The National Health Security Preparedness Index
2021 Release

PREPARED
NATIONAL HEALTH SECURITY PREPAREDNESS INDEX

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Throughout 2020 and 2021, emergency preparedness and response professionals across the globe experienced waves of real-world stress tests like no other time in history. The SARS-CoV-2 pandemic demanded the activation of all phases of the health security enterprise over time, including prevention, detection, treatment, mitigation, and recovery. In the United States, medical and public health systems struggled to mount effective and coordinated responses as they encountered shortages in staff and equipment along with inadequate data, information, and communication systems. The biomedical industry produced effective vaccines with unprecedented speed but incomplete take-up and inequitable coverage rates threatened to make herd immunity unreachable. The resulting health and social outcomes constitute the high price of a constrained and fragmented pandemic response: well over 500,000 deaths in the United States; millions of long-term and permanent injuries and disabilities; educational and career disruptions for more than 100 million residents; and burdens concentrated among Black, Hispanic/Latino, Native American, and low-income populations. Coinciding with the COVID-19 pandemic, many communities confronted storms, floods, fires, extreme temperatures, and infrastructure failures over the past year. Other hazards included a continuing epidemic of drug overdose deaths and recurring episodes of community violence.

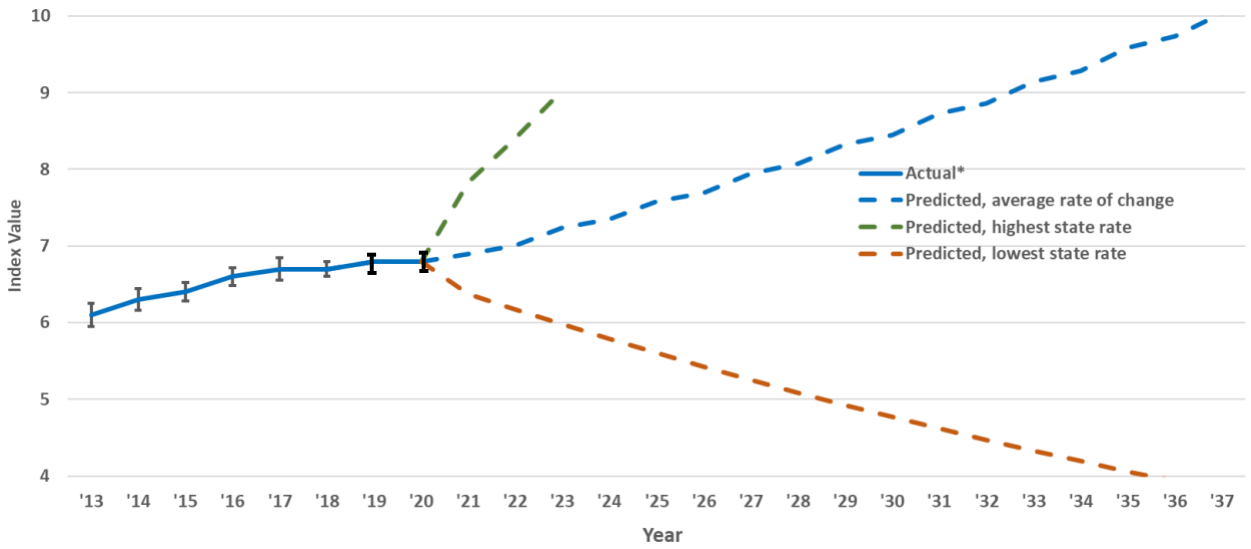
What is Health Security & Who is Responsible?

Health security consists of the resources, skills, and capabilities that help communities prepare for, protect against, and respond to hazardous events that can adversely impact human health.[1,2] 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] Health security requires coordinated actions from all spheres of government and the private sector. Many health security threats are increasing in frequency and intensity, including:[4]

- Extreme weather events including storms, fires, floods, droughts, and temperature extremes
- Newly emerging and resurgent infectious diseases like Zika, MERS, Ebola, and SARS-CoV-2
- Growing antibiotic resistance among diseases
- Community violence and terrorism risks
- Aging and failing infrastructure in transportation, housing, food, water, and energy systems

Results from the 2021 release of the **National Health Security Preparedness Index** show that the nation's readiness for disease outbreaks, natural hazards, and other large-scale emergencies remained relatively constant through 2020 but wide differences in preparedness persisted across states and communities. The national average Index score remained at 6.8 out of 10 in 2020, unchanged from the prior year and a 11.5 percent improvement since 2013 (**Figure 1**).

