ISSUE REPORT

Ready or Not:

PROTECTING THE PUBLIC'S HEALTH FROM DISEASES, DISASTERS, AND BIOTERRORISM 2023

SPECIAL SECTION on the intersection of health equity and emergency preparedness

Trust for America's Health
TFAH.ORG

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Acknowledgements

Trust for America's Health (TFAH) is a nonprofit, nonpartisan public health policy, research, and advocacy organization that promotes optimal health for every person and community and works to make the prevention of illness and injury a national priority.

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Ready or Not and the NHSPI are complementary projects that work together to measure and improve the country's health security and emergency preparedness. TFAH looks forward to a continued partnership in order to protect the public's health.

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Executive Summary

The past year, 2022, continued to test the nation's public health preparedness in a variety of ways—including an ongoing pandemic, extreme weather events, increases in chronic disease rates, and startling jumps in the number of lives lost to substance misuse and suicide. During the year, the number of individuals who died due to COVID-19 in the U.S. surpassed 1 million.[1] In addition, 2022 was the eighth consecutive year in which the United States experienced 10 or more billion-dollar, weather-related disasters.[2]

Ready or Not: Protecting the Public's Health from Diseases, Disasters, and Bioterrorism, has tracked the nation's public health emergency preparedness since 2003. This twentieth edition of the report is as critical to policymakers now as it has ever been. The report is designed to give policymakers at all levels of government actionable data and recommendations with which they can target policies and spending to strengthen their jurisdiction's emergency preparedness. The report's 10 key public health preparedness indicators give state officials benchmarks for progress, point out gaps within their states' all-hazards preparedness, and provide data to compare states' performances against similar jurisdictions.

Readers should note that this report is not designed to be an assessment of a given state's response to the COVID-19 pandemic, as widescale political, funding, economic, and social factors all influenced the virus's impact and local responses. Moreover, the pandemic has illustrated that being prepared to adequately respond to a public health emergency the scale of a pandemic—and execute that response—is enormously complex and beyond the scope of this report. However, this report measures critical capacities that are foundational to protecting the public's health every day and during emergencies, including robust and sustained public health funding, disease surveillance capacity, healthcare access and quality, public health laboratory and hospital surge capacity, access to safe water, and paid time off for all employees. In addition, the pandemic has shown that there is no substitute at the state or local level for a strong federal response during an emergency. Another issue starkly illuminated by the pandemic is the role that health inequities play when some communities and population groups fare worse during an emergency than others. The issue requires greater attention. As a starting point, this report discusses the intersection of health equity and emergency preparedness in a special section (see pg. 9).

TABLE 1: Top-Priority Indicators of State Public Health Preparedness

INDICATORS			
1	**Incident Management:** Adoption of the Nurse Licensure Compact.	6	**Water Security:** Percentage of the population that used a community water system that failed to meet all applicable health-based standards.
2	**Public Health System Comprehensiveness:** Percentage of state population served by a comprehensive public health system.	7	**Workforce Resiliency and Infection Control:** Percentage of employed population that used paid time- off in any given month.
3	**Institutional Quality:** Accreditation by the Public Health Accreditation Board.	8	**Countermeasure Utilization:** Percentage of people ages 6 months or older who received a seasonal flu vaccination.
4	**Institutional Quality:** Accreditation by the Emergency Management Accreditation Program.	9	**Patient Safety:** Percentage of hospitals with a top-quality ranking ("A" grade) on the Leapfrog Hospital Safety Grade.
5	**Institutional Quantity:** Size of the state public health budget compared with the past year.	10	**Health Security Surveillance:** The public health laboratory has a plan for a six- to eight-week surge in testing capacity.

Source: National Health Security Preparedness Index[3]

Notes: The National Council of State Boards of Nursing organizes the Nurse Licensure Compact. Systems for Action uses the National Longitudinal Survey of Public Health Systems to measure public health system comprehensiveness. The U.S. Environmental Protection Agency assesses community water systems. Paid time off includes sick leave, vacation time, or holidays, among other types of leave. The Leapfrog Group is an independent non-profit organization. TFAH drew every indicator and some categorical descriptions from the National Health Security Preparedness Index, with one exception: public health funding. See "Appendix B: Methodology" for a description of TFAH's funding data-collection process, including its definition.

This Year's Findings

In this 2023 report, Trust for America's Health (TFAH) found that nine states improved their relative standing (all by one tier), while nine fell by one tier. States were scored relative to one another for each indicator and overall, compared with last year.

The *Ready or Not* report groups states and the District of Columbia into one of three tiers (high, middle, and low) based on their relative performances across the 10 indicators. This year, 19 states and the District of Columbia scored in the high-performance tier, 16 placed in the middle-performance tier, and 15 were in the low-performance tier (see Table 2). (see "Appendix B: Methodology" for more information on the scoring process.)

Nine states showed notable improvement, moving up a tier: Delaware, Georgia, Maine, Mississippi, North Carolina, and Wisconsin moved from the middle tier to the high tier, and Alaska, Arkansas, and Indiana moved from the low tier to the middle tier. As an example of the factors behind such movement, Alaska's rise from the low tier to the middle tier had two primary drivers. First, the state increased its public health funding in fiscal year 2022, whereas it had fallen in fiscal year 2021. In addition, an estimated 49 percent of its eligible population received a seasonal flu vaccination during the 2021-22 season, up from 45.4 percent the year before.

Nine states fell one tier: Alabama, Illinois, Iowa, and South Carolina moved from the high tier to the middle tier, and Arizona, Michigan, New Mexico, Oklahoma, and Tennessee moved from the middle tier to the low tier. Iowa, for instance, saw its score fall because it lost its accreditation from the Emergency Management Accreditation Program and had a smaller share of its hospitals receive an "A" rating for patient safety.

TABLE 2: State Public Health Emergency Preparedness
State performance, by scoring tier, 2022

Performance Tier	States	Number of States
High Tier	CO, CT, DC, DE, FL, GA, KS, ME, MD, MA, MS, NJ, NC, OH, PA, UT, VT, VA, WA, WI	19 states and DC
Middle Tier	AK, AL, AR, CA, IA, ID, IL, IN, MO, ND, NE, NH, NY, RI, SC, TX	16 states
Low Tier	AZ, HI, KY, LA, MI, MN, MT, NM, NV, OK, OR, SD, TN, WV, WY	15 states

Note: See "Appendix B: Methodology" for scoring details. Complete data were not available for U.S. territories.

TFAH's analysis found:

A majority of states have made preparations to expand healthcare and public health laboratory capabilities in an emergency. Thirty-seven states participated in the Nurse Licensure Compact, up from 26 in 2017.[4] The compact allows registered nurses and licensed practical or vocational nurses to practice in multiple jurisdictions with a single license. In an emergency, this enables health officials to quickly increase their staffing levels. For example, nurses may cross state lines to work at evacuation sites or other healthcare facilities. All states, except one, and the District of Columbia had a plan to surge public health laboratory capacity for six to eight weeks as necessary during overlapping emergencies or large outbreaks.

Most residents who received their household water through a community water system had access to safe water. On average, just 5 percent of state residents used a community water system in 2021 that did not meet all applicable health-based standards, down slightly from 7 percent in 2018. Water systems with such violations increase the chances of water-based emergencies in which contaminated water supplies place the public at risk.

Most states are accredited in the areas of public health, emergency management, or both. As of December 2022, the Public Health Accreditation Board or the Emergency Management Accreditation Program accredited 43 states and the District of Columbia; 30 states and the District of Columbia were accredited by both groups. Seven states (Alaska, Hawaii, New Hampshire, South Dakota, Texas, West Virginia, and Wyoming) were not accredited by either group. Both programs help ensure that necessary emergency prevention and response systems are in place and staffed by qualified personnel.

Seasonal flu vaccination rates have risen significantly in recent years but ticked down slightly during the 2021–2022 flu season. The seasonal flu vaccination rate among Americans ages 6 months or older rose from 42 percent during the 2017–2018 season to 52 percent during the 2019–2020 and 2020–2021 seasons,[5,6] and then it ticked down slightly to 51 percent in the 2021–2022 season.[7] However, Healthy People 2030, a set of federal 10-year objectives and benchmarks for improving the health of all Americans by 2030, sets a seasonal influenza vaccination-rate target of 70 percent annually.[8]

Only about half the U.S. population is served by a comprehensive public health system—an indicator newly tracked in the 2022 edition of this series. Comprehensive public health systems tend to engage in a wide array of recommended activities to assess their communities' health and needs, to develop evidenced-based public policy that promotes health and safety, to ensure that necessary services are accessible to all residents, and to cultivate a broad coalition of stakeholder partners. Comprehensive systems have been shown to contribute to positive health outcomes in a cost-effective manner. In just eight states and the District of Columbia were a majority of residents served by a comprehensive public healthcare system.

Looking at six years of data from 2017–22, 55 percent of employed state residents, on average, used paid time off. Those without paid leave are more likely to work when they are sick and risk spreading infection.[9] The absence of dedicated paid sick leave has been linked to or has exacerbated some infectious disease outbreaks.[10] This has become particularly relevant during the COVID-19 pandemic, as isolation and quarantine are important tools for controlling the outbreak. A recent study found that states that gained access to emergency sick leave through the Families First Coronavirus Response Act saw an estimated 400 fewer confirmed COVID-19 cases per state, per day.[11]

Only 26 percent of hospitals, on average, earned a top-quality patient safety grade, down slightly from 28 percent in 2021. Hospital safety scores measure performance on such issues as healthcare-associated infection rates, intensive-care capacity, and an overall culture of error prevention. In the absence of diligent actions to protect patient safety, deadly infectious diseases can take hold or strengthen.

PANDEMIC AND ALL-HAZARDS PREPAREDNESS ACT REAUTHORIZATION

The Pandemic and All-Hazards Preparedness Act (PAHPA) was originally enacted in 2006. The law supports and improves the nation's health emergency preparedness and response capabilities by establishing funding and authorities for public health and medical preparedness programs, such as the Hospital Preparedness Program, medical countermeasures programs, and the Public Health Emergency Preparedness Cooperative Agreement.[12] In addition, it created the U.S. Department of Health and Human Services' Assistant Secretary for Preparedness and Response position. The law was reauthorized in 2013 and 2019.[13]

The current (118th) Congress is slated to consider PAHPA reauthorization. Among TFAH's priorities for the reauthorization are provisions such as:

- Reauthorizing public health and healthcare preparedness programs with robust funding levels to ensure strong capabilities for the nation's readiness.
- Enabling more efficient responses to emergencies by empowering public health agencies to collect privacy-protected public health data in a timely and coordinated way.
- Cutting down on red tape to enable nimble hiring and temporary reassignment of workers in health agencies during an emergency.
- Creating a Health Defense Operations budget designation to ensure critical activities receive sustainable resources.
- Extending advisory committees on the needs of children, individuals with disabilities, and older adults in disasters.

INFLATION REDUCTION ACT SUPPORTS ACCESS TO HEALTHCARE, INCLUDING VACCINES.

The Inflation Reduction Act, signed into law in August 2022, includes significant steps to improve adults' access to vaccines, a longstanding recommendation of this report series. Beginning in 2023, the law will require first dollar coverage (i.e., with no cost-sharing or out-of-pocket expenses) for all adult vaccinations recommended by the Advisory Committee on Immunization Practices under Medicare Part D, Medicaid, and the Children's Health Insurance Program (CHIP). These changes make recommended vaccine coverage in the Medicare, Medicaid, and CHIP programs consistent with many private insurance plans.[14] Prior to the passage of the law, many states provided coverage but charged out-of-pocket costs.[15]

The law contained other provisions that will improve the nation's public health, including investments in clean energy and for climate resilience as well as lowered healthcare and prescription drug prices.[16] The law extends premium subsides in the Affordable Care Act marketplaces, which are estimated to prevent approximately 2 million people from losing their health insurance.[17]

Report Purpose and Methodology

TFAH's annual *Ready or Not* report series tracks states' readiness for public health emergencies based on 10 key indicators that collectively provide a checklist of top-priority issues and action items for states and localities to continuously address. By gathering timely data on all 50 states and the District of Columbia, the report assists states in benchmarking their performance against comparable jurisdictions. TFAH completed this analysis after consultation with a diverse group of subject-matter experts and practitioners.

The indicators included in this report were drawn from, and identified in partnership with, the National Health Security Preparedness Index (NHSPI),[18] with one exception: a measure of state public health funding-level trends, which reflects how well-resourced key agencies are to prepare for and respond to emergencies. The NHSPI is an initiative of the Robert Wood Johnson Foundation produced with scientific and administrative direction from the University of Kentucky and the University of Colorado. (See "Appendix B: Methodology" for a detailed description of how TFAH selected and scored the indicators.)

While state rankings in *Ready or Not* and the NHSPI largely align, there are some important differences. The two projects have somewhat different purposes and are meant to be complementary, rather than duplicative. With more than 100 indicators, the NHSPI paints a broad picture of national health security, allowing users to zoom out and holistically understand the extent of both individual states and the entire nation's preparedness for large-scale public health threats. In slight contrast, *Ready or Not*, with its focus on 10 select indicators, focuses attention on state performances on a subset of the index and spotlights important areas in order for stakeholders to prioritize a smaller, more focused set of improvement goals. TFAH and the NHSPI work together to help federal, state, and local officials use data and findings from each project to make Americans safer and healthier.

SPECIAL SECTION:

The Intersection Between Community Resilience, Emergency Preparedness, and Health Equity: Measuring to Improve

Communities experiencing health inequities—differences in health status due to structural barriers and lack of infrastructure that lead to social and economic disadvantage—typically suffer more significant and longer-lasting impacts during an emergency. Therefore, improving community conditions—such as economic opportunities, and access and affordability of healthy food, transportation, healthcare, and safe and stable housing—and ensuring that preparedness and emergency response mechanisms are informed by the communities' lived experience, address inequities, and are appropriately implemented will make communities more resilient.

Massimo Giachetti

Health equity and emergency event risk are interdependent. Reducing risk improves health equity, and improving health equity reduces risk. Hurricane Katrina is a tragic example of the impact of health and economic inequities on emergency preparedness and impact. Seven New Orleans area neighborhoods (zip codes) suffered the costliest flood damage during Katrina, and four of those neighborhoods had populations that were at least 75 percent Black.[19] The COVID-19 pandemic is the latest example of the heightened risk faced by some population groups, including communities of color, rural communities, people with disabilities, and older adults. Overall, higher community rates of COVID-19 deaths are associated with high community poverty rates, high percentage of residents of color, and low levels of educational attainment.[20]

Health equity and emergency event risk are interdependent. Reducing risk improves health equity, and improving health equity reduces risk.

According to Centers for Disease Control and Prevention (CDC) data posted in December 2022, people of color in the U.S. had higher rates of COVID-19 cases, hospitalizations, and deaths than did white people. Specifically, the case rate for American Indian and Alaska Native (AI/AN) people was 1.5 times that of the case rate for white people, and the death rate for AI/AN people was 2.1 times that of white people. For Hispanic and Latino people, the case rate was 1.5 times that of non-Hispanic white people, and the death rate was 1.7 times that of non-Hispanic white people. For Black and African American people, the case rate was 1.1 times more than white people, and the death rates was 1.6 times more. For Asian people, the case rate and the death rate were 0.8 times that of white people.[21]

The pandemic, particularly in its early stages, also illuminated the ways in which long-standing disinvestment in public health data systems created serious gaps in real-time measurements of disease progression and burden. These gaps made getting needed resources to communities most in need more difficult. Also evident during the pandemic were vast differences between population groups' access to paid time off from work. Hispanic workers have the lowest level of access to paid leave among all employee groups,[22] and Black women in the workforce have the greatest unmet need for access to paid time off for caregiving or health needs.[23] In addition, research has shown that community structural factors associated with the social determinants of health impacted COVID-19 mortality rates.[24]

The purpose of TFAH's *Ready or Not* report series is to help states gauge and address their degree of readiness to safeguard residents' health during emergencies by providing actionable data. One of TFAH's goals for this 2023 report is to also help increase awareness of the intersection of health equity and emergency preparedness.

Measuring health equity is a critical step toward addressing disparities that weaken community resilience, but devising and/or evaluating such measures is a complex task. During 2022, TFAH embarked on a process to study the possibility of incorporating a measure or measures of health equity into the report's preparedness indicator set. This included studying numerous equity and vulnerability data sets already in use and discussing the importance and challenges of measuring equity with numerous public health organizations and health equity experts. This section, as a start, reports on the relationship between health equity and preparedness and some current measures of equity and community resilience. As TFAH continues to study the issue, it will consider the feasibility of including a measure or measures of health equity within the *Ready or Not* indicator set in future reports. The goal is to draw attention to this important issue and give states measurable goals and action steps by which they can improve their states' emergency preparedness by addressing health inequities.

As part of this process, TFAH considered the following questions:

1. Are there high-quality indicators of health equity—with particular relevance to public health emergency preparedness and with regularly updated state-level data supporting them—currently in use, frequently updated, and available for consideration as an addition or additions to the indicators set currently tracked in the *Ready or Not* series?
2. Recognizing that there continue to be gaps in the data available to support such indicators, and more importantly for policymakers to assess health equity at the state level and to track progress, increased readiness, etc., is there an emerging consensus around the type of data that need to be collected and analyzed, as well as which institution(s) should be serving as leaders in this effort?

Challenges in Measuring Health Equity and Its Impact During Emergencies

The COVID-19 pandemic highlighted the critical need for real-time and more complete population groups' data and data exchange, particularly in the early stages of an outbreak. Data gaps prevent knowing the full story during emergencies and can hide the true impact of an emergency within communities that have been marginalized, leading to inadequate or misdirected responses. More complete data needs to be collected at the point of care. But the answer is more complicated than data collection. Another challenge to collecting data is a lack of trust in government. Residents are often unwilling to answer questions from government officials, including public health officials, because they do not trust how the data will be used or are concerned about their immigration or employment status.[25,26] In addition, the nation's health data collection and reporting infrastructure needs to be expanded.

Other questions that will need to be studied as the public health community seeks better measures of the intersection of health equity and emergency preparedness are:

- What are the most meaningful measures of social determinants of health (SDOH) and their impacts on emergency preparedness?
- Can SDOH data be layered with preparedness data?
- How should structural discrimination and its relationship to equity and preparedness be measured?
- How can consistency in data collection be improved, and how can access to additional data sets become more available (e.g., private healthcare data sets) at aggregate levels?
- Are there data outside of traditional public health measures that could be valuable to study for emergency preparedness planning purposes?

  Such as:

  - Percent of community residents with health insurance/access to healthcare
  - Percent of community residents with access to consistently reliable transportation
  - Percent of community residents with property insurance
  - Percent of community residents living in safe housing
  - Percent of households with broadband internet
  - Percent of community households with savings, i.e., an emergency fund

Select Measures of Community Resilience/Vulnerability Currently Available

The Community Resilience Estimate, U.S. Census Bureau

The U.S. Census Bureau defines "community resilience" as "the capacity of individuals and households to absorb, endure, and recover from the health, social, and economic impacts of a disaster such as a hurricane or pandemic."[27] In order to measure community resilience, the U.S Census Bureau developed the Community Resilience Estimate (CRE)—a composite of U.S. Census variables that denote jurisdictional vulnerability to disasters, including COVID-19.

