

# The National Health Security Preparedness Index

Summary of Key Findings

April 2018

**PREPARED** ✓  
NATIONAL HEALTH SECURITY PREPAREDNESS INDEX

  
Robert Wood Johnson  
Foundation

The United States experienced the most active and expensive year on record for disasters and emergency events in 2017, with total economic damages exceeding \$300 billion.<sup>1</sup>

Hurricanes, storms, floods, fires, and extreme temperatures touched every region of the country, causing requests for disaster assistance to increase 10-fold from 2016 levels. California's wildfires killed at least 22 people in 2017, the Gulf coast hurricanes Harvey and Irma produced more than 80 deaths each in Texas and Florida, and more than 1,000 deaths were estimated in Puerto Rico during Hurricane Maria and its aftermath. The nation's health security enterprise mobilized repeatedly in 2017 to reduce the incidence of disease, injury, and death in the face of these disasters and many other hazardous events.

Results from the 2018 release of the **National Health Security Preparedness Index** indicate that readiness for disasters, disease outbreaks, and other emergencies continued to improve in 2017, but current levels of health security remain far from optimal.

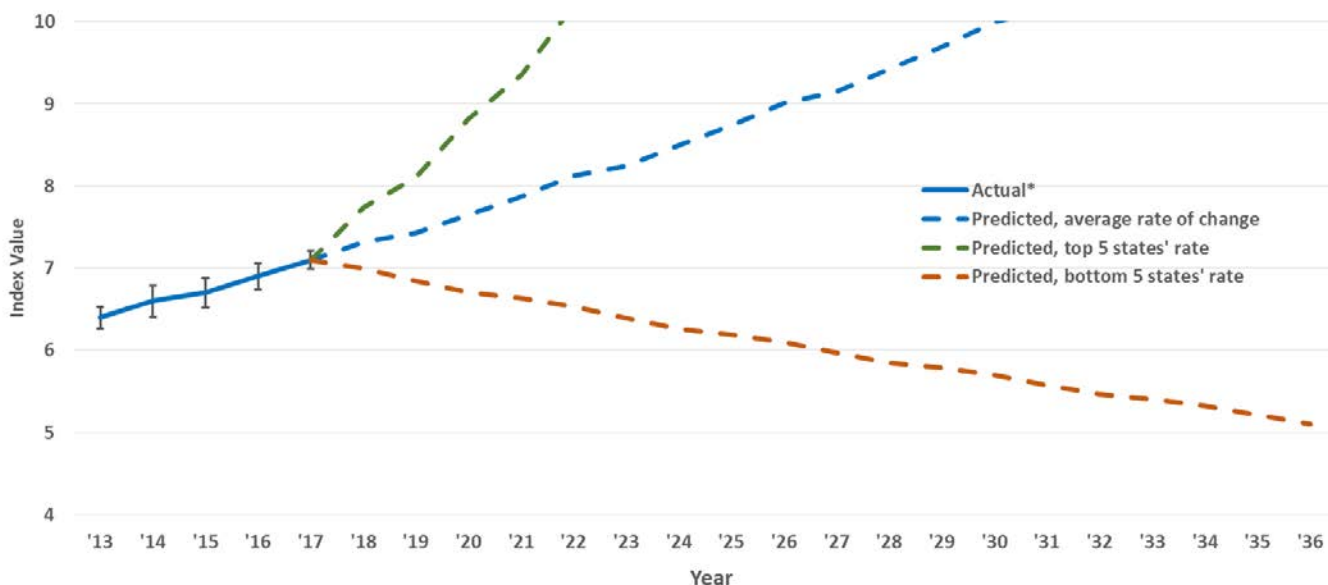
The national Index reached 7.1 out of 10 in 2017, representing a 2.9 percent improvement over the prior year and a 10.9 percent improvement since 2013. Large differences in health security persisted across states and regions, with the Deep South, Southwestern, and Upper Mountain West regions lagging significantly behind the rest of the nation. If current trends continue, the average state will require five additional years to reach health security levels currently found in the best-prepared states, and nine more years to reach a strong health security level of at least 9.0 out of 10. Consequently, growth in the frequency and intensity of health security threats may outpace growth in the nation's health security protections in the years to come, resulting in greater risks to population health.

### Rising Threats to Health Security

Health security is a condition in which the nation and its people are prepared for, protected from, and resilient to events that can adversely impact health status.<sup>2</sup> Hazardous events are unpredictable as to their location, timing, intensity, and geographic reach. For this reason, protections need to be available 'everywhere' in order to prevent disease and injury 'anywhere.'<sup>3</sup> Many health security threats are increasing in frequency and intensity in the United States and globally due to a combination of factors:<sup>4</sup>

- Extreme weather events including storms, fires, floods, droughts, and temperature extremes
- Newly emerging and resurgent infectious diseases like Zika, MERS, and Ebola
- Growing antibiotic resistance among infectious agents.
- Incomplete vaccination coverage
- Globalization in travel and trade patterns
- Political instability, violence, and terrorism risks
- Aging infrastructure for transportation, housing, food, water, and energy systems
- Cyber-security vulnerabilities

**1** National health security improved consistently during 2013-2017, but at a modest rate of less than 3 percent per year. At this pace, the United States will require nine years to achieve a strong health security level of at least 9.0.



NOTE: Vertical lines indicate confidence intervals. \*Five-year trend is statistically significant.

The Index tracks the nation's progress in preparing for, responding to, and recovering from the health consequences of disasters, disease outbreaks, and other large-scale emergencies. Because health security is a responsibility shared by many different stakeholders in government and society, the Index combines measures from more than 60 sources and multiple perspectives to offer a broad view of protection.<sup>5</sup> Aggregating large volumes of data from national household surveys, medical records, safety inspection results, and surveys of health agencies and facilities, the Index produces composite measures of health security for each U.S. state and the nation as a whole. The Index reveals strengths as well as vulnerabilities in the protections needed to keep people safe and healthy in the face of emergencies, and it tracks how these protections vary across the United States and change over time.

## Key Findings

■ **Improvements Continue Across the United States:** The United States posted a fifth consecutive year of gains in health security nationally, with the Index reaching its highest level of 7.1 out of 10 in 2017 (**Figure 1**). This result represents a 2.9 percent improvement from 2016, and a 10.9 percent improvement from 2013. Health security improved in a total of 38 states and the District of Columbia in 2017, while it declined in four states and remained unchanged in eight states.

■ **The Pace of Improvement Remains Modest:** The national Index increased by two percentage points in 2017 from the prior year (2.9%), and by seven percentage-points since 2013 (10.9%). At this pace, the United States as a whole will require five additional years to reach the health security level enjoyed in the strongest state (Maryland's 8.0 Index value), and nine additional years to achieve a health security level of at least 9.0 out of 10. If the United States could achieve rates of improvement experienced in the 5 fastest-improving states, national health security could reach a level of 9.0 in as few as four years (**Figure 1**). Conversely, if national rates regress to the negative rates of change observed among the lowest five states, national health security could fall to its lowest level on record by 2024.

■ **Inequities in Protection Are Growing:** The nation's health protections are not distributed evenly across the United States, with a gap of 25 percent in Index values of the highest and lowest states in 2017. States in the Deep South, Southwest, and Upper Mountain West regions experienced significantly lower health security levels and smaller gains in health security over time compared to their counterparts in other regions (**Figure 2**). These below-average regions contain disproportionate numbers of low and moderate income residents and rural residents who have fewer personal and community resources to draw upon in the event of an emergency. State inequities in preparedness were largest in the *community planning and engagement* domain, where the leading state achieved a preparedness level nearly two times higher than the lowest state in 2017. Gaps between the highest and lowest states also approached a two-fold difference in the *healthcare delivery* domain (**Figure 6**). Large

### What the Index Measures

The Index includes 140 measures grouped into six broad domains of health security:

- **Health security surveillance:** detecting and monitoring health threats and identifying where hazards start and spread so that they can be contained rapidly;
- **Community planning and engagement:** maintaining supportive relationships among government agencies, community organizations, and individual households; and developing shared plans for responding to hazards;
- **Information and incident management:** deploying people, supplies, money, and information to the locations where they are most effective in protecting health and safety;
- **Healthcare delivery:** ensuring access to high-quality medical services across the continuum of care during and after emergencies;
- **Countermeasure management:** storing and deploying medical and pharmaceutical products that protect against diseases and toxic agents, including vaccines, prescription drugs, masks, gloves, and medical equipment;
- **Environmental and occupational health:** maintaining the security and safety of water and food supplies, testing for hazards and contaminants in the environment, and protecting workers and emergency responders from hazards while on the job.