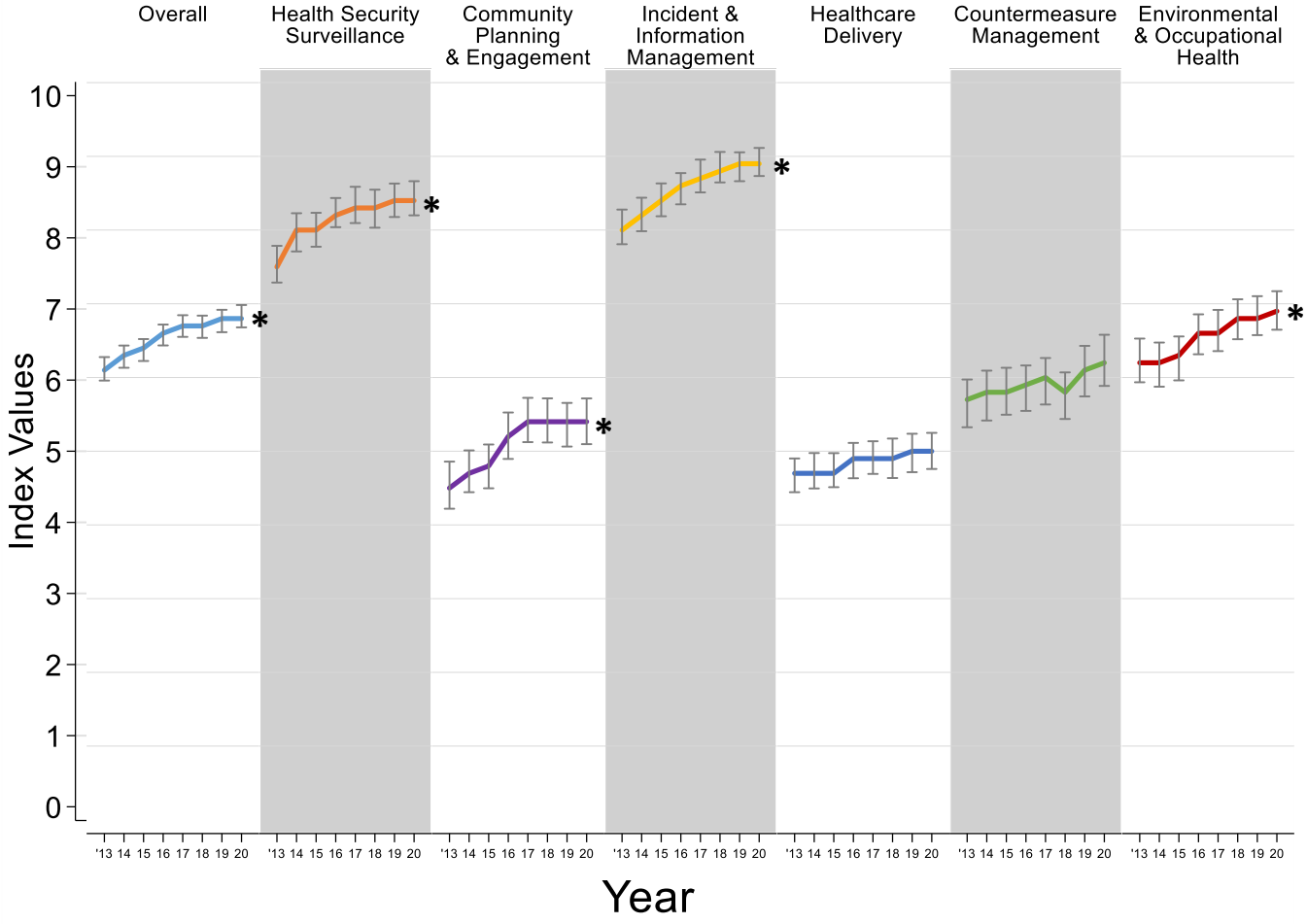
1 **Overall levels of health security remained flat in 2020 but trended upward slowly in prior years. If current trends continue the United States will require at least 12 years to reach an average Index value of 9.0.**



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

These results reflect the reality that health security professionals and systems remained fully occupied with COVID-19 response activities throughout 2020, leaving few resources to devote to preparedness planning and quality improvement for future emergencies. If current trends continue, most states will require eight additional years to reach health security levels currently found in the best-prepared states, and at least 12 more years to reach a strong health security level of at least 9.0 on the 10-point scale.

2 **Health security has trended upward in most domains since 2013, particularly for surveillance, incident management, and community planning. But health care delivery has shown little improvement.**



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Four of the six health security domains included in the Index showed statistically significant improvements since 2013 (**Figure 2**), but the *Health Care Delivery* domain continued to lag behind other domains in the extent of improvement. Most domain scores remained far below the high-performance target level of 9.0 on the 10-point scale.

Most importantly, results from the 2021 release of the Index show that states and communities with stronger levels of health security experienced significantly lower mortality risks related to the COVID-19 pandemic. These findings confirm that geographic differences in health security levels have real and tangible consequences for human health. They indicate a continuing national failure in progress toward equality in health protection.

This report summarizes key findings from the 2021 release of the National Health Security Preparedness Index. 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

■ **National Health Security Levels Held Steady in 2020:** The overall level of health security remained unchanged in 2020 from the prior year, with a national average score of 6.8 out of 10 (**Figure 1**). This was the first year since 2013 in which the national average level of health security did not improve. The domains of *Countermeasure Management* and *Environmental & Occupational Health* showed small gains in 2020, but these one-year trends were not large enough to reach statistical significance (**Figure 2**). Based on the trends measured since 2013, the United States will require at least 12 additional years to reach a strong health security level of at least 9.0 on the 10-point scale.

■ **Gains in Health Security Exceeded Losses at the State Level:** At the state level, the Index improved in a total of 29 states in 2020, while it declined in 7 states, and remained largely unchanged in 15 states (**Figure 3**). A total of 12 states had health security levels that fell significantly below the national average, while 22 states had levels significantly above the national average. Kansas joined the group of above-average states for the first time in 2020, while Minnesota and New York re-joined this group. Kentucky and Alabama moved into the group of below-average states in 2020.

■ **Inequities in Protection Persist:** Large geographic differences in health security persisted across the United States with a gap of 32 percent in the Index values of the highest and lowest states in 2020. 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 3**). 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 from six domains:

