The National Health Security Preparedness Index
2020 Release

PREPARED
NATIONAL HEALTH SECURITY PREPAREDNESS INDEX

Robert Wood Johnson Foundation

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The novel coronavirus SARS-CoV-2 (COVID-19) pandemic poses the largest test of the U.S. health security enterprise in more than a century. Deaths may exceed 100,000 in the United States, unemployment may reach 20% or more, and economic damages will amount to trillions of dollars across the country. Older adults and racial and ethnic minority groups are experiencing significantly higher mortality than other populations, and low and middle-income households are enduring severe economic distress including job loss, food insecurity, and housing instability. The COVID-19 pandemic completes a full decade of large-scale hazardous events affecting broad segments of the American population. For a 10th consecutive year, Americans endured eight or more high-consequence hazardous events each year that exceeded $1 billion in damages.[1] Beyond the COVID pandemic, hurricanes, storms, floods, fires, and extreme temperatures have touched every region of the country. Other hazards during 2019 included widespread outbreaks of hepatitis A, a continuing epidemic of opioid overdose deaths, clusters of severe lung disease associated with vaping, and tragic episodes of community violence at schools, churches and other public spaces. The nation's health security enterprise mobilized repeatedly to reduce the incidence of disease, injury, and death in the face of these events. In many areas, states and communities responded to two or more large-scale events at the same time.

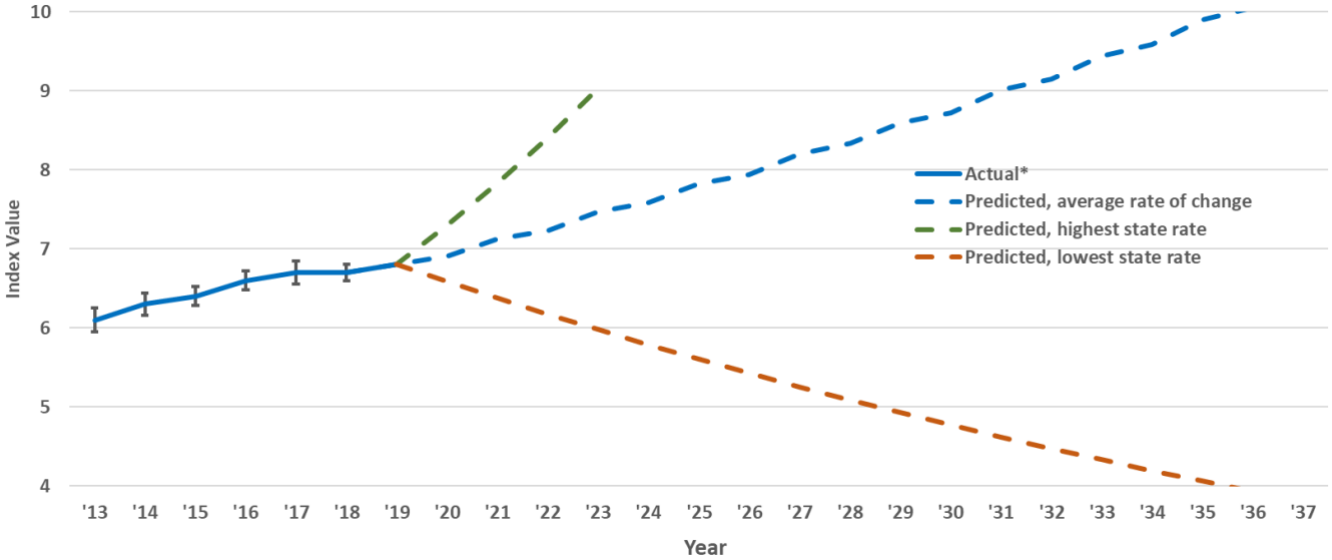
Rising Threats to Health Security

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.[2] 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.[3] Many health security threats are increasing in frequency and intensity in the United States and globally due to a combination of factors:[4]

- Extreme weather events including storms, fires, floods, droughts, and temperature extremes
- Newly emerging and resurgent infectious diseases like Zika, MERS, Ebola and now SARS-Cov-2
- 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

Results from the 2020 release of the **National Health Security Preparedness Index** indicate that readiness for disease outbreaks, natural hazards, and other large-scale emergencies improved during 2019, but wide differences in preparedness persisted across states and regions. The national Index score reached 6.8 out of 10 by the end of 2019, representing a 1.5% improvement over the prior year and a 11.5% improvement since 2013.

1 **National health security improved consistently during 2013-2019, but at a modest rate of less than 2% per year. At this pace, most states will require at least 10 years to achieve a strong health security level of at least 9.0.**



NOTE: Vertical lines indicate confidence intervals. *Seven-year trend is statistically significant at p<0.01.

If current trends continue, most states will require six additional years to reach health security levels currently found in the best-prepared states, and at least 10 more years to reach a strong health security level of at least 9.0 out of 10 (**Figure 1**). Increases in the frequency and intensity of hazardous events are outpacing increases in preparedness levels as measured by the Index, resulting in heightened health risks for U.S. communities.

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 the private sector, the Index combines measures from more than 60 sources and multiple perspectives to offer a broad view of protection.[5] 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

A Majority of States Improve: The United States posted a sixth consecutive year of gains in health security nationally, with the Index reaching its highest level of 6.8 out of 10 by year-end 2019 (**Figure 1**). This represents a 1.5% improvement from 2018, and a 11.5% improvement from 2013. Health security improved in a total of 31 states in 2019, while it declined in 8 states, and remained largely unchanged in 12 states.

The Pace of Improvement Remains Slow: The national Index value has increased by one percentage point per year since 2013. At this pace, the United States will require six additional years to reach health security levels enjoyed in the strongest states of Massachusetts and Maryland (7.5 Index value), and at least 10 additional years to achieve a health security level of 9.0 out of 10. If the U.S. could achieve rates of improvement experienced in the fastest-improving states, national health security could reach a level of 9.0 in as few as five years (**Figure 1**). Conversely, if national rates regress to the negative rates of change observed among the lowest-scoring states, health security could fall to its lowest level on record by 2021.

Inequities in Protection Persist: The nation's health protections are not distributed evenly across the United States, with a gap of 32% in Index values of the highest and lowest states in 2019. States in the South-Central, Upper Mountain West, Pacific Coast, and Midwest regions experienced significantly lower health security levels and smaller gains in health security over time compared to their counterparts in other regions (**Figure 2**). 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.