Risk-factor data about households and individuals were gathered from the 2019 American Community Survey (ACS). Incorporated risk factors from the 2019 ACS include:

- Income to poverty ratio
- Single or zero caregiver household
- Communication barriers
- Household without full-time, year-round employment
- Household members with a disability that limits life activity
- Lack of health insurance
- Household does not have access to an automobile
- Household does not have broadband internet access
- Crowded housing

These data were combined with demographic data from the Population Estimates Program (i.e., tract, age group, race and ethnicity, and sex) to create the CRE. The CRE estimates the total number of people living in a community by the number of risk factors they have. It categorizes individuals into three risk groups:[28]

1. Low risk: people living with 0 risk factors
2. Medium risk: people living with one to two risk factors
3. High risk: people living with three or more risk factors

The Centers for Disease Control and Prevention's Social Vulnerability Index

CDC defines "social vulnerability" as "the potential negative effects on communities caused by external stresses on human health," including natural or human-caused disasters or disease outbreaks.[29] CDC and the Agency for Toxic Substances and Disease Registry created the Social Vulnerability Index (SVI), which measures social vulnerability similarly to how the U.S. Census Bureau's CRE functions. SVI is a composite of 16 variables from the U.S. Census Bureau's ACS that describe socioeconomic status, household, racial/ethnic minority status, housing type, and transportation access.[30]

The Satcher Health Leadership Institute at the Morehouse School of Medicine Health Equity Tracker

The tracker aggregates data from 14 key data sources, including CDC's SVI and the U.S. Census Bureau's ACS, to give a detailed view of health outcomes by race, ethnicity, sex, and other critical factors. While the tracker is not directly related to disaster preparedness, it does have useful information about health equity more broadly. The tracker provides information about several different categories of variables, including COVID-19 infection and vaccination rates, poverty levels, percentage of uninsured people, mental distress and substance misuse, levels of chronic disease, and degree of political participation such as voting.[31]

The Scorecard for Achieving Racial and Ethnic Equity in U.S. Health Care by the Commonwealth Fund

The Commonwealth Fund has "tracked the functioning of each state's health care system, with the goal of motivating actions to improve their residents' health and health care" through its annual State Health System Performance Scorecard. But the Commonwealth Fund also acknowledges that such metrics about health system performance "can mask profound underlying inequities." The Commonwealth Fund therefore developed a Scorecard of State Performance in Achieving Racial and Ethnicity Equity in U.S. Health Care as a complement to the Scorecard on State Health System Performance. Like the Census Bureau's CRE and CDC's SVI, the Commonwealth Fund scorecard considers many variables and stratifies the variables by race/ethnicity. Unlike CRE and SVI, Commonwealth's Scorecard is not explicitly based on disaster or outbreak preparedness. It also uses 24 indicators across three different priority areas (i.e., health outcomes, healthcare access, and quality and use of healthcare services) as opposed to CRE's 10 and SVI's 16 measures.[32]

The Deloitte Health Equity Dashboard

The Deloitte Health Equity Dashboard provides county- and zip code-level data on populations at elevated risk for certain health conditions and the location of sites (e.g., hospitals, pharmacies, urgent care clinics, and grocery stores) key to maintaining health and wellness. Deloitte uses HealthPrism predictive models, which contain data on SDOH to determine whether populations are at "elevated risk" for conditions (i.e., they fall within the top quintile risk level). The dashboard gathers data from consumer marketing datasets, CDC, and the U.S. Census Bureau. Where there are gaps in data, Deloitte uses predictive models to cover the full U.S. population. The dashboard includes data on age, race/ethnicity, healthcare access, geography, income, and health conditions.[34]

Looking Forward: Examples of Actionable Ways Jurisdictions Can Prioritize Equity in Emergency Planning

As mentioned earlier, in addition to a review of many currently available health equity data sets, TFAH hosted meetings with a number of public health and health equity organizations. Based on those meetings, this report highlights a few suggested activities for public health agencies:

- Partner with community leaders and organizations in meaningful ways before the advent of a public health emergency. The community partnerships fused during the COVID-19 crisis should be preserved and nurtured going forward. On-going partnerships with community organizations should include periodic check-ins and emergency preparedness drills.
- Build your department staff to represent the community it serves. Staff members who understand the lived experience of community members will earn their trust and be more effective in their work.
- All state, local, and territorial public health and emergency departments should have health equity officer positions and should integrate health equity as a principle in all work. Health equity officers serve as members of the department's leadership teams and should be part of the department's emergency preparedness and response team. They furthermore need the resources necessary to complete their mission.

Next Steps for TFAH

Finding valid and actionable measures of the intersection between health equity and emergency preparedness is a complex task. This special section begins that process by calling attention to the issue and to the challenges of better understanding ways to address health inequities that will lead to stronger community resilience. Hopefully, it increases dialogue among readers. As a next step, TFAH will continue to research valid and actionable indicators of health equity and their impact on emergency preparedness for possible inclusion in future reports' indicator sets. Our ultimate goal is to give state, local, tribal, and territorial health officials more data and action steps to improve their overall emergency readiness.

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Advancing Health Equity as a Part of Improved Emergency Preparedness Requires Better Data and a Systems Approach

Q and A with Hassanatu Blake, MPH, MBA
Director of Health Equity & Social Justice
National Association of County and City Health Officials

TFAH: How do health inequities impact a community's level of emergency preparedness?

Ms. Blake: The COVID-19 pandemic has illuminated that communities who are historically disenfranchised and hold less power experience inequities at a much heightened level during emergencies. Disasters exacerbate existing health inequities, especially in underserved populations who live in disaster-prone areas, and, inequities exacerbate the impact of disasters, infectious disease outbreaks, and other crises that vulnerable communities face. Both make it difficult to respond to the needs of the whole community. Local health departments must utilize the proven strategy to plan with and prioritize underserved and vulnerable communities before emergency events to ensure they have the proper support and to protect all residents. It is great to see emergency preparedness planning increasingly being infused with health equity strategies, but much more needs to be done. Emergency preparedness planning should include cross-sectional planning with community-based organizations (CBOs). CBOs can give preparedness teams community perspectives on how to address inequities by adding community voices to exercises and input into preparedness plans during times of crisis.

TFAH: What are the most common barriers to health equity?

Ms. Blake: There are many, often rooted in historic structural racism. Common health equity barriers related to emergency preparedness include communication (i.e., misinformation, resources accessible only to those who speak English or "abled" persons), systematic/social factors (i.e., social determinants of health; political determinants of health - voting, government, and policy; climate change; organizational processes, etc.), and programmatic factors (i.e., program processes, access to technology, and the digital divide).

TFAH: Can you describe how the National Association of County and City Health Officials (NACCHO) and/or your members are addressing health inequities?

Ms. Blake: In partnership with the Centers for Disease Control and Prevention's (CDC) National Initiative to Address COVID-19 Health Disparities Among Populations at High-Risk and Underserved, Including Racial and Ethnic Minority Populations and Rural Communities, NACCHO is providing technical assistance (TA) to local health departments across the country as they rethink how to address health inequities and put health equity concepts into

public health practice. Currently, in its second year, NACCHO's TA provides tools, trainings, and other resources (i.e., Roots of Health Inequity Course) to reduce immediate COVID-19-related health disparities and increase health departments' capacity and services to prepare for and/or prevent future emergencies.

NACCHO Health Equity and Social Justice - https://www.naccho.org/programs/public-health-infrastructure/health-equity

Roots of Health Inequity Course - http://www.rootsofhealthinequity.org/

In addition, NACCHO has partnered with the Center for Community Resilience (CCR) at The George Washington University and the CDC to support the Resilience Catalysts in Public Health (RC) network. This network utilizes the Community Resilience (CR) framework developed by Wendy Ellis, DrPH to eliminate adversity, build resilience, and foster equity through policy, practice, and program change. The RC network partners leverage the RC process and NACCHO's technical assistance to build resilience and improve outcomes for their communities.
Resilience Catalysts in Public Health - https://www.naccho.org/programs/public-health-infrastructure/public-health-3-0/resilience-catalysts-in-public-health

TFAH: As you know, this *Ready or Not* report series is intended to give health officials actionable data to strengthen emergency preparedness. What data points are you most interested in as a measure of health equity?

Ms. Blake: Measuring health equity is complex and poses well-documented challenges. Nevertheless, some pressing data points to consider as health equity measures are demographics, resilience, and organizational capacity to evaluate available support and allocation of resources that impact health equity outcomes. Demographics are important to ensure data can be disaggregated. Disaggregated data allows local health departments and communities to understand factors, such as level of housing segregation, distance from public services, political determinants of health, and nuances in culturally diverse communities that are linked to health inequities. Furthermore, data around how quickly a community can recover, and community resilience are important to explore. This type of data is needed in order to address systemic issues that are brought to the surface in the wake of a crisis.

TFAH: Any thoughts about how best to measure progress on advancing health equity in ways that improve emergency preparedness?

Ms. Blake: First, it's important to remember that many members of a community are part of various communities. Therefore, operationalizing health equity is complex, needs to be done at the systems level, and should include intersectionality. Being able to account for these factors in our data can help to better prepare communities to address current and emergent inequities within and across groups.

Second, intermediate milestones for strategic goals are imperative to sustainably measure progress in advancing health equity. Some of these can include increasing community engagement efforts, and, improving partnership building with communities and other stakeholders. In preparedness planning, collaborating with marginalized communities as early as possible is important to effectively establish systems of support and execute communications strategies that prioritize the most vulnerable communities.

Assessing States' Preparedness

A major takeaway from the public health events of 2022, ranging from the continued COVID-19 pandemic to the growing number and intensity of weather-based emergencies, is that every state needs to be prepared to respond to a variety of potential emergencies. Such readiness requires understanding an individual state's preparedness strengths, risks, and vulnerabilities. To help states assess readiness, and to highlight a checklist of top-priority concerns and action areas, this report examines a set of 10 select indicators. The indicators, overwhelmingly consistent from year to year, draw heavily on the National Health Security Preparedness Index (NHSPI), an initiative of the Robert Wood Johnson Foundation produced with scientific and administrative direction from the University of Kentucky and the University of Colorado. They capture core elements of emergency preparedness. Based on states' standing across the 10 indicators (see "Appendix B: Methodology" for scoring details) and TFAH analysis, the states were placed into three performance tiers: high, middle, and low (see Table 3.)

TABLE 3: State Public Health Emergency Preparedness
State performance, by scoring tier, 2022

Performance Tier	States	Number of States
High Tier	CO, CT, DC, DE, FL, GA, KS, ME, MD, MA, MS, NJ, NC, OH, PA, UT, VT, VA, WA, WI	19 states and DC
Middle Tier	AK, AL, AR, CA, IA, ID, IL, IN, MO, ND, NE, NH, NY, RI, SC, TX	16 states
Low Tier	AZ, HI, KY, LA, MI, MN, MT, NM, NV, OK, OR, SD, TN, WV, WY	15 states

Note: See *"Appendix B: Methodology" for scoring details. Complete data were not available for U.S. territories.*

Note: Importantly, the implications of this assessment, and responsibility for continuously improving, extend beyond any one state or local agency. Such improvement typically requires sustained engagement and coordination by a broad range of policymakers and administrators. Moreover, some indicators are under the direct control of federal and state lawmakers, whereas improvement in other indicators requires multisector, statewide efforts, including by residents.

INDICATOR 1: ADOPTION OF NURSE LICENSURE COMPACT

KEY FINDING: 37 states participate in the Nurse Licensure Compact.

Workforce shortages can impair a state's ability to effectively manage disasters or disease outbreaks, potentially resulting in poorer health outcomes for those affected. This reality has been on display during the COVID-19 pandemic and the recent overlapping outbreaks of COVID-19, seasonal flu, and respiratory syncytial virus (RSV), as healthcare capacity in most parts of the country has at times been pushed to the brink amid regional waves of infections and hospitalizations. At three separate times over the past three years—December 2020, September 2021, and January 2022—at least one-fifth of hospitals in the United States reported that they were expecting a critical staff shortage within a week.[35]

In an event like a pandemic, the ability to quickly surge qualified medical personnel by bringing in healthcare workers from out of state is a key component of healthcare readiness. But a 2022 analysis by NPR of license application records from 32 states found that nurses just out of school or moving to a new state commonly wait months to have their applications processed, with wait times especially long in several large states.[36]

This indicator examines whether states have adopted legislation to participate in the Nurse Licensure Compact (NLC). Launched in 2000 by the National Council of State Boards of Nursing, the NLC permits registered nurses and licensed practical nurses to practice with a single multistate license—physically or remotely—in any state that has joined the compact. The NLC provides standing reciprocity, with no requirement that an emergency be formally declared.

The COVID-19 pandemic has placed extraordinary pressure on hospitals across the country when surging infections send admissions soaring. States that were members of the NLC were better positioned to bring in nurses from other member states, without harmful delays, or to send nurses to other member states that were experiencing acute shortages. "I think the COVID-19 [pandemic] is going to cause the states that are not in the compact now to really take a second look at it," said NLC Director Jim Puente in June 2020. "If the NLC was expanded to all 50 states, none of the guesswork with emergency orders would be necessary because nurses could travel to other states where they are needed. No applications, fees, or background checks would be necessary."[37]

As of November 2022, 37 states had adopted the NLC, with Ohio, Pennsylvania, and Vermont being the most recent adopters.[38] This was a net increase of 11 since 2017.

According to Chris Winters, then Deputy Secretary of State in Vermont and former director of the office of professional regulation, his state graduates about 400 nurses a year, which is not enough to keep pace with the needs of hospitals, long-term care facilities, and other providers. He anticipates that Vermont joining the NLC will help it recruit and retain nurses and also facilitate greater use of telehealth practice.[39]

Then Vermont Secretary of State Jim Condos said last year when the state's membership went into effect that it "aligns with our goal to reduce barriers to licensure while ensuring public protection" and "enables rapid onboarding of vetted, competent nurses from other states into Vermont healthcare facilities at a time when the need has never been greater."[40]

TABLE 4: 37 States Participate in the Nurse Licensure Compact

Participants and nonparticipants, 2022

Participants			Nonparticipants	
Alabama	Maine	Pennsylvania*	Alaska	Michigan
Arizona	Maryland	South Carolina	California	Minnesota
Arkansas	Mississippi	South Dakota	Connecticut	Nevada
Colorado	Missouri	Tennessee	District of Columbia	New York
Delaware	Montana	Texas	Hawaii	Oregon
Florida	Nebraska	Utah	Illinois	Rhode Island
Georgia	New Hampshire	Vermont	Massachusetts	Washington
Idaho	New Jersey	Virginia		
Indiana	New Mexico	West Virginia		
Iowa	North Carolina	Wisconsin		
Kansas	North Dakota	Wyoming		
Kentucky	Ohio			
Louisiana	Oklahoma			

**Note: Pennsylvania joined the NLC in 2021 but had not set a date for implementation as of December 2022.*

Source: National Council of State Boards of Nursing[41]

INDICATOR 2: COMPREHENSIVE PUBLIC HEALTH SYSTEMS

KEY FINDING: Only about half of the U.S. population—a state average of 45 percent—is served by a comprehensive public health system. Comprehensive public health systems have been shown to contribute cost-effectively to residents' health and safety. At the state level, in 2018, the share of residents served by such a system ranged from more than two-thirds in the District of Columbia (86 percent), New York (77 percent), Arizona (67 percent), and Pennsylvania (67 percent) to fewer than one-third in Arkansas (31 percent), South Dakota (28 percent), and Indiana (25 percent).

Since 1998, a team of researchers who are now part of Systems for Action, a joint initiative of the Robert Wood Johnson Foundation and the Colorado School of Public Health, have periodically administered the National Longitudinal Survey of Public Health Systems to a nationally representative cohort of U.S. communities.[42] Through the survey, they can estimate the percentage of the U.S. population that resides in communities with a comprehensive public health system, defined as a place in which "a broad array of the recommended public health activities are available in the community, AND in which a relatively broad range of organizations contribute to implementing these activities, AND/OR in which the local public health agency contributes [a] relatively large share of the effort to implement these activities."[43]

The survey asks local public health officials whether their agencies or community partners:[44]

1. Conduct community-needs assessments that systematically describe the prevailing health status in the community?
2. Survey the population for behavioral risk factors?
3. Conduct on an ongoing basis timely investigations of adverse health events, including communicable disease outbreaks and environmental health hazards?
4. Make necessary laboratory services available to support investigations of adverse health events and meet routine diagnostic and surveillance needs?
5. Complete periodic analyses of the determinants of and contributing factors to priority health needs, the adequacy of existing health resources, and the population groups most effected?
6. Complete periodic analyses of age-specific participation in preventive and screening services?
7. Cultivate a network of support and communication relationships that includes health-related organizations, the media, and the general public?
8. Make formal efforts at least annually to inform public officials about the potential public health impact of decisions under their consideration?
9. Periodically prioritize community health needs based on a community-needs assessment?
10. Implement community health initiatives that are consistent with priorities established from a community health needs assessment?
11. Develop and periodically update a community health action plan with community participation to address community health needs?
12. Develop and periodically update plans to allocate resources in a manner consistent with community health action plans?
13. Deploy resources as necessary to address priority health needs identified in the community health needs assessment?
14. Periodically conduct an organizational assessment of the public health agency?
15. Address age-specific priority health needs through the provision of or linkage to appropriate services?
16. Regularly evaluate the effects of public health services on community health status?
17. Regularly use professionally recognized process and outcome measures to monitor public health programs and to redirect resources as appropriate?

18. Regularly make public information about current health status, healthcare needs, health behaviors, and healthcare policy issues?

19. Regularly report to media on health issues affecting the community?

20. Implement mandated public health programs or services as required by state or local law, ordinance, or regulation?

For each activity, surveyors ask respondents how well the measure is being performed (using a five-point Likert scale), the proportion of effort contributed by the local public health agency, and which types of other organizations (state health agency; other federal, state, or local agencies; faith-based organizations; hospitals; health insurers; employers and business groups; physician practices; community health centers; other nonprofits; k–12 schools; colleges and universities; tribal organizations; or others) are also involved, among other questions. It also asks how respondents would rate their agencies' effectiveness at assuring the conditions in which their residents can be healthy, and how they would rate the overall health of their jurisdictions' people.[45]

The researchers aggregate respondents' answers to determine whether a comprehensive public health system is serving a jurisdiction; that is, one in which there is high availability of recommended activities, a high level of organizational contributions, and/or a high level of agency effort. There is evidence that when localities improve from having a noncomprehensive system to a comprehensive one, they experience significant reductions in premature mortality rates from potentially preventable conditions, such as infant mortality, cardiovascular disease, diabetes, and cancer.[46] Moreover, these places tend to be more cost-effective, using relatively fewer resources despite supporting a broader array of public health activities.[47]

Since 1998, when the survey began, the estimated percentage of U.S. residents who are served by a comprehensive public health system has increased markedly, from 25 percent[48] in 1998 to 49 percent in 2020.[49] Still, the survey documented much of that improvement during its early years, as the percentage has not increased since 2006.[50] In 2018, the latest year for which state-level estimates were available, the states where a comprehensive public health system served the greatest percentage of residents were the District of Columbia (86 percent), New York (77 percent), Arizona (67 percent), and Pennsylvania (67 percent), compared with Indiana (25 percent), South Dakota (28 percent), and Arkansas (31 percent). No data were available for Hawaii and Rhode Island.

This wide range demonstrates that the capacities of a person's local health department, a meaningful contributor to one's health and safety, depends significantly on where the person lives. Of note, the data suggests a persistent and expanding gap between rural and urban jurisdictions, with rural areas providing fewer recommended public health activities and engaging narrower networks of partners compared with their urban counterparts.[51] Researchers suggest that these disparities are due to several factors, including rural departments having relatively lower levels of funding and staffing, as well as marketplace and policy dynamics such as a greater prevalence of hospital closures and health-insurer consolidations in rural areas and greater health insurance coverage gains recently in urban areas. This gap is made more concerning by a small but notable recent trend of officials in predominantly rural states and localities turning down federal assistance to bolster their public health programs, seemingly an unfortunate consequence of mistrust and political polarization surrounding CDC specifically and the field in general.[52]

TABLE 5: Only About Half of the U.S. Population Has a Comprehensive Public Health System

Percent population served by a comprehensive public health system, 2018

States	Percent of Residents
DC	86%
NY	77%
AZ, PA	67%
MA	63%
AK	62%
CA	59%
NV, UT	55%
FL, WA	49%
IL, MN, NJ	47%
MI	46%
ME, VT, WV	45%
CO, LA, NC, NE, SC, VA	44%
GA, MD, MO	43%
DE, OR, WI	42%
ID, OK	39%
IA, KS, NH, TX	38%
CT, KY, NM, OH	37%
MT, TN, WY	36%
AL, MS	35%
ND	34%
AR	31%
SD	28%
IN	25%

Note: No data were available for Hawaii or Rhode Island. The District of Columbia's value was imputed by Systems for Action.

Source: NHSPI analysis of data from the National Longitudinal Survey of Public Health Systems.[53]

INDICATORS 3 AND 4: ACCREDITATION

KEY FINDING: Most states are accredited by one or both of two well-regarded bodies—the Public Health Accreditation Board and the Emergency Management Accreditation Program—but seven are not accredited by either.

The Public Health Accreditation Board (PHAB), a nonprofit organization that administers the national public health accreditation program, advances quality within public health departments by providing a framework and a set of evidence-based standards against which they can measure their performance. Among standards with direct relevance to emergency preparedness are assurances of laboratory, epidemiologic, and environmental expertise to investigate and contain serious public health problems, policies, and procedures for urgent communications, and maintenance of an all-hazards emergency operations plan.[54] Through the process of accreditation, health departments identify their strengths and weaknesses, increase their accountability and transparency, and improve their management processes, which all promote continuous quality improvement.[55]

In 2022, PHAB unveiled the latest update to its standards and measures for accreditation. Among other modifications, the new version—Version 2022—more intentionally integrates public health preparedness including lessons from recent years on topics such as the COVID-19 pandemic, racism as a public health emergency, climate change, and public health communication. Of note, the new version places greater emphasis on health departments continuously preparing to respond to emergencies and working to address social determinants of health or inequities when developing strategies to contain or mitigate threats.[56]

Emergency management, as defined by the Emergency Management Accreditation Program (EMAP), encompasses all organizations in a given jurisdiction with emergency or disaster functions, which may include prevention, mitigation, preparedness, response, and recovery. The EMAP helps applicants ensure—through self-assessment, documentation, and peer review—that they meet national standards for emergency response capabilities.[57]

The PHAB and the EMAP each provide important mechanisms for improving evaluation and accountability. Accreditation and reaccreditation by these entities demonstrate that a state's public health and emergency management systems are capable of effectively responding to a range of health threats. The priority capabilities that the PHAB and the EMAP test include are identification, investigation, and mitigation of health hazards; a robust and competent workforce; incident, resource, and logistics management; and communications and community-engagement plans.[58,59] States sometimes aim to meet applicable standards but do not pursue accreditation.