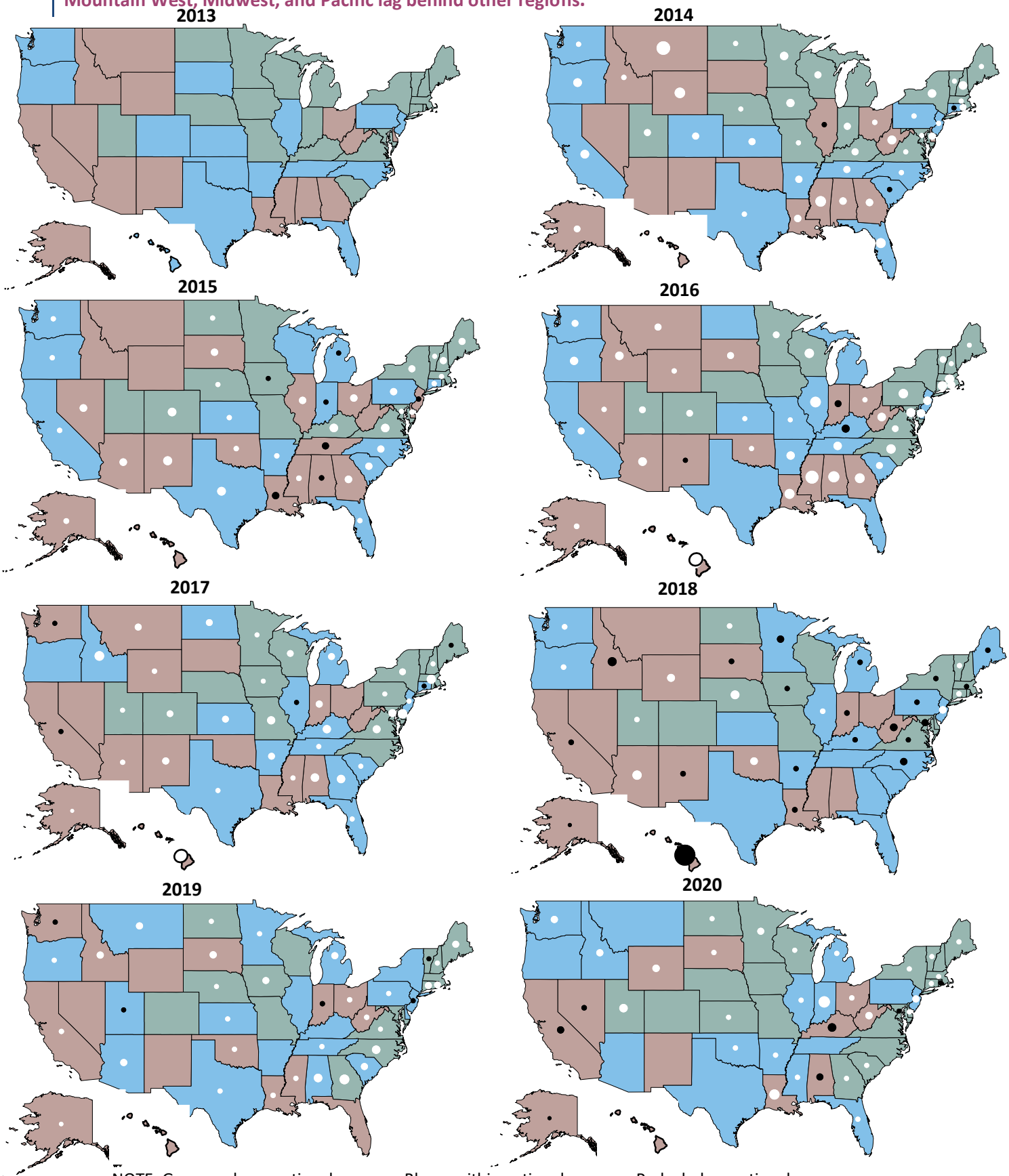
- **Health security surveillance**: detecting and monitoring health threats and identifying where hazards start and spread so that they can be contained rapidly;
- **Community planning and engagement**: maintaining supportive relationships among government agencies, community organizations, and individual 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;
- **Health care 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 assess the performance of public health agencies or other sector-specific initiatives. It measures **collective actions** across multiple sectors.

State inequities in preparedness remained largest in the *Countermeasure Management* domain, where the leading state achieved a preparedness level nearly 150 percent higher than the lowest state in 2020. Gaps between the highest and lowest states approached 100 percent in the *Community Planning and Engagement* domain and in the *Health Care Delivery* 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 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.

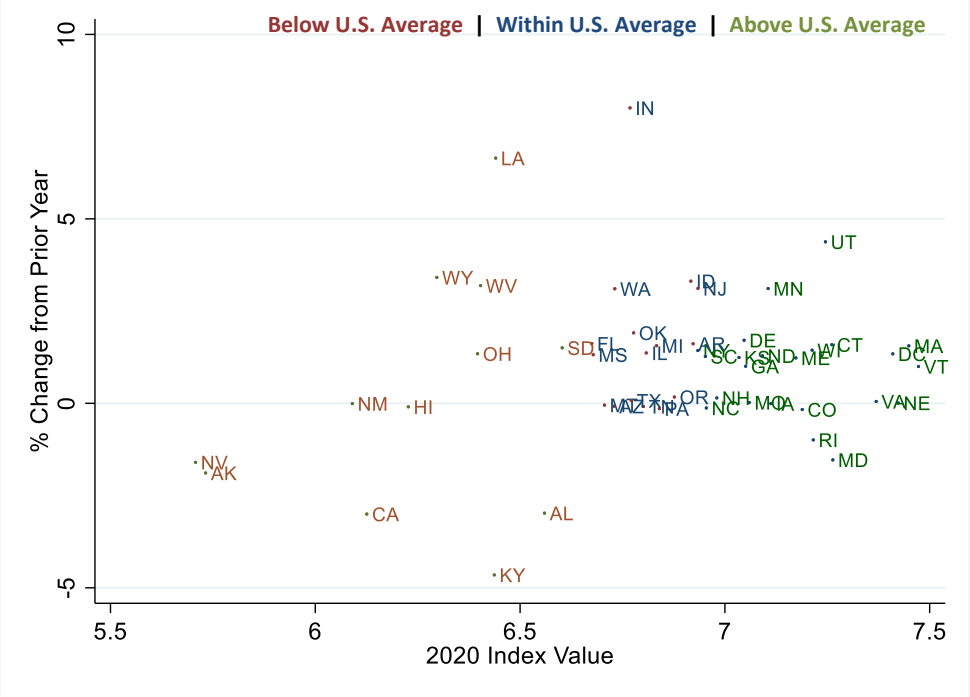
3 **Geographic disparities in health security have evolved but persisted over time. States in the South-Central, Upper Mountain West, Midwest, and Pacific lag behind other regions.**



NOTE: Green = above national average; Blue = within national average; Red = below national average.
Dark circle = reduction from prior year; Light circle = improvement from prior year

Utah became the western-most state with above-average health security levels in 2020 while Georgia remained the southern-most state with above-average levels. A total of seven states fell significantly below the national average health security level in 2020 while also failing to improve over time (**Figure 5**). 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.