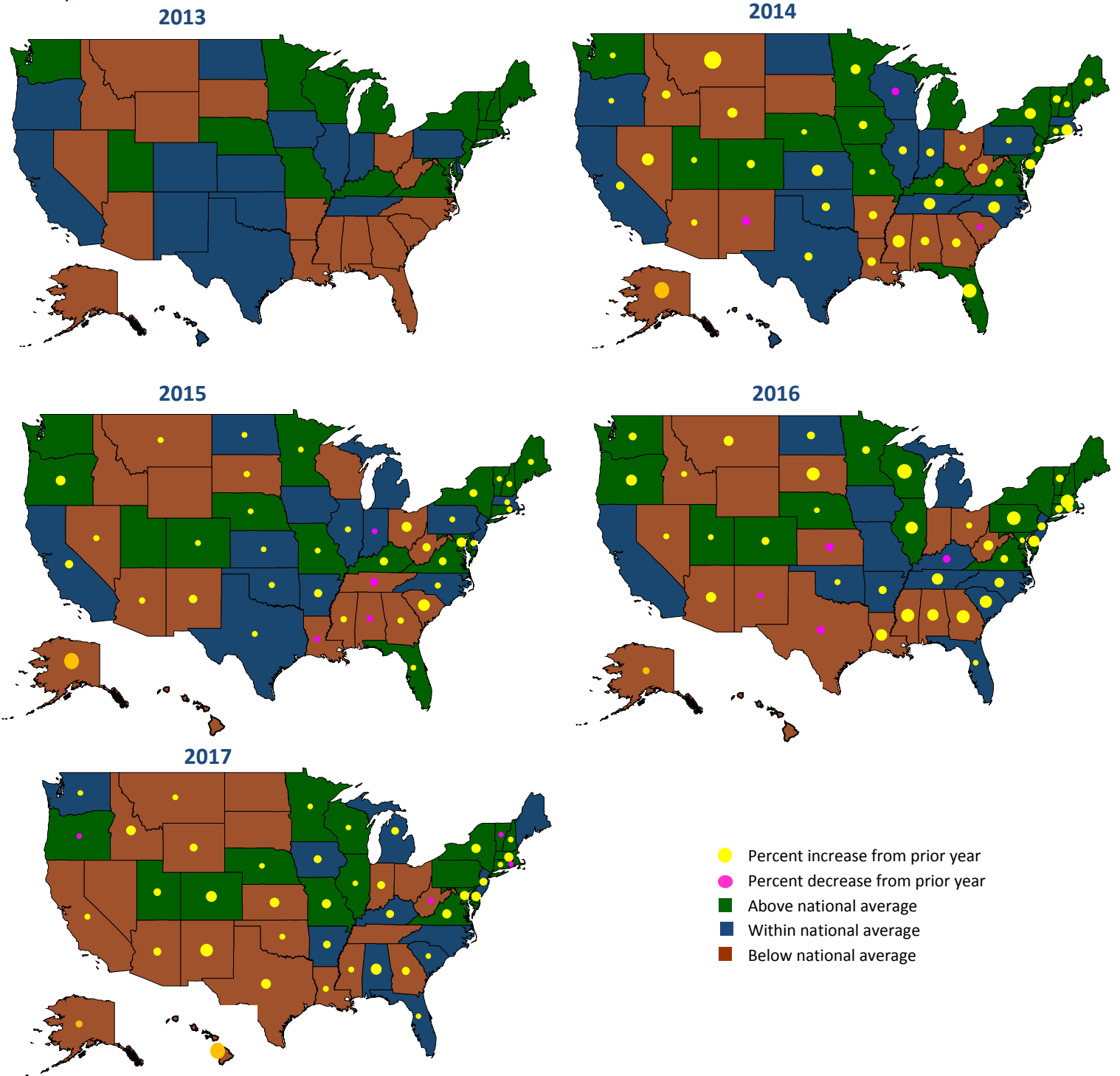
### What It Does Not Measure

The Index does not characterize the performance of individual state or local public health preparedness programs, healthcare preparedness programs, or other sector-specific initiatives. It measures **collective impact** in health security across multiple sectors.



differences in health security across states weaken the nation as a whole by limiting the ability of state, federal and local stakeholders to work together and share information and resources, a function known as interoperability. These gaps are particularly troubling because they leave some communities more vulnerable to disasters and emergencies than others, contributing to inequities in population health and well-being. The Index results suggest a need for sustained national efforts focused not only on improving health security levels overall but also on closing gaps in preparedness across states and communities.

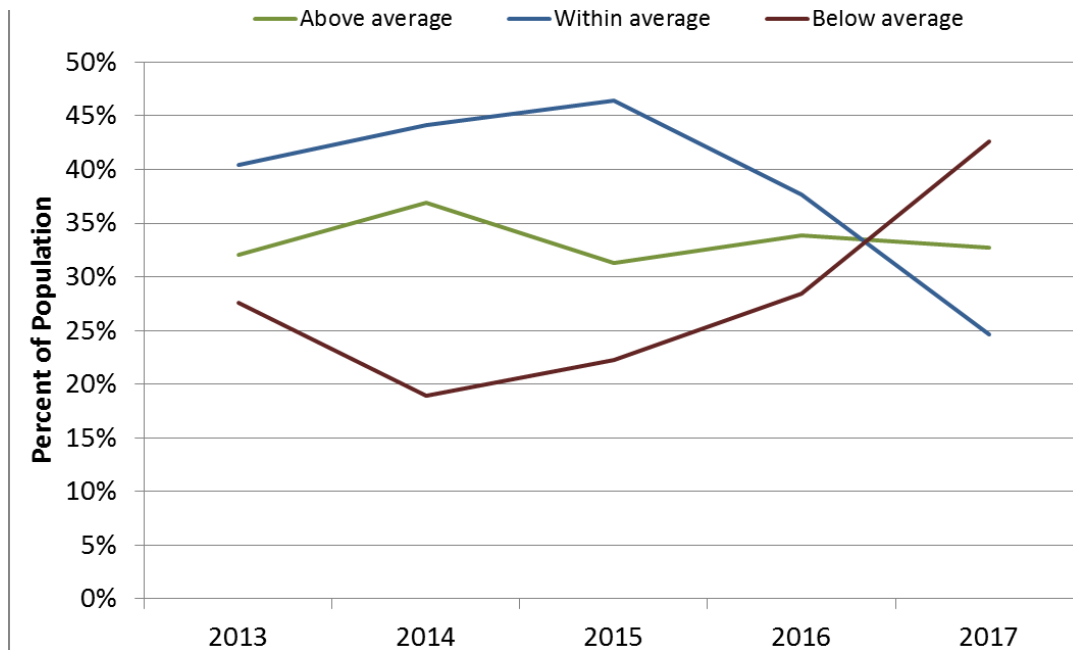
**2** | Geographic disparities in health security are persistent and becoming more pronounced over time. States in the Deep South, Southwest, and Upper Mountain West lag behind other regions.



■ **Geographic Stratification Accelerates:** States that fall below the national average in health security levels generally share a border with other below-average states, and this geographic pattern accelerated in 2017 as California, Oklahoma, and North Dakota fell below the national average for the first time since Index measurement began (**Figure 2**). Two of these states fell below the national average despite experiencing gains in health security in 2017, because these gains were significantly smaller than those realized in other states. Geographic stratification poses additional threats to national health security by making it more difficult for states to offer mutual aid and assistance to neighboring jurisdictions when hazardous events occur. Above-average states have become more geographically isolated from below-average states over the past five years, complicating the task of mutual aid.

■ **More Americans Reside in Areas with Below-Average Protections:** As geographic stratification in health security has intensified, the share of the U.S. population living in regions with below-average health security has steadily increased in recent years, while those living in above-average regions have declined (**Figure 3**). The population living in below-average regions stood at less than 20 percent in 2014, but it rose to a high of 43 percent in 2017 as populous southern-tier states like Texas and California lagged behind national trends in health security. Correspondingly, the U.S. population living in above-average health security regions reached a high mark of 46 percent in 2015, before falling to a low of 33 percent in 2017. Currently, 30 percent more Americans live in regions with below-average health security than in regions with above-average security.

**3 | The proportion of U.S. residents living in regions with below-average health security has risen significantly since 2014, accounting for more than 40 percent of the population by 2017.**

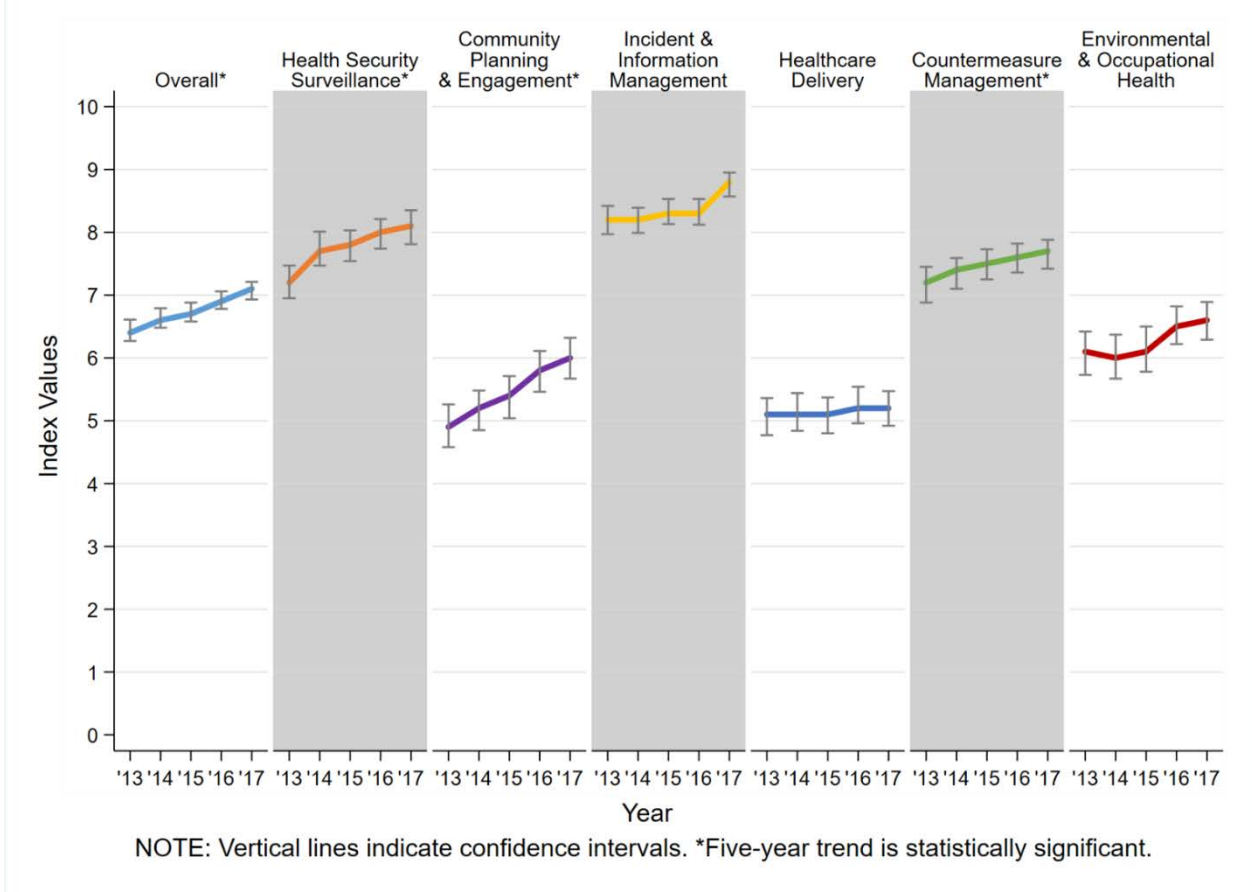


■ **Community Engagement Gains Strength:** The largest gains in health security since 2013 occurred in an area of vulnerability for the nation as a whole, that of *community planning and engagement*. Historically, the United States struggled to develop supportive relationships among government agencies, community organizations, and individual residents and to develop shared plans for responding to emergencies. Relationships that connect people and organizations together make communities more resilient to disasters and can accelerate recovery after events occur. This domain stood out as the nation’s weakest area of preparedness in the first Index released in 2013, but it improved by 22.4 percent as of 2017—more than any other domain monitored in the Index (**Figure 4**). Maintained over time, improvements in engagement and collaboration can attract new resources and expertise that strengthen other domains of health security.

In 2017, **43 percent** of U.S. residents lived in a region with below-average levels of health security as measured in the Index.

# 4

Health security trended upward in most domains during 2013-2017, particularly in community planning/engagement, surveillance, and incident management. The healthcare delivery domain remained flat.

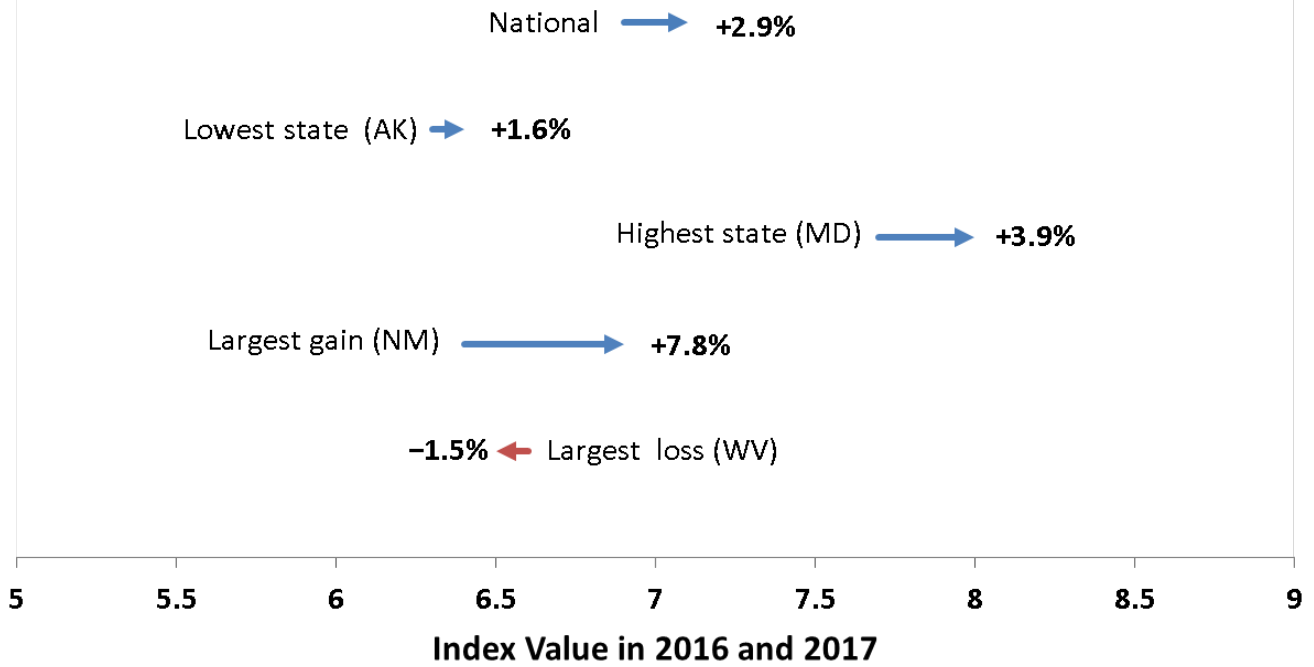


■ **Emergency Management Remains the Nation’s Strongest Component:** The largest one-year gain in health security occurred in *incident management*, the ability to follow a standardized approach in managing the response to emergency events. Strong incident management can lead to faster response times, fewer errors, and more efficient use of resources when emergencies occur. Health security in this domain reached 8.8 in 2017, significantly higher than any other domain monitored in the Index and a 6 percent improvement from the prior year (**Figure 4**). These results reflect more than a decade of national focus on training government agencies, health professionals, and community leaders in the incident command process and in practicing these skills regularly through exercises, drills, and real events.

■ **Health Systems Show Few Signs of Progress:** The United States did not show signs of improvement in the healthcare delivery dimensions of health security as of 2017, even as the nation grew stronger in other domains of activity (**Figure 4**). Healthcare providers have accommodated shifts in health insurance coverage and new models of healthcare delivery and financing in recent years, while operating in an increasingly uncertain health policy environment. These pressures make it difficult for health system leaders to devote attention and resources to health security needs within their communities.

■ **Improvements in Leading and Trailing States:** Overall, gains in health security far surpassed losses among states between 2016 and 2017, indicating that many stakeholders found ways to improve their operations and respond to emerging hazards despite ongoing resource constraints (**Figure 5**). States experiencing the largest gains in health security were distributed relatively evenly across the United States and included states that both lead and trail the nation in overall levels of security. These results demonstrate that improvements are possible in many different circumstances, including states that have already acquired robust health security capabilities as well as states that have many unmet needs.

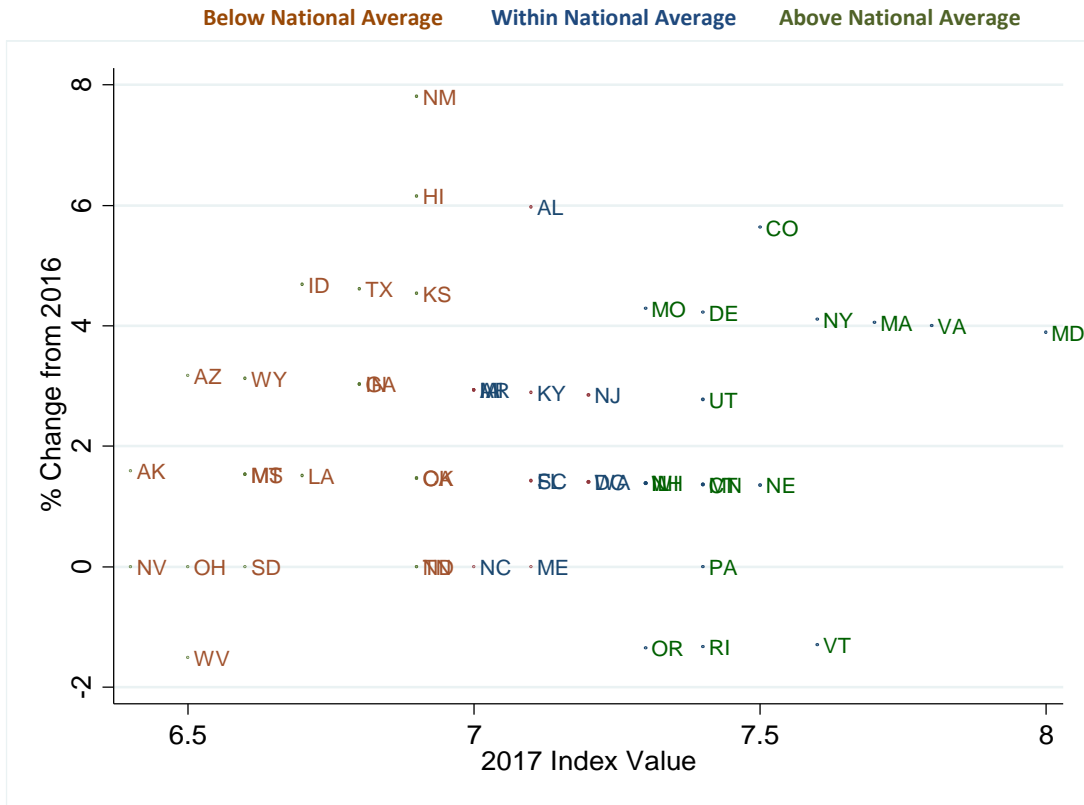
**5** | Gains in state health security far surpassed losses between 2016 and 2017. New Mexico's 8 percent gain moved the state within range of the U.S. average, while West Virginia's loss was less than 2 percent.



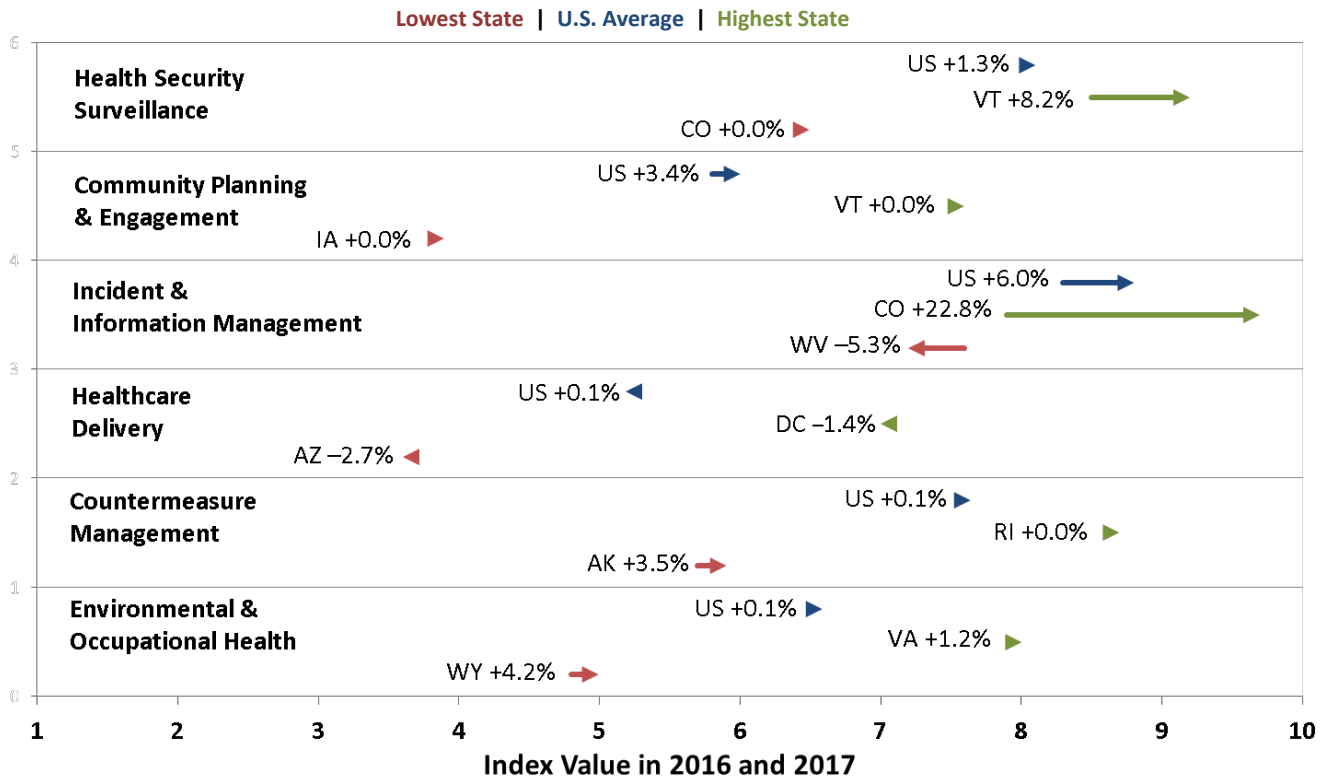
■ **Prioritizing Areas of Stagnant and Declining Security:** A total of 12 states experienced stagnant or declining levels of health security between 2016 and 2017, even as the nation as a whole gained strength (Figure 6). Six of these states also fall below the national average level of health security, indicating that they are falling further behind over time. Many other states failed to make progress in specific domains such as *healthcare delivery* and *environmental health*, even when they achieved improvements in other domains. The direction and magnitude of change in health security varied widely across states and domains (Figure 7), indicating a need for heightened attention to specific geographic areas and functional capabilities that show signs of vulnerability. Because each state's portfolio of strengths and weaknesses is relatively unique, individual states need to develop tailored approaches to health security priority-setting and improvement. The Index is one tool that states can use to identify and prioritize areas for improvement.



**6** Improvements in health security occurred throughout the United States, including in states that both lead and trail the national average. However, 12 states failed to gain ground.



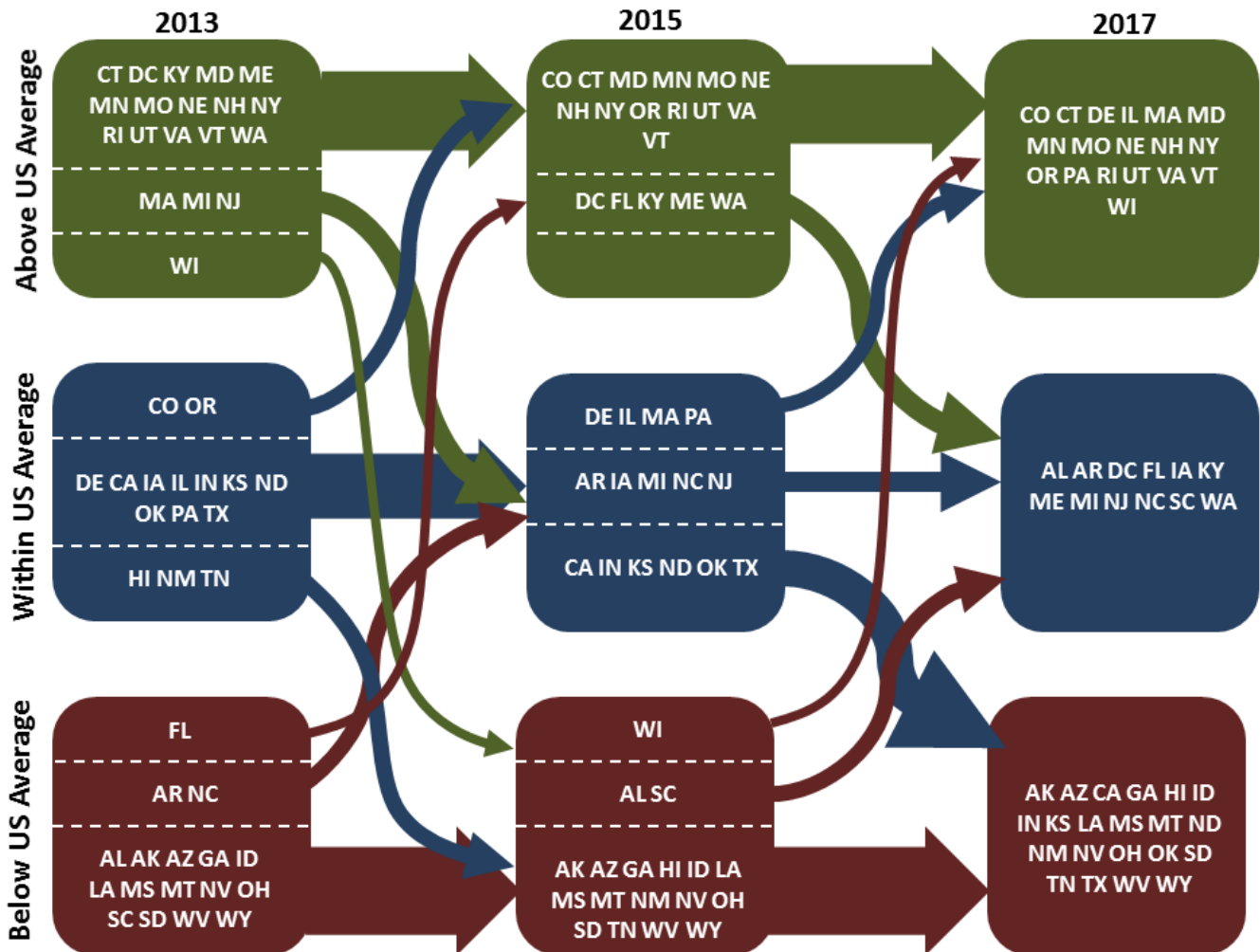
**7** Changes in health security levels between 2016 and 2017 varied widely across states and domains. Vermont was the only state that led the nation in more than one domain.





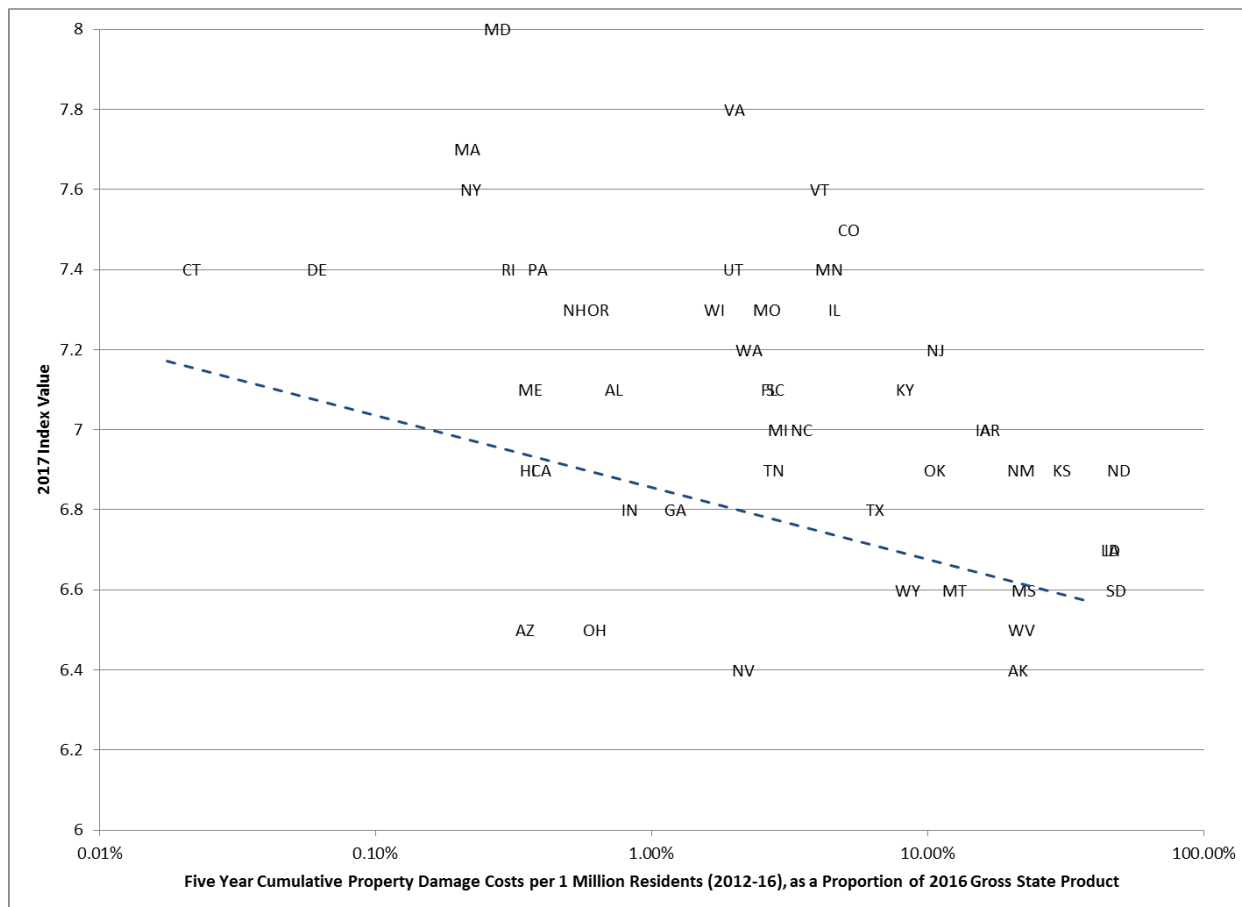
■ **Many States Follow Dynamic Health Security Trajectories:** Some states consistently fall above or below the national average health security level, but more than a third of states experience changes in their leading or trailing positions over time (Figure 8). During the five year period through 2017, Florida and Wisconsin exhibited some of the most dynamic patterns in health security, moving above, below, and within the national average over five years. Health security levels are determined by a complex mix of capacities and capabilities, making it difficult to identify the specific combination of factors that cause transitions in health security levels over time. States can use the large dashboard of health security metrics included in the Index to identify key drivers of change.

8 | Health security trajectories are dynamic, with more than a third of states experiencing changes in health security large enough to shift their position relative to the national average.



■ **Economic Losses Linked to Lower Health Security Levels:** States that experienced higher economic losses from past disasters showed lower overall levels of health security in 2017 (Figure 9). The reasons for this relationship are not fully understood, but research demonstrates that disasters can dampen subsequent economic activity in local communities, potentially constraining the public and private resources available to invest in future health security capabilities.<sup>6</sup> Resources received during post-disaster periods may be allocated primarily for recovery needs, rather than being invested in preparing for future hazardous events. These findings suggest that states and regions incurring large disaster-related economic losses may require targeted assistance to improve health security capabilities, alongside the assistance provided for recovery activities.

**9** The costs of disasters vary widely across states, as a share of total state economic activity. States that incur higher economic costs show lower levels of health security.

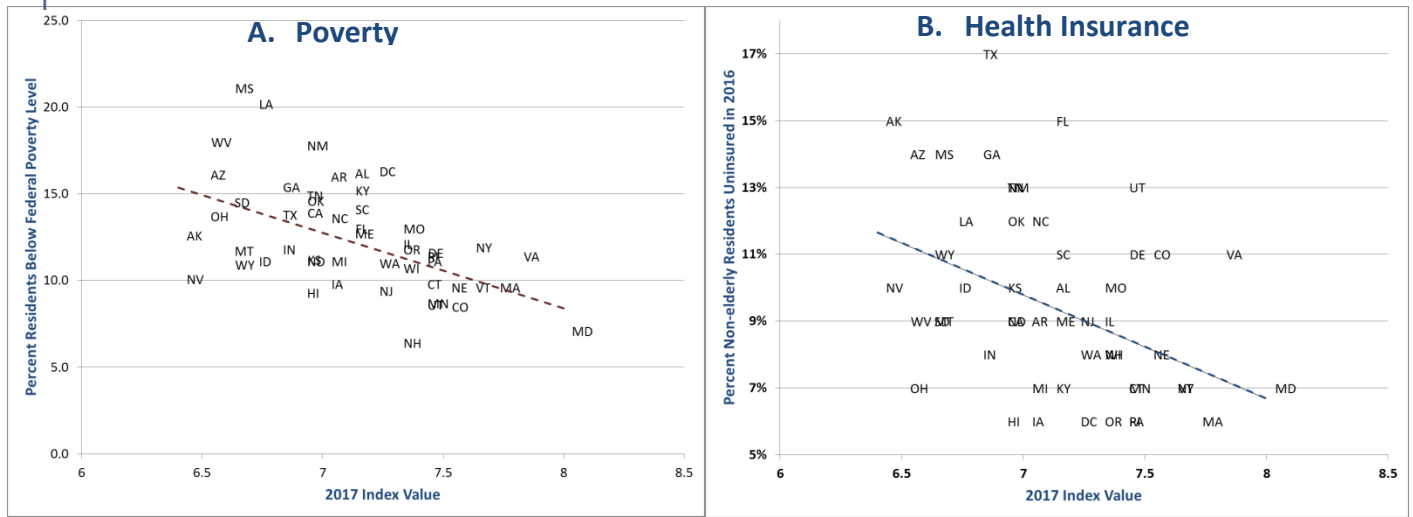


NOTE: Cost data computed from the Spatial Hazard Events and Losses Database for the United States, Version 16.<sup>12</sup>

■ **Inequities Linked to Poverty and Coverage Gaps:** Poverty and health insurance coverage are strongly linked to state health security levels as measured by the Index (**Figure 10A**). States with higher poverty levels have fewer public and private resources available to invest in health protections, and these states also face many competing demands on their resources. Federal aid helps to reduce differences in fiscal capacity across states, but federal preparedness funding falls far short in eliminating the health security gaps that exist between affluent and poorer states. After a brief period of growth following the September 2001 terror attacks, dedicated federal funding for health security and preparedness has declined sharply over time.<sup>3</sup>

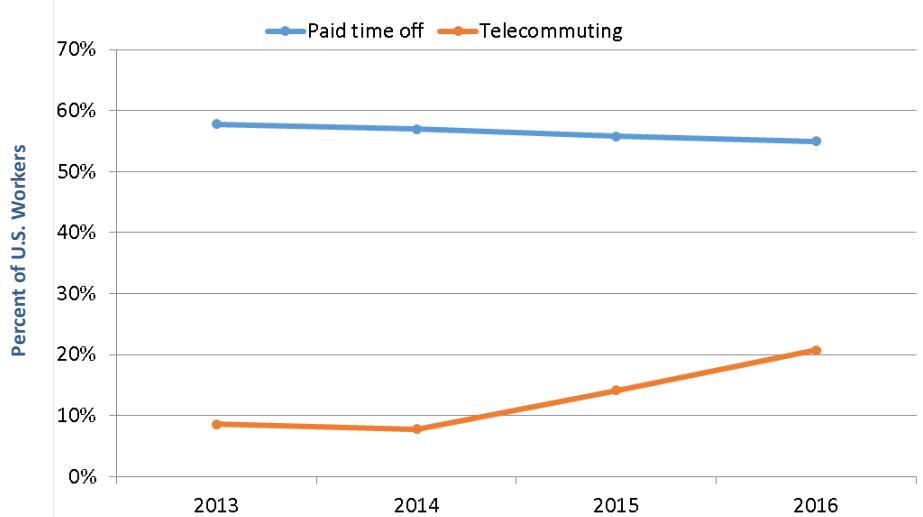
Health security is stronger among states that have achieved higher rates of health insurance coverage among their residents (**Figure 10B**). Hospitals, physicians, and other healthcare providers are able to invest more time and resources in health security activities when they face fewer obligations to provide free and discounted medical care for uninsured patients. When disasters occur, health insurance—along with property insurance and other forms of coverage—helps to spread the costs of recovery evenly across families, businesses, and governments.<sup>7</sup> By spreading risk broadly across society, insurance coverage promotes resiliency and helps communities bounce back faster from adversity. Federal and state efforts to expand health insurance coverage appear to have strengthened health security, but these gains have accrued unevenly across the United States.

**10** Health security varies inversely with state poverty levels and the proportion of the population without health insurance coverage. Recent gains in coverage have strengthened health security in many states.



■ **Employment Policies Drive Workforce Health Security:** The proportion of American workers who receive paid time off from their employer has trended downward over time (**Figure 11**), raising risks of disease transmission in the workplace and making it more difficult for workers to accommodate school or workplace closures in the event of an emergency.<sup>8</sup> Conversely, workers who telecommute to their jobs at least some of the time have risen since 2014, preparing more workplaces to maintain core operations during emergencies. Low-wage workers are much less likely to be covered by these employment policies, giving rise to another source of inequity in health security.

**11** Employment policies and practices drive health security in the workforce. Workers with paid time off have trended downward, while telecommuting among workers is on the rise.



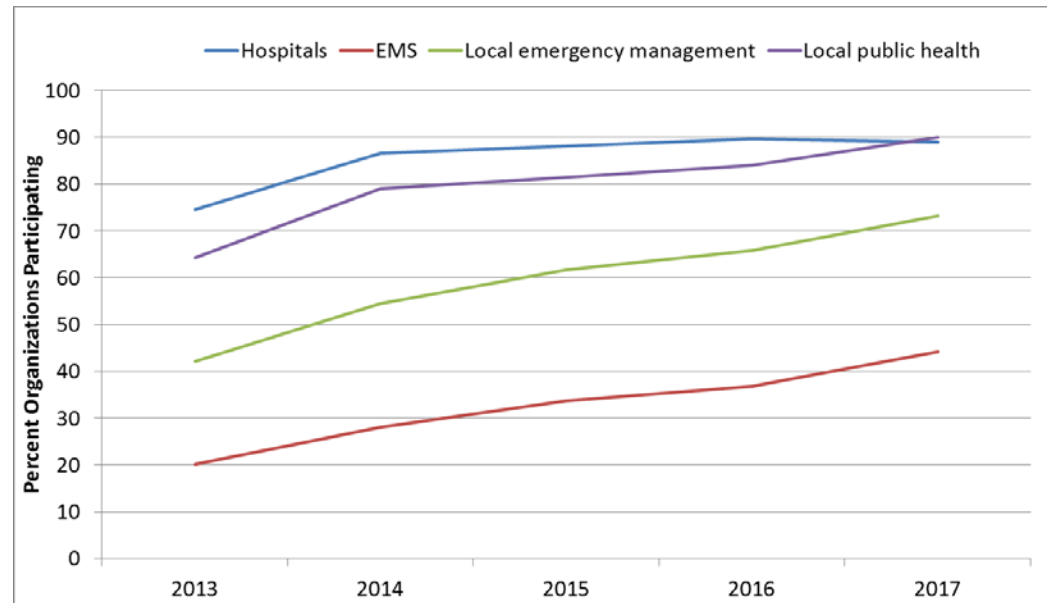
In 2017, 44 states had **above-average** levels of health security in at least one of the six domains in the Index, and 46 states had **below-average** levels of health security in one or more domains. Each state faces a unique combination of strengths and vulnerabilities in health security.

■ **Preparedness Coalitions Gain Membership, Expand Reach:** Healthcare preparedness coalitions have expanded their membership in many states and regions, engaging a growing share of organizations that help to bolster access to medical care during and after emergencies. The proportion of hospitals, emergency medical service (EMS) providers, local emergency management agencies, and local public health agencies that participate in a healthcare preparedness coalition increased steadily over time since 2013 (**Figure 12**). These coalitions, supported by the federal Hospital Preparedness Program of the U.S.

Assistant Secretary for Preparedness and Response, help local healthcare and emergency organizations share resources, develop emergency plans and protocols, and coordinate responses to emergency events.<sup>9</sup> As such, coalitions provide a promising platform for organizing quality improvement initiatives in the healthcare sector that focus on health security and preparedness. Unfortunately, participation by EMS providers and local emergency management agencies continues to be incomplete in many states and communities. Coalitions can strengthen their capabilities by forging stronger relationships with other multi-sector networks and alliances operating within communities.<sup>10</sup>

## 12

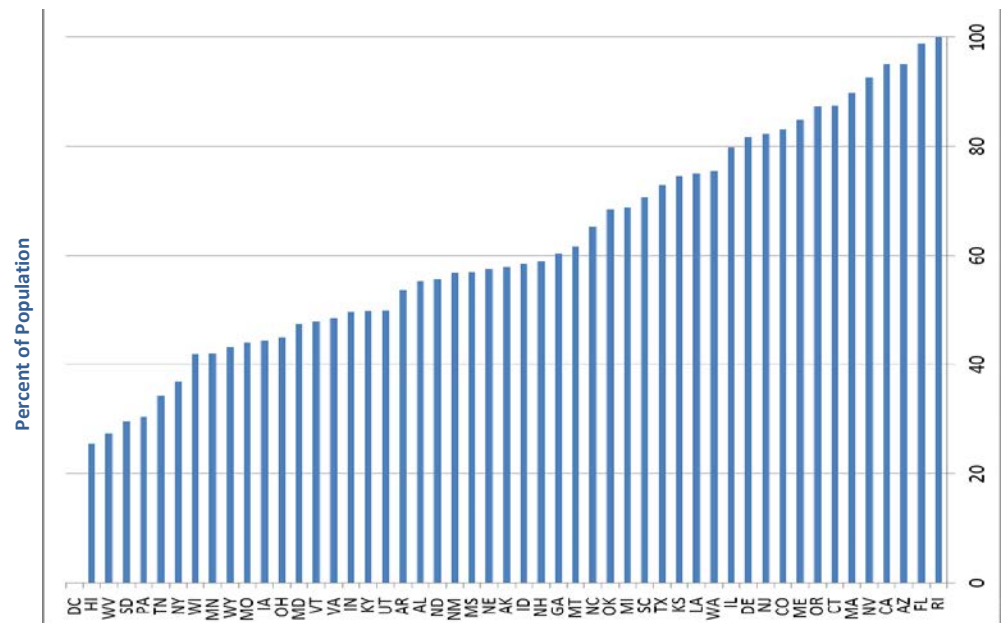
**Participation in healthcare preparedness coalitions has trended upward since 2013. But participation by EMS and emergency management agencies lags other organizations.**



## 13

**Community participation in flood mitigation activities through Federal Emergency Management Agency's Community Rating System varies widely across the United States. Nearly all the residents of flood-prone areas in Florida and Rhode Island live in communities that participate, but in West Virginia less than a third of such residents have this protection.**

■ **Flood Mitigation Activities Are Far from Universal:** The National Flood Insurance Program's Community Rating System allows communities located in flood risk areas to earn flood insurance discounts by undertaking one or more creditable activities to reduce risks, such as public information dissemination, early warning systems, and environmental modifications to reduce damage. In most U.S. states, less than 60 percent of people who reside in flood-prone areas live in a community that participates in this program (**Figure 13**). Expanded participation in the program incentivizes local governments and households to undertake activities that reduce health risks and economic damages when flooding occurs.





## Implications for Policy and Practice

The nation's health protections have grown significantly stronger over time, generating five consecutive years of improvement. These gains occurred during a period of constrained government resources, more frequent and costly hazardous events, and many competing priorities and uncertainties within the U. S. health system. This analysis cannot support definitive conclusions about the actions that produced these improvements, but contributing factors are likely to include developing a National Health Security Strategy, defining core capabilities for key sectors involved in health security and preparedness, community-engaged planning and protocol development, and regular testing of plans and protocols through exercises, drills, and responses to real events. Health security professionals are now well positioned to learn from and build upon the successes achieved over the past five years.

Unfortunately, the gains achieved to date are not sufficient to keep all communities safe and healthy in the face of rising risks of disasters and emergencies. Health security is improving at an uneven pace across the United States, leaving large and growing segments of the American population under-protected. Several states are losing strength in health security, and many others are failing to keep pace with advances in policy and practice. Closing current gaps and inequities in health security will require new and more coordinated actions by government and the private sector. Stakeholders involved in the policy and practice of health security should consider the following strategies for accelerating the pace of progress:

■ **Develop and Promote the Role of Chief Health Security Strategist:** Through a broad constellation of metrics, the Index demonstrates how many different sectors contribute to health security at state and national levels. Key sectors include public health, medical care, emergency management, public safety, nonprofit and voluntary organizations, businesses, the faith community, and others. Even seasoned professionals may not be fully aware of health security resources and needs that lie outside their immediate control and responsibility. For these reasons, every state and community needs individuals who are empowered to monitor the *health security enterprise as a whole* and to convene, mobilize, and coordinate collective actions across the public and private sectors that strengthen this enterprise. The *chief strategist role* for a state or community requires strong leadership and communication skills, savvy political awareness, entrepreneurial instincts, and systems thinking. State and federal stakeholders should work together to develop training, mentoring, and career development opportunities that focus on establishing this role in every state and community across the United States

■ **Enhance Health Security Data Sources, Information Systems, and Metrics:** The Index uses the best available data sources and measures to characterize health security levels across the United States, but many gaps in data and measurement exist. Most existing data systems focus on structural capacities such as people, institutions, policies, and programs that are easily observed and counted. Such measures are necessary but not sufficient for fully characterizing how resources are used within the health security enterprise, including measures of effectiveness, efficiency and equity. Moreover, existing data systems are infrequently shared outside the individual sectors being measured, and they are rarely linked with other data sources relevant to health security. The Index represents an initial platform for multi-sector health security data sharing and linkage, but more extensive initiatives are needed to ensure that health security leaders have the information needed to function effectively as chief health strategists. To this end, state and federal stakeholders should create a standing committee and process for identifying unmet data and measurement needs across the U.S. health security enterprise and for developing data acquisition and exchange platforms that can address unmet needs.

■ **Strengthen and Connect Existing Networks and Coalitions:** Multi-sector networks and coalitions focused on health and social issues are growing steadily across the United States, including preparedness coalitions that specialize in health security issues. This growth has contributed to rising Index values in many states. Many community networks that have formed outside the preparedness field lack awareness about health security needs in their communities and lack knowledge about strategies for building health security through community collaboration. Research demonstrates these multi-sector networks have profound effects on population health status over time.<sup>10</sup> Health security professionals should work to connect disparate networks and focus their activities on improving health security in geographic and

functional areas where gaps and disparities exist. Multi-sector networks are uniquely positioned to leverage existing resources and expertise available in the public and private sectors.

■ **Engage the Private Sector in the Business of Health Security:** The Index demonstrates that key elements of national health security lie within the purview of private sector employers and businesses. Human resource policies involving paid leave and telecommuting options have the potential to boost health security while improving employee productivity, recruitment, and retention. Similarly, employer support for health insurance coverage and household financial planning among their workers can strengthen employee productivity and health security. For these reasons, health security professionals should collaborate with the business community through entities like chambers of commerce and economic development councils to expand the adoption and use of beneficial workforce policies for health security.

■ **Expand Preparedness Planning, Training, and Reporting Across the Healthcare System:** Healthcare delivery remains the weakest domain of health security measured in the Index. The U.S. Centers for Medicare and Medicaid Services (CMS) recently proposed a set of new preparedness standards that apply to all types of healthcare providers participating in Medicare and Medicaid.<sup>11</sup> The standards require all providers to conduct an assessment of their risks and vulnerabilities to emergency events, develop an emergency response plan based on these risks, develop a communications plan to coordinate care in the event of emergencies, and conduct regular trainings and tests of the emergency plans. Federal and state officials should work to implement these new preparedness standards across the U.S. health system, monitor compliance with the standards, and provide regular feedback to healthcare providers on their progress. Importantly, federal stakeholders should produce and publicly disseminate timely measures of healthcare system compliance with the CMS emergency preparedness rule.

■ **Ensure Adequate Surge Funding for Health Security Capabilities:** Historically, federal and state health officials have lacked an effective mechanism for rapidly deploying resources to address newly emerging health emergencies soon after they are detected, when hazards are easiest to contain. Recent U.S. experiences with Zika and Ebola outbreaks and the Flint water crisis demonstrated that emergency response times can be slowed considerably by administrative and political processes that must be followed in requesting new funding and in redirecting existing funding to combat new health threats. A dedicated and adequately resourced health security emergency response can circumvent these delays by allowing federal and state health officials to rapidly obtain funding for newly emerging health threats.

■ **Identify Costs and Funding Requirements for Sustainable and Equitable Health Security Infrastructure:** Health security requires resources not only for responding to disasters when and where they occur, but also for robust pre-event surveillance, planning, training, communication, and preparation activities in all states and communities. Federal funding for pre-event health security activities has declined sharply in recent years, and the resulting gaps in funding are particularly problematic for low-resource and rural regions. The federal government should consider a phased approach for (1) estimating the costs required to establish a robust health security infrastructure across the United States; and (2) increasing federal, state, and local funding contributions to levels that meet these cost estimates. Intergovernmental matching funds requirements can be used to address inequities in resource availability across states and communities based on socioeconomic status and the rural-urban continuum.

■ **Allow for Flexibility in the Allocation and Use of Health Security Resources:** Index results demonstrate that each state's health security strengths and weaknesses are unique and influenced by local socioeconomic, demographic, and environmental circumstances. For this reason, individual states and communities need to develop tailored approaches to health security priority-setting and improvement. Health security funding mechanisms should allow states the flexibility to allocate and use their resources in ways that are responsive to local needs and circumstances.

## About the Index

The 2018 Index release is the fifth in a series of annual releases of data and analysis on national health security and preparedness. The initial Index releases in 2013 and 2014 were supported by the U.S. Centers for Disease Control and Prevention and developed through a collaborative effort of more than 30 organizations led by the Association of State and Territorial Health Officials, the Oak Ridge Associated Universities, the University of Pittsburgh Medical Center, and Johns Hopkins University. This work generated broad stakeholder input that shaped the Index's overall design and structure and demonstrated the overall utility of the Index concept. In January 2015, responsibility for the Index transferred to the Robert Wood Johnson Foundation, and key enhancements were made to the Index measures and methodology to extend its utility as a measurement tool. Results from the 2018 release of the Index are not directly comparable to prior releases of the Index; however, this Index release includes results for five consecutive annual periods dating back to 2013, thereby allowing for valid comparisons over time.

## Index Content and Structure

The 2018 Index release measures 140 individual capabilities that research and experience have shown to be important in protecting people from the health consequences of disasters, disease outbreaks, and other large-scale hazards and emergencies. Because no single agency or organization has the ability to support all of the protections necessary to keep people safe and healthy in the face of these events, the Index reflects preparedness as a responsibility shared by many different stakeholders in government and society. Correspondingly, the Index combines measures from more than 60 different data sources and from multiple sectors in order to offer a broad view of the health security levels achieved for the nation as a whole and for individual U.S. states.

The Index measures are grouped into one of six domains representing broad areas of preparedness activity:

1. **Health security surveillance:** actions to monitor and detect health threats and to identify where hazards start and spread so that they can be contained rapidly;
2. **Community planning and engagement:** actions to develop and maintain supportive relationships among government agencies, community organizations, and individual households; and to develop shared plans for responding to disasters and emergencies;
3. **Information and incident management:** actions to deploy people, supplies, money, and information to the locations where they are most effective in protecting health and safety;
4. **Healthcare delivery:** actions to ensure access to high-quality medical services across the continuum of care during and after disasters and emergencies;
5. **Countermeasure management:** actions to store and deploy medical and pharmaceutical products that prevent and treat the effects of hazardous substances and infectious diseases, including vaccines, prescription drugs, masks, gloves, and medical equipment; and
6. **Environmental and occupational health:** actions to maintain the security and safety of water and food supplies, to test for hazards and contaminants in the environment, and to protect workers and emergency responders from health hazards while on the job.

The Index further divides these six domains into a total of 19 subdomains reflecting specific areas of practice and policy. Individual measures are used to calculate measures for each of the 19 subdomains and then combined into summary measures for each of the six domains and an overall Index composite measure. All summary measures are scaled along a range from 0 to 10, with 10 representing the highest level of preparedness. The Index produces summary measures for each of the 50 U.S. states and the District of Columbia individually and for the nation as a whole. In this fifth annual release, the 2018 Index release includes annual results for the years 2013 through 2017.

## Index Methodology

Construction of the 2018 Index began with a pool of more than 200 individual measures identified by stakeholders involved in prior releases of the Index, and supplemented by a public call for new measures held annually thereafter. We used a series of measurement validity and reliability tests to eliminate redundant measures and measures lacking a strong empirical association with the Index domain and subdomain areas. Measures for which updated data could not be obtained at least every three years for each U.S. state were also eliminated from the Index. The resulting set consists of 140 individual measures, including a group of 19 measures defined as Foundational Capabilities because they reflect activities that are firmly ingrained in practice in all U.S. states and do not vary across states or over time.

We convened expert panels to determine how much weight to give to each individual measure when combining them into composite measures for subdomains, domains, and the overall Index score. Experts rated each measure based on its importance to health security capacities and capabilities represented in each Index subdomain and domain. Before combining measures, each measure was standardized to a common scale using the min-max normalization method, and missing values were imputed using a regression-based multiple imputation method. Weighted averages were used to construct summary measures at the subdomain, domain, and overall Index levels for each state and each year. Foundational Capability measures were constructed as constants and averaged into the domain and overall summary measures using expert panel weights. State measures were then averaged to construct summary measures for the nation as a whole, giving each state equal weight in the national results. All summary measures are scaled along a range from 0 to 10, with 10 representing the highest level of preparedness. Confidence intervals were estimated around each national summary measure in order to identify which states fall above, below, or in-line with the national measures.



**For more information and full Index results,  
visit the National Health Security Preparedness Index website at:  
[www.nhspi.org](http://www.nhspi.org)**



## References

1. NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2018). <https://www.ncdc.noaa.gov/billions/>
2. Assistant Secretary for Planning and Response, U.S. Department of Health and Human Services. *National Health Security Strategy and Implementation Plan*. Washington, DC: U.S. Department of Health and Human Services; 2015. Available at: <https://www.phe.gov/Preparedness/planning/authority/nhss/Documents/nhss-ip.pdf>
3. Trust for America's Health. *Ready or Not? Protecting the Public's Health from Diseases, Disasters, and Bioterrorism*. Washington, DC: Trust for America's Health; 2017. Available at: <http://www.healthymamericans.org/assets/files/TFAH-2017-ReadyOrNot-Fnl.pdf>
4. Intergovernmental Panel on Climate Change. *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*. Cambridge, UK: Cambridge University Press; 2012. Available at: [https://www.ipcc.ch/pdf/special-reports/srex/SREX\\_Full\\_Report.pdf](https://www.ipcc.ch/pdf/special-reports/srex/SREX_Full_Report.pdf)
5. Mays GP, Childress M, Zephyr D, Hoover A. *Methodology for the 2016 National Health Security Preparedness Index*. Lexington, KY: University of Kentucky Center for Public Health Systems and Services Research; 2016. Available at: [http://nhspi.org/wp-content/uploads/2016/04/NHSPI\\_2016\\_Methodology\\_PDF.pdf](http://nhspi.org/wp-content/uploads/2016/04/NHSPI_2016_Methodology_PDF.pdf)
6. Boustan LP, Kahn ME, Rhode PW, and Yanguas ML. The Effect of Natural Disasters on Economic Activity in US Counties: A Century of Data. *National Bureau of Economic Research Working Paper No. 23410*. Cambridge, MA: NBER; May 2017. Available at: <http://www.nber.org/papers/w23410>
7. Deryugina T. The fiscal cost of hurricanes: disaster aid versus social insurance. *National Bureau of Economic Research Working Paper # 2272*. Cambridge, MA: NBER; 2016. Available at: <http://www.nber.org/papers/w2272>
8. Susser P, Ziebarth NR. Profiling the U.S. sick leave landscape: presenteeism among females. *Health Services Research* 2016;51:2305–2317.
9. Courtney B, Toner E, Waldhorn R, Franco C, Rambhia K, Norwood A, Inglesby TV, O-Toole T. Healthcare coalitions: the new foundation for national healthcare preparedness and response for catastrophic health emergencies. *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science*. 2009;7(2): 153-163.
10. Mays GP, Mamaril CB, Timsina LR. Preventable death rates fell where communities expanded population health activities through multisector networks. *Health Affairs* 2016;35(11):2005-2013.
11. U.S. Centers for Medicare and Medicaid Services. Emergency Preparedness Requirements for Medicare and Medicaid Participating Providers and Suppliers. *81 Federal Register 80594*. Available at: <https://www.federalregister.gov/documents/2016/11/16/2016-27478/medicare-and-medicaid-programs-emergency-preparedness-requirements-for-medicare-and-medicaid>
12. Hazards and Vulnerability Research Institute, 2017. Spatial Hazard Events and Losses Database for the United States, Version 16.0. [Online Database]. Columbia, SC: Hazards and Vulnerability Research Institute, University of South Carolina.

# Acknowledgements

The National Health Security Preparedness Index is a program of the Robert Wood Johnson Foundation. The Program Office for the Index is based at the University of Kentucky and staffed through a collaboration between the Center for Public Health Systems and Services Research, College of Public Health, and the Center for Business and Economic Research, Gatton College of Business and Economics. The Program Office is directed by Glen P. Mays, PhD, Professor of Health Systems and Services Research at the University of Kentucky.

## Report Authors:

Glen P. Mays, PhD, MPH; Michael T. Childress, MA; Pierre Martin Dominique Zephyr, MS; Anna Goodman Hoover, PhD, MA; Sarah C. Vos, PhD; Ann Kelly, MHA; Nurlan Kussainov, MPP.

## Recommended Citation:

Center for Public Health Systems and Services Research. *National Health Security Preparedness Index 2018 Release Summary of Key Findings*. Lexington, KY: University of Kentucky; April 2018.

## Contributors at the Robert Wood Johnson Foundation:

Lori K. Grubstein, MPH, MSW, MPA, Program Officer  
Alonzo Plough, PhD, MA, MPH, Vice President, Research-Evaluation-Learning and Chief Science Officer

## National Advisory Committee Members, 2017-2018:

Thomas V. Inglesby, MD (Chair), Johns Hopkins University Center for Health Security  
Robert Burhans, BA, Health Emergency Management Consultant  
Anita Chandra, DrPH, RAND  
Mark DeCoursey, U.S. Chamber of Commerce Foundation  
Eric Holdeman, Emergency Management Consultant  
Harvey E. Johnson, Jr., American Red Cross  
Ana Marie Jones, Interpro Incorporated  
Dara Lieberman, MPP, Trust for America's Health  
Suzet McKinney, DrPH, MPH, Illinois Medical District Commission  
Stephen Redd, MD, U.S. Centers for Disease Control and Prevention (CDC)  
John Wiesman, DrPH, MPH, Washington State Secretary of Health

## Program Consultants:

Christopher R. Bollinger, PhD, University of Kentucky; Christopher Nelson, PhD, RAND

### Index Workgroups:

This work would not have been possible without the input and feedback provided by voluntary members of the Index Analytic Methodology and Model Design Workgroup, and the Stakeholder Engagement and Communication Workgroup.

### Cover Art and Photos:

Cover photo licensed from Getty Images. Photos on page 7 and 16 licensed from iStock.

### For More Information:

National Health Security Preparedness Index Program Office  
Center for Public Health Systems and Services Research  
University of Kentucky College of Public Health  
111 Washington Avenue, Suite 201  
Lexington, KY 40536

Telephone: 859-257-2912

Email: [healthsecurity@uky.edu](mailto:healthsecurity@uky.edu)

Web: [www.nhspi.org](http://www.nhspi.org)

**COLLEGE OF PUBLIC HEALTH**  
Center for Public Health  
Systems and Services Research