As of December 2022, 30 states and the District of Columbia were accredited by both the PHAB and the EMAP. Iowa and Nebraska no longer have dual accreditation after their EMAP accreditation lapsed. Kentucky is now accredited by the PHAB, alongside an additional 12 states that have received accreditation from just one of the two. (See Table 6.)

In congratulating the Kentucky Department for Public Health, PHAB President and CEO Paul Kuehnert, DNP, R.N., FAAN, said of the achievement: "The pandemic shows the critical need for high performing health departments that are focused

on quality and performance improvement. Through national public health accreditation, health departments are demonstrating their commitment to protect and promote the community's health."[60]

Just seven states (Alaska, Hawaii, New Hampshire, South Dakota, Texas, West Virginia, and Wyoming) received no accreditation from either body. A state without accreditation has not necessarily been denied; the state may not have pursed one or may still be in the process of seeking accreditation. In addition, a state may choose to continue one accreditation and allow its second accreditation to lapse. It is also important to note that this analysis includes state-level accreditation only. It does not include local, tribal, or territorial health departments that may be accredited.

TABLE 6: 43 States and the District of Columbia Accredited by the PHAB and/or the EMAP
Accreditation status by state, December 2022

PHAB and EMAP			PHAB ONLY	EMAP ONLY	No Accreditation
Alabama	Illinois	Oklahoma	Indiana	Michigan	Alaska
Arizona	Kansas	Pennsylvania	Iowa	Nevada	Hawaii
Arkansas	Louisiana	Rhode Island	Kentucky	North Carolina	New Hampshire
California	Maryland	South Carolina	Maine	Tennessee	South Dakota
Colorado	Massachusetts	Utah	Minnesota		Texas
Connecticut	Mississippi	Vermont	Montana		West Virginia
Delaware	Missouri	Virginia	Nebraska		Wyoming
District of Columbia	New Jersey	Washington	New Mexico		
Florida	New York	Wisconsin	Oregon		
Georgia	North Dakota				
Idaho	Ohio				
30 states + DC			**9 states**	**4 states**	**7 states**

Note: These indicators track accreditation by the PHAB and the EMAP. TFAH classified states with conditional or pending accreditation at the time of data collection as having no accreditation. States sometimes aim to meet applicable standards but do not pursue accreditation. This analysis includes state-level accreditations only, it does not include accredited local or tribal health departments. In some instances, local public health departments have accreditation in states that do not.

Sources: PHAB[61] and EMAP[62]

INDICATOR 5: STATE PUBLIC HEALTH FUNDING TRENDS

KEY FINDING: A majority of states held their public health funding steady or increased it in fiscal year (FY) 2022, but at least 13 reduced funding. (Data were not available for three states.)

The COVID-19 pandemic showed how sufficient, flexible, and sustained funding for a comprehensive public health system is integral to preparedness and response, including the ability to detect, prevent, and control disease outbreaks and mitigate the health consequences of disasters. General public health capabilities—such as those pertaining to epidemiology, environmental hazard detection and control, infectious disease prevention and control, and risk communications—and targeted emergency response resources are necessary to ensure that officials maintain routine capabilities and that surge capacity is readily available for emergencies. A trained and standing-ready public health workforce, and one that knows its community, is critical to the surge capacity that is so often necessary during an emergency.

According to the Public Health Activities and Services Tracking project at the University of Washington, state public health programming and services span six core areas:[63]

1. **Communicable disease control.** Public health services related to communicable disease epidemiology, hepatitis, HIV/AIDS, immunization, sexually transmitted diseases, tuberculosis, etc.
2. **Chronic disease prevention.** Public health services related to asthma, cancer, cardiovascular disease, diabetes, obesity, tobacco use, etc.
3. **Injury prevention.** Public health services related to firearms, motor vehicles, occupational injuries, senior fall prevention, substance-use disorder, other intentional and unintentional injuries, etc.
4. **Environmental public health.** Public health services related to air and water quality, fish and shellfish, food safety, hazardous substances and sites, lead, onsite wastewater, solid and hazardous waste, zoonotic diseases, etc.
5. **Maternal, child, and family health.** Public health services related to the coordination of services; direct service; family planning; newborn screening; population-based maternal, child, and family health; supplemental nutrition; etc.
6. **Access to and linkage with clinical care.** Public health services related to beneficiary eligibility determination, provider, or facility licensing, etc.

The overall infrastructure of public health supports states' ability to promote health equity, build resilience in the population, and carry out emergency response activities. But public health funding is typically discretionary, making it vulnerable to neglect or retrenchment, especially when times are tight. Decades of underfunding public health have undermined emergency preparedness activities and weakened response and recovery efforts. State investment in public health is important for the operations of health agencies: about 28 percent of state and territorial health department revenues are from state sources,[64] while 21 percent of local health department revenue is from state sources, on average.[65]

Fortunately, at least 34 states and the District of Columbia maintained or increased public health funding in FY 2022. (See Table 7.) But at least 13 states reduced the money they directed to these vital activities, increasing the likelihood that they will be less prepared and less responsive in the moments that matter most.

This indicator does not assess the adequacy of states' public health funding. It should also be noted that due to inflation and population growth, stable funding is in some cases a funding reduction.

From FY 2019 to FY 2022, some states experienced sizable fluctuations in the state-supported funding allotted to public health services, owing to a host of pandemic-related funding actions. For example, in some cases, a temporary infusion of state-supported funds might have been appropriated for just one year. In other cases, state-supported funding might have been temporarily cut and replaced by pandemic-related federal aid. Importantly, states are asked to report to TFAH only their state-supported funding.

TABLE 7: State Public Health Funding Held Stable or Increased in at Least 34 States and DC
Public health funding, by state, FY 2021 to 2022

State	Percentage Change
Alabama	-3%
Alaska	2%
Arizona	6%
Arkansas	6%
California	-3%
Colorado	3%
Connecticut	6%
Delaware	40%
District of Columbia	7%
Florida	2%
Georgia	2%
Hawaii	Not reported
Idaho	0%
Illinois	9%
Indiana	0%
Iowa	2%
Kansas	9%
Kentucky	0%
Louisiana	-8%
Maine	-17%
Maryland	Not reported
Massachusetts	7%
Michigan	Not reported
Minnesota	-22%
Mississippi	5%
Missouri	-1%
Montana	-2%
Nebraska	11%
Nevada	-26%
New Hampshire	-6%
New Jersey	22%
New Mexico	-6%
New York	3%
North Carolina	7%
North Dakota	20%
Ohio	89%
Oklahoma	-25%
Oregon	47%
Pennsylvania	7%
Rhode Island	367%
South Carolina	4%
South Dakota	3%
Tennessee	-15%
Texas	32%
Utah	1%
Vermont	10%
Virginia	5%
Washington	37%
West Virginia	3%
Wisconsin	12%
Wyoming	-15%

Note: Because of differences in organizational responsibilities and budgeting, funding data are not necessarily comparable across states. Three states (Hawaii, Maryland, and Michigan) did not provide TFAH with public health funding data for FY 2022. See "Appendix B: Methodology" for a description of TFAH's data-collection process, including its definition of public health funding.

Source: TFAH analysis of states' publicly available funding data.

INDICATOR 6: COMMUNITY WATER SYSTEM SAFETY

KEY FINDING: Few Americans drink from community water systems that are in violation of applicable health-based standards required by the Safe Drinking Water Act. But room for improvement remains.

Access to safe water is essential for consumption, sanitation, hygiene, and the efficient operation of the healthcare system and other critical infrastructure. In the United States, the vast majority of the population gets water from a public water system,[66] and the U.S. Environmental Protection Agency (EPA) sets legal limits on contaminants in drinking water, including microorganisms, disinfectants, and their byproducts, other chemicals, and radionuclides.[67] The EPA also requires states to periodically report drinking-water-quality information from public water systems in their jurisdictions.[68] Water systems must report any violations, such as failing to follow established monitoring and reporting schedules, failing to comply with mandated treatment techniques, violating any maximum contaminant levels, and failing to meet customer-notification requirements.[69]

The United States has one of the safest public drinking water supplies in the world, but some communities, particularly low-income communities, do not have constant access to safe water. When water safety issues occur, it can require a multisector emergency response, as well as a long-term public health response. Among the most prominent water contamination crises in recent years was one that occurred in Flint, Michigan, where a 2014 change in water source caused distribution pipes to corrode and to leach lead and other contaminants into the drinking water. Tens of thousands of residents, including young children, were exposed to high levels of lead and other contaminants.[70]

In 2019, residents of Newark, New Jersey, had to rely on bottled water due to high levels of lead in their tap water, though nearly all of the city's 23,000 lead service lines have since been replaced with copper pipes, and in July 2021 the state enacted laws requiring public water systems to inventory and replace lead service lines within 10 years.[71,72] In children, even low levels of lead exposure can damage the nervous system and contribute to developmental delays, learning disabilities, and weight and hearing loss.[73] These incidents could have long-term consequences on the health and brain development of children, as well as the mental health and trust of the community.

As climate change contributes to more frequent wildfires, a residual danger is the release of toxic chemicals into community water systems. For example, months after the Hermits Peak and Calf Canyon fire in northeastern New Mexico in 2022 (in this case, the result of Forest Service officials losing control of two prescribed burns), officials in Las Vegas, NM were struggling to keep drinking water safe and accessible, as the city's main reservoir was overwhelmed by ashy sludge, forcing a scramble for stopgap solutions and a usage limit of 44 gallons per person per day (the equivalent of about two showers[74]).[75] Pollution that contaminates drinking water systems during and after major wildfires can include natural debris, silt, asbestos, heavy metals, radioactive isotopes, and carcinogens from decomposing wells themselves.[76]

Major storms, which are made more frequent and more intense by climate change,[77] can damage water infrastructure and lead to power outages, sometimes causing potable water to become inaccessible or tainted. When Hurricane Ian devastated parts of coastal Florida in September 2022, pumps and treatment plants serving residents of Lee County, encompassing Fort Myers, were left without power and water lines were severed.[78] Three of the county's hospitals were without water,

necessitating the evacuation of some patients. Further inland, dozens of lift stations that pump wastewater to treatment plants were offline in Polk County and officials were warning residents against overwhelming the local system to an extent that it could send untreated water back into their homes. At one point, the Florida Department of Health had posted nearly 50 boil-water advisories on its website.[79]

In Jackson, Mississippi, a heavy downpour in August 2022 overwhelmed the city's water system, cutting off 150,000 residents from running water for days. This came after the city had lived under a boil-water notice for weeks, a notice that continued for additional weeks due to the flooding.[80] In December 2022, subfreezing temperatures caused pipes within the water system to break. As a result, the community was again under a boil-water order and some residents had no water at all.[81]

Other water-related hazards in the United States include harmful algal blooms that cause algal toxins and the emerging presence of per- and polyfluoroalkyl substances (PFAS) from industrial chemicals.[82]

CDC data indicate waterborne pathogens cause approximately 7,000 deaths, 7 million illnesses, and more than $3 billion in healthcare costs each year.[83] The risks from contaminated drinking water disproportionately threaten communities of color, highlighting the impact that structural racism can have on a critical resource most Americans consider a basic service. In some areas, redlining has kept peri-urban communities of color, tribal lands, and rural agricultural areas out of municipal water systems, thereby increasing their potential exposure to waterborne illness. In addition, older buildings are more vulnerable to waterborne pathogens in their pipes.[84]

Encouragingly, the federal Infrastructure Investment and Jobs Act, enacted in November 2021, took several significant steps toward expanding access to safe drinking water. Among its provisions were $24 billion in grants to states under the existing Clean Water Act (focused on regulating pollution and protecting surface-water quality[85]) and the Safe Drinking Water Act (focused on protecting waters actually or potentially designed for drinking[86]); $15 billion to replace lead pipes and service lines; $9 billion to address emerging PFAS; and a number of initiatives to provide dedicated assistance to small, disadvantaged, low-income, rural, and/or tribal communities.[87,88] In fall 2022, states began to receive funding from the EPA for projects dedicated to broadening access to clean, safe drinking water; shoring up wastewater treatment facilities; and more effectively managing stormwater runoff.[89]

According to the EPA, across the nation, 5 percent of state residents on average used a community water system in 2021 that failed to meet all applicable health-based standards, down from 7 percent in 2018.[90] That share was actually or effectively 0 percent in California, Delaware, Hawaii, Iowa, Maryland, Nevada, North Dakota, Vermont, Virginia, and Washington. (See Table 8.) But in six states (Arizona, Louisiana, Massachusetts, New Jersey, New York, and Oregon), more than 15 percent of residents used a community water system with health-based violations. (The percentage in West Virginia was 14.5, rounded up to 15 percent in the table below.)

Of note, approximately 23 million U.S. households get their drinking water from private wells. The data reported by this indicator do not include water quality for those households.[91]

TABLE 8: Few Americans Used Contaminated Community Water Systems
Percent of state populations who used a community water system in violation of health-based standards, 2021

States	Percent of Population
CA, DE, HI, IA, MD, ND, NV, VT, VA, WA	0%
AL, IL, MI, MN, MO, MT, NE, NH, OH, RI, TN	1%
CT, NC, PA, SD, UT, WI	2%
AR, FL, GA, IN, KS, ME	3%
CO, KY	4%
AK, DC, WY	5%
ID	6%
NM	7%
TX	8%
MS	9%
SC	11%
OK	14%
MA, OR, WV	15%
NJ	18%
LA	19%
AZ	27%
NY	45%

Source: NHSPI analysis of data from the EPA[92]

Note: The EPA estimates that more than 13 million U.S. households get their drinking water from private wells.[93] *The data reported by this indicator do not reflect the water quality of those households, though they are included in population percentage calculations. Only regulated contaminants are measured. These data do not include water safety on Indian reservations. Often, state percentages are driven by violations in major towns and cities (e.g., Phoenix, Arizona; Shreveport, Louisiana; Boston, Massachusetts; Hackensack, New Jersey; New York City; Stillwater, Oklahoma; Portland, Oregon; and Columbia and Spartanburg, South Carolina).*

INDICATOR 7: USE OF PAID TIME OFF

KEY FINDING: Just over half of workers in states, on average, used some type of paid time off—sick leave, vacation, holidays. Most states were closely clustered to that midpoint, with few outliers.

Note: The specification of this indicator has been adjusted slightly in recent years from a measure of those who received paid time off to a measure of those who used it. Additionally, these figures reflect a one-month snapshot, intended to show relative usage across states, not a measure of the total percentage of workers who used paid time off during the entire year.

The need for paid time off has been evident during the pandemic, as frontline and essential workers—people whose jobs do not permit them to work remotely—have often been compelled to work when sick themselves, caring for a sick family member, or experiencing temporary side effects immediately after vaccination. Black and Hispanic workers typically have less access to paid sick leave and are overrepresented in groups of frontline workers.[94]

When workers without paid leave get sick, they face the choice of going to work and potentially infecting others or staying home and losing pay—or even their jobs. They encounter similarly impossible decisions when a child or another dependent family member gets sick. Therefore, access and the ability to use job-protected paid time off, especially dedicated paid sick leave, can strengthen infection control and resilience in communities by reducing the spread of contagious diseases and bolstering workers' financial security. This is particularly important for industries and occupations that require frequent contact with the public. For example, people working in food-service, older adult and nursing care facilities, and childcare industries commonly have no paid sick leave.[95] Low-wage workers[96] and workers of color are also less likely to have access to paid leave compared with white and higher-earning workers.[97] This often leads employees to work throughout an illness or return to work before their symptoms have fully subsided, when time off could have reduced the potential of workplace infections.[98,99]

The public health benefit is clear: at a societal level, flu rates have been shown to be lower in cities and states that mandate paid sick leave.[100,101] When employees who previously did not have access are granted paid or unpaid sick leave, rates of flu infections decrease.[102] A 2020 study found that states that gained access to emergency paid sick leave through the Families First Coronavirus Response Act saw an estimated 400 fewer confirmed cases of the virus per state, per day.[103]

Paid time off also increases access to preventive care among workers and their families, including routine checkups, screenings, and immunizations. Delaying or skipping such care can result in poor health outcomes and can ultimately lead to costlier treatments. Workers without paid sick days are less likely to get a flu shot, and their children are less likely to receive routine checkups, dental care, and flu shots.[104]

During the COVID-19 pandemic, research showed that access to paid sick leave helped slow the spread of the virus.[105] The Families First Coronavirus Response Act, enacted in March 2020, helped temporarily address this issue for employers with 50 - 500 employees and certain public employers, temporarily

requiring employees to be provided with paid sick leave under certain conditions. This helped reduce the spread of the virus in workplaces and communities by removing a barrier to employees staying home when necessary. However, these protections expired on December 31, 2020, despite the ongoing need for the use of paid leave to control the pandemic; instead, Congress provided a tax credit for qualifying employers to offer paid sick leave from January 1, 2021, to September 30, 2021.[106,107] State and local paid leave laws helped fill in some of the gap, but most states and localities do not have them.[108]

From March 2017–2022, 55 percent of all workers in states, on average, took some type of paid time off—the same percentage as in recent years—according to the Current Population Survey, which is sponsored jointly by the U.S. Census Bureau and the U.S. Bureau of Labor Statistics.[109] Alaska (62 percent), Connecticut (60 percent), the District of Columbia (61 percent), Iowa (61 percent), Maryland (60 percent), Massachusetts (60 percent), Mississippi (63 percent), New York (61 percent), and Texas (63 percent) stood out as states where relatively high percentages of workers used such benefits, whereas fewer workers used them in Illinois (49 percent), Pennsylvania (48 percent), Rhode Island (48 percent), and South Dakota (49 percent).[110] (see Table 9.)

TABLE 9: 55 Percent of Workers, On Average, Used Paid Time Off
Percent of employed population that took paid time off, March 2017–2022

States	Percent of Workers
MS, TX	**63%**
AK	**62%**
DC, IA, NY	**61%**
CT, MA, MD	**60%**
KS, ME, NM, OR, WA	**59%**
AL, NJ, NC, VA	**57%**
CO, GA, HI, MO, NH	**56%**
LA, OK, VT, WV	**55%**
AR, CA, DE, FL, ID, NV	**54%**
MT, ND, OH, NE, TN, WI	**53%**
AZ, IN, UT, WY	**52%**
KY, SC	**51%**
MI, MN	**50%**
IL, SD	**49%**
PA, RI	**48%**

Source: NHSPI analysis of data from the Annual Social and Economic Supplement of the Current Population Survey[111]

Note: Paid time off includes sick leave, vacations, and holidays. The data are measured based on a survey of a sample of the general population. The specification of this indicator has been adjusted slightly from a measure of those who received paid time off to a measure of those who used it. Additionally, these figures reflect a one-month snapshot, intended to show relative usage across states, not a measure of the total percentage of workers who used paid time off during the entire year.

INDICATOR 8: FLU VACCINATION RATE

KEY FINDING: Flu vaccination coverage held at a relatively high level for the third consecutive year during the 2021–2022 season, with an especially high rate for older adults. Overall, 51 percent of U.S. residents ages 6 months and older received vaccinations—still well below the overall target level of 70 percent of the population vaccinated annually.

CDC recommends that, with few exceptions, everyone ages 6 months and older get vaccinated for seasonal influenza annually. Yet, year after year, even with a steady increase among adults over the past three decades,[112] coverage estimates indicate that just over half of Americans do so. *Healthy People 2030* sets federal 10-year benchmarks for improving the health of all Americans, including an overall seasonal influenza vaccination-rate target of 70 percent annually.[113]

Vaccination is the long-standing best protection against the seasonal flu, particularly for people at high risk of severe flu-related outcomes, including people with certain chronic health conditions and older adults. In addition to protecting Americans from the seasonal flu, establishing a cultural norm of vaccination, building vaccination infrastructure, and establishing policies that support vaccinations can help prevent or limit other illnesses for which there is a vaccine, including COVID-19. Although flu vaccination rates have increased in recent years, there is troubling evidence that polarization around the COVID-19 vaccine is already having spillover effects to flu and other vaccines. One analysis found that during the 2021–2022 season, adult flu vaccination decreased within states in the bottom half of COVID-19 vaccine uptake and increased in states in the top half.[114]

Heading into the 2022–2023 flu season, there were signs that the country could experience a so-called "tripledemic," the collision of widely circulating COVID-19, seasonal flu, and RSV. Susceptibility was high for the latter two after two consecutive light years, which led to reduced population-level immunity, especially for young children who might

not have had any previous exposure. Moreover, behaviors that people were practicing earlier in the pandemic to mitigate the spread of COVID-19—physical-distancing, masking, holding gatherings outside—have tapered off. As of mid-November 2022, the hospitalization rate for seasonal flu was the highest it had been in more than a decade.[115] And pediatric units in hospitals across the country were swamped throughout the fall and winter with patients with RSV, leading one pediatric physician to characterize the time as "our March 2020," referring to the month when cases of COVID-19 began spiking in the United States.[116]

Editor's note: *January 2023 data showed declines in the infection rates for COVID-19, RSV, and the flu leading some researchers to suggest that the "tripledemic" was nearing its end. However, others cautioned that the additional winter months still posed a threat for continued infections.*[117]

Fortunately, scientists are beginning to make encouraging strides in developing better tools for preventing serious cases of flu or RSV. In the case of flu, a group of scientists reported in the journal *Science* in November 2022 that they had successfully tested a universal flu vaccine in mice and ferrets that could protect against all known strains of the virus,[118] moving the country toward being positioned to better prevent a future flu pandemic. In the same month, Pfizer announced that its RSV vaccine had demonstrated strong efficacy against hospitalization among infants younger than six months. In December 2022, Pfizer submitted its RSV vaccine for older adults to the Food and Drug Administration for approval. In October 2022, GSK reported that its RSV vaccine proved effective in trials at preventing serious illness in older adults.[119]

Editor's note: *In February 2023, FDA advisors recommended that the agency approve two RSV vaccines for adults, one manufactured by Pfizer, the other by GlaxoSmithKline.*

Under the Affordable Care Act, all routine vaccines recommended by the Advisory Committee on Immunization Practices, including flu vaccines, are fully covered when provided by in-network providers, except in states that have not expanded their Medicaid programs in accordance with the law. Some barriers to flu vaccination may include a belief that the vaccine does not work very well, misconceptions about the safety of the vaccine, or, a belief that the flu does not present serious risks.[120] The reality is flu vaccines prevent millions of illnesses each year and tens of thousands of hospitalizations, including significantly reducing the risk of intensive care and death, and are proven to be safe.[121]

There are a number of policy options available to states and localities seeking to increase vaccination levels. To help increase access, states can expand the number of qualified healthcare workers who can administer vaccines. There is evidence, for example, that pharmacists can play a key role in facilitating broader access and controlling epidemics and their costly consequences.[122] States and localities can also target residents at high risk (e.g., people in long-term care facilities, older adults, young children, and people with chronic conditions) and promote vaccination through public information campaigns.[123] In 2022, 11 states enacted laws expanding medical

professionals' scope of practice to increase the vaccination workforce.[124] States can also limit nonmedical exemptions to school entry requirements for recommended childhood vaccines, for flu as well as other illnesses, which increases vaccination rates and reduces outbreaks.[125]

According to the National Conference of State Legislatures, states have recently taken creative steps to improve vaccination rates. For example, Arkansas and Indiana allow pharmacy technicians to administer flu vaccines, and New Hampshire and West Virginia permit qualified pharmacy interns to do so under supervision.[126] California and Ohio allow podiatrists to administer flu vaccines, New Jersey allows optometrists to do so, Wisconsin authorizes dentists to give flu shots, Maryland lets paramedics provide them, and Virginia allows persons who are otherwise authorized to administer controlled substances in hospitals to administer the vaccines. At least 16 states require hospitals to offer flu vaccination to at least patients who are at high risk of serious illness from the flu, including New Mexico (patients 65 or older), Ohio (each admitted patient), and Georgia (patients 50 or older).[127] Thirty-two states have flu vaccination requirements for patients or residents of long-term care facilities, and 24 states have provisions regarding flu vaccination for healthcare workers at some or all long-term care facilities. Some states have taken novel actions to increase awareness and participation, including New York and Kentucky, which each recognize Immunization Awareness Month in August.

During the 2021–2022 flu season, 51 percent of U.S. residents ages 6 months and older were vaccinated, according to CDC, slightly below the rates in the 2019–2020 and 2020–2021 seasons, which at 52 percent had the highest rate in at least a decade. There has been a notable and durable uptick from 42 percent during the 2017–2018 flu season. Rhode Island (66 percent), the District of Columbia (64 percent), and Connecticut (63 percent) had the highest coverage, while vaccination rates were lowest in Mississippi (38 percent), Wyoming (41 percent), Florida (42 percent), Idaho (42 percent), and Nevada (42 percent). (See Table 10.)

Children were more likely to receive vaccinations than were adults. Fifty-eight percent of those ages 6 months to 17 years received flu vaccinations in 2021–2022, compared with 49 percent of adults. The most highly vaccinated age group was people ages 65 and over at 74 percent.[128]

TABLE 10: Just Over Half of U.S. Residents Received a Seasonal Flu Vaccination
States' seasonal flu vaccination rates for people ages 6 months or older, 2021–2022

State	Vaccination Rate, Ages 6 Months or Older
Rhode Island	66.1
District of Columbia	63.7
Connecticut	63.0
Massachusetts	62.9
New Hampshire	62.1
Maryland	61.9
Vermont	60.9
New Jersey	59.3
Maine	58.5
Minnesota	57.7
Colorado	57.5
Washington	55.9
Michigan	55.7
Virginia	55.6
Iowa	55.3
Pennsylvania	55.1
South Dakota	55.1
Nebraska	54.6
Hawaii	54.5
New York	54.4
Delaware	53.4
Wisconsin	53.3
Kansas	52.9
North Dakota	52.6
Illinois	51.9
New Mexico	51.7
North Carolina	50.6
Indiana	50.4
Utah	50.3
Missouri	49.9
Arkansas	49.8
Oregon	49.8
Ohio	49.6
Alaska	49.0
Kentucky	48.5
California	48.1
South Carolina	47.8
West Virginia	47.8
Alabama	47.1
Tennessee	47.0
Texas	46.6
Georgia	46.5
Montana	46.3
Arizona	44.1
Louisiana	43.1
Oklahoma	42.9
Florida	42.3
Idaho	42.3
Nevada	42.0
Wyoming	41.2
Mississippi	38.2

Source: Centers for Disease Control and Prevention.[129]

Note: Data are calculated from a survey sample, with a corresponding sampling error.

INDICATOR 9: PATIENT SAFETY IN HOSPITALS

KEY FINDING: On average, 26 percent of hospitals received an "A" grade in the fall 2022 hospital safety assessment administered by the Leapfrog Group, a nonprofit advocate for safety, quality, and transparency in hospitals.

Every year, approximately 200,000 people die from hospital errors, injuries, accidents, and infections, collectively making such incidents a leading cause of death in the United States.[130,131] Keeping hospital patients safe from preventable harm is an important element of preparedness; those hospitals that excel in safety are less likely to cause or contribute to a public health emergency and are better positioned to handle any emergencies that put routine quality standards to the test.

During the COVID-19 pandemic, hospitals were one of numerous settings ripe for viral transmission, threatening the safety of patients, staff, and visitors. The pandemic also discouraged people in need of urgent or emergency care from going to the emergency department, likely contributing to overall excess mortality.[132] Universal masking and availability and proper use of personal protective equipment (PPE)—in addition to other steps, such as adequate ventilation, limiting the sharing of patient rooms, and universal hand hygiene—proved to be critical in preventing outbreaks in hospitals. Still, hospital crowding from regional waves of infection during the pandemic has been shown to contribute to adverse outcomes, "such as increased medical errors and reduced quality of care as well as delays in treatment, medication error, longer patient stays, poorer outcomes, and increased mortality."[133]

The Leapfrog Group calculates its hospital safety score by using more than two dozen evidence-based metrics that measure the success of healthcare processes and outcomes. The measures track such issues as healthcare-associated infection rates, the number of available beds and qualified staff in intensive-care units, patients' assessments of staff communications and responsiveness, and a hospital's overall culture of error prevention.[134] These measures are especially critical for health systems' readiness for emergencies and outbreak prevention and control, which include workforce training and availability, surge capacity, and infection-control practices.

In the Leapfrog Group's fall 2022 assessment, 26 percent of general acute-care hospitals across the United States, on average, met the requirements for an "A" grade—a slight decrease from fall 2021, when the share was 28 percent. But results varied widely from state to state, with no hospitals in the District of Columbia, North Dakota, and Vermont receiving the top score, to a majority of hospitals doing so in New Hampshire (54 percent), Virginia (52 percent), and Utah (52 percent). (See Table 11.)

TABLE 11: Hospital Patient Safety Scores Vary Significantly by State

State percentage of hospitals with "A" grade, fall 2022

State	Percent of Hospitals
New Hampshire	54%
Virginia	52%
Utah	52%
Colorado	50%
Idaho	50%
New Jersey	47%
North Carolina	44%
Maine	44%
Pennsylvania	41%
Florida	39%
Oregon	38%
Washington	35%
Massachusetts	35%
Texas	34%
Tennessee	34%
Hawaii	33%
Rhode Island	33%
Minnesota	33%
Michigan	33%
Montana	30%
South Carolina	29%
Louisiana	29%
Mississippi	29%
Kansas	29%
California	28%
Ohio	28%
Indiana	27%
Illinois	27%
Nevada	26%
Georgia	26%
Arkansas	25%
Connecticut	25%
Oklahoma	23%
Missouri	22%
Maryland	20%
Kentucky	18%
Alaska	17%
Delaware	14%
Alabama	13%
New York	13%
Wisconsin	12%
Wyoming	11%
Arizona	10%
New Mexico	10%
South Dakota	10%
Nebraska	5%
West Virginia	5%
Iowa	3%
District of Columbia	0%
North Dakota	0%
Vermont	0%

Note: This measure captures only general acute-care hospitals.

Source: The Leapfrog Group.[135]

INDICATOR 10: STATE PUBLIC HEALTH LABORATORY SURGE CAPACITY

KEY FINDING: All states but one and the District of Columbia reported having a plan in 2022 for a six-to-eight-week surge in laboratory-testing capacity to respond to an outbreak or other public health event.

Public health laboratories have been essential to emergency response and effective disease surveillance systems throughout the pandemic. They help detect and diagnose health threats as they emerge, and they track and monitor the spread of those threats, which can help public health officials learn how to control them. Public health labs exist in every state and U.S. territory and are the backbone of the Laboratory Response Network (LRN), a national network of laboratories that provide the infrastructure and capacity to respond to public health emergencies.[136]

When a disaster or disease outbreak strikes, public health laboratories must be able to surge to meet increased demand, just like hospitals and other responders. The Association of Public Health Laboratories defines internal surge capacity as a "sudden and sustained increase in the volume of testing that a LRN reference laboratory can perform in an emergency situation, implementing substantial operational changes as defined in laboratory emergency response plans and using all resources available within the laboratory."[137] Surging capacity can require staff movement or reassignment, extra shifts, and hiring. Labs also have to plan for infrastructure factors, such as sufficient biological safety cabinets and chemical fume hoods; amount and type of supplies; space for intake, processing, and storage of samples; versatility and capacity of analytical equipment and instruments; availability of PPE; and power supply.[138] It should also be noted that while the existence of surge plans are important, these plans have to be funded, tested, and regularly updated.

State public health laboratories have been critical assets throughout the COVID-19 pandemic, especially in early 2020, when they were the only laboratories outside CDC authorized to conduct testing.[139] Despite early challenges in the tests rolled out to states, at least one public health laboratory in every state, DC, Puerto Rico, and Guam was able to test for COVID-19 as of June 2020.[140] Testing capacity increased over time, as private labs received authorization and ramped up capacity, and as a variety of rapid antigen tests were manufactured and approved for use at home; but the processing of CDC's 2019-nCoV Real-Time RT-PCR Diagnostic Panel assisted officials with monitoring throughout the course of the pandemic.

In Minnesota, for instance, once officials recognized in spring 2020 that their normal sample receiving area would not be able to handle the exploding number of COVID-19-related specimens on top of added physical-distancing and other safety restrictions, they converted the state's training laboratory into a triage unit. In days, leaders held walk-through meetings to organize the space, collaborated with state technology staff to procure necessary equipment, and set up supplies (racks, proper waste bins, transport containers). The site was up and running as the state's primary public COVID-19 testing facility within two weeks.[141]

In addition, public health laboratories are using genomic sequencing of the SARS-CoV-2 to identify variants. Such genomic surveillance is critical to understanding and preventing the spread of the virus,[142] and proved critical during the emergence of the Delta and Omicron variants, which were each more transmissible than earlier strains.[143] Throughout 2021, the scale

of sequencing increased dramatically from fewer than 3,000 samples per week in January to about 80,000 samples per week by early December,[144] a rise that coincided with a nearly $2 billion increase in federal investments, much of which was made possible by the American Rescue Plan Act.[145,146]

Also in 2021, CDC launched the Traveler-Based SARS-CoV-2 Genomic Surveillance Program, a public-private initiative led by CDC's Travelers' Health Branch in partnership with XpresCheck and Concentric by Ginkgo.[147] The program collects anonymous nasal swabs from arriving international travelers (on a voluntary basis) at major U.S. international airports. It tests for presence of SARS-CoV-2, and if it is detected, the program sequences the virus's genome to identify any new variants. In December 2022, partly in response to a surge of infections in China, the program was expanded to include airports in Los Angeles and Seattle (in addition to John F. Kennedy in New York City, Newark Liberty, San Francisco, Hartsfield-Jackson in Atlanta, and Washington, D.C.-Dulles).[148,149] The program has also begun aircraft lavatory wastewater surveillance.

Going forward, challenges to the effectiveness of public health laboratory preparedness include funding gaps to invest in infrastructure and modernization; a lack of standardized platforms to exchange data electronically; a limited ability to detect radiological, nuclear, and chemical threats; and perhaps most significantly, workforce shortages.[150]

Scott Becker, chief executive officer of the Association of Public Health Laboratories, points to the past year's response to mpox as an example of both the diagnostic contributions of public health labs and the need to better support them.[151] In May 2022, when the first U.S. case of mpox was detected, public health labs were quickly able to provide testing. But the assays that had been provided to them years before were not designed to be used on efficient automated machines that make large-scale testing easier; they required highly trained staff working in laboratory spaces with elevated biosafety practices. Becker says that federal funding is needed to update existing tests used by public health labs "to conform to the latest technologies and allow them to be quickly adapted to test large numbers of specimens at a time." Tests must also be able to detect new pathogens, not just those already identified, he says.

In 2022, Oregon was the only jurisdiction that reported to the Association of Public Health Laboratories that it did not have a plan for a six- to eight-week surge in testing capacity. (See Table 12.) However, state officials indicated that while the state had not documented the strategies and tactics it uses to respond to surges, it is capable of managing them.[152] Nevertheless, such plans are important tools for continuity when there is personnel turnover or when current staff members are on leave.

TABLE 12: States Planning for a Laboratory Surge

State public health laboratories with a plan for a six- to eight-week surge in testing capacity, 2022

Had a Plan			No Plan
Alabama	Kentucky	North Dakota	Oregon
Alaska	Louisiana	Ohio	
Arizona	Maine	Oklahoma	
Arkansas	Maryland	Pennsylvania	
California	Massachusetts	Rhode Island	
Colorado	Michigan	South Carolina	
Connecticut	Minnesota	South Dakota	
Delaware	Mississippi	Tennessee	
District of Columbia	Missouri	Texas	
Florida	Montana	Utah	
Georgia	Nebraska	Vermont	
Hawaii	Nevada	Virginia	
Idaho	New Hampshire	Washington	
Illinois	New Jersey	West Virginia	
Indiana	New Mexico	Wisconsin	
Iowa	New York	Wyoming	
Kansas	North Carolina		

Source: Association of Public Health Laboratories[153]

Note: This indicator tracks only the existence of a plan, not its quality or comprehensiveness, or the frequency in which it is used or tested.

TABLE 13: INDICATORS OF PUBLIC HEALTH EMERGENCY PREPAREDNESS BY STATE

	Nurse Licensure Compact (NLC)	Public Health System Comprehensiveness	Public Health Accreditation Board (PHAB)	Emergency Management Accreditation Program (EMAP)	Public Health Funding	Water Security	
	State participates in NLC, 2022	Percentage of population served by a comprehensive public health system, 2018	Accredited by PHAB, 2022	Accredited by EMAP, 2022	Percentage change, FY 2021-22	Percent of population who used a community water system in violation of health-based standards, 2021	
Alabama	✓	35%	✓	✓	-3%	1%	
Alaska		62%			2%	5%	
Arizona	✓	67%	✓	✓	6%	27%	
Arkansas	✓	31%	✓	✓	6%	3%	
California		59%	✓	✓	-3%	0%	
Colorado	✓	44%	✓	✓	3%	4%	
Connecticut		37%	✓	✓	6%	2%	
Delaware	✓	42%	✓	✓	40%	0%	
D.C.		86%	✓	✓	7%	5%	
Florida	✓	49%	✓	✓	2%	3%	
Georgia	✓	43%	✓	✓	2%	3%	
Hawaii		-			Not reported	0%	
Idaho	✓	39%	✓	✓	0%	6%	
Illinois		47%	✓	✓	9%	1%	
Indiana	✓	25%	✓		0%	3%	
Iowa	✓	38%	✓		2%	0%	
Kansas	✓	38%	✓	✓	9%	3%	
Kentucky	✓	37%	✓		0%	4%	
Louisiana	✓	44%	✓	✓	-8%	19%	
Maine	✓	45%	✓		-17%	3%	
Maryland	✓	43%	✓	✓	Not reported	0%	
Massachusetts		63%	✓	✓	7%	15%	
Michigan		46%		✓	Not reported	1%	
Minnesota		47%	✓		-22%	1%	
Mississippi	✓	35%	✓	✓	5%	9%	
Missouri	✓	43%	✓	✓	-1%	1%	
Montana	✓	36%	✓		-2%	1%	
Nebraska	✓	44%	✓		11%	1%	
Nevada		55%		✓	-26%	0%	
New Hampshire	✓	38%			-6%	1%	
New Jersey	✓	47%	✓	✓	22%	18%	
New Mexico	✓	37%	✓		-6%	7%	
New York		77%	✓	✓	3%	45%	
North Carolina	✓	44%		✓	7%	2%	
North Dakota	✓	34%	✓	✓	20%	0%	
Ohio	✓	37%	✓	✓	89%	1%	
Oklahoma	✓	39%	✓	✓	-25%	14%	
Oregon		42%	✓		47%	15%	
Pennsylvania	✓	67%	✓	✓	7%	2%	
Rhode Island		-	✓	✓	367%	1%	
South Carolina	✓	44%	✓	✓	4%	11%	
South Dakota	✓	28%			3%	2%	
Tennessee	✓	36%		✓	-15%	1%	
Texas	✓	38%			32%	8%	
Utah	✓	55%	✓	✓	1%	2%	
Vermont	✓	45%	✓	✓	10%	0%	
Virginia	✓	44%	✓	✓	5%	0%	
Washington		49%	✓	✓	37%	0%	
West Virginia	✓	45%			3%	15%	
Wisconsin	✓	42%	✓	✓	12%	2%	
Wyoming	✓	36%			-15%	5%	
51-state average	**N/A**	**45%**	**N/A**	**N/A**	**13%**	**5%**	

Note: See "Appendix A: Methodology" for a description of TFAH's data-collection process and scoring details. For the measure of public health system expansiveness, no data were available for Hawaii and Rhode Island. States with conditional or pending accreditation at the time of data collection were classified as having no accreditation. Public health funding data for FY 2022 were not available for Hawaii, Maryland, and Michigan. Some state residents use private drinking-water sources, rather than community water systems. Private sources are not captured by these data. Only regulated contaminants are measured.