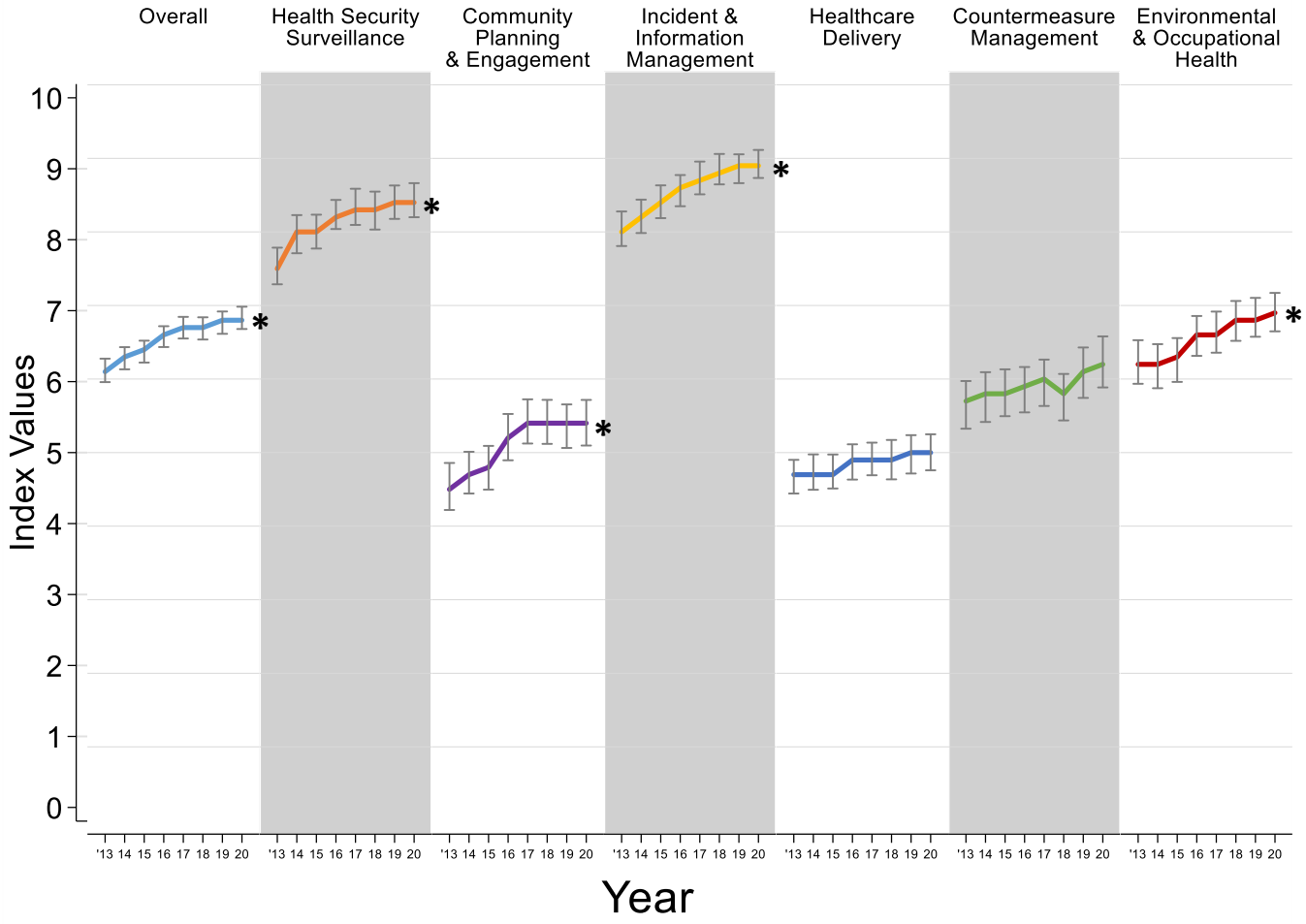
5 **Improvements in health security occurred throughout the United States, but seven states lost ground in 2020.**



■ **Most Domains of Preparedness Improved Significantly Since 2013:** 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 Engagement*, *Incident and Information Management*, and *Environmental and Occupational Health* (**Figure 6**). In the *Countermeasure Management* domain, health security trended upward but the gains were not large enough to reach statistical significance. 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 Continues to Stall After Large Previous Gains:** Health security levels in the *Community Planning and Engagement* domain have flattened in recent years after showing large gains earlier in the decade (**Figure 6**). Over the entire study period, the largest gains in health security occurred in this domain, which increased by 19.5 percent between 2013 and 2017 to reach a national average of 5.4. 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. The lack of continued gains in this domain over recent years suggest that future gains in health security may be more difficult to achieve, because community engagement generates resources and expertise that are utilized heavily in other domains of health security. Specific measures within this domain that have stalled or declined 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.

6 Health security varies considerably across domains of activity. The surveillance and incident management domains show the highest levels of performance, with consistent improvements over time.



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

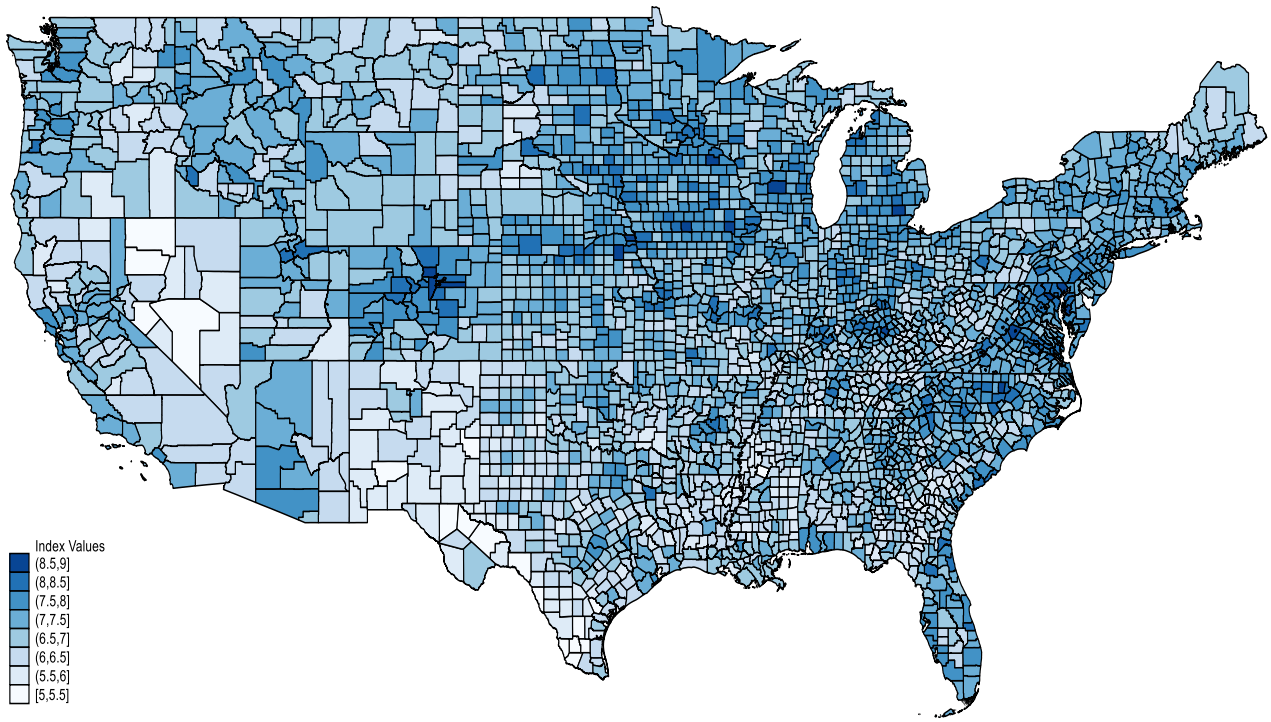
■ **Managing Emergency Incidents Remains a Core Strength:** Health security levels remained highest in the *Incident and Information Management* domain, which indicates the ability to implement standardized processes and protocols in managing the acute phases of emergency events. Strong incident management can lead to faster response times, fewer errors, and more efficient use of resources when emergencies occur. Health security in this domain remained at 8.9 in 2020, significantly higher than any other domain monitored in the Index (**Figure 6**). 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 percent 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.

■ **Health Care Delivery Capabilities Remain Low:** Health security levels remained lowest in the *Health Care 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 modestly since then (**Figure 6**). Health security levels in this domain remained at a national average of 5.0 in 2020. 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 Gain Strength:** Measures in the *Environmental and Occupational Health* domain continued to trend upward in 2020, improving by more than 11 percent since 2013 (**Figure 6**). 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 essential for addressing 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 when necessary.

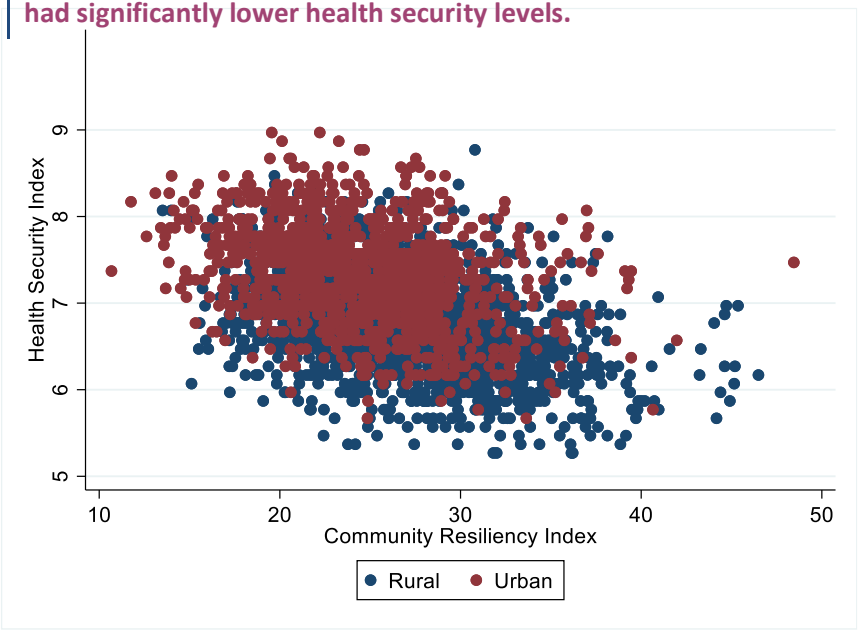
■ **Health Security Varies Widely Within States, Leaving Vulnerable Communities with Less Protection:** County-level estimates of health security levels show that wide geographic differences exist within states (**Figure 7**). Across the United States, health security levels in rural areas were more than 8 percent lower than in urban areas in 2020 ($p<0.01$).

7 **Health security levels vary widely across counties. Rural areas have significantly lower levels of protection than do urban areas, even in states with relatively strong health security scores.**



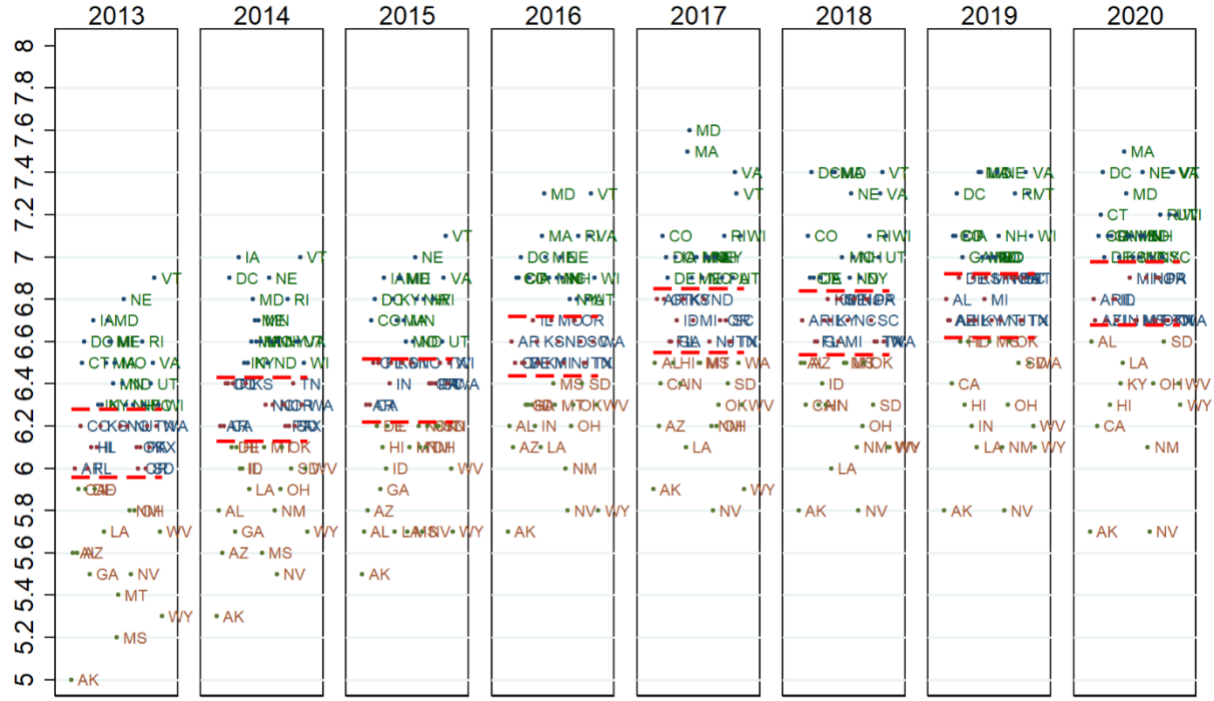
Counties with lower levels of health security showed significantly higher rates of **social and health vulnerability** among residents, as measured by the U.S. Census Bureau's Community Resiliency Index[14] (**Figure 8**). Vulnerability is measured by the Census Bureau using a combination of risk factors that include poverty, crowded housing, language barriers, unemployment, disability, lack of health insurance, advanced age, and diagnosed heart disease, diabetes, and respiratory disease. The significant inverse association between the National Health Security Preparedness Index and the Community Resiliency Index indicates that the most vulnerable residents have fewer protections in place against hazardous events. National initiatives to improve health security levels should prioritize communities with the highest rates of social and health vulnerability.

8 Counties with higher rates of social and health vulnerability, as measured by the Community Resiliency Index, had significantly lower health security levels.



The Community Resiliency Index measures rates of social and health vulnerability among county residents. Indicators include poverty, crowded housing, language barriers, unemployment, disability, lack of health insurance, age 65+ years, and diagnosed heart disease, diabetes, and respiratory disease. Estimates are produced by the U.S. Census Bureau.[14]

9 Most states experienced improvements in health security over the full eight-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.

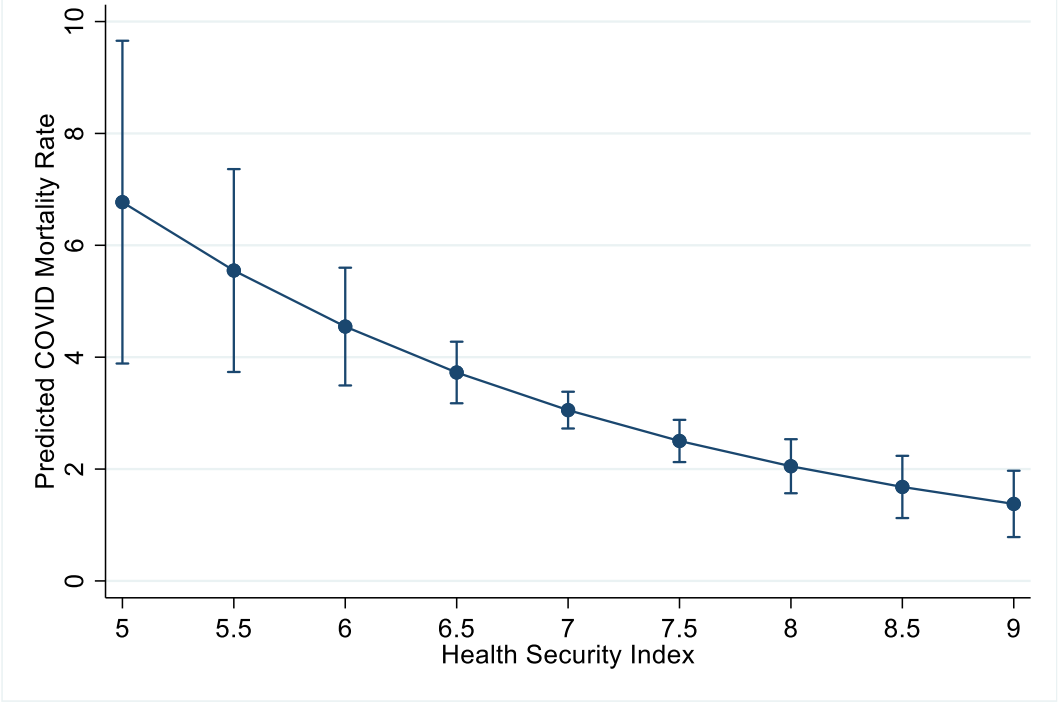
■ **Gains in Health Security Are Distributed Broadly Across the United States:** Since 2013, gains in health security far surpassed losses among states, indicating that many stakeholders found ways to improve their operations and respond to emerging hazards despite ongoing resource constraints (**Figure 9**). 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.

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.

10 **COVID-19 deaths were significantly lower in communities with higher levels of health security as measured in the Index.**

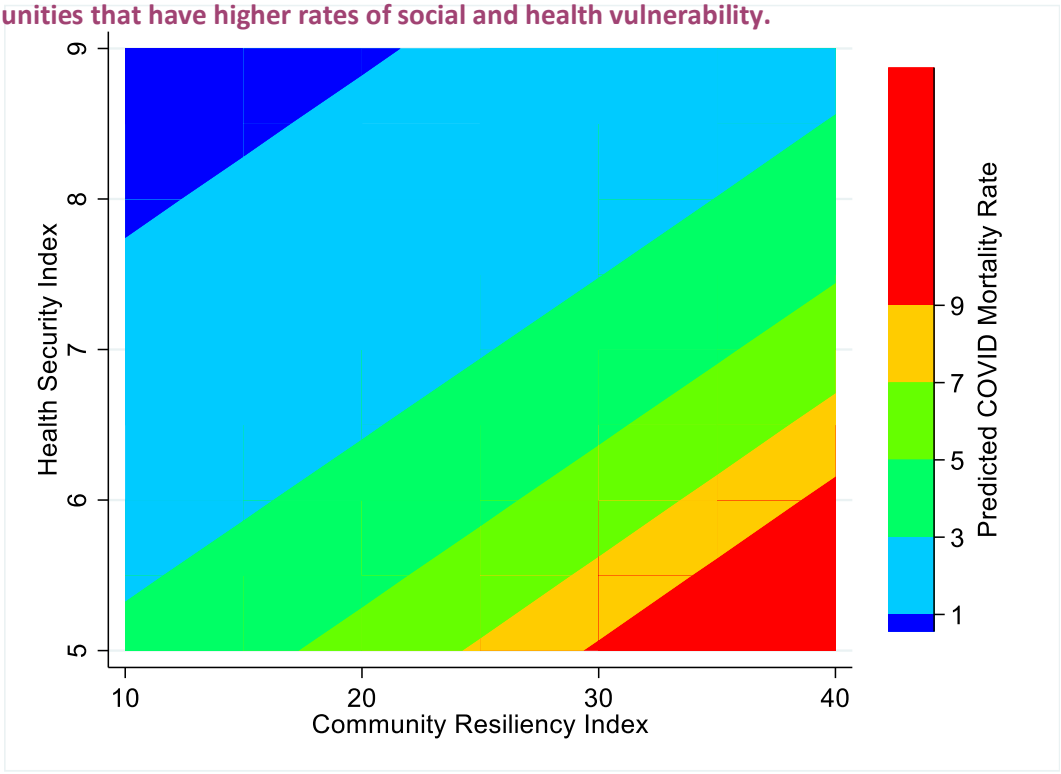


NOTE: Horizontal lines indicate 95 percent confidence intervals. Estimates were produced using generalized linear models with a log link function and exchangeable error correlation. Models controlled for COVID-19 risk factors including county population size, population density, percent aged 65 years or older, percent Black, percent Hispanic, percent below poverty level, percent under age 65 without health insurance, number of nursing home residents per capita, and social vulnerability rates measured in the Community Resiliency Index.[14] Models were adjusted for clustering of counties within states.

■ **Higher Health Security Levels are Associated with Significantly Lower COVID-19 Mortality Risks:** Health security stakeholders worked diligently during the COVID-19 pandemic to reduce deaths through coordinated efforts to detect cases, interrupt 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-19 mortality risks, we linked county-level Index data with county-level mortality data from the Johns Hopkins University COVID-19 tracking system, 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-19 death rate per 100,000 residents and its health security levels as of year-end 2020 as measured with the Index, while controlling for county-level risk factors such as population density, age, racial and ethnic composition, poverty, nursing home residents, and measures of social and health vulnerability, as measured in the Census Bureau Community Resilience Index.[14] Results show that counties with

stronger health security levels experience significantly lower rates of COVID-19 deaths per capita. A 1 percent increase in the overall Index score is associated with a 1.3 percent reduction in the COVID-19 mortality rate in the average county, after adjusting for risk factors and for clustering of counties within states (**Figure 10**). Health security levels in the domains of *Health Security Surveillance*, *Incident and Information Management*, and *Health Care 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 highly relevant to ongoing COVID-19 response and recovery efforts. Further research is needed to examine the specific pathways through which health security levels may influence COVID-19 responses and outcomes.

11 **Health security levels appear more strongly protective against COVID-19 mortality risks in communities that have higher rates of social and health vulnerability.**



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■ **More Vulnerable Communities May Benefit Disproportionately from Higher Health Security:** Not surprisingly, the protective effects of health security levels appear more pronounced in counties with higher rates of social and health vulnerability as measured by the Census Bureau's Community Resiliency Index (**Figure 11**). Those counties with the highest rates of vulnerability show the largest reductions in the risk of COVID-19 mortality as health security index levels rise. These findings provide additional reasons to focus on communities with high rates of vulnerability when implementing initiatives to strengthen health security capabilities.

The Index includes a number of measures that are relevant for monitoring and improving state and local capacity to address COVID-19 risks. Several of these measures are described in the paragraphs below.

■ **Testing and Surveillance:** Public health laboratories require an ability to expand testing capabilities rapidly to accommodate surges in demand for COVID-19-related testing and to incorporate new testing methods and approaches as they emerge. As of 2020, most states reported having an updated staffing plan for accommodating at least an eight-week surge in demand for public health laboratory testing, but several 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 percent 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 percent to a high of 100 percent across states.

■ **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 percent of local EMS providers participated in these regional coalitions, as compared to 73 percent of county emergency management agencies, 88 percent of hospitals, and 90 percent of local public health agencies. Participation rates varied widely across individual states, from a low of 3 percent to a high of 100 percent 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-19 pandemic. Across the United States, more than 35 percent 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 percent to a high of 64 percent 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 percent to 90 percent across states using the most recently available data.

Implications for Policy and Practice

Results from the 2021 release of the National Health Security Preparedness Index show that the nation's health protections held steady in 2020 after consistent gains in prior years. Fortunately, relatively few states experienced reductions in health security levels in 2020 despite the unprecedented effects of the COVID-19 pandemic on medical care and public health delivery systems. Unfortunately, the pandemic exposed many weaknesses in these systems, clearly demonstrating that recent gains in health security capabilities have not been sufficient to protect communities from the health consequences of hazardous events. Health security levels have improved at an uneven pace across the United States, leaving large segments of the population under-protected and vulnerable to health and economic burdens created by COVID-19. The residents of communities with lower health security levels experienced significantly higher risks of mortality during the pandemic, even after accounting for demographic, socioeconomic, and health-related risk factors. These findings confirm that geographic differences in health security levels have real and tangible consequences for human health and they indicate a continuing national failure in progress toward equality in health protection. 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 must consider a range of strategies for accelerating the pace of progress. The Trust for America's Health recently produced the ***2021 Ready or Not*** report that identifies a series of 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 that are grounded in the recommendations of the *Ready or Not* report and in the full constellation of Index domains and measures.

■ **Increase Investments in Core Public Health Infrastructure:** The COVID-19 pandemic exposed large gaps and inadequacies 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, antiquated data systems, 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 leaves most state and local public health agencies with inadequate staffing and incomplete technological infrastructure needed to address 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 program and the Hospital Preparedness Program—have experienced significant reductions in funding over most of the past decade, despite rising risks and costs. The COVID-19 pandemic has adversely affected many state and local government tax bases and revenue sources, which are the primary sources for most governmental public health expenditures in the U.S. To address these vulnerabilities, 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.

■ **Improve Medical Surge Capacity:** The Index has consistently identified constraints in health care delivery system capacity to address surges in demand for care during large-scale emergencies. The COVID-19 pandemic offers new perspectives on the extensiveness of these constraints, and requires 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, personal protective equipment, 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.

■ **Expand Real-Time Data Acquisition, 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. Of particular concern, many data sources contain incomplete and inaccurate information on the ***race and ethnicity of affected population groups***, and also lack relevant information on social needs and risks. 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 summarizing multi-sector health security data, 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.

■ **Build and Enhance Multi-Sector Networks and Network Leadership:** 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 more recent stagnation in Index trends 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 have constrained the availability of financial resources to support some of these networks while increasing demand for their services. Broadening participation and strengthening linkages across networks can help to preserve and enhance their viability. These networks 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 for public health professionals that focus on network development and leadership skills in every state and community.

■ **Strengthen 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 Assistance to Communities with High Rates of Vulnerability:** More than 20 states experienced stagnant or declining levels of health security in 2020. Seven of these states also scored below the national average level of health security, indicating that they are falling further behind over time. Of particular concern, results from the 2021 Index demonstrate that communities with the highest rates of social and health vulnerabilities have significantly lower levels of health security. To reduce these inequities in protection, the nation's low-capability and high-vulnerability states and communities must receive priority for funding, training, and technical assistance, including new federal resources made available through recent federal COVID-19 appropriations. Conducting detailed studies of how health security resources are acquired, allocated, and used in states and communities 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 capabilities. A dedicated, federally-supported research and development initiative is needed conduct these studies and develop evidence-informed recommendations for reducing inequities in health security. The results and recommendations from these studies 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, and the U.S. Health Resources and Services Administration's Regional Public Health Training Centers. These efforts can help to transform state and local health security systems into learning systems that adapt and improve rapidly based on real-world experience and scientific evidence.

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

About the Index

The 2021 Index release is the eighth 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 2021 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 2021 Index release includes results for eight consecutive annual periods spanning 2013-2020, thereby allowing for valid comparisons over time.

Index Content and Structure

The 2021 Index release includes measures of 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 detect and monitor 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. ***Health care 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 capability level observed in the data. The Index produces summary measures for each of the 50 U.S. states and the District of Columbia, along with national averages. In this eighth annual release, the 2021 Index release includes annual results for the years 2013 through 2020. Additionally, the 2021 release of the Index includes county-level estimates of health security that use a subset of 84 measures that are relevant to capabilities at the local level.

Index Methodology

Construction of the 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 2021 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 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, using weights based on the expert panel ratings of importance. 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 averages. Finally, county-level estimates of health security were generated using a subset of 84 measures that members of an expert panel rated to be highly relevant to capabilities implemented at the local level. More information can be found in the Index methodology report.[5]

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