What the Index Measures

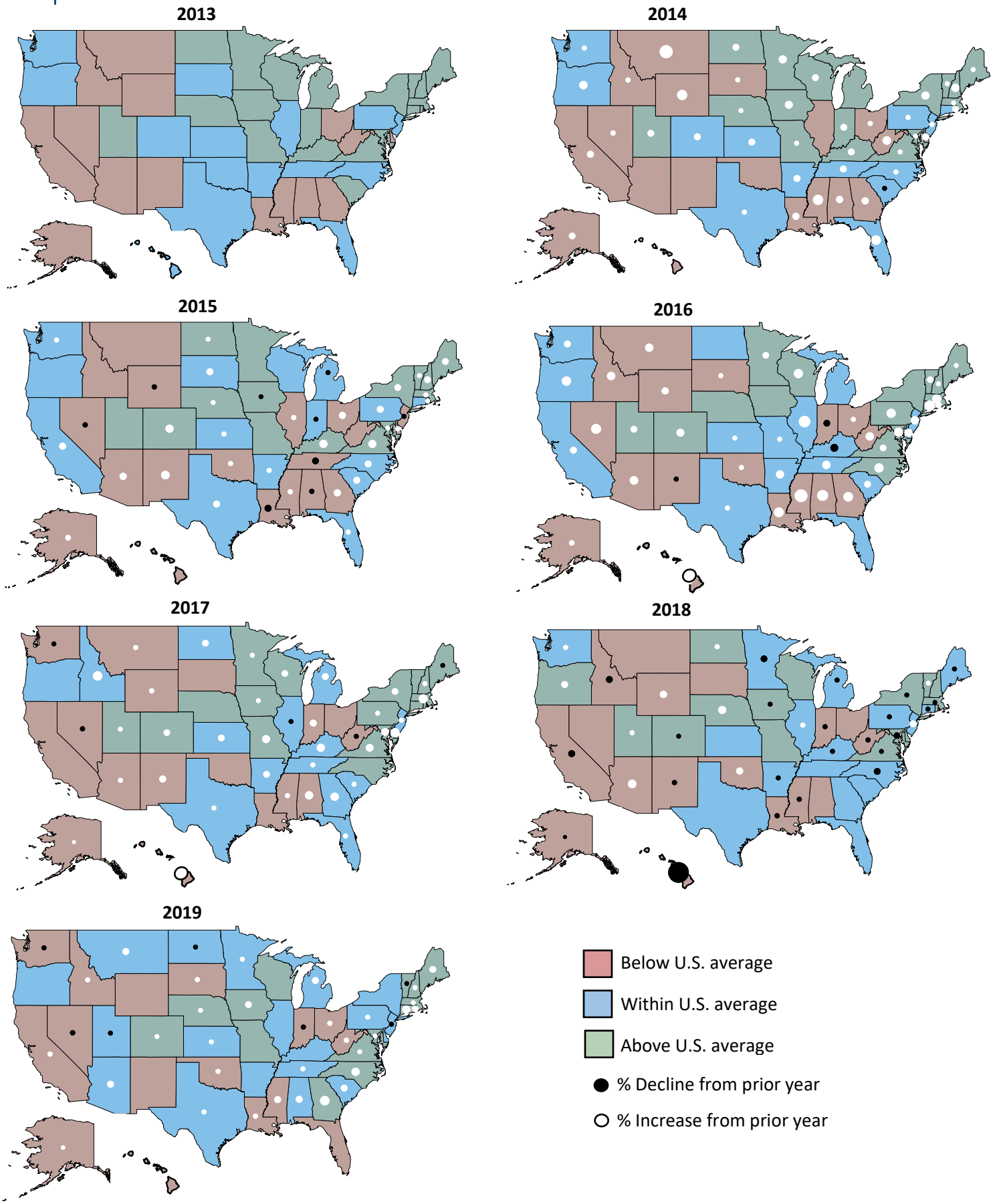
The Index includes 130 measures grouped into six broad domains of health security:

- **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; and
- **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, health care preparedness programs, or other sector-specific initiatives. It measures **collective impact** in health security across multiple sectors.

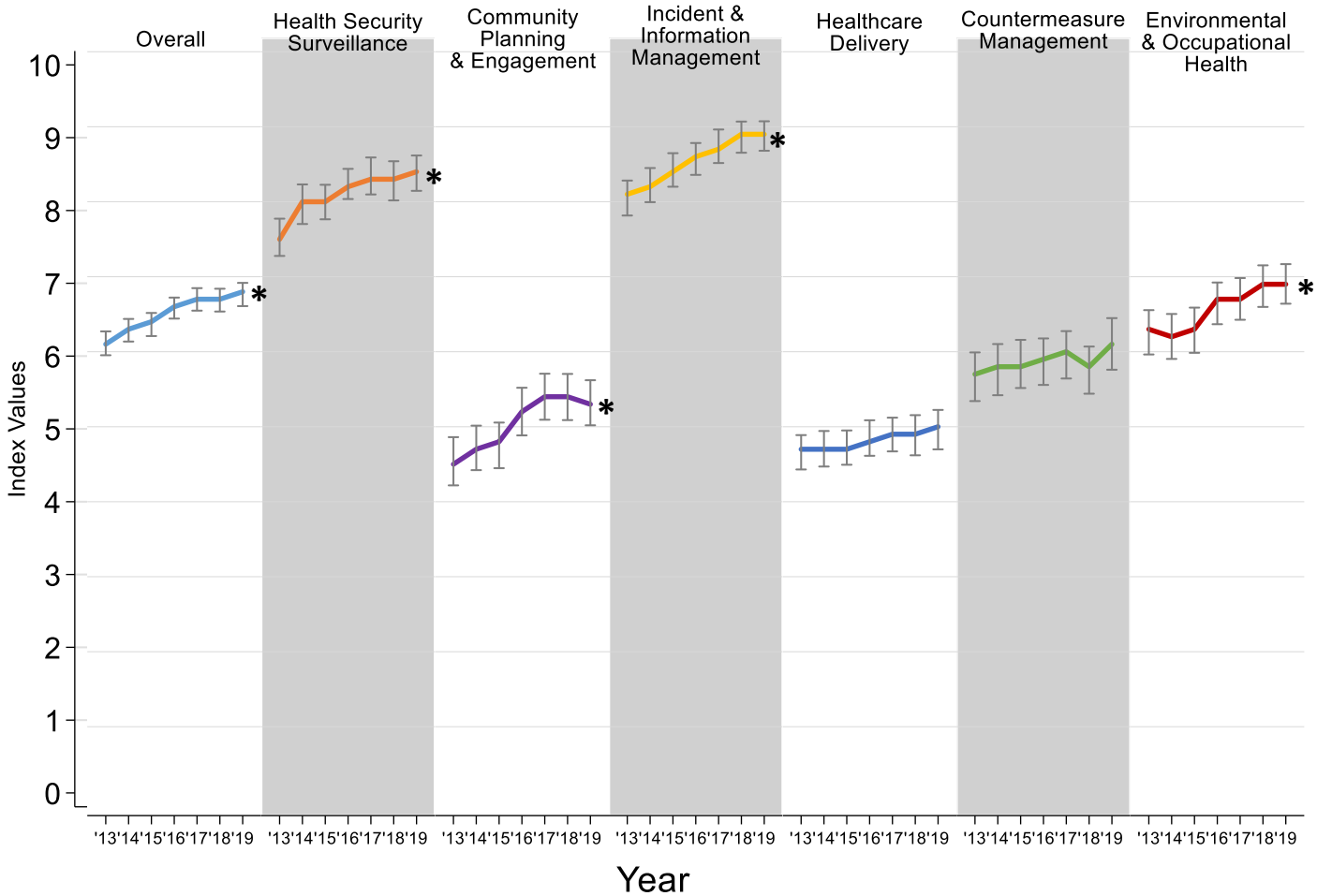
2 Geographic disparities in health security have become more pronounced over time. States in the South Central, Upper Mountain West, Midwest, and Pacific Coast lag behind other regions.