TABLE 13: INDICATORS OF PUBLIC HEALTH EMERGENCY PREPAREDNESS BY STATE

		Paid Time Off	Seasonal Flu Vaccination	Patient Safety	Public Health Lab Capacity	State Performance
		Percent of employed population who used paid time off, March 2017-22	Seasonal flu vaccination rate for people ages 6 months or older, 2021–22	Percentage of hospitals with "A" grade, fall 2022	Public health laboratories had a plan for a six- to eight-week surge in testing capacity, 2022	Scoring tier, 2022
	Alabama	57%	47.1	13%	✓	Middle
	Alaska	62%	49	17%	✓	Middle
	Arizona	52%	44.1	10%	✓	Low
	Arkansas	54%	49.8	25%	✓	Middle
	California	54%	48.1	28%	✓	Middle
	Colorado	56%	57.5	50%	✓	High
	Connecticut	60%	63	25%	✓	High
	Delaware	54%	53.4	14%	✓	High
	D.C.	61%	63.7	0%	✓	High
	Florida	54%	42.3	39%	✓	High
	Georgia	56%	46.5	26%	✓	High
	Hawaii	56%	54.5	33%	✓	Low
	Idaho	54%	42.3	50%	✓	Middle
	Illinois	49%	51.9	27%	✓	Middle
	Indiana	52%	50.4	27%	✓	Middle
	Iowa	61%	55.3	3%	✓	Middle
	Kansas	59%	52.9	29%	✓	High
	Kentucky	51%	48.5	18%	✓	Low
	Louisiana	55%	43.1	29%	✓	Low
	Maine	59%	58.5	44%	✓	High
	Maryland	60%	61.9	20%	✓	High
	Massachusetts	60%	62.9	35%	✓	High
	Michigan	50%	55.7	33%	✓	Low
	Minnesota	50%	57.7	33%	✓	Low
	Mississippi	63%	38.2	29%	✓	High
	Missouri	56%	49.9	22%	✓	Middle
	Montana	53%	46.3	30%	✓	Low
	Nebraska	53%	54.6	5%	✓	Middle
	Nevada	54%	42	26%	✓	Low
	New Hampshire	56%	62.1	54%	✓	Middle
	New Jersey	57%	59.3	47%	✓	High
	New Mexico	59%	51.7	10%	✓	Low
	New York	61%	54.4	13%	✓	Middle
	North Carolina	57%	50.6	44%	✓	High
	North Dakota	53%	52.6	0%	✓	Middle
	Ohio	53%	49.6	28%	✓	High
	Oklahoma	55%	42.9	23%	✓	Low
	Oregon	59%	49.8	38%		Low
	Pennsylvania	48%	55.1	41%	✓	High
	Rhode Island	48%	66.1	33%	✓	Middle
	South Carolina	51%	47.8	29%	✓	Middle
	South Dakota	49%	55.1	10%	✓	Low
	Tennessee	53%	47	34%	✓	Low
	Texas	63%	46.6	34%	✓	Middle
	Utah	52%	50.3	52%	✓	High
	Vermont	55%	60.9	0%	✓	High
	Virginia	57%	55.6	52%	✓	High
	Washington	59%	55.9	35%	✓	High
	West Virginia	55%	47.8	5%	✓	Low
	Wisconsin	53%	53.3	12%	✓	High
	Wyoming	52%	41.2	11%	✓	Low
	51-state average	**55%**	**51.9**	**26%**	**N/A**	**N/A**

Paid time off includes sick leave, vacations, and holidays. The patient safety measure captures only general acute-care hospitals.

Recommendations for Policy Actions by Federal, State, Local, Territorial, and Tribal Policymakers and Health Officials, the Healthcare Sector, Community Leaders, and Businesses*

Policymakers have an opportunity and duty to strengthen the nation's health security. The role of public health is to prevent, detect, and protect against public health threats, but its systems, structures, and workforce must have consistent support. Now is the time to heed the lessons learned from the COVID-19 pandemic and adapt the systems and structures developed in respondse to ongoing and emerging health threats. TFAH has issued this call to action for nearly two decades. Without significant and sustained attention to the nation's preparedness and response capabilities, the country will enter the next public health crisis with the same insufficient level of readiness we experienced during the early stages of the COVID-19 pandemic.

TFAH based the following policy recommendations on research and analysis, consultation with experts, and a review of gaps in federal and state preparedness, and makes the following recommendations for federal, state, local, tribal, and territorial policymakers and other stakeholders to improve public health emergency readiness. The recommendations are intended to strengthen the nation's preparedness for possible future pandemics and to build a stronger foundation on which to respond to a range of public health emergencies.

***Editor's note:** Many of TFAH's recommendations may apply to tribal and territorial agencies, but we recognize would be contingent on appropriate levels of funding to support public health infrastructure within these jurisdictions. In addition, gaps in available data for U.S. territories and Tribes need to be addressed.*

Priority Area 1: Provide Stable, Flexible, and Sufficient Funding for Domestic and Global Public Health Security

Congress responded to the COVID-19 pandemic with vital, short-term, emergency funding, including important investments in public health data and workforce. However, recent administration requests for supplemental funding were rebuffed by Congress, limiting the country's ability to invest in next-generation vaccines and treatments or to provide services to individuals who are uninsured. Importantly, the limited scope and time frame for emergency supplemental money does not make up for decades of underfunding of America's public health capabilities. Major gaps remain in cross-cutting, foundational capabilities at all levels of governmental public health. COVID-19 funding by statute cannot be used to address long-standing health challenges or even other emerging public health threats. This short-term funding also sets up potentially devastating funding cliffs in the coming years that will need to be addressed by Congress or risk losing vital progress. At the same time, political polarization has led some state and local governments to reject some federal funding, putting a fractured public health system and the health of communities at further risk.[154]

RECOMMENDATIONS FOR FEDERAL GOVERNMENT:

- **Congress and state lawmakers should enhance and modernize the public health infrastructure, including by investing $4.5 billion per year to support foundational public health capabilities at the federal, state, tribal, local, and territorial levels.** While funding is needed across many public health programs, the chronic underfunding of public health infrastructure, coupled with siloed, disease-specific funding, prevents the nation's public health system from modernizing and protecting the nation's health security. Recent investments from the American Rescue Plan Act are a vital down payment to modernizing public health systems, but Congress should provide ongoing investment in these cross-cutting public health capacities, such as proposed in the Public Health Infrastructure Saves Lives Act.[155]

  While mandatory funding would ensure sustainability and predictability, as an alternative, Congress should provide a robust annual investment in CDC's public health infrastructure program through the appropriations process, and CDC should ensure accountability and metrics for infrastructure funds.

  Editor's Note: *CDC awarded $3.2 billion in one-time funding for state, local, and territorial health departments through the Strengthening U.S. Public Health Infrastructure, Workforce, and Data Systems grant in 2022. Most of this funding was enacted in the American Rescue Plan Act of 2021.*

- **Congress should continue to increase funding for Public Health Emergency Preparedness.** Congress should continue to restore funding for the Public Health Emergency Preparedness (PHEP) cooperative agreement, a critical source of funding for health departments to build capabilities to effectively respond to a range of public health threats. This investment has been cut by more than 20 percent since FY 2003, or by about half, after adjusting for inflation.[156] The PHEP program has saved lives by building and maintaining a nationwide public health emergency management system that enables communities to prepare for and rapidly respond to public health threats.

- **Congress should invest in continuous public health data modernization.** Sustained investment in public health data systems at the federal, state, and local levels is imperative to ensure health agencies can quickly detect and respond to threats. Years of inadequate funding have meant that public health agencies are reliant on archaic data systems. Congress should build on initial investments to CDC's Data Modernization Initiative to build the foundations for data-sharing across public health, modernize CDC's services and systems, leverage new data sources, improve the completeness of demographic and other equity-related data, and ensure public health can act on innovative data analytics. The Data: Elemental to Health campaign estimates at least $7.84 billion is needed over the next five years for CDC's Data Modernization Initiative to strengthen public health data collection and reporting at the state and local levels.[157]

- **Congress should create a Health Defense Operations budget designation.** Congress should create a Health Defense Operations budget designation to exempt specific health defense programs central to health security from the annual discretionary budget allocations and ensure these critical activities receive sustainable resources necessary to secure Americans' health, economic, and national security. [158] The surge of short-term, time-limited funding in COVID-19 response and recovery legislation was important to the significant U.S. response but was not a sustainable source of funding to finance this country's preparedness requirements. Furthermore, annual discretionary appropriations continue to be constrained by budget caps and competing priorities in the nondefense discretionary budget category, making it nearly impossible to invest in medium- to long-term health defense.

- **Congress should modernize detection and forecasting of pathogens.** Congress should support next-generation disease surveillance by funding CDC's Center for Forecasting and Outbreak Analytics and supporting pathogen genomics sequencing and surveillance technology and capacity made possible through CDC's Advanced Molecular Detection program and partnerships with Pathogen Genomic Centers of Excellence. Congress should continue to invest in public health laboratory modernization through the Epidemiology and Laboratory Capacity program.

  Editor's note: *Congress enacted legislation authorizing CDC to conduct epidemic forecasting and outbreak analytics as well as form partnerships for pathogen genomics centers of excellence as part of the Consolidated Appropriations Act, 2023.*

- **The U.S. Department of Health and Human Services (HHS) and jurisdictions should ensure timely, complete, disaggregated demographic data collection and reporting, including during public health emergencies.** Complete, disaggregated public health data by sex, race, ethnicity, age, income, sexual orientation, gender identity, primary language, disability type and status, pregnancy status, the intersections of these demographics, and other factors are vital to effective public health preparedness and response. In addition to continued investment in the infrastructure and workforce to enable health agencies to collect and act on data, HHS and public health departments should build on progress thus far to ensure that health equity and demographic data disaggregation are central to data-modernization efforts, including prioritizing funding for under-resourced communities, educating and working with patients and providers, and ensuring sustained community engagement in decisions around public health data system design and use.[159] In addition, HHS should stand up an interagency task force in consultation with state, local, territorial, and tribal agencies; community leaders; healthcare and laboratory providers; and private-sector stakeholders—to identify and address barriers to the collection and regular reporting of disaggregated, detailed demographic data.

- **Policymakers at all levels should expand strategies to recruit, train, and retain public health personnel at all levels.** Federal, state, and local governments must prioritize stable, long-term funding for recruitment

and retention of a diverse workforce, including those with experience in public health informatics, laboratory science, health equity, epidemiology, community health, and other foundational public health capacities. Congress should also invest in public health workforce development, training, and retention programs, such as the recently enacted Public Health Workforce Loan Repayment program, Public Health AmeriCorps, fellowships, and other incentives to serve in or augment governmental public health, like fellowships that increase workforce diversity and recruitment in underserved areas and populations. Schools and programs of public health should incorporate health equity, data equity, and cultural competency into their curricula and training programs.

Editor's note: *The Public Health Workforce Loan Repayment Program was passed by Congress as part of the Consolidated Appropriations Act, 2023. The program allows for up to $150,000 in loan repayment to public health professionals who agree to serve three years in a local, state, or tribal health department.*[160]

- **Congress should accelerate capacity to respond through existing crisis-response mechanisms and faster supplemental funding.** In addition to stable core funding, the federal government needs readily available funds on hand to enable a rapid response while Congress assesses the necessity for supplemental funding. Congress should continue a no-year infusion of funds into the Public Health Emergency Rapid Response Fund and/or the Infectious Disease Rapid Response Reserve Fund to serve as available funding that may provide a temporary bridge between preparedness and supplemental emergency funds. Congress should replenish such funding on an annual basis, and funding should not come from existing preparedness resources, as response capacity cannot substitute for adequate readiness. Congress should also pass emergency supplemental funding quickly and allow sufficient flexibility in such funding so awardees can leverage funds for overlapping emergencies, such as COVID-19 and mpox.

- **Congress and the Executive Branch should demonstrate a long-term, sustainable commitment to global health security by implementing the global health security goals laid out in the National Biodefense Strategy.** The United States should continue to strengthen partnerships with international bodies such as the World Health Organization (WHO), while working with global partners to strengthen core public health capabilities. Congress should solidify America's role as a global health leader by committing sufficient resources to proven initiatives, such as CDC's Global Public Health Protection program, the Field Epidemiology Training and Global Laboratory Leadership Programme, Public Health Emergency Operations Centers, and National Public Health Institutes. Congress should fund and CDC should implement the modernization of the U.S. quarantine system, including IT systems, quarantine stations, regulatory frameworks, and traveler engagement and information.

Priority Area 2: Ensure Effective Leadership and Coordination

Safeguarding the health of all communities during emergencies is a core responsibility of government and its partners at all levels. However, the COVID-19 pandemic has contributed to the rise of threats against public health, consideration or enactment of limits to legal health authorities,[161] and a crisis of trust in governmental agencies. Policymakers must shore up the leadership and coordination of the agencies tasked with protecting the nation against health threats and must work to earn the trust of its residents.

RECOMMENDATIONS FOR FEDERAL, STATE, AND LOCAL GOVERNMENT:

- **Congress should empower CDC and other relevant HHS agencies to collect public health data in a timely and coordinated way.** Rather than the current patchwork approach of ad hoc data-use agreements and other workarounds that slow outbreak detection and response, Congress should provide CDC with the authority to set public health data standards and require jurisdictions and healthcare facilities to report critical and complete public health data.[162] A uniform approach to data collection, such as proposed in the Improving DATA in Public Health Act, would reduce the burden on data providers and give federal public health agencies and state and local partners a more complete picture of outbreaks and other health threats.

- **Congress and HHS should cut red tape to strengthen HHS's response capabilities.** CDC, the Administration for Strategic Preparedness and Response (ASPR), and other relevant HHS agencies are critical to the nation's prevention and response of public health emergencies, yet they are subject to bureaucratic hiring and contracting procedures even during times of crisis. Congress should help these agencies become more responsive by providing more nimble hiring and contracting authority.

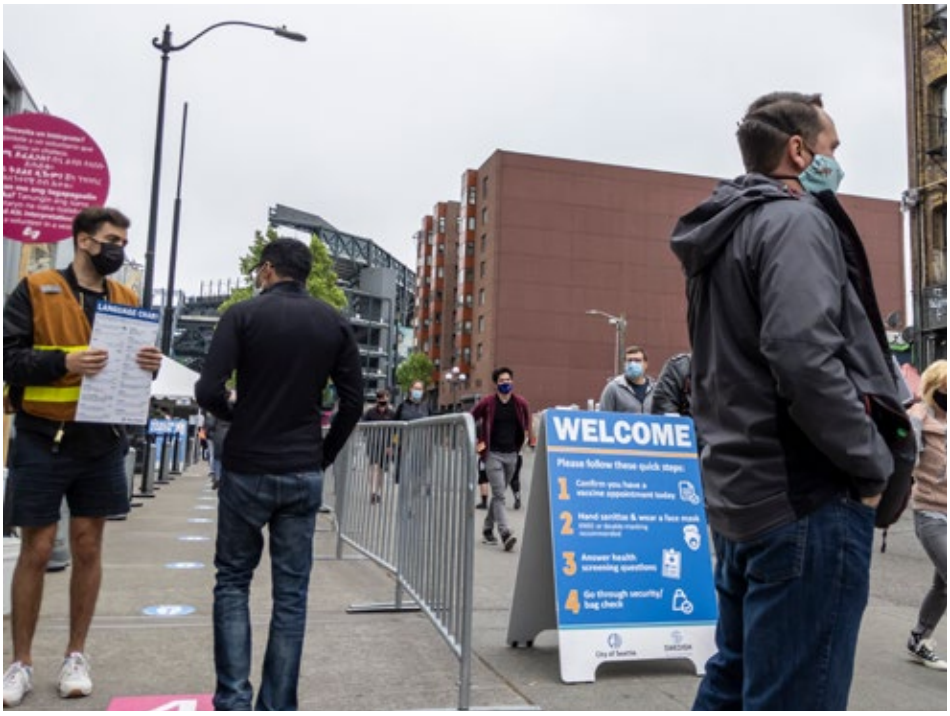
Editor's note: *Congress provided HHS with some authority to directly hire a limited number of individuals during a public health emergency as part of the Consolidated Appropriations Act, 2023.*

- **Congress should create a COVID-19 commission to examine the pandemic and make recommendations to Congress.** Congress should authorize an independent commission to investigate the preparedness and response to the pandemic and make concrete recommendations for addressing gaps and missteps. A comprehensive, congressionally authorized commission would help inform future policymaking and pandemic preparedness and response. The commission should recommend ways to strengthen public health and healthcare system preparedness, health equity, medical and nonmedical countermeasures development and deployment, messaging and communications, and workforce before the next public health emergency.

- **Policymakers should prioritize rebuilding trust in public health agencies and leaders.** Policy decisions at the federal, state, and local levels should be based on the best available science, led by public health experts, and free from any real or perceived political interference. The president, the HHS secretary, and the leadership of federal public health and emergency response agencies—including CDC, ASPR, U.S. Department of Homeland Security, Federal Emergency

Management Agency, and FDA—must conduct a thorough review on the independence and performance of these agencies during the COVID-19 pandemic. Federal health agencies need to build capacity for more rapid response during a health emergency. Federal and state officials should establish procedures and policies to ensure the scientific integrity and independence of their agencies, without political interference. Timely, science-based, and clear public health guidance is particularly critical to rebuilding public confidence. The public health workforce at all levels must build stronger communications processes and skill sets.

- **Policymakers should act to strengthen public health protections.** Federal and state lawmakers, governors, and courts should reject laws that weaken public health authorities, which could threaten such basic public health protections as vaccinations and quarantine.
- **Congress and state legislatures should invest in effective public health communications.** This investment should include research into best practices for different audiences, incorporating communications into planning and response, modernizing communication channels to make guidance more accessible, and partnering with trusted messengers. HHS and other federal, state, and local health agencies should engage with and provide resources to a diverse group of stakeholders to research and test effective messaging, translating complicated concepts to a lay audience, using social media, and countering and preventing misinformation and disinformation. While the substance of communications should be consistent, messages must acknowledge the historical context of distrust in some communities and be linguistically and culturally tailored for different populations. Trusted, nongovernmental partners should receive funding to assist in message development, help deliver messages and conduct community outreach.



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Priority Area 3: Prevent Outbreaks and Pandemics

The nation must be ready for the next COVID-19, mpox virus, seasonal flu, or vaccine-preventable disease. Despite the tremendous losses the nation has experienced, the first year and a half of the U.S. COVID-19 vaccination campaign is estimated to have saved 2.2 million lives and averted at least 17 million hospitalizations and nearly $900 billion in healthcare costs.[163] At the same time, the nation continues to see disparities in Americans' access to vaccines and treatments for a range of infections.[164] The United States must be able to protect all residents from major pandemics, emerging infectious diseases, and localized outbreaks.

RECOMMENDATIONS FOR FEDERAL AND STATE GOVERNMENT AND HEALTHCARE:

- **Congress should support the vaccine infrastructure and delivery, including programs promoting equitable distribution and combating misinformation.** CDC's Section 317 Immunization Program supports state and local immunization systems to increase vaccination rates among uninsured and underinsured adults and children, respond to outbreaks, educate the public, target populations experiencing disadvantage, improve vaccine confidence, establish partnerships, and improve information systems. Yet, funding has not kept up with needs, as states have to spend immunization dollars to respond to outbreaks[165] and attempt to manage the impact of vaccine underutilization. Congress should increase annual funding for CDC's immunization program as well as the seasonal influenza program and post-licensure vaccine safety monitoring. Congress should also provide annual appropriations to HHS to study and address the causes of vaccine hesitance, improve community engagement, and to educate clinical providers on methods for improving vaccine acceptance.

- **Congress and states should ensure first-dollar coverage for recommended vaccines under commercial insurance and for uninsured populations.** Nearly 90 percent of Americans will have access to vaccines with no cost-sharing thanks to the Inflation Reduction Act (IRA),[166] but barriers remain for many adults. Congress should enact a vaccine safety-net program to address these barriers for adults, such as outlined in the Vaccines for Adults program proposed in the President's FY 2023 Budget Request. HHS should also encourage states to adopt the IRA's Medicaid extension so low-income adults have access to this vaccine benefit through Medicaid.

Editor's note: *The Inflation Reduction Act, signed into law in August 2022, includes provisions to close gaps in vaccination coverage in Medicare and Medicaid—a longstanding recommendation of this report. Beginning in 2023, the law will improve access to recommended vaccines by requiring first-dollar coverage for all adult vaccinations recommended by the Advisory Committee on Immunization Practices under Medicare Part D, Medicaid, and the Children's Health Insurance Program (CHIP).* *See news box on page 8.*

- **Congress should significantly increase investments in public health initiatives to prevent, detect, and contain antimicrobial resistance** by supporting the Antimicrobial Resistance Solutions Initiative (ARSI) at CDC; the National Healthcare Safety Network, which supports reporting of antibiotic use and resistance data in healthcare facilities; and healthcare-associated infection/antimicrobial resistance programs. Through ARSI and CDC's One Health program, support for prevention measures are made in every state to strengthen lab capacity, track infections across healthcare systems, detect new threats, slow or stop the spread of pathogens, coordinate prevention strategies, educate healthcare providers on appropriate antibiotic use, and advocate for other innovations. In addition, Congress should increase funding to build global capacity to prevent and detect resistant infections.[167]

- **Centers for Medicare & Medicaid Services, CDC, and healthcare entities should decrease over-prescription of antibiotics through implementation of antibiotic stewardship and antibiotic-use reporting.** Centers for Medicare & Medicaid Services (CMS) should enforce stewardship requirements for hospitals and work with public health stakeholders to track progress in prescribing rates and resistance patterns.[168] CMS and CDC should work with healthcare, public health, patients, and patient advocates to develop improvements to the current stewardship Condition of Participation, such as creating staffing standards to ensure that stewardship programs are sufficiently resourced to meet their goals. CMS should also advance policies to improve outpatient antibiotic prescribing, such as through quality measures and value-based reimbursement programs. All relevant facilities must improve their reporting of antibiotic use and resistance through the National Healthcare Safety Network and should adopt stewardship programs that meet CDC's Core Elements.[169]

- **Congress and states should provide job-protected paid leave.** The pandemic has called attention to the fact that paid family, sick, and medical leave are important infection-control measures, protecting both workers and customers, in addition to creating economic security. Congress should enact a permanent federal paid family and medical leave policy and dedicated paid sick days protections, including for preventive services such as vaccination. Until federal protections are passed, states should enact paid-leave laws and/or remove preemption exemptions for localities that enact these policies.

- **States should minimize vaccine exemptions for schoolchildren, and healthcare facilities should increase vaccination of healthcare workers.** States should enact or strengthen policies that enable universal childhood vaccinations to ensure children, educators and other school personnel, and the general public are protected from vaccine-preventable diseases. This includes eliminating nonmedical exemptions and opposing legislation to expand exemptions.[170] States should require healthcare personnel to receive all Advisory Committee on Immunization Practices–recommended vaccinations to protect staff and patients and to achieve necessary healthcare infection control. Healthcare facilities should ensure access to and education about vaccines for all staff and contractors, and they should remove any barriers to staff receiving vaccines. Healthcare facilities should also report healthcare worker vaccination status to CDC's National Healthcare Safety Network.

Priority Area 4: Build Resilient Communities and Promote Health Equity in Preparedness

Each new outbreak or disaster reiterates the urgency of addressing the social, economic, and structural reasons for health inequities that cause some populations to experience a disproportionate impact from disasters, receive fewer resources during the response, limit their access to healthcare, and take longer to recover. When the intersectionality of factors, such as homelessness, incarceration, disability, age, employment, LGBTQ+ status, and immigration status are taken into consideration, the inequities are compounded. The pandemic demonstrated the effectiveness of building partnerships between community-based organizations and leaders, governmental agencies, and community health and healthcare organizations. However, these partnerships will likely dissolve without sustained attention and funding.

Addressing underlying inequities and intentionally and meaningfully engaging with and resourcing the people and communities most likely to be disproportionately impacted throughout the emergency planning and response process are critical to promoting community resilience and ensuring that all receive appropriate services, regardless of circumstance. Equity must be an explicit and foundational principle in all emergency planning, response, and recovery.

RECOMMENDATIONS FOR FEDERAL, STATE, AND LOCAL GOVERNMENT AND COMMUNITY LEADERS:

- **Federal and state lawmakers should invest in policies and capacity to address the social determinants of health:** People at highest risk during disasters and those who have the hardest time recovering are often those with unstable or unhealthy housing, those with limited access to transportation, and those who live in low-socioeconomic-status communities.[171] Addressing these nonmedical factors, sometimes called social determinants of health (SDOH), can improve resilience, but it must be a cross-sector effort. Congress should fund CDC's SDOH work, which enables research into best practices and provides grants for cross-sector partnerships and community solutions to SDOH.
- **Congress and federal agencies should provide resources and technical assistance to communities to enhance equity and resilience before, during, and after an event.** Rather than a top-down approach to promote equity and resilience, policymakers should support an asset-based approach that relies on communities identifying and leveraging their strengths. Congress and federal agencies and grantees should direct targeted resources to community-based organizations and existing community health networks that focus on the health of communities of color, older adults, people with disabilities, and other groups that bear a disproportionate burden during disasters. Grants should support

evidence-based, culturally relevant, and linguistically appropriate public health campaigns that address prevention and treatment, providing community leaders the opportunity to fully participate in planning activities, allowing organizations to hire and engage community members so emergency plans better reflect the community, as well as improving data collection and sharing. Federal and other grant makers and states should ensure that existing grants and sub-awards reach the grassroots level and communities most in need and should adapt partnerships built during the COVID-19 pandemic for broader health equity and resilience work.

- **Officials at all levels of government, from the White House and federal agencies to state and local governments should strengthen their health equity leadership and adopt strategies and accountability metrics to incorporate equity into preparedness.** The recommendations of the COVID-19 Health Equity Task Force should continue to be implemented, and the White House should create a permanent health equity infrastructure to ensure accountability for these recommendations and to bolster equity leadership and coordination for future health crises. Before an event occurs, public health and partner organizations—such as schools, agencies on aging, healthcare and behavioral health facilities, homeless service organizations, and community-based organizations—must work together to identify and plan with communities at higher risk of health impacts during an emergency. HHS, CDC, state, local, tribal, and territorial governments should build up internal infrastructure to drive equity, including by identifying a chief health equity officer who has a leadership role in the emergency operations center and/or incident command structure for all-hazards events and who is engaged in every emergency operation center activation with sufficient resources and authority. Health equity and emergency preparedness officials should work across programs to incorporate equity issues and goals into preparedness policies and plans; to improve staff capacity to understand how the legacies of discrimination, current-day racial trauma, and other structural inequities affect disaster resilience and recovery; to develop and disseminate communications materials that are culturally and linguistically tailored; and to collect and leverage data to identify unique community assets and measures of well-being and to advance equity before and during events. All jurisdictions and federal grant makers should establish metrics and procedures for ensuring responses are equitable and for addressing inequities as they occur.

- **Plan with communities, not for them, and empower their involvement with resources.** All sectors involved in emergency planning and response must conduct meaningful engagement, partnerships, and listening efforts as well as ongoing inclusion and local hiring (especially from communities typically at higher risk during disasters). Officials should establish relationships with services, existing networks, and organizations that serve these populations before emergencies take place, and government and philanthropies should fund community leaders and community-based organizations to participate in preparedness and resilience efforts. Health departments and emergency management agencies should rely on the expertise, community trust, and networks of those who may bear a disproportionate risk, such as older adults, people with disabilities, and individuals with chronic health conditions to ensure emergency plans, procedures, communications strategies, and evacuation shelters meet the needs of all in the community.

- **Jurisdictions, CMS, and the Substance Abuse and Mental Health Services Administration (SAMSHA) should address mental health and substance use gaps, bolster crisis resources, and incorporate mental health first-aid and treatment access into disaster response and recovery strategies.** All jurisdictions should assess existing mental health and substance use resources and gaps before the next emergency, strengthen partnerships across sectors, and incorporate these assets into preparedness planning. CMS and other policymakers must consider in advance what waivers may be needed to ensure continuity of care for people in treatment. SAMHSA can bolster preparedness efforts by establishing a program on community-based mental health resilience, increasing surveillance and monitoring of the impact of climate emergencies and extreme weather on mental health, and researching the most effective post-disaster interventions. *For additional discussion of strengthening prevention of alcohol, drug, and suicide deaths, see TFAH's Pain in the Nation report series.*

Priority Area 5: Accelerate Development and Distribution of Medical Countermeasures

In 2021, the White House released the American Pandemic Preparedness Plan, which included ambitious goals toward enabling rapid development of diagnostic tests, vaccines, and therapeutics.[172] An effective medical countermeasure (MCM) enterprise could prevent a range of health threats. However, these products are only effective if they reach anyone who needs them, when they need them. Congress has made significant investments in research and development, but investments must match the size and scope of the threat to the nation.

RECOMMENDATIONS FOR FEDERAL GOVERNMENT AND PRIVATE-SECTOR PARTNERS:

- **Congress should provide significant long-term funding for the entire Medical Counter Measures (MCM) enterprise.** The MCM enterprise involves multisector partners that share capabilities, such as research, planning, testing, regulation, manufacturing, surveillance, distribution, dispensing, delivery, stockpiling, training, clinical guidance, and monitoring. Long-term coordinated and transparent funding to the Biomedical Advanced Research and Development Authority, Strategic National Stockpile, CDC, FDA, National Institutes of Health, and other components of the Public Health Emergency Medical Countermeasure Enterprise (PHEMCE) would offer more certainty to the biotechnology industry and researchers, would strengthen public-private partnerships, and would enable the purchase of ancillary medical supplies, such as PPE. The United States should grow its investment in innovative, flexible technologies and platforms that will enable faster production of products for a range of threats, rather than focusing on products for a single pathogen.[173]
- **Congress and HHS should prioritize the distribution and dispensing of MCMs.** Congress should provide resources to the Strategic National Stockpile and CDC's Public Health Emergency Preparedness (PHEP) program to improve distribution and dispensing. HHS should enable appropriate contracts and require integration of private-sector healthcare supply distributors and supply-chain partners into planning, exercises, and emergency responses to better leverage existing systems and resources. Once the COVID-19 vaccination campaign is complete, HHS should assess and address gaps in vaccine development, procurement, maintenance, deployment, tracking, and equitable administration.
- **Congress should create incentives for new-product discovery to prevent and fight resistant infections.** The antimicrobial development pipeline is extremely vulnerable, leaving patients at risk for antimicrobial-resistant infections. Congress should enact legislation that includes sustainable development incentives for novel antibiotics that address unmet needs and are de-linked from sales and strong stewardship and surveillance provisions, such as the PASTEUR Act, to strengthen the market for antibiotic developers, improving patient access for those who need it most without encouraging overuse.

- **HHS should clarify and strengthen the Public Health Emergency Management Countermeasure Enterprise (PHEMCE) leadership of MCM and supply-chain management for emergencies.** HHS should continue to reinvigorate interagency PHEMCE coordination,[174] including regular interagency meetings; engagement with private-sector and non-profit supply-chain partners; and improved transparency and communication with state, local, tribal, and territorial agencies and collaborative long-term planning and evaluation. These agencies should be included in planning and decision-making. HHS should take steps to minimize political interference with its decision-making and ensure transparency and communication with stakeholders. Federal agencies should also explore all available authorities, such as through the Defense Production Act, and communicate strategies with stakeholders to bolster the supply chain during emergencies. HHS should clarify roles and responsibilities for supply-chain management, in consultation with private-sector and public health partners, and should develop and disseminate best practices for supply management.[175]
- **HHS should improve MCM guidance and communications for groups at higher risk of health impacts during an event.** HHS, including CDC, should continue to consult with experts and work with healthcare professionals and state, local, tribal, and territorial public health partners to develop standardized guidance for dispensing MCMs to groups such as children, pregnant women, older adults, people with disabilities, and people who are homebound. And HHS and state, local, tribal, and territorial agencies should work with organizations that reach the public, especially communities at disproportionate risk—

such as groups representing older adults, people with disabilities, and limited-English-proficient communities—to improve communications around MCM issues before an event. Communities need to be engaged before an outbreak or event to ensure their understanding of the risks, benefits, and distribution challenges of introducing a medical product to a large portion of the population and ultimately improving acceptance and access to MCMs. It is important to provide clear and accurate guidance to the public in multiple formats and languages, via trusted sources and multiple communications channels, including formats that are accessible to people with low literacy and hearing or vision loss.

Priority Area 6: Ready the Healthcare System to Respond and Recover

The nation's healthcare system—from primary to long-term care—is under strain from day to day. Workforce shortages and hospital closures are disrupting how people receive care. Add in a natural disaster, severe flu season, or pandemic, and many healthcare facilities are strained beyond the breaking point. Health system readiness is an essential component of community resilience and recovery. Health system preparedness and response, comprising robust public-private collaboration, benefits the healthcare system, its patients, its staff, and the community it serves. Healthcare must heed the lessons of the pandemic and recent natural disasters and invest in ongoing readiness.

RECOMMENDATIONS FOR FEDERAL GOVERNMENT AND HEALTHCARE:

- **Congress, HHS, and healthcare leaders should strengthen the Hospital Preparedness Program and fund regional coordination.** Congress must continue to increase annual funding for the Hospital Preparedness Program (HPP) to build strong healthcare coalitions capable of engaging and supporting members during disaster responses, and it should provide additional funding to the Regional Disaster Health Response System to coordinate across coalitions and states[176] to map specialized disaster care (such as burn or pediatric care) across the country, and to leverage those assets in a coordinated way.[177] HPP has been severely underfunded relative to the need, with funding cut by nearly two-thirds after adjusting for inflation over the last two decades.
  - HHS should support HPP by:
    - Assessing the role of HPP in the COVID-19 response and address gaps in the program.
    - Strengthening requirements under the program, such as requiring crisis standards of care planning as a condition of funding for HPP.[178]
    - Ensuring healthcare leaders take the lead on HPP planning and implementation to the extent possible, with support and coordination from public health, emergency management, and others, and recipients should ensure as much funding as possible is reaching healthcare coalitions.
  - Healthcare administrators should ensure their facilities have tools and support for meaningful participation in healthcare coalitions, including the impetus and ability to share information and resources across the coalition and with public health agencies as well as to encourage participation in exercises.
- **Congress and HHS should create incentives and establish accountability in order to sustain preparedness and surge capacity across healthcare systems.** The shortages of beds, healthcare personnel, and equipment during the pandemic underscore the need for cooperation among healthcare entities, across systems, and across geographic borders. Although there has been progress in developing healthcare coalitions in many regions and progress

in meeting CMS and other accreditation preparedness standards by individual healthcare facilities, these existing mechanisms have not provided enough incentive for many healthcare facilities to create meaningful surge capacity and cooperation across competing entities. In addition to strengthening existing systems, Congress and HHS should consider long-term sustainability for building healthcare readiness across the system, including meaningful incentives and disincentives:

- An external self-regulatory body, in alignment with federal policy goals, could set, validate, and enforce standards for healthcare facility readiness, stratified by facility type, with authority for financial ramifications.[179]
- Payment incentives could sustain preparedness, surge capacity, regional disaster partnerships, and reward facilities that maintain specialized disaster care.

- **Congress and states should continue to expand access to healthcare. Access to healthcare is always important for promoting health and well-being and particularly so during a pandemic or disaster.** Congress and the administration should strengthen incentives for states to expand Medicaid, make marketplace coverage more affordable, and improve outreach and marketing for enrollment.[180]

- **Assess impact of CMS Preparedness Standards and improve transparency.** An external review by the U.S. Government Accountability Office or a similar entity should assess how CMS preparedness standards have affected overall healthcare readiness, and HHS should begin tracking progress on preparedness measures over time. CMS should also strengthen preparedness standards by adding medical surge capacity and other capabilities, including infection prevention and control, stratified by facility type, as a necessary requirement within the next iteration of the rule.[181]

RECOMMENDATIONS FOR STATE GOVERNMENT AND THE HEALTHCARE SECTOR:

- **State and local emergency planners should integrate healthcare delivery into emergency preparedness and response.** Jurisdictions should increase engagement and integration of the healthcare sector into emergency planning and responses, including plugging healthcare coalitions and other entities representing private healthcare and the healthcare supply chain into emergency planning and response and incident command. Health systems, healthcare coalitions, and public health should develop memoranda of understanding ahead of disasters to improve situational awareness across healthcare and to enable movement of patients, personnel, and supplies. Private-sector healthcare leadership should prioritize preparedness moving forward, including training and workforce protections, regular exercises, and drills for a range of disasters, surveillance for emerging threats, stockpiling of supplies ahead of disasters, and full engagement in regional collaborations and coalitions.

- **States should strengthen policies regarding disaster healthcare delivery.** States should review credentialing standards to ensure healthcare facilities can call on providers from outside their states, and health systems should ensure they can receive outside providers quickly during a surge response. States should also adopt policies that promote healthcare readiness and ease the ability to surge care and services, such as the Nurse Licensure Compact, the Interstate Medical Licensure Compact, the Recognition of EMS Personnel Licensure Interstate CompAct,[182] the Uniform Emergency Volunteer Health Practitioners Act,[183] emergency prescription refill laws and protocols, and implementation and education of providers regarding crisis standards of care guidelines.[184,185] State and healthcare leaders must take crisis standards of care planning and implementation seriously and ensure transparency for healthcare providers who must make decisions in constrained conditions. Jurisdictions must ensure equitable application of crisis standards of care so as not to create or exacerbate disparities.

Priority Area 7: Prepare for Environmental Threats and Extreme Weather

Climate change, environmental hazards, and extreme weather pose serious and growing threats to human health. According to a 2020 report by TFAH and the Johns Hopkins Bloomberg School of Public Health, many of the states most at risk from climate change are also the least ready to deal with it. Environmental health involves detecting and protecting people from hazardous conditions in air, water, food, and other settings, and it is therefore a critical component of the nation's health security.

RECOMMENDATIONS FOR FEDERAL AND STATE GOVERNMENT:

- **Congress and states should strengthen readiness for climate change and environmental health threats** and support environmental health equity and justice efforts.
- **Congress should increase investments for programs that identify and mitigate health impacts of climate change and extreme weather,** including HHS's Office of Climate Change and Health Equity[186] to expand its work to address the health effects of climate change, and CDC's National Center for Environmental Health, including the Climate and Health program and National Environmental Public Health Tracking Network. Congress should increase funding so these programs reach all 50 states and all eligible jurisdictions.
- **Congress should support sustainable state and local vector-control programs.** As the threat and geographic distribution of mosquitos, ticks, and other vectors changes, Congress should expand funding for the vector-borne disease program at CDC to support state and local capacity to prevent and detect vector-borne diseases, such as Zika, West Nile Virus, and Lyme disease.
- **The administration, Congress, and states should safeguard clean water for all U.S. residents, particularly after disasters.** The administration and Congress should protect and strengthen the Clean Water Rule, which includes measures to protect a safe water supply, such as addressing the ongoing problem of lead, per- and polyfluoroalkyl substances, and algal toxins in drinking water; taking steps to reduce the potential for waterborne illnesses; and increasing protection against potential acts of terrorism on America's drinking and agricultural water systems. Federal and state lawmakers should continue to invest in upgrading water and wastewater infrastructure to protect safe drinking water, particularly in the face of extreme weather and flooding. All states should include water security and wastewater management in their preparedness plans, and they should build relationships among health departments and local environmental and water agencies. CDC should include national guidance and metrics for planning for a range of water-related crises.

RECOMMENDATIONS FOR STATE AND LOCAL GOVERNMENT:

- **Every jurisdiction should have a comprehensive climate vulnerability assessment and adaptation plan that incorporates public health in accordance with CDC's Building Resilience Against Climate Effects (BRACE) framework.** Public health and environmental agencies at all levels should work together to track concerns, coordinate risk-management and communications, and prioritize necessary capabilities to reduce and address threats. States and localities should investigate what additional capacities are necessary and identify populations and communities at increased risk. States must also continue work to complete all steps of the framework, including identifying and implementing evidence-based interventions to protect residents. Public health officials should incorporate environmental health into emergency operations planning and incident command. Finally, as agencies implement interventions, they should continually evaluate effectiveness and strive for quality improvement.

Year in Review: An Overview of 2022's Major Public Health Emergencies, Threats, Reports, and Strategies

Infectious Disease Outbreaks and Control

Antimicrobial Resistance

According to CDC, more than 3 million antimicrobial-resistant (AR) infections occur in the United States annually, leading to about 48,000 deaths.[187] CDC's *COVID-19: U.S. Impact on Antimicrobial Resistance, Special Report 2022* reported at least a 15 percent increase in resistant-hospital onset infections and deaths during the first year of the pandemic. The increase is a reversal of progress made against antimicrobial-resistant infections the years prior to the COVID-19 pandemic.[188]

Globally, AR is a leading cause of death, with at least 4.95 million associated deaths in 2019. Data on antimicrobial resistance and consumption showed high levels of antibiotic resistance in the pathogens that cause the most serious infections and growing resistance to antibiotic treatments for more common infections. Rates of resistance are highest in low- and middle-income countries.[189]

Childhood Immunizations

During the 2020–2021 school year, school-entry vaccine coverage for children entering kindergarten in the United States dropped from 95 percent to below 94 percent, leaving about 35,000 children across the country without vaccination for many common diseases.[190]

Cholera

Cholera was reported in 29 countries during 2022, including significant outbreaks in Haiti, Malawi, and Syria. During the previous five years, under 20 countries reported cases. The uptick in cases led the International Coordinating Group to temporarily replace the standard two-dose vaccination regimen with a single-dose regimen.[191]

Foodborne Illness

CDC led investigations and issued outbreak notices 13 times during 2022, including for enoki mushrooms, deli meat and cheese, fish, soft cheeses, ground beef, ice cream, strawberries, peanut butter, raw oysters, frozen falafel, and alfalfa sprouts.[192]

Ebola

During September and October 2022, 130 cases of the Ebola virus disease were confirmed in Uganda, leading to 43 deaths. This was the fifth outbreak of Sudan ebolavirus in Uganda since 2000.[193]

Hepatitis A

Hepatitis A cases decreased in 2020 after a rise in the number of cases between 2015 and 2018. Cases decreased by 47 percent between 2019 and 2020.[194] People in the highest-risk category for contracting hepatitis A virus infection are people who use drugs, people experiencing unstable housing or homelessness, men who have sex with men, people who are currently or were recently incarcerated, and people with chronic liver disease, including cirrhosis and hepatitis B and C.

The Global Fund to Fight AIDS, Tuberculosis (TB) and Malaria has received more than $14.25 billion in funding for 2023–2025, $4 billion less than its targeted funding level—a concern according to fund leaders because the COVID-19 pandemic has already disrupted programs to prevent, detect, and treat these diseases. Approximately 50 percent of the new funding will be directed to malaria programs and about one-third to HIV/AIDS programs, leaving approximately $2 billion for TB programs.[205]

HIV

An estimated 38.4 million people are living with HIV across the globe, two-thirds of whom live in Africa.[195] The majority of all diagnosed new infections occurred in sub-Saharan Africa. In 2021, an estimated 650,000 people worldwide died due to HIV related causes.[196] In 2019, there were approximately 1.2 million people living with HIV in the United States. During 2020, 30,635 people received an HIV diagnosis, 68 percent of diagnoses were related to male-to-male sexual contact, and 22 percent were related to heterosexual contact. Forty-two percent of the new cases occurred in Blacks/African Americans, 27 percent Hispanic/Latino people, and 26 percent in whites. Deaths among people with HIV in the United States totaled 18,489 in 2020.[197]

Lyme Disease

Lyme Disease is the most common vector-borne disease in the United States. It is transmitted to humans through bites of blacklegged ticks. CDC estimates that approximately 476,000 people in the United States are diagnosed and treated for Lyme Disease annually.[198]

Measles

Measles outbreaks, United States. In 2022, U.S. measles cases remained relatively low: 88 measles cases reported by five jurisdictions as of December 12, 2022. Although this is an increase from the 49 individual measles cases confirmed in 2021, the number of reported cases is still well below the 1,274 cases of measles in 2019. Measles is a highly contagious disease; outbreaks in the United States have been linked to sustained spread in U.S. communities, with pockets of unvaccinated people and/or an increase in the number of travelers who get measles abroad.[199]

CDC and WHO estimate that since the start of the COVID-19 pandemic, approximately 40 million children have missed a measles vaccine dose.[200]

Interruptions in Measles and other Global Vaccination Programs. The WHO reported that COVID-19 interrupted measles vaccination programs in many countries leaving millions of children at risk for the measles virus. The WHO reported that 22 countries experienced large measles outbreaks in 2021.[201] The problem was particularly acute in Africa. In addition, due to disruptions in immunization campaigns caused by the pandemic, approximately 125 million children worldwide did not get essential vaccines to protect them against measles, diphtheria, tetanus, whooping cough, and polio.[202]

Malaria Control and Prevention

According to the CDC, in 2020, about 241 million cases of Malaria occurred globally leading to 627,000 deaths. About 2,000 cases of malaria are diagnosed in the United States annually. Most U.S. cases occurred in people who did not take preventative measures before travel, 85 percent of those cases were imported from Africa.[203]

A December 2022 WHO report found that COVID-19 hindered malaria-control efforts globally, resulting in 13 million more infections and 63,000 additional deaths as a result of the on-going pandemic. Approximately 95 percent of the world's malaria cases and deaths were in Africa.[204]

mpox

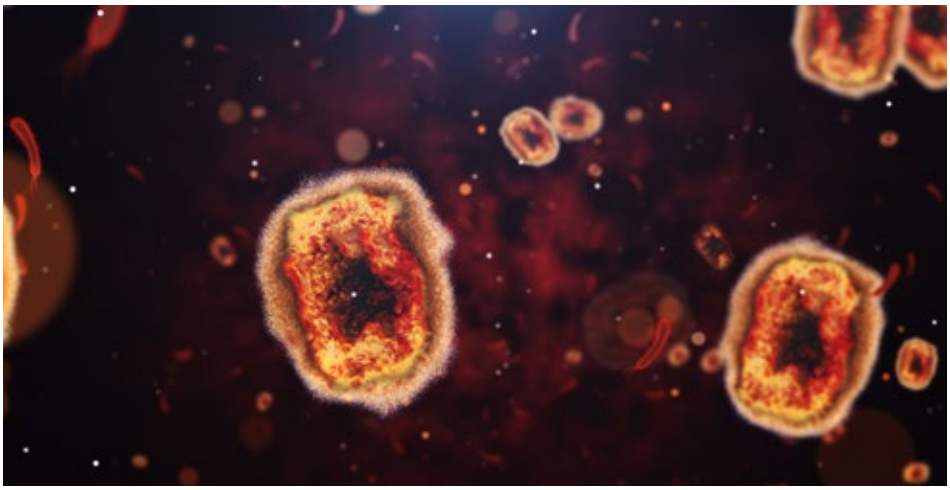
During 2022, there were 82,474 cases of mpox reported globally, including 29,711 cases in the United States (as of December 7, 2022). The majority of U.S. cases occurred in men who have sex with other men. U.S. case counts were highest in in July, August, and September and dropped sharply in the fall months after targeted education and vaccination programs.[206]

Polio

While polio cases worldwide were down between 2020 and 2022, there is a continued need for increased surveillance and immunization programs to reach eradication goals.[207] Polio infections were confirmed in non-endemic countries/continents of Africa, Asia, Europe, India, the United Kingdom, Canada, and the United States during 2022. In December, health officials in numerous U.S. states, including New York, Michigan, and Pennsylvania, began testing wastewater for the poliovirus. Polio outbreaks were also reported in polio-endemic countries of Afghanistan and Pakistan during the year.[208]

Seasonal Flu

Flu illnesses were high during the first three months of the 2022–2023 flu season with 13–27 million reported cases resulting in between 120,00 and 260,000 hospitalizations and between 7,300 and 21,000 deaths.[209] In addition to seasonal flu, the continued circulation of COVID-19 and RSV added to the health risks of the winter months and stressed capacity at some hospitals.[210]



In November, CDC reported that between 2009 and 2022, Black, Hispanic, and American Indian/ Alaska Native adults were less likely to be vaccinated against seasonal flu and more likely to be hospitalized due to flu than were white adults.[211]

Tuberculosis

Tuberculosis cases in the United States were up during 2021 as compared with 2020 but remained lower than reported cases in 2019. Researchers believe the decrease could be related to multiple factors associated with the COVID-19 pandemic including social distancing or that the pandemic could have led to delayed or missed diagnoses.[212]

West Nile Virus

West Nile Virus is the leading cause of mosquito-borne disease in the United States. Preliminary 2022 data show a total of 970 cases of the virus across the United States, as reported to CDC. Human and non-human West Nile Virus infections were reported in 42 states during 2022.[213]

COVID-19 Pandemic's Impact on Education, Health, and the Economy

During 2022, the third year of the COVID-19 pandemic, its impact on Americans' health (beyond the virus), education, and the economy became clearer.

Education

Scores on the National Assessment of Educational Progress showed that students in most states and across almost all demographic groups lost ground in math and reading skills during the pandemic.[214]

On average, students tended to learn less during remote schooling, particularly in math. The learning loss was worse in high-poverty communities where schools were often in remote-learning status than those in middle- and higher-income communities.[215]

Health

As of December 2022, COVID-19 deaths worldwide stood at over 6.6 million. U.S. deaths were over 1 million.[216] Many health researchers believe that the death estimates are likely to be undercounts of the actual numbers.[217] During the fall of 2022, COVID-19 deaths were trending to be the third leading cause of death in the United States for the third year in a row.[218]

Editor's note: *Data released in January of 2023 showed that while COVID-19 was the third leading cause of U.S. deaths from mid-2020 to mid-2022, by the end of 2022 it was not among the top five causes of deaths nationally.*[219]

According to provisional data, increases in excess deaths due to the pandemic and other causes led life expectancy in the United States to decline by 2.7 years in 2021, the biggest decline in nearly a century and a larger decline than 19 other high-income countries. People of color in the U.S. suffered the largest losses. Life expectancy for American Indians and Alaska Native people declined by 6.6 years. The decline for Hispanic people was 4.2 years, and the decline for Black people was four years.[220]

A CDC analysis of death certificates found that long COVID caused or played a role in at least 3,500 deaths during the pandemic, a small percentage of the deaths due to the virus but researchers say significant because it shows that the impact of COVID-19 can be life-threatening in the long term.[221]

The U.S. COVID-19 vaccine program was an area of success among the often-poor performance of the pandemic response. Through March 2022, the vaccine program was estimated to have prevented 2.2 million COVID-19 deaths and 17 million hospitalizations.[222] However vaccine uptake was not as universal as hoped. A Peterson Center on Healthcare and Kaiser Family Foundation study estimates that, since June 2021, when all American adults were eligible to be vaccinated against COVID-19, an estimated 234,000 Americans who died due to COVID-19 would have survived if they had been vaccinated.[223]

During the 2020–2021 school year, school-entry vaccine coverage for children entering kindergarten in the United States dropped from 95 percent to below 94 percent, leaving about 35,000 children across the country without vaccination for many common diseases.[224]

The WHO reported that COVID-19 interrupted measles vaccination programs in many countries, leaving millions of children at risk for the measles virus. The WHO reported 26 large measles outbreaks worldwide during 2020 and 2021. The problem was particularly acute in Africa.[225] Due to disruptions in immunization campaigns caused by the pandemic, approximately 125 million children worldwide did not get essential vaccines to protect them against measles, diphtheria, tetanus, whooping cough, and polio.[226]

Pregnancy- and childbirth-related deaths increased sharply during 2020 and 2021 with health researchers believing that COVID-19 was a factor in about a quarter of the deaths. Maternal death rate during the pandemic was higher for Black women than for white and Hispanic women. Preterm and low-birthweight babies also went up in 2021, as did reports of depression in pregnant and postpartum women.[227]

A study of more than 16,000 Americans who had COVID-19 found that 15 percent still had symptoms two months to a full year later. Vaccinated people were less likely to report such long-lasting symptoms. Symptoms included fatigue, loss of smell, shortness of breath, and brain fog.[228]

The COVID-19 pandemic led to a steep decrease in HIV testing and a drop-off in the number of diagnosed infections, likely due to underdiagnosis according to researchers rather than a decrease in infection rates.[229]

An estimated 9.4 million cancer screenings that would have normally happened were missed in the U.S. in 2020 due to the pandemic.[230]

Health Equity

A *Washington Post* analysis found that while Black people were more likely to die due to COVID-19 at the beginning of the pandemic (2020) than were white people, by the end of 2021 deaths among Black people were declining while deaths among white people were not. By the end of 2021, white people were dying due to COVID-19 at a higher rate than Black people.[231] However, for the three-year span of the pandemic, 2020 – 2022, the overall rate of cases and deaths among Black people was higher than that of white people.[232]

A National Center for Health Statistics report found that men died due to COVID-19 at rates near or over 50 percent higher than those of women in rural and urban areas during 2020 (before the availability of the COVID-19 vaccine). Researchers point to women's stronger immune systems and men's higher rates of high blood pressure, diabetes, lax mask-wearing, and delays in seeking medical care as the reasons behind the differences.[233]

Some of the biggest disparities in pandemic death rates were between rural and urban communities, often rooted in access to a hospital. A study that examined the impact of hospital closures found that within the 50 U.S. counties with the highest COVID-19 death rates, 24 were within 40 miles of a hospital that had closed.[234]

Health and Misinformation

A Kaiser Family Foundation (KFF) survey found that nearly one-third of U.S. women who were pregnant or planned to become pregnant believed at least one piece of misinformation about the coronavirus vaccine and pregnancy.[235] An October 2021 KFF survey found that 78 percent of respondents believed or were unsure about at least one false statement about COVID-19.[236]

Impact on Children and Families

According to data released in September, an estimated 10.5 million children worldwide lost a parent or caregiver due to the pandemic. Families in Southeast Asia and Africa suffered the highest number of losses.[237]

In the United States, it is estimated that approximately 200,000 children lost a parent or caregiver due to COVID-19. As of the spring/early summer of 2022, Black, Hispanic, and American Indian/Alaska Native children lost parents and caregivers at more than double the rate of white children.[238]

The Economy and Workforce

COVID-19 pushed an estimated 77 million people worldwide into "extreme poverty" according to a report of the U.N. Department of Economic and Social Affairs. According to the report, the economic impacts of the pandemic are extremely acute in developing countries.[239]

The economic pain caused by the pandemic was particularly keen for individuals and families who were already living with economic pressures. In April 2020, 20 million Americans lost their jobs due to the pandemic pushing the unemployment rate from 2.5 percent before the pandemic to 14.7 percent in just two months. Low-income workers and those without access to paid leave experienced the most hardship. In response, Congress's adoption of the Coronavirus Preparedness and Response Supplemental Appropriations Act, the Families First Coronavirus Response Act, and the Coronavirus Aid, Relief, and Economic Security Act helped millions of families buy food and remain in their homes.[240]

It is estimated that long COVID has affected approximately 23 million Americans and could have a financial impact equal to or exceeding the Great Recession.[241] According to research published by the Federal Reserve Bank of New York, a surge of about 900,000 people within the U.S. workforce are reporting disabilities at least in part due to long COVID-19.[242]

ADVOCACY, EDUCATION, AND GRASSROOTS PARTNERSHIPS HELP NARROW THE VACCINATION GAP

The Good Health WINs initiative—a partnership between the National Council of Negro Women, Vaccinate Your Family, and Trust for America's Health—strengthens the vaccine infrastructure within the Black community through advocacy and education to close the vaccination equity gap. This nationwide network hosted nearly 1,500 vaccination education events in its first year (2021), reaching 750,000 people with science-based information about the safety and effectiveness of the COVID-19 vaccine. For example, the Dallas, Texas chapter of Good Health WINS held a vaccination education event at North Texas University in May of 2022. In addition, the Jackson, Mississippi, chapter held a community voter registration and vaccination drive in October 2022.

Community partnerships like the Good Health WINs initiative proved critical to closing the vaccination gap between people of color and non-Hispanic white people that existed early in the pandemic. Between April 2021 and March 2022, the COVID-19 vaccination disparity between white and Black Americans fell from 14 percent to just 5 percent.

Severe Weather and Natural Disasters

Drought

As of July, six states (California, Texas, Oregon, Nevada, Utah, and New Mexico) experienced severe drought conditions, and more than 32 percent of the land in U.S. western states experienced extreme or exceptional drought.[243] These drought conditions fueled large and intense wildfires.[244]

Extreme Heat

Record heat was recorded in Asia, Europe, North Africa, Australia, the Pacific Islands, and the United States during 2022.[245]

In September, more than 61 million residents of California, Arizona, and Nevada were under active extreme heat advisories, watches, and warnings. All-time-high temperatures were recorded in eight California cities.[246]

Flooding

Six instances of severe flooding took place in the United States in 2022, leading to 105 deaths.[247]

Hurricanes

The 2022 hurricane season produced eight hurricanes, including Ian, Nicole, and Fiona, which caused extensive damage in Florida and Puerto Rico respectively. Ian caused over 100 deaths and catastrophic damage. Ian was a billion-dollar climate disaster and the third-most destructive storm on record, behind only Hurricanes Katrina and Harvey.[248]

Tornadoes

According to preliminary reports, there were 1,329 tornadoes in the U.S. in 2022 causing 24 deaths.[249] Multiple storms hit Iowa, Illinois, and Indiana in March causing massive damage and loss of life. A total of 32 tornadoes were reported during a three-day period. Seven people died in one of the worst storms near Des Moines, Iowa.[250] In December, dozens of tornadoes hit Louisiana, causing three deaths and significant damage to homes and public buildings, including a hospital and local infrastructure. The same storm event created tornadoes in Oklahoma and Texas.[251]

Wildfires

As of December 30, 2022, 68,255 wildfires had burned 7,534,403 acres within the United States. The 2022 fire activity was above the 10-year average of 59,733 wildfires per year. A significant portion of the fire activity took place in California and Colorado.[252]

Reports, Studies, Strategies, and Convenings

Climate Change

Instances of people being exposed to extreme heat are increasing as the climate warms. **A study of health exposure and related heat illness** in Maricopa and Yuma counties, Arizona, showed that between 2010 and 2020, heat-related hospitalizations were highest for adults over age 65. Older adults also had more barriers to access to cooling centers than did younger adults, including awareness of the centers and the lack of transportation to them.[253]

A United Nations Environment Programme report found that steps being taken to adapt to the impacts of climate change on people and the planet are insufficient and that climate risks are growing as global warming accelerates. The report *Too Little, Too Slow: Climate Change Failure Puts World at Risk* calls for urgently needed increases in efforts to adapt to the impact of climate change. The report calls for both mitigation and adaptation interventions in order to protect vulnerable countries and communities.[254]

Climate change is bringing people and disease-causing organisms closer together and is exacerbating the impact of more than 200 infectious diseases and dozens of nontransmissible conditions, such as snake bites, according to a **study published in *Nature*** in August.[255]

COVID-19 and Global Disease Threats

A Commonwealth Fund and Yale School of Public Health study found that the COVID-19 vaccine prevented more than 18.5 million U.S. hospitalizations and 3.2 million U.S. deaths. The prevented infections preserved hospital capacity for the patients who most needed it.[256]

The University of Minnesota's Center for Infectious Disease Research and Policy published a draft version of a Coronavirus Vaccines Research and Development Roadmap. The roadmap outlines strategies for the development of vaccines for new COVID-19 variants as well as for yet-to-emerge coronaviruses. The authors of the roadmap advocate for broadly protective coronavirus vaccines that would protect against multiple viruses.[257]

A Delphi study of 386 academic, health, government, and nongovernment experts on the worldwide COVID-19 response developed 41 consensus statements and 57 recommendations to strengthen the world's response to future infectious disease outbreaks. The recommendations, directed toward government, the healthcare sector, and industry, included six domains: (1) communication, (2) health systems, (3) vaccination, (4) prevention, (5) treatment and care, and (6) inequities. Recommendations that earned a 99 percent or better combined endorsement were: improving communications, rebuilding public trust and engage communities in the management of pandemic responses.[258]

A WHO report found that countries worldwide are no better prepared to address new global disease threats than they were before the coronavirus pandemic. Among the report's recommendations to improve preparedness are improved financing and surveillance systems and ensuring that access to vaccines is made more even worldwide.[259] In addition, a WHO report on the global vaccine market called for more steps to provide equitable vaccine access, a problem not unique to COVID-19.[260]

The report of *The Lancet* Commission on lessons for the future from the COVID-19 pandemic called the global response "a massive global failure," leading to millions of preventable deaths and reversals in progress toward sustainable development for many countries. The report includes recommendations in three key areas: (1) steps to control and understand the current pandemic, (2) needed investments to strengthen defense against future pandemics, and (3) proposals to enhance multilateralism.[261]

A U.S. Government Accountability Office report on medical-surge experiences during the COVID-19 pandemic found that of eight hospitals studied, all reported problems during the pandemic related to staffing, supplies, space, and information. The hospitals reported supplementing staffing levels and working with healthcare coalitions to help alleviate the challenges.[262]

CDC Moving Forward Assessment. In April 2022, CDC Director Dr. Rochelle Walensky launched a review of agency operations "to identify ways to improve and institutionalize how CDC develops and deploys its science." The assessment identified the following objectives for the agency: share scientific findings and data faster, translate science into practice and easy-to-understand policy, prioritize health communications, promote results-based partnerships, and development a workforce prepared for future emergencies.[263]

A report of the Senate Homeland Security & Governmental Affairs Committee released in December found that many of the deaths and much of the economic disruption caused by the COVID-19 pandemic could have been prevented if the federal government had paid attention to decades of warnings about the need to shore up emergency preparedness. Among the issues noted in the report were underfunding, inadequate disease surveillance, public health staffing shortages, and dependance on foreign supply chains.[264]

The report of the Select Subcommittee on the Coronavirus Crisis, *Preparing for and Preventing the Next Public Health Emergency: Lessons from the Coronavirus Crisis*, found that the United States failed to invest in the measures necessary to be prepared to respond to a global pandemic, and as a result, Americans were at heightened risk during the coronavirus outbreak. The report cites chronic underfunding of public health and health disparities as creating the heightened risk. Among the report's recommendations: increase bivalent booster uptake, accelerate development of a pan-coronavirus vaccine, ensure Americans' access to at-home testing options, and make investments to grow and sustain a culturally competent public health workforce.[265]

A December report by the WHO and CDC warned that progress made toward global measles elimination has been slowed by the COVID-19 pandemic and as a result puts millions of children at risk of the disease.[266]

Kaiser Family Foundation polling has determined support for required childhood vaccination for measles, mumps, and rubella (MMR vaccine) has gone down. In 2019, 82 percent of respondents supported required MMR vaccination to attend public schools; that percentage dropped to 71 percent in Kaiser's latest poll, released in December 2022.[267]

Food Safety

A review of the FDA's Human Foods Program by the Reagan-Udall Foundation called for changes in the FDA's mission, organization, and leadership, arguing that the agency needs to act with more urgency to prevent food-related illnesses, including more frequent use of its recall authority. The review was requested by FDA Commissioner Dr. Robert Califf in response to the year's earlier infant-formula crisis.[268]

The Association of State and Territorial Health Officials released its **Responding to Emerging Food Safety Threats Policy Statement**, which noted that while states and territories carry "an enormous amount of responsibility" for food safety, they do so with limited resources. Among the statement's recommendations were to ensure adequate federal funding to state, territorial, and local health agencies to sustain and expand key food-safety programs, to strengthen the food-safety workforce, and to leverage technology to enhance food-safety and foodborne-illness surveillance.[269]

Health Equity and Community Resilience

The Federal Plan for Equitable Long-Term Recovery and Resilience (Federal Plan for ELTRR) outlines a government-wide approach for federal agencies to work together to improve the community conditions necessary to improve individual and community resilience and well-being.[270]

National Biodefense and Preparedness Strategies

In October, the Biden administration released ***The National Biodefense Strategy and Implementation Plan on Countering Biological Threats, Enhancing Pandemic Preparedness, and Achieving Global Health Security***. The plan emphasizes integrated, whole-of-government approaches to allow the U.S. government to more effectively assess, prevent, prepare for, respond to, and recover from biological threats.[271]

In December, HHS's **Administration for Strategic Preparedness and Response (ASPR) released its Strategic Plan for 2022-2026**. The document includes ASPR's strategic goals and objectives, and describes its approach "to help the country prepare for, respond to, and recover from" future challenges.[272]

Public Health Workforce and Infrastructure Funding

In November, CDC announced $3.2 billion in award funds to states, local governments, and territories to help strengthen their public health infrastructure.[273] This first-of-its-kind funding includes $3 billion from the American Resecure Plan Act.[274]

Report Methodology

TFAH made major refinements to its methodology for *Ready or Not* in 2018. For more information, see the 2019 edition of the series, Appendix A: Methodology.[275]

To meet TFAH's criteria, each indicator must be:

- **Significant.** The indicator needed to be a meaningful measure of states' public health emergency preparedness. The NHSPI first measured significance by using a multistage Delphi process with a panel of experts and then again by TFAH through interviews with additional experts.
- **Broadly relevant and accessible.** The indicator needed to be relevant—and timely data needed to be accessible—for every state and the District of Columbia.
- **Timely.** Data for the indicator needed to be updated regularly.
- **Scientifically valid.** Data supporting the indicator needed to be credible and rigorously constructed.
- **Nonpartisan.** The indicator, and data supporting the indicator, could not be rooted in or seen as rooted in any political goals.

Using these criteria, TFAH aims to select a broad set of actionable indicators with which it—and other stakeholders, including states themselves—can continue to track states' progress. (Complete data were not available for U.S. territories.) TFAH will strive to retain most of these indicators for multiple years to assist states in tracking their progress against each measure.

TFAH seeks measures that are incorporated in the NHSPI and that most closely meet TFAH's criteria. There is one exception: a measure of state public health funding-level trends that the NHSPI does not track.

Public Health Funding Data Collection and Verification

To collect public health funding data for this report, TFAH surveyed state officials. Informed by the Public Health Activities and Services Tracking project at the University of Washington, TFAH defines public health programming and services as inclusive of communicable disease control; chronic disease prevention; injury prevention; environmental public health; maternal, child, and family health; and access to and linkage with clinical care. Specifically, this definition includes:

- **Communicable disease control.** Public health services related to communicable disease epidemiology, COVID-19, hepatitis, HIV/AIDS, immunization, sexually transmitted diseases, tuberculosis, etc.
- **Chronic disease prevention.** Public health services related to asthma, cancer, cardiovascular disease, diabetes, obesity, tobacco, etc.
- **Injury prevention.** Public health services related to firearms, motor vehicles, occupational injuries, senior falls prevention, substance-use disorder, other intentional and unintentional injuries, etc.
- **Environmental public health.** Public health services related to air and water quality, fish and shellfish, food safety, hazardous substances and sites, lead, onsite wastewater, solid and hazardous waste, zoonotic diseases, etc.

- **Maternal, child, and family health.** Public health services related to the coordination of services; direct service; family planning; newborn screening; population-based maternal, child, and family health; supplemental nutrition; etc.
- **Access to and linkage with clinical care.** Public health services related to beneficiary eligibility determination, provider or facility licensing, etc.

TFAH excludes from its definition insurance coverage programs, such as Medicaid or the Children's Health Insurance Program, as well as inpatient clinical facilities.

TFAH, under the guidance of state respondents, revised data for the base year. (In this report, that was FY 2021.) For some states, this was necessary to improve comparability between the two years when a re-organization of departmental responsibilities had occurred over the period.

All states and the District of Columbia verified earlier funding data and provided new funding data, with three exceptions: Hawaii, Maryland, and Michigan.

Scoring and Tier Placements

TFAH grouped states based on their performances across the 10 indicators, and TFAH gave partial credit for some indicators to draw finer distinctions among states and within states over time. TFAH placed states into three tiers—high tier, middle tier, and low tier—based on their relative performance across the indicators.

Specifically, TFAH scored each indicator as follows:

- Adoption of the NLC: 0.5 point. No adoption: 0 points.
- Percent of the state's population served by a comprehensive public health system, as determined through administration of the National Longitudinal Survey of Public Health Systems.
  - More than one standard deviation above the mean: 1 point.
  - Within one standard deviation above the mean: 0.75 point.
  - Within one standard deviation below the mean: 0.5 point.
  - More than one standard deviation below the mean: 0.25 point.
  - A score of .625—halfway between .25 point and 1 point—was assigned to Hawaii and Rhode Island, for which data were not available.
- Accreditation by the PHAB: 0.5 point. Not accredited: 0 points.
- Accreditation by the EMAP: 0.5 point. Not accredited: 0 points.
- Size of state public health budget compared with the past year (nominally, not inflation-adjusted).
  - No change or funding increase: 0.5 point.
  - Funding decrease: 0 points.
- Percent of population who used a community water system that failed to meet all applicable health-based standards: TFAH scored states according to the number of standard deviations above or below the mean of state results.
  - Within one standard deviation above the mean (and states with 0 percent of residents who used a noncompliant community system): 1 point.
  - Within one standard deviation below the mean: 0.75 point.
  - Between one and two standard deviations below the mean: 0.5 point.
  - Between two and three standard deviations below the mean: 0.25 point.

- More than three standard deviations below the mean: 0 points.

- Percent of employed population who used paid time off: TFAH scored states according to the number of standard deviations above or below the mean of state results.
  - More than one standard deviation above the mean: 1 point.
  - Within one standard deviation above the mean: 0.75 point.
  - Within one standard deviation below the mean: 0.5 point.
  - More than one standard deviation below the mean: 0.25 point.
- Percent of people ages 6 months or older who received a seasonal flu vaccination: TFAH scored states according to the number of standard deviations above or below the mean of state results.
  - More than one standard deviation above the mean: 1 point.
  - Within one standard deviation above the mean: 0.75 point.
  - Within one standard deviation below the mean: 0.5 point.
  - More than one standard deviation below the mean: 0.25 point.
- Percent of hospitals with a top-quality ranking ("A" grade) on the Leapfrog Hospital Safety Grade. TFAH scored states according to the number of standard deviations above or below the mean of state results.
  - More than one standard deviation above the mean: 1 point.
  - Within one standard deviation above the mean: 0.75 point.
  - Within one standard deviation below the mean: 0.5 point.
  - Positive number, more than one standard deviation below the mean: 0.25 point.
  - No hospitals with a top-quality ranking ("A" grade): 0 points.
- Public health laboratory has a plan for a six- to eight-week surge in testing capacity: 0.5 point. Did not report having a plan: 0 points.

The highest possible score a state could receive was 7.5 points.

TFAH placed states whose scores ranked among the top 17 in the high-performance tier. TFAH placed states whose scores ranked between the 18th-highest and 34th-highest in the middle tier. TFAH placed states with scores ranked between the 35th-highest and 51st-highest in the low-performance tier. (Ties in states' scores can prevent an even distribution across the tiers.)

This year, states in the high tier had scores ranging from 5.75 to 6.5; states in the middle tier had scores ranging from 5 to 5.625; and states in the low tier had scores ranking from 3.5 to 4.75.

Assuring data quality

TFAH conducted several rigorous phases of quality assurance to strengthen the integrity of the data and to improve and deepen TFAH's understanding of states' performance, especially that of outliers on specific indicators. During collection of state public health funding data, researchers systematically inspected every verified data file to identify incomplete responses, inconsistencies, and apparent data-entry errors. Following this inspection, TFAH contacted respondents and gave them the opportunity to complete or correct their funding data.

Endnotes

1 Statista. "Total number of cases and deaths from COVID-19 in the United States as of December 14, 2022." https://www.statista.com/statistics/1101932/coronavirus-covid19-cases-and-deaths-number-us-americans/. Accessed January 24, 2023.

2 Dennis, Brady. "The Toll Extreme Weather Took in the U.S. During 2022, by the Numbers." *The Washington Post*. https://www.washingtonpost.com/climate-environment/2022/12/30/blizzard-hurricane-drought-flood-tornado-2022/. Accessed January 24, 2023.

3 The National Health Security Preparedness Index. "Prepared." September 2021. https://nhspi.org/. Accessed January 24, 2023.

4 National Council of State Boards of Nursing. "NLC Member Jurisdictions." 2022. https://www.ncsbn.org/public-files/nlcmember-states.pdf. Accessed January 24, 2023.

5 Centers for Disease Control and Prevention. "Influenza Vaccination Coverage for Persons 6 Months and Older." *FluVaxView,* National Center for Immunization and Respiratory Diseases, updated May 28, 2021. https://www.cdc.gov/flu/fluvaxview/reportshtml/trends/index.html. Accessed January 24, 2023.

6 Ibid.

7 Centers for Disease Control and Prevention. "Influenza Vaccination Coverage for Persons 6 Months and Older." *FluVaxView,* National Center for Immunization and Respiratory Diseases, updated May 28, 2021. https://www.cdc.gov/flu/fluvaxview/interactive-general-population.htm. Accessed January 24, 2023.

8 U.S. Department of Health and Human Services. "Increase the Proportion of People Who Get the Flu Vaccine Every Year." *Healthy People 2030*, Office of Disease Prevention & Health Promotion. https://health.gov/healthypeople/objectives-and-data/browse-objectives/vaccination/increase-proportion-people-who-get-flu-vaccine-every-year-iid-09. Accessed January 24, 2023.

9 DeRigne, LeaAnne, Patricia Stoddard-Dare, and Linda Quinn. "Workers Without Paid Sick Leave Less Likely to Take Time Off for Illness or Injury Compared to Those With Paid Leave." *Health Affairs*, 35(3), March 2016. https://www.healthaffairs.org/doi/10.1377/hlthaff.2015.0965. Accessed January 24, 2023.

10 Clemans-Cope, Lisa, Cynthia D Perry, Genevieve M Kenney, et al. "Access to and Use of Paid Sick Leave Among Low-Income Families With Children." *Pediatrics*, 122(2): e480-486, August 2008. https://pubmed.ncbi.nlm.nih.gov/18676534/. Accessed January 24, 2023.

11 Pichler, Stefan, Katherine Wen, and Nicolas R. Ziebarth. "COVID-19 Emergency Sick Leave Has Helped Flatten the Curve in the United States." *Health Affairs*, 39(12), October 15, 2020. https://www.healthaffairs.org/doi/10.1377/hlthaff.2020.00863#:~:text=Our%20findings%20show%20that%20states,mandates%20before%20enactment%20of%20the. Accessed January 24, 2023.

12 Administration for Strategic Preparedness & Response. "Pandemic and All-Hazards Preparedness Reauthorization Act." https://aspr.hhs.gov/legal/pahpa/Pages/pahpra.aspx. Accessed January 24, 2023

13 Administration for Strategic Preparedness & Response. "Pandemic and All-Hazards Preparedness Reauthorization Act." https://aspr.hhs.gov/legal/pahpa/Pages/pahpra.aspx. Accessed January 24, 2023.

14 Centers for Medicare & Medicaid Services. "The Inflation Reduction Act Lowers Health Care Costs for Millions of Americans." October 5, 2022. https://www.cms.gov/newsroom/fact-sheets/inflation-reduction-act-lowers-health-care-costs-millions-americans. Accessed January 24, 2023.

15 Gustafsson, Lovisa, and Sara R. Collins. "The Inflation Reduction Act Is a Milestone Achievement in Lowering Americans' Health Care Costs." The Commonwealth Fund, August 15, 2022. https://www.commonwealthfund.org/blog/2022/inflation-reduction-act-milestone-achievement-lowering-americans-health-care-costs#:~:text=The%20Inflation%20Reduction%20Act%20%28IRA%29%2C%20which%20is%20expected,drug%20prices%20and%20out-of-pocket%20costs%20for%20Medicare%20beneficiaries. Accessed January 24, 2023.

16 The White House. "Fact Sheet: How the Inflation Reduction Act Builds a Better Future for Young Americans." August 16, 2022. https://www.whitehouse.gov/briefing-room/statements-releases/2022/08/16/fact-sheet-how-the-inflation-reduction-act-builds-a-better-future-for-young-americans/. Accessed January 24, 2023.

17 Gustafsson, Lovisa, and Sara R. Collins. "The Inflation Reduction Act Is a Milestone Achievement in Lowering Americans' Health Care Costs." The Commonwealth Fund, August 15, 2022. https://www.commonwealthfund.org/blog/2022/inflation-reduction-act-milestone-achievement-lowering-americans-health-care-costs#:~:text=The%20Inflation%20Reduction%20Act%20%28IRA%29%2C%20which%20is%20expected,drug%20prices%20and%20out-of-pocket%20costs%20for%20Medicare%20beneficiaries. Accessed January 24, 2023.

18 The National Health Security Preparedness Index. "Prepared." September 2021. https://nhspi.org/. Accessed January 24, 2023.

19 Frank, Thomas. "Flooding Disproportionately Harms Black Neighborhoods." *Scientific American*, June 2, 2020. https://www.scientificamerican.com/article/flooding-disproportionately-harms-black-neighborhoods/. Accessed January 24, 2023.

20 Albrecht, Don E. "COVID-19 in Rural America: Impacts of Politics and Disadvantage." *Rural Sociology*, 87(1): 94-118, March 2022. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8661577/. Accessed January 24, 2023.

21 Centers for Disease Control and Prevention. "COVID-19: Risk for COVID-19 Infection, Hospitalization, and Death by Race/Ethnicity." Updated December 28, 2022. https://www.cdc.gov/coronavirus/2019-ncov/covid-data/investigations-discovery/hospitalization-death-by-race-ethnicity.html. Accessed January 24, 2023.

22 Bartel, Ann P., Soohyun Kim, Jaehyun Nam, et al. "Racial and Ethnic Disparities in Access to and Use of Paid Family Leave and Medical Leave: Evidence From Four Nationally Representative Datasets." U.S. Bureau of Labor Statistics, *Monthly Labor Review*, January 2019. https://www.bls.gov/opub/mlr/2019/article/racial-and-ethnic-disparities-in-access-to-and-use-of-paid-family-and-medical-leave.htm. Accessed January 24, 2023.

23 Jessica Milli, Jocelyn Frye, Maggie Jo Buchanan. Center for American Progress. "Black Women Need Access to Paid Family and Medical Leave". March 4, 2022. Black Women Need Access to Paid Family and Medical Leave - Center for American Progress Accessed February 8, 2023.

24 Qinyun Lin, Susan Paykin, Dylan Halpern et al. "Assessment of Structural Barriers and Racial Group Disparities of COVID-19 Mortality With Spatial Analysis". JAMA Network Open. March 4, 2022. Assessment of Structural Barriers and Racial Group Disparities of COVID-19 Mortality With Spatial Analysis | Health Disparities | JAMA Network Open | JAMA Network January 24, 2023.

25 Pew Research Center. "Americans and Privacy: Concerned, Confused and Feeling Lack of Control Over Their Personal Information. November 15, 2019. Americans and Privacy: Concerned, Confused and Feeling Lack of Control Over Their Personal Information | Pew Research Center Accessed February 1, 2023.

26 NPR. "Immigrants Fear Data Collected Under DACA Could Give Government Deportation Power". March 25, 2017. Immigrants Fear Data Collected Under DACA Could Give Government Deportation Power : NPR Accessed February 1, 2023.

27 U.S. Census Bureau. "2019 Community Resilience Estimates." https://experience.arcgis.com/experience/b0341fa9b237456c9a9f1758c15cde8d/. Accessed January 24, 2023.

28 U.S. Census Bureau. "2019 Community Resilience Estimates: Methodology." Updated March 2, 2022. https://www.census.gov/programs-surveys/community-resilience-estimates/technical-documentation/methodology.html. Accessed January 24, 2023.

29 Agency for Toxic Substance and Disease Registry. "CDC/ATSDR Social Vulnerability Index." Centers for Disease Control and Prevention. Updated November 16, 2022. https://www.atsdr.cdc.gov/placeandhealth/svi/index.html. Accessed January 24, 2023.

30 Agency for Toxic Substance and Disease Registry. "CDC SVI 2018 Documentation." Centers for Disease Control and Prevention. Updated February 10, 2022. https://www.atsdr.cdc.gov/placeandhealth/svi/documentation/SVI_documentation_2018.html. Accessed January 24, 2023.

31 Health Equity Tracker. "Better Data for Equity." Satcher Health Leadership Institute, Morehouse School of Medicine. https://healthequitytracker.org/exploredata. Accessed January 24, 2023.

32 Radley, David C., Jesse C. Baumgartner, Sara R. Collins, et al. "Achieving Racial and Ethnic Equity in U.S. Health Care: A Scorecard of State Performance." Commonwealth Fund, November 18, 2021. https://www.commonwealthfund.org/publications/scorecard/2021/nov/achieving-racial-ethnic-equity-us-health-care-state-performance. Accessed January 24, 2023.

33 National Equity Atlas. "Racial Equity Index." https://nationalequityatlas.org/research/racial_equity_index/index# Accessed January 24, 2023.

34 Deloitte. "Health Equity Dashboard." https://www2.deloitte.com/us/en/pages/life-sciences-and-health-care/articles/free-public-health-equity-data.html. Accessed January 24, 2023.

35 Fast, Austin. "Nurses Are Waiting Months for Licenses as Hospital Staffing Shortages Spread." NPR, March 10, 2022. https://www.npr.org/2022/03/10/1084897499/nurses-are-waiting-months-for-licenses-as-hospital-staffing-shortages-spread. Accessed January 24, 2023.

36 Ibid.

37 National Council of State Boards of Nursing. "The Nurse Licensure Compact and COVID-19 – a Tale of Two States." June 2020. https://www.ncsbn.org/14826.htm. Accessed January 24, 2023.

38 National Council of State Boards of Nursing. "NLC Member Jurisdictions." https://www.ncsbn.org/public-files/nlcmemberstates.pdf. Accessed January 24, 2023.

39 Guessferd, Christina. "State Hopes New Licensure Compact Will Attract Nurses to Vermont." WCAX, February 8, 2022. https://www.wcax.com/2022/02/08/state-hopes-new-licensure-compact-will-attract-nurses-vermont/. Accessed January 24, 2023.

40 D'Ambrosio, Dan. "Vermont Joins National Compact to Make it Easier for Nurses to Practice Here." Burlington Free Press, February 2, 2022. https://www.burlingtonfreepress.com/story/news/2022/02/02/vt-joins-compact-ease-nursing-hires/9312538002/. Accessed January 24, 2023.

41 National Council of State Boards of Nursing. "NLC Member Jurisdictions." https://www.ncsbn.org/public-files/nlcmemberstates.pdf. Accessed January 24, 2023.

42 Systems for Action. "National Longitudinal Survey of Public Health Systems." https://systemsforaction.org/national-longitudinal-survey-public-health-systems. Accessed January 24, 2023.

43 Mays, Glen P. *Defining Comprehensive Public Health Delivery Systems.* Lexington, KY: University of Kentucky, 2015. http://works.bepress.com/glen_mays/198/. Accessed January 24, 2023.

44 Systems for Action. "2018 National Longitudinal Survey of Public Health Systems." 2018. https://systemsforaction.org/sites/default/files/resource_files/2018%20National%20Longitudinal%20Survey%20Public%20Health%20Systems%20%28NALSYS%29.pdf. Accessed January 24, 2023.

45 Ibid.

46 Mays, Glen P. *Defining Comprehensive Public Health Delivery Systems.* Lexington, KY: University of Kentucky, 2015. http://works.bepress.com/glen_mays/198/. Accessed January 24, 2023.

47 Ibid.

48 Ibid.

49 Robert Wood Johnson Foundation. "Why Build a Culture of Health?" https://www.rwjf.org/en/building-a-culture-of-health/why-health-equity.html. Accessed January 24, 2023.

50 Mays, Glen P. *Defining Comprehensive Public Health Delivery Systems.* Lexington, KY: University of Kentucky, 2015. http://works.bepress.com/glen_mays/198/. Accessed January 24, 2023.

51 Owsley, Kelsey M., Mika K. Hamer, and Glen P. Mays. "The Growing Divide in the Composition of Public Health Delivery Systems in US Rural and Urban Communities, 2014–2018." *American Journal of Public Health*, 110: S204_S210, 2020. https://ajph.aphapublications.org/doi/full/10.2105/AJPH.2020.305801. Accessed January 24, 2023.

52 Orozco Rodriguez, Jazmin. "Mistrust and Polarization Steer Rural Governments to Reject Federal Public Health Funding." *Kaiser Health News*, November 18, 2022. https://khn.org/news/article/mistrust-and-polarization-steer-rural-governments-to-reject-federal-public-health-funding/. Accessed January 24, 2023.

53 The National Health Security Preparedness Index. "Prepared." September 2021. https://nhspi.org/. Accessed January 24, 2023.

54 Public Health Accreditation Board. *Public Health Accreditation Board Standards and Measures: Version 1.5*. Alexandria, VA: Public Health Accreditation Board, December 2013. http://www.phaboard.org/wp-content/uploads/SM-Version-1.5-Board-adopted-FINAL-01-24-2014.docx.pdf. Accessed January 24, 2023.

55 Public Health Accreditