⁵¹

⁴⁶ Available at <http://www.kingcounty.gov/healthservices/health/partnerships.aspx> (accessed December 8, 2013).

⁴⁷ *An Overview of Public Private Partnerships in Health*. Available at <http://www.hsph.harvard.edu/ihs/publications/pdf/PPP-final-MDM.pdf> (accessed December 8, 2013).

⁴⁸ *Building Community-Based Surge Capacity Through a Public Health and Academic Collaboration: The Role of Community Health Centers*. *Public Health Reports*. Available at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1525264/?report=reader> (accessed December 8, 2013).

⁴⁹ Hick JL, Hanfling D, Burstein JL, DeAtley C, Barbisch D, Bogdan GM, Cantrill S. Health care facility and community strategies for patient care surge capacity. *Ann Emerg Med*. 2004 Sep;44(3):253-61.

⁵⁰ *Public Health Surveillance and Communications Using Regional Emergency Medicine Internet (REMI)*. Available at <http://www.sfhip.org/modules.php?controller=index&module=PromisePractice&action=view&pid=287> (accessed December 8, 2013).

⁵¹ American Academy of Pediatrics. Available at http://www2.aap.org/immunization/pediatricians/Partnerships/STC_LA_LINKS.pdf (accessed December 8, 2013).

Safeguard Iowa: Case Study #1 in Public–Private Partnerships

The Safeguard Iowa Partnership was launched in 2007 with support of the Iowa Business Council, Business Executives for National Security, and the State of Iowa. According to the website, “Safeguard Iowa Partnership is a public/private partnership that fills statewide security and disaster response gaps that neither government nor business can fill alone.”⁵² Participating entities pledge resources during emergencies, share preparedness information, and offer services to support preparedness initiatives, allowing partners to contribute in cost-effective and highly leveraged ways to help prevent and reduce the impact of emergencies.

There are 106 private-sector partners, 90 public-sector partners, and 44 nonprofit-sector partners. Twenty-four of the private-sector partners are financial supporters of Safeguard Iowa, with several contributing at the platinum, gold, and silver levels. Key corporations such as Wells Fargo, U.S. Cellular, Nationwide, Principal Financial Group, and ING are listed among the supporters of Safeguard Iowa.

Safeguard Iowa sees its mission as strengthening the capacity of Iowa to prepare, respond, and recover from disasters through strong collaboration between the public and private sectors. The strategic initiatives include a functional communication system, a minimum of four training opportunities, one exercise per year, and a business disaster case-management task force, and business disaster recovery support.

Safeguard Iowa offers a number of attractive benefits to its private-sector partners. Key among these benefits is access to information before, during, and after a disaster through liaisons in the state and local emergency operations centers (EOCs). Safeguard Iowa also places trained volunteer private-sector liaisons in these EOCs to improve communications during disasters.

The MESH Coalition: Case Study #2 in Public–Private Partnerships

The MESH Coalition is a nonprofit, public–private health care coalition that is located in Indianapolis, Indiana, and is primarily sustained by subscribing health care organizations.

The MESH Coalition is one of the only privately managed health care coalitions in the United States. Services provided include (1) clinical education and training, (2) health care “intelligence,” (3) community-based planning, and (4) financial, legal, and regulatory analysis. The MESH Coalition also serves as the Marion County Medical Multi-Agency Coordination Center, providing a critical operational link among private health care organizations and public health and safety agencies.

Through these services, the MESH Coalition provides a valuable forum for health care organizations to work collaboratively and focus on issues such as operational readiness and reimbursement following a disaster. The MESH Coalition was originally funded by a grant award from the Assistant Secretary for Preparedness and Response (ASPR) in 2008, and, since that time, MESH has created a sustainable business model focused on providing services in the form of value-added activities for facilities that have a business interest in ensuring that the community is prepared.

⁵² Safeguard Iowa. Available at <https://safeguardiowa.wildapricot.org/FAQ> (accessed December 8, 2013).

Resource Sharing

According to a recent journal article, about one-half of all local health departments are engaged in resource sharing.⁵³ The extent of sharing was lower for those serving larger urban populations. Sharing was more extensive for state-governed local health departments, those covering multiple jurisdictions, states with centralized governance, and in instances of financial constraint.

One of the most common resource-sharing arrangements is the sharing of staff to enhance workforce capacity. In Kansas, quality-improvement personnel were shared across multiple counties to work on quality-improvement projects and help each county work toward national accreditation.⁵⁴ In Colorado, six west-central counties collaborated to form a “Nurse-Family Partnership” program to coordinate services across county jurisdictional boundaries.⁵⁵ Across the United States, similar partnerships are experiencing like outcomes as local health departments are working to develop partnerships to share essential personnel required to meet normal and emergency operating conditions.

Resource sharing has also been successful in improving public health surge capacity. The Alabama Department of Public Health, the Mississippi State Department of Health, and the South Central Center for Public Health Preparedness in conjunction with more than 40 organizations have developed a voluntary network of health care providers, public health departments, volunteers, and emergency responders from Alabama, Florida, Louisiana, Mississippi, and Tennessee.⁵⁶ The purpose of this network, called the Southeastern Regional Pediatric Disaster Surge Network, is to improve the pediatric preparedness and response strategies of public health, emergency response, and pediatric providers in the event of large-scale emergencies or disasters that overwhelm local or state pediatric resources.

Resource sharing has been less successful in improving public health surveillance because the systematic collection, analysis, interpretation, and management of public health-related data to verify an issue of public health concern are inherently within the responsibility of the local health departments and the state health departments. Recommendations generally focus on improved partnerships between state and local public health agencies to improve public health surveillance methods.⁵⁷

Many local health departments have demonstrated the capacity for sharing resources to administer mass-vaccination clinics in the event of a public health emergency. In Idaho, five health departments shared resources (human resources, translation, data, clinical supplies,

⁵³ Vest JR, Shah GH. The extent of interorganizational resource sharing among local health departments: The association with organizational characteristics and institutional factors. *J Public Health Manag Pract.* 2012 Nov;18(6):551-60.

⁵⁴ *Kansas: Home Rule in the Sunflower State.* Available at http://nnphi.org/CMSuploads/Kansas_MLC.pdf (accessed December 8, 2013).

⁵⁵ The Colorado Trust. Available at http://www.coloradotrust.org/attachments/0001/8941/PFH_CaseStudy_090612-FINAL.rev.pdf (accessed December 8, 2013).

⁵⁶ *Southeastern Regional Pediatric Disaster Surge Network: A Public Health Partnership.* *Public Health Reports.* Available at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2966653> (accessed December 8, 2013).

⁵⁷ BioWatch and Public Health Surveillance, Evaluating Systems for the Early Detection of Biological Threats, IOM Report Brief (October 2007). Available at <http://iom.edu/~media/Files/Report%20Files/2009/BioWatch-Public-Health-Surveillance/Biowatch%202010%20Report%20Brief.pdf> (accessed January 6, 2013)

vaccines, and other equipment) to provide a large-scale flu clinic.⁵⁸ In New Jersey, three counties, one city, and a township joined together to cross-train staff and volunteers to ensure adequate staffing of mass-vaccination clinics.⁵⁹

Linking Public Health and Hospitals: A Case Study in Resource Sharing

In 2003, the North Carolina Division of Public Health used PHEP grant funds to place 11 public health epidemiologists in the state's largest hospitals. These epidemiologists conducted syndromic surveillance of community illnesses with special attention to infections that might indicate a bioterrorism attack. In the 2009 H1N1 pandemic response, these public health epidemiologists provided a public health link to key hospitals and played a vital role in communicating critical information to communicable disease nurses in LHDs. The hospitals benefitted by having expertise on staff to provide advice on treatment, isolation, and quarantine.

This close linkage between public health and hospitals improved the emergency response capability of both sectors. The public health epidemiologists improved timeliness of the response to public health investigations and provided detailed information on cases of critical public health significance.

“Baking” Preparedness Funding into Local Taxes

One of the strategies local groups have taken is to bolster programs through local taxes. This allows for the funding of preparedness by local citizens who are most likely to benefit from a local response.

Hampton Roads Metropolitan Medical Response System (HRMMRS): A Case Study

One example of how a local community has been successful in organizing local government to fund preparedness efforts is the HRMMRS in Southeastern Virginia.⁶⁰ Hampton Roads originally received a \$2 million HHS contract in 1999 to address preparedness and response for mass-casualty incidents from weapons of mass destruction in the 16 jurisdictions of Hampton Roads. The jurisdictions saw the value of the HRMMRS in particular to support local preparedness efforts. In February 2001, the Hampton Roads Planning District Commission, representing all 16 jurisdictions, agreed to assess its citizens \$0.20 per capita per year for a region of approximately 1.5-1.6 million citizens. The HRMMRS receives approximately \$290,000 per year, which is used to support the regional Hampton Roads Metropolitan Medical Strike Team, replace expired pharmaceuticals, conduct regional Mass Casualty Incident (MCI) training and exercises, and sustain disaster response resources (Disaster Medical Support Units, Shelter Support Units, Mass Casualty/Evacuation Transport vehicles). The HRMMRS works closely with the Eastern Virginia Healthcare Coalition and

⁵⁸ Public Health Assessment and Wellness. Available at <http://twinfalls.id.networkofcare.org/ph/model-practice-detail.aspx?pid=1222> (accessed December 8, 2013).

⁵⁹ NJ HOA Mass Vaccination Exercises. Available at <http://www.njhoa.org/pdf/NJHOA%20Mass%20Vaccinations%20Best%20Practices%20Report%202009.pdf> (accessed December 8, 2013).

⁶⁰ Interview with Bill Ginnow by Jesse Pines, August 2013.

other state and federal preparedness initiatives to ensure optimal use of all available funding for training, exercises, and capability sustainment.

CONCLUSIONS AND RECOMMENDATIONS

Although local health departments have primary responsibility for population health protection and public health emergency response, public funding has been declining for more than three decades. CDC and others have repeatedly identified deficiencies in public health infrastructure, workforce, and planning that compromise all-hazards readiness—systemic problems that remain unresolved today.⁶¹ Much of the blame for the current, suboptimal state of public health infrastructure, systems, and workforce has been attributed to the lasting effects of historic underfunding.⁶² For the years 1979 to 2008, federal public health spending, as a percentage of all U.S. health expenditures, declined 19.7 percent.⁶³ The future looks bleak as economic pressures on state budgets and increasing demands from programs such as education and economic development will likely continue to reduce the dollars available for public health preparedness.⁶⁴ According to data provided by NACCHO, 55 percent of the nation’s local health departments reduced or eliminated at least one program between July 2010 and June 2011, and 20 percent of these programs focused on emergency preparedness.⁶⁵

For hospitals, the emergency preparedness situation is just as dire. Although hospitals have been building their disaster response capability, Hurricane Katrina illustrated the results of failure when four patients died inside Memorial Medical Center in New Orleans.⁶⁶

The decreasing funds available to health departments, hospitals, and communities from all sources necessitate a new strategy for emergency preparedness, what can be termed the “new normal.” This means adjusting to less money while maintaining a state of readiness that would be adequate under normal or emergency conditions. In order for health partners and their communities to survive this new normal in funding, there are several options that have shown promise in a variety of communities and states: regionalization, public–private partnerships, and resource-sharing arrangements. Five criteria may be used to evaluate these three options. These criteria, which are critical components of public health readiness, are listed below:

1. Workforce capacity
2. Surge capacity
3. Laboratory capacity and capability

⁶¹ Julie Gerberding, CDC, Professional Judgment [Budget] for Fiscal Year 2008, submitted to the US House Appropriations Subcommittee on Labor, Health, and Human Services, Education and Related Agencies, April 2007.

⁶² Institute of Medicine. *Future of Public Health* (1988). Available at <http://iom.edu/Reports/1988/The-Future-of-Public-Health.aspx> (accessed January 6, 2013)

⁶³ Kinner K, Pellegrini C. Expenditures for public health: Assessing historical and prospective trends. *Am J Public Health*. 2009 Oct;99(10):1780-91.

⁶⁴ NCSL, *State Budget Actions FY2006 and FY2007* (Washington, DC: NCSL, 2007); GAO, *State and Local Governments*, 1-6.

⁶⁵ *Local Health Department Job Losses and Program Cuts: Findings from the January 2012 Survey*, National Association of City and County Health Officials, p. 1.

⁶⁶ Gray, B, Hebert, K. (2006). *Hospitals in Hurricane Katrina: Challenges Facing Custodial Institutions in a Disaster*. The Urban Institute. http://www.urban.org/UploadedPDF/411348_katrinahospitals.pdf (Accessed January 6, 2013).

4. Mass-patient care capability
5. Mass-vaccination capability

Given that funding for emergency preparedness efforts will likely continue to fall, communities will need to find creative ways to ensure local preparedness. According to a recent journal article, “all disasters are inherently local and require a coordinated response at the lowest jurisdictional level”; therefore, solutions for funding and support will need more and more to come directly from communities, not the federal government.⁶⁷ In this white paper, several sample models of preparedness were identified and successful communities highlighted. The concepts of regionalization, public–private partnerships, and resource sharing have demonstrated success at both the state and local levels. Building on and maintaining these strong local relationships is the way to effectively create emergency response systems that can be sustained through variable levels of federal funding. In addition, some communities may need to find local ways to fund preparedness efforts through local taxes. Although successful models do exist in some communities, it is unlikely that all communities across the United States will have local groups that are creative enough to develop sustainable programs. Therefore, local, state, and federal governments bear a significant responsibility to ensure that all communities in the United States are prepared for public health emergencies.

In light of the findings of this paper and studies that have explored this topic in the past, we propose seven recommendations about how the government can focus limited resources on the most valuable areas of emergency preparedness and response, and ensure that no community is left vulnerable to a major disaster.

Recommendation 1: The federal government should develop and assess measures of emergency preparedness both at the community level and across communities in the United States. Measures should include both preparedness (i.e., capabilities) and response and recovery. There should be a greater focus on identifying appropriate levels of emergency preparedness funding by conducting research to justify specific dollar amounts that should be invested in preparedness activities based on economic principles. The following research agenda is one suggested approach.

Measuring Risks

To measure the value of preparedness activities, a solid basis is needed for evaluating the costs associated with public health emergencies. Some research activity is already in progress through ASPR’s Hurricane Sandy research projects; however, additional investment should be made in the design and improvement of models for evaluating the expected costs associated with different types of hazardous events.

Measuring Preparedness

To identify the communities most at risk from a public health emergency, a systematic measure of preparedness is required. This would include, but not be limited to, providing a working definition of what it means to be prepared for a given type of hazard;

⁶⁷ Stewart K, Smith M. Leveraging public-private partnerships to improve community resilience in times of disaster, *Int J Phys Logist Mgmt* 2009;39 (5): 343-364.

understanding the different factors that determine a community's ability to respond to an event; designing specific metrics that identify a community's overall preparedness; and developing outcome measures that could be used retrospectively to evaluate the response to an event.

Evaluating the Effect of Preparedness Activities

There is a lack of sufficient understanding about what specific activities are most effective in terms of their impact on the outcome of an event. An effective research agenda would promote rigorous scientific evaluation of different activities to understand how effective they are. Preparedness activities in this context should be broadly defined to evaluate a wide range of policies and procedures, including prevention, response, coordination, and community partnerships, etc. To the extent possible, these assessments should evaluate the relative benefits and costs of different activities to best understand their value.

Ultimately, the goal of the research agenda is to improve preparedness. However, simply identifying effective tools for measuring preparedness and evaluating different activities may not achieve this unless we also understand how to get communities engaged and adopt the right activities for them. To this end, more work should be done to evaluate how different policies can best accomplish this. Such policies could involve financial incentives, education, community outreach, or any combination of these or other interventions.

Understanding Disparities in Preparedness

It is generally accepted that communities vary considerably in terms of their capacity to respond to different types of events. Some of these differences are easy to identify and understand; for example, rural jurisdictions are generally considered to have less ability to respond to an event than urban jurisdictions. However, even within these broad categories, there is considerable variation in response capacity. Understanding how and why different communities have different willingness and ability to engage in different preparedness activities could help our ability to overcome barriers and guarantee a minimum level of preparedness for all U.S. jurisdictions.

Recommendation 2: Measures developed by the federal government should be used to conduct a nationwide gap analysis of community preparedness. States and local communities should be responsible for conducting these assessments, which should include current capabilities and resources that exist within both communities and regions. There should be a focus on identifying redundant capacities and capabilities and areas where resources can be shared across communities. Local assessments should also identify local barriers that exist in sharing resources across communities and how they can be remedied (e.g., through mutual aid agreements). After these assessments have been done, new formulas should be created to ensure that federal and state monies are distributed where they are needed most, based on the risk and impact of potential disasters. Priority should be given to distributing monies to local coalitions that span communities, so that all communities are covered.

Recommendation 3: The current way that preparedness funding is distributed—in large infusions following a public health emergency followed by years of austerity—does not support sustainable all-hazards preparedness that is distributed uniformly across the nation. Alternative ways of distributing funding should be considered that ensure that all communities have the ability to build and sustain local coalitions that can support sufficient infrastructure. For example, there should be longer time horizons (e.g., 5-6 years rather than shorter time periods) for grant funds so that communities can coordinate to ensure long-term all-hazards preparedness.

Recommendation 4: When monies are released for specific projects, there should be clear metrics of grant effectiveness. In a 2003 study, the Government Accountability Office concluded that there had been measurable improvement in one area—the management of first responders—but there remains significant challenges in measuring all other aspects of preparedness and response.⁶⁸ To date, there has been no definitive study that measures the capability and capacity of communities to prevent, prepare, or respond to a terrorist event.

Recommendation 5: There should be better coordination at the federal level, including funding and grant guidance. This may lead to better coordination and inclusion of nontraditional response groups at the local level. Relaxing restrictions on funding use and more direct guidance to intersect grants (PHEP and HPP, for example) and include all community stakeholders from the top can help to alleviate siloed planning at the local level.

Recommendation 6: Local communities should build these coalitions or use existing coalitions to build public-private partnerships with local hospitals and other businesses with a stake in preparedness. There should be incentives for jurisdictions to be more creative and innovative at the local level with their programs. Funding should be expanded to focus on developing these local coalitions, and participation in these coalitions should have economic or accreditation incentives attached. For example, value-based purchasing programs or other payment programs could potentially include active participation in a coalition. Alternatively, accreditation bodies such as the Joint Commission could expand expectations for hospitals to participate in coalition. This should also be expanded to groups that accredit and reward other facilities that participate in state and federal payment programs, such as nursing homes, dialysis facilities, pharmacies, and assisted living facilities. It is vital that health care coalitions not be hospital-centric and that other local stakeholders be involved and participate. In addition, a working group should be formed to develop a set of best practices to engage local businesses in preparedness.

Recommendation 7: Communities should be encouraged to engage in creative ways to finance local preparedness efforts through mechanisms such as social impact bonds,⁶⁹ free-market

⁶⁸ Government Accountability Office, “Homeland Security: Management of First Responder Grant Programs Has Improved, but Challenges Remain,” GAO-05-121 (Washington, DC: February, 2005) and “Homeland Security: Reforming Federal grants to Better Meet Outstanding Needs,” GAO-03-1146T (Washington, DC: September 3, 2003).

⁶⁹ *Harvard Magazine*. Available at <http://harvardmagazine.com/2013/07/social-impact-bonds> (accessed December 8, 2013).

models for homeland security,⁷⁰ and using state and local taxing authorities. Further work should explore these concepts in depth to assess which strategies are most effective and sustainable, and to develop a community toolkit for exploring and implementing some of these approaches.

⁷⁰ *Entrepreneurial Security: A Free-Market Model for National Economic Security*. Available at <http://www.hsaj.org/?article=9.1.7> (accessed December 8, 2013).