State inequities in preparedness were largest in the *Countermeasure Management* domain, where the leading state achieved a preparedness level nearly 2.5 times higher than the lowest state in 2019. Gaps between the highest and lowest states also approached a two-fold difference in the *Community Planning and Engagement* domain. Large differences in health security across states create vulnerabilities by limiting the ability of state, federal and local stakeholders to work together and share information and resources, in keeping with the goals of 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. Results from the Index indicate 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.

■ **Fewer States Fall Above and Below the National Average:** A total of 16 states and the District of Columbia achieved health security levels that were significantly above the national average in 2019, down from 17 jurisdictions a year earlier and 21 states in 2013 (**Figure 2**). Conversely, 16 states had health security levels that fell significantly below the national average, down from 17 states in 2018. Most states that fell below the national average shared a border with other below-average states, and this geographic pattern continued in 2019 as Washington and Florida fell below the national average. Montana and Arizona moved from below-average to within-average in 2019, converging with the health security levels in neighboring states. Clusters of below-average states exist in the South-Central, Upper Mountain West, Pacific Coast, and Midwest regions. Above-average states cluster in the Northeast, Mid-Atlantic, Upper Midwest, and Central Rocky Mountain regions.

3 Health security trended upward in most domains during 2013-2019, particularly in surveillance and incident management.



NOTE: vertical lines indicate statistical confidence intervals. * = statistically significant trend from baseline (p<0.01).

Colorado is now the western-most state with above-average health security levels, while Georgia is the southern-most state with above-average levels. Geographic clustering of health security levels creates challenges for the nation by making it more difficult for states to offer mutual aid and assistance to neighboring jurisdictions when hazardous events occur.

■ **Most Domains of Preparedness Improve Significantly:** Health security levels improved by a statistically-significant amount since 2013 in four of the six domains measured in the Index: *Health Security Surveillance*, *Community Planning and Engagemen*t, *Incident and Information Management*, and *Environmental and Occupational Health*. In the two remaining domains of *Healthcare Delivery* and *Countermeasure Management*, health security trended upward but the gains were not large enough to reach statistical significance (**Figure 3**).

■ **Large Improvements Occur in Distributing Supplies, But Variability Persists:** The largest one-year gain in health security occurred in the *Countermeasure Management* domain, which rose by 6.1% in 2019 to reach a national average of 6.1. The activities measured in this domain focus on distributing protective supplies and equipment to the people and places that experience hazardous events. Since 2013, health security has improved by 8.2% in this domain, but this trend does not represent a statistically significant improvement due to underlying variability of the measures used in this domain (**Figure 3, Column 6**). Specific measures within this domain that have improved over time in selected states include hospital participation in group purchasing arrangements, pharmacist workforce supply, and influenza vaccination coverage rates.

■ **Community Engagement Declines After Large Previous Gains:** Health security levels in the *Community Planning and Engagement* domain have plateaued and trended downward in recent years after showing large gains earlier in the decade. Over the entire study period, the largest gains in health security occurred in this domain, which increased by 19.5% between 2013 and 2017 to reach a national average of 5.4. However, performance in this domain declined moderately to 5.3 by the end of 2019. Relationships that connect people and organizations together make communities more resilient to disasters and can accelerate recovery after events occur. Historically, the United States experienced difficulties in developing supportive relationships among government agencies, community organizations, and individual residents and in engaging these stakeholders in planning for emergencies. This domain stood out as the nation's weakest area of preparedness in the first Index released in 2013, but it improved by more than any other domain monitored in the Index through 2017 (**Figure 3, Column 3**). The recent decline in this domain suggests that challenges that could soon spread to other areas of health security, because community engagement generates resources and expertise that are utilized heavily in other domains of health security. Specific measures within this domain that have worsened over time in selected states include the supply of health professionals who are registered volunteers with a medical reserve corps, the proportion of emergency medical services (EMS) agencies that participate in regional health care preparedness coalitions, and the percentage of youth who report missing school due to concerns about safety.

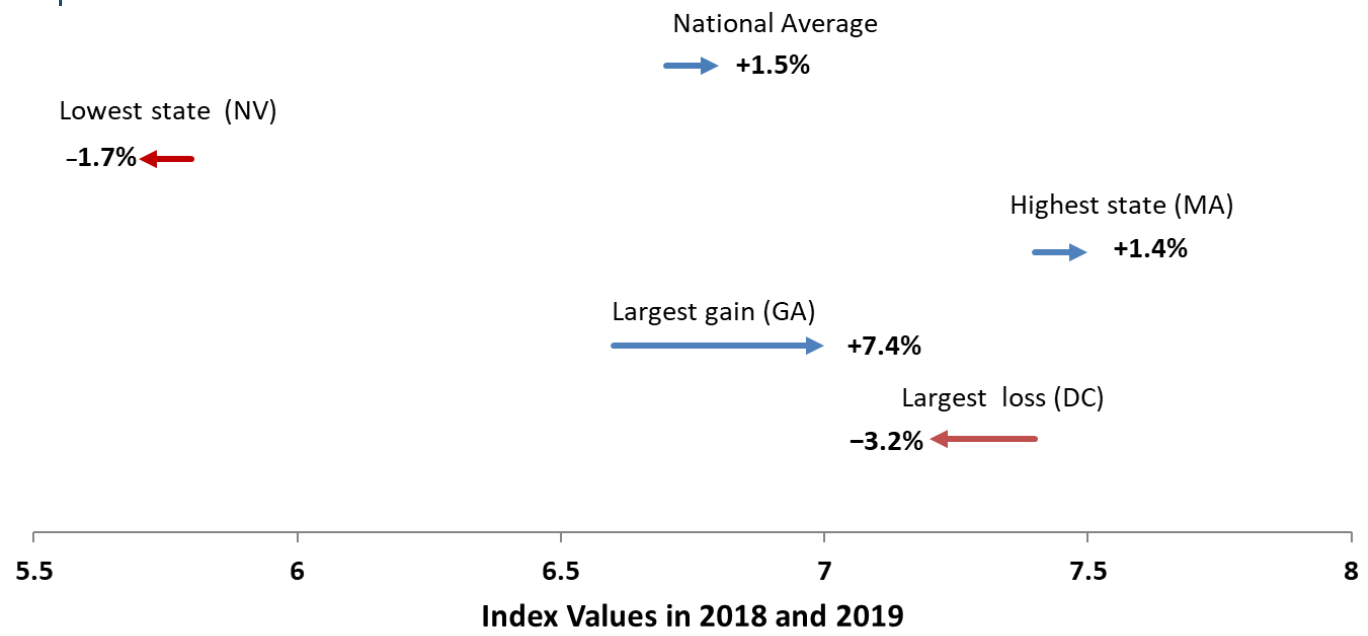
■ **Managing Emergency Response Remains a Core Strength**: Health security levels remained highest in the *Incident and Information Management* domain, which indicates the ability to implement standardized processes and protocols in managing the acute phases of emergency events. Strong incident management can lead to faster response times, fewer errors, and more efficient use of resources when emergencies occur. Health security in this domain reached 8.9 in 2019, significantly higher than any other domain monitored in the Index and 1.0 percentage-point higher than the prior year (**Figure 3, Column 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. Activities in this domain have improved by 10.6% since 2013. Specific measures within this domain that have improved over time in selected states include the average time required by state public health emergency personnel to report for emergency response duty, the proportion of 911 centers that have adopted enhanced digital communications infrastructure, and state adoption of the nurse licensure compact.

■ **Healthcare Capacity Remains Low but Improves Modestly:** Health security levels remained lowest in the *Healthcare Delivery* domain, which measures the capacities of health care professionals and facilities to meet surging demand for

care during and after emergency events. Health security in this domain remained flat during 2013-15 but trended up moderately since then. Health security levels in this domain reached a national average of 5.0 in 2019, improving by 1.7% from the previous year (**Figure 3, Column 5**). Specific measures within this domain that have failed to improve over time in selected states include the supply of physicians and nurses relative to population size, EMS emergency response times, hospital airborne isolation room capacity, nursing home staffing levels, nursing home infection control violations, and mental health shortage area designations.

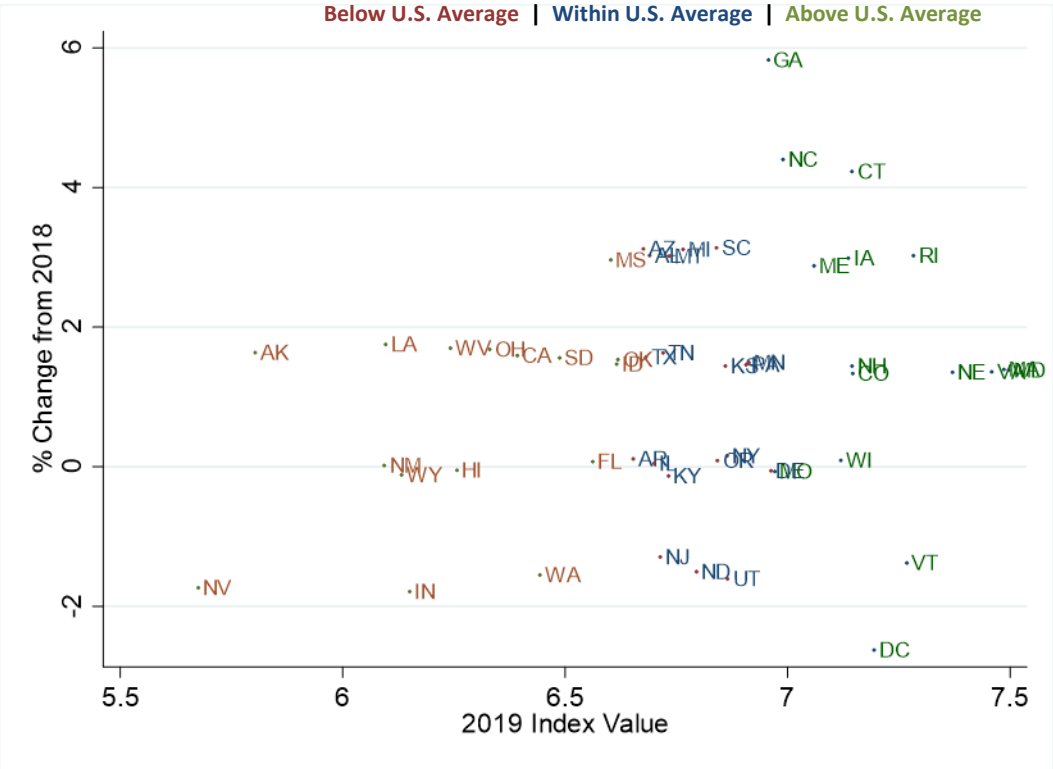
■ ***Environmental and Occupational Health* Protections Continue to Gain Strength:** Measures in the *Environmental and Occupational Health* domain trended downward in 2013-14, but since then these activities have shown steady improvements of 11.3% (**Figure 3, Column 7**). These measures reflect the nation's ability to detect and mitigate risks in food, water, air, soil, and core infrastructure, while protecting the health and safety of workers and first responders when hazardous events occur. Continued improvements in this domain are needed to address future risks associated with climate change. Specific measures within this domain that have improved over time for selected states include public health laboratory capacity to test for environmental hazards, state adoption of climate adaptation plans, and workers who report an ability to work from home if needed.

4 **Gains in state health security surpassed losses in 2019. Georgia's improvements moved it above the national average, while DC lost some of its previous gains.**



■ **States with Improved Health Security Far Outnumber Those with Losses:** Overall, gains in health security far surpassed losses among states between 2018 and 2019, indicating that many stakeholders found ways to improve their operations and respond to emerging hazards despite ongoing resource constraints (**Figure 4**). Georgia experienced the largest one-year increase in health security at 7.4%, while the largest decline in health security during this period was only -3.2% in the District of Columbia. A total of 31 states experienced gains in health security in 2019, while 8 jurisdictions experienced losses (**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 Improvements in health security occurred throughout the United States, but eight states lost ground in 2019.

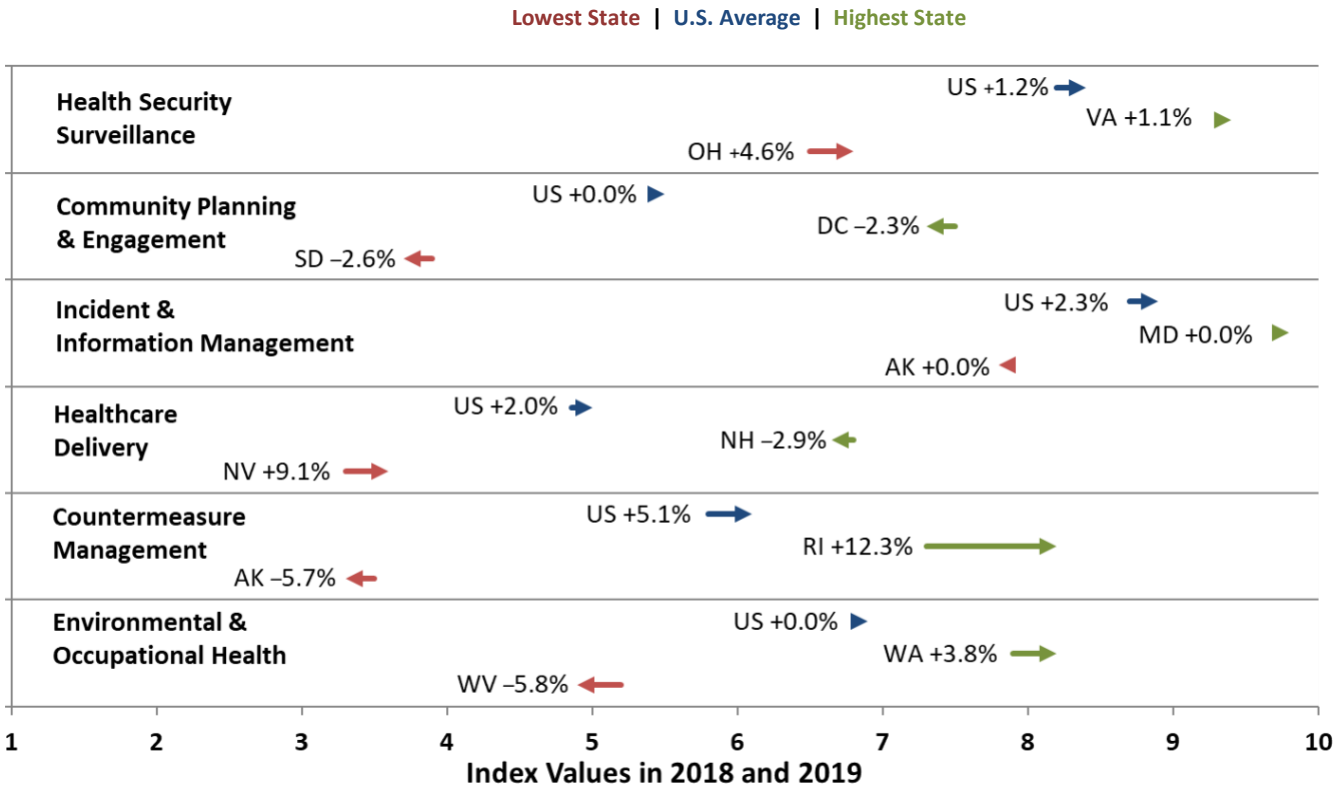


■ **Larger Numbers of States Have Stagnant or Declining Health Security Levels:** A total of 20 states experienced stagnant or declining levels of health security between 2018 and 2019, even as the nation as a whole gained strength (**Figure 5**). Seven of these states also fell below the national average level of health security, indicating that they are falling further behind over time. Because each of these states is located in close proximity to states with leading and/or improving levels of health security, opportunities exist for strengthening preparedness through peer learning and regional cooperation.

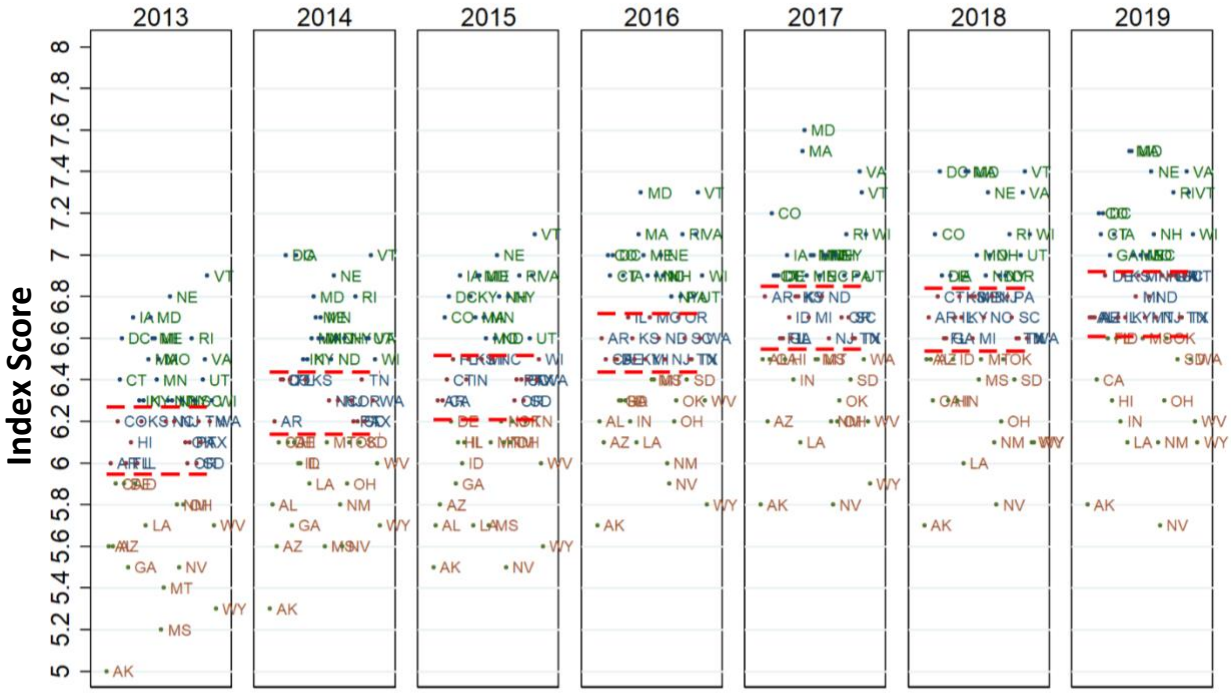
Many other states failed to make progress in specific domains of preparedness such as *Healthcare Delivery* and *Environmental Health*, even when they achieved improvements in other domains. The direction and magnitude of change in health security varied widely across states and domains (**Figure 6**), indicating a need to focus on specific combinations of geographic areas and functional capabilities that are failing to improve. Because each state's portfolio of strengths and weaknesses is relatively unique, individual states need to develop tailored approaches to health security planning and priority-setting that are responsive to specific state circumstances. States can use the Index to identify and prioritize specific domains for improvement.

■ **Geographic Disparities Widen in Environmental Health but Narrow in Healthcare Delivery:** Differences in health security between leading and trailing states became more pronounced in several domains in 2019 (**Figure 6**). For environmental health activities, the top state of Nebraska improved by 3.8%, while the lowest state of West Virginia declined by 5.8%. For *Countermeasure Management*, the leading state of Rhode Island improved by 12.3% while trailing state of Alaska declined by 5.7%. Conversely, the health security gap declined significantly for *Healthcare Delivery*, driven by Nevada's large gain of 9.1%, pushing the national average higher by 2.0%.

6 Changes in health security levels between 2018 and 2019 varied widely across states and domains. Rhode Island, Nevada and Ohio experienced large gains in selected domains.



7 Most states experienced improvements in health security over the full seven-year period, but the level and timing of improvements varied widely across states.



NOTE: Dotted lines represent statistical confidence intervals for the national average Index score.

Results Relevant to the COVID-19 Pandemic

The Index measures health security capabilities relevant to a wide range of hazardous events that threaten U.S. states and communities, but many of these measures are also directly relevant to the current COVID-19 pandemic. Index results provide insights into the opportunities and challenges that states and communities face in mobilizing resources to address the health, social, and economic disruptions caused by the pandemic. Examples of measures that are particularly relevant for monitoring state and local capacity to address COVID-19 risks include the following:

■ **Testing and Surveillance:** Public health laboratories require an ability to expand testing capabilities rapidly to accommodate surges in demand for COVID-related testing, and to incorporate new testing methods and approaches as they emerge. As of 2019, most states reported having an updated staffing plan for accommodating at least an 8-week surge in demand for public health laboratory testing, but two states did not report such a plan. A total of 42 states had a requirement for private and clinical laboratories to send specimens for reportable diseases to the state public health laboratory to facilitate statewide coordination in testing and surveillance, but eight states did not have this requirement. Regarding timeliness of laboratory testing, state public health labs submitted an average of 95% of their foodborne illness test results to the U.S. Centers for Disease Control and Prevention (CDC) within four working days of receiving specimens for testing, but this submission rate varied from a low of 55% to a high of 100% across states in 2019.

■ **Community Planning and Coordination:** All states have established regional networks of health care preparedness coalitions that allow local hospitals, public health agencies, EMS providers, county emergency management agencies and others to coordinate their plans, communicate rapidly and share resources on a regional level during emergency events. Across the United States, only 44% of local EMS providers participated in these regional coalitions, as compared to 73% of county emergency management agencies, 88% of hospitals, and 90% of local public health agencies. Participation rates varied widely across individual states, from a low of 3% to a high of 100% using the most recent data available.

■ **Rapid Public Health Response:** The ability to mobilize essential public health personnel quickly to respond to evolving emergency events is particularly important in the COVID pandemic, because states must take time-sensitive actions to address shortages in health care equipment and supplies and to accommodate surges in demand for care. The average number of minutes required for state public health emergency personnel to report for emergency duty when called during the most recent exercises and drills ranged from a low of one minute to a high of 780 minutes across states.

■ **Medical Staffing for Surge Capacity:** All states have established Medical Reserve Corps (MRCs) that allow health professionals to register to be called up for deployment to health care facilities and other settings that experience surges in demand for care. The number of MRC registrants per 100,000 population varied widely across states, ranging from less than 10 to more than 280 using the most recent data available.

■ **Hospital Surge Capacity:** Airborne isolation rooms represent essential hospital infrastructure for safely treating patients with highly infectious diseases and reducing the risk of transmission to other patients and health care personnel. The availability of these rooms in U.S. community hospitals varied widely across states from a low of nine rooms to a high of 228 rooms per 100,000 population using the most recent data available.

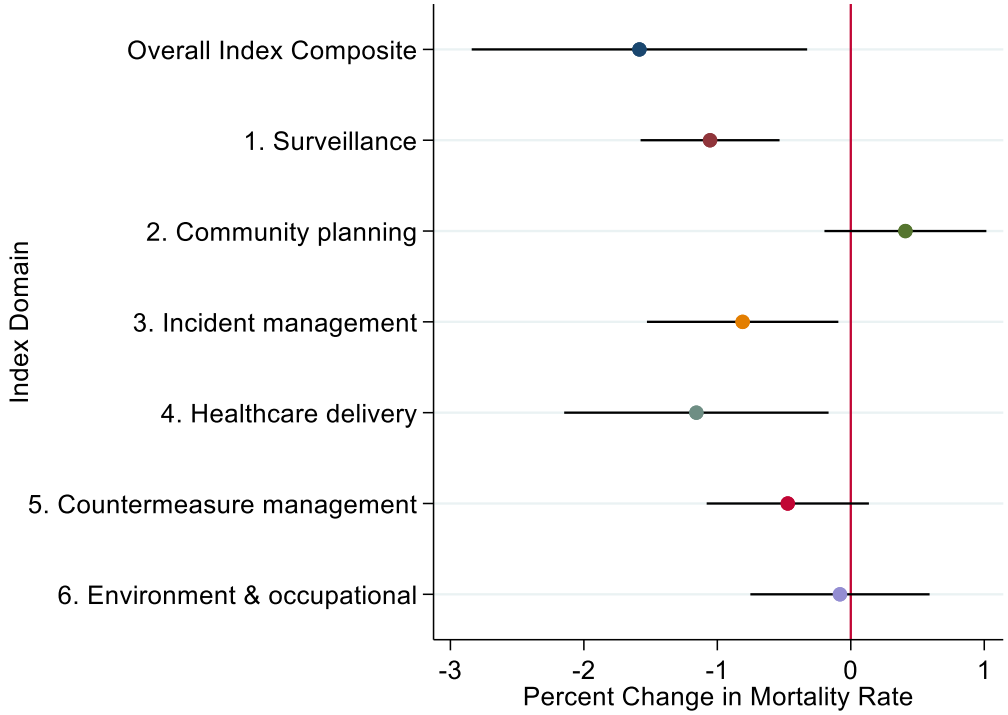
■ **Nursing Home Infection Control:** Nursing home residents face some of the highest risks for infection, need for critical care, and death in the COVID pandemic. Across the United States, more than 35% of nursing home residents received care in a facility that has been cited for deficiencies in infection control practices during inspections in the past year. This percentage varied from a low of 7% to a high of 64% across states.

■ **Household Access to Broadband:** Access to broadband internet in the home is far from universal across the U.S. population, making it difficult for many households to comply with stay-at-home orders, school closures, and remote working arrangements. Low income households, rural residents, and racial and ethnic minority groups are

disproportionately affected by these gaps in community infrastructure. Household broadband access varied from 76% to 90% across states in 2019.

COVID Mortality Risks: One of the highest priorities for health security stakeholders during the COVID pandemic is to reduce mortality through coordinated efforts to suppress community transmission, protect high risk populations and front-line workers, and ensure access to timely and appropriate medical care. To examine the connections between health security levels and COVID mortality risks, we linked Index data with county-level data from the Johns Hopkins University COVID-19 tracking system as of April 14, 2020, and with county-level data on other demographic and socioeconomic risk factors. We used statistical models to estimate the association between a county's COVID death rate per 100,000 residents and its state health security levels as of year-end 2019 as measured with the Index, while controlling for county-level risk factors such as population density, age, racial and ethnic composition, poverty, and nursing home residents. Results show that counties located in states with stronger health security levels experience significantly lower numbers of COVID deaths per capita. A 1% increase in the overall Index score is associated with a 1.5% reduction in the COVID mortality rate in the average county, after adjusting for risk factors and for clustering of counties within states (**Figure 8**). Health security levels in the domains of surveillance, incident management, and healthcare delivery appear to be the primary drivers of this relationship, but the strongest association is found when using the overall Index composite measure as the broadest measure of health security. These results are exploratory and observational in nature, and do not necessarily indicate that health security levels have a direct causal impact on community mortality rates. Nevertheless, the results demonstrate that infrastructure and capabilities measured in the Index are likely to be highly relevant to ongoing COVID response and recovery efforts. Further research is needed to examine the pathways through which health security levels may influence COVID responses and outcomes.

8 **States with higher health security levels experience lower numbers of COVID deaths per capita. A 1% increase in the Index score is associated with a 1.5% reduction in the mortality rate.**



NOTE: Horizontal lines indicate 95% confidence intervals. Estimates were produced using generalized estimating equation models with a log link function and exchangeable error correlation. Models controlled for county population size, population density, percent aged 65 years or older, percent black, percent Hispanic, percent below poverty level, percent under age 65 without health insurance, and number of nursing home residents per capita. Models were adjusted for clustering of counties within states.

Implications for Policy and Practice

The Index shows that the nation's health protections have grown significantly stronger over the seven years ending in 2019. Gains occurred during a challenging period in which large-scale hazardous events increased in frequency and intensity across the United States, including hurricanes, fires, floods, extreme heat, overdose and vaping injuries, and infectious disease outbreaks. Remarkably, these gains have occurred despite constrained government investments in health security and preparedness programs, and despite many competing priorities and uncertainties facing the U.S. health system. This report cannot support definitive conclusions about the reasons for these improvements, but contributing factors are likely to include a defined National Health Security Strategy, clearly articulated capabilities for key sectors such as public health and medical care, community-engaged planning structures and collaborative networks, and routine testing of emergency plans and protocols through exercises, drills, and responses to real events.

Unfortunately, U.S. experiences to date with the COVID-19 pandemic vividly demonstrate that recent gains in health security capabilities are not sufficient to keep all communities safe and healthy in the face of rising risks of disasters and emergencies. Health security levels are improving at a relatively slow and uneven pace across the United States, leaving large segments of the American population under-protected. A growing number of states are failing to achieve improvements in health security, and many others struggle 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, particularly given the likelihood of continued growth in the frequency and intensity of hazardous events.

Stakeholders involved in the policy and practice of health security should consider a number of strategies for accelerating the pace of progress. The Trust for America's Health recently produced the ***2020 Ready or Not*** report that articulates a series of priorities and recommendations for strengthening the nation's preparedness for public health emergencies.[3] The Trust report focuses on a subset of 10 priority indicators from the National Health Security Preparedness Index that are rated as highly important and highly actionable by health security and preparedness professionals across the United States. In the sections below, we describe several strategies for improving health security based on the recommendations of the *Ready or Not* report and the full constellation of measures included in the 2020 release of the Index:

■ **Ensure Stable, Adequate and Equitable Funding for Public Health Infrastructure:** The COVID-19 pandemic has exposed large and urgent gaps in public health infrastructure across the United States. These gaps include limited state and local public health workforce capacity to support disease investigation and control, constraints in laboratory testing and surveillance infrastructure, inadequate medical care surge capacity, and incomplete system-level planning and intergovernmental coordination. Recent research estimates a $4.5 billion annual shortfall in spending necessary to achieve comprehensive public health capabilities across all states and communities.[9] Insufficient funding means that many state and local public health agencies lack the staffing levels and technological infrastructure needed to address existing and emerging health threats in their communities. The two primary federal programs that support emergency preparedness capabilities in public health and health care settings—the Public Health Emergency Preparedness (PHEP) program and the Hospital Preparedness Program (HPP)—have experienced significant reductions in funding since 2010, despite rising risks and costs. Most recently, the COVID-19 pandemic has decimated state and local government tax bases and revenue sources, which are the sources for most governmental public health expenditures in the United States. To address these weaknesses, the federal government should take steps to (1) refine existing estimates of the costs required to maintain a robust public health infrastructure at federal, state and local levels, including staffing and technology costs; and (2) develop and implement coordinated financing mechanisms that provide stable funding at levels sufficient to meet these costs. Intergovernmental matching fund requirements should be considered to address inequities in resource availability across states and communities based on socioeconomic conditions and the rural-urban continuum.

■ **Strengthen Medical Surge Capacity:** The Index has consistently identified significant constraints in health care delivery system capacity to address surges in demand for care during large-scale emergencies. The COVID-19 pandemic

has offered new perspectives on the extensiveness of these constraints, and has required stakeholders to test new approaches for addressing them. In view of these experiences, the federal government should undertake a comprehensive analysis to identify surge capacity needs at state and local levels, giving special attention to hospital bed supply, critical care capacity, health professional staffing levels, and capacities related to EMS, mental health, and long-term care. This review should include assessments of how the Strategic National Stockpile, MRC, and other federal, state, and local resources can be improved to more effectively extend medical capacity in emergencies. Based on this analysis, federal and state governments should carefully consider how existing health care financing mechanisms can be leveraged to support the development and maintenance of additional medical surge capacity, including Medicare and Medicaid as the two largest sources of federal support for health care delivery systems, along with U.S. Department of Defense and Veterans Affairs resources.

■ **Enhance Data Integration and Analytic Capacity:** Health security stakeholders rely on an array of fragmented and cumbersome data and surveillance systems to identify and respond to health risks in their populations. Electronic clinical data systems and medical information technology infrastructure remain largely disconnected from the public health surveillance systems and registries that are used for population-level monitoring and response at state and local levels, despite more than $30 billion in federal investments in electronic health record technology over the past decade. The ability to extract near real-time information from these data systems remains extremely limited in many situations, including for the current COVID-19 pandemic. 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. The Index represents one platform for multi-sector health security data sharing and linkage, but more extensive initiatives and real-time data are needed to ensure that health security leaders have the information needed to function effectively. To this end, state and federal stakeholders should create processes for identifying unmet needs in data systems and analytic capacity across the U.S. health security enterprise and for developing data acquisition and exchange platforms that can address unmet needs.

■ **Expand and Link Multi-Sector Networks:** Multi-sector networks and coalitions focused on health and social issues exist across the United States, including health care preparedness coalitions that specialize in health security issues.[10] Growth in these networks in selected states and communities has contributed to rising Index values over time, but the recent decline in Index measures related to community engagement and planning indicate that new attention is needed. Regional health care preparedness coalitions consistently lack broad participation from sectors such as long-term care, mental health, and EMS. Community networks that have formed outside the preparedness field often 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 can achieve profound effects on population health status over time.[11] Health security professionals should work strategically to broaden participation in coalitions and networks, and to link disparate networks together so as to focus their attention on improving health security capabilities. Social and economic disruptions triggered by the COVID-19 pandemic are likely to reduce the availability of financial resources to support these networks, while increasing demand for their services. Broadening participation and strengthening linkages across networks can help to preserve and enhance their viability.

■ **Promote Multi-Sector Leadership:** The Index demonstrates that many different sectors contribute to health security at state and national levels, including public health, medical care, emergency management, public safety, businesses, the faith community, and others. Given this complexity, even seasoned professionals may not be fully aware of how to tap into health security resources that lie outside their immediate control and responsibility. For these reasons, strong leaders are needed who can conceptualize the ***health security enterprise as a whole*** and who can convene, mobilize, and coordinate collective actions across the public and private sectors that strengthen this enterprise. Every state and community requires leaders who can perform the ***chief strategist role*** for their area by exercising strong communication skills, savvy political awareness, entrepreneurial instincts, and systems thinking.[3] These skills are central to the capability of *Community Preparedness* as defined in the national Public Health Preparedness Capabilities developed by the CDC.[12] State and federal stakeholders should work together to enhance training, mentoring, and career development opportunities that focus on establishing and enhancing this role in every state and community across the United States.

■ **Make the Business Case for Strong 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 can boost health security by enhancing compliance with social distancing strategies while improving employee productivity, recruitment, and retention.[8] Public-private partnerships are needed to expand broadband internet infrastructure for underserved urban and rural communities. Similarly, employer support for health insurance coverage and household financial planning among their workers can strengthen employee productivity and health security. The COVID-19 pandemic demonstrates the many points of connection between public health protections and economic risks, creating new opportunities and incentives for engaging the private sector in strengthening health security. 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.

■ **Target New COVID-19 Assistance to Regions that Are Falling Behind:** A total of 20 states experienced stagnant or declining levels of health security in 2019, even as the nation as a whole gained strength. Seven of these states also scored below the national average level of health security, indicating that they are falling further behind over time. These areas should receive special consideration as funding, training, and technical assistance opportunities are developed and enhanced over time, including new federal preparedness resources made available through recent federal COVID-19 appropriations. Conducting detailed assessments of how health security resources are acquired, allocated and used in these states during the preparation, response, and recovery phases of emergency events is likely to yield new insight about ways of reducing geographic disparities in health security. The federal government should develop a research and development initiative to conduct these assessments for states with under-developed health security resources. The results and recommendations from these assessments should be disseminated widely through existing training and technical assistance programs, such as the CDC's Preparedness and Emergency Response Learning Centers, the U.S. Assistant Secretary for Preparedness and Response's Technical Resources Assistance Center and Information Exchange (TRACIE), and the U.S. Health Resources and Services Administration's Regional Public Health Training Centers.

For more information and detailed Index results,
visit the National Health Security Preparedness Index website at:
www.nhspi.org

About the Index

The 2020 Index release is the seventh 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 CDC 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 2020 release of the Index are not directly comparable to prior releases of the Index due to updates in the set of measures used in the analysis. Nevertheless, the 2020 Index release includes results for seven consecutive annual periods spanning 2013-2019, thereby allowing for valid comparisons over time.

Index Content and Structure

The 2020 Index release measures 130 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 seventh annual release, the 2020 Index release includes annual results for the years 2013 through 2019.

Index Methodology

Construction of the 2020 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 measurement set for the 2020 Index release consists of 130 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. Statistical 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.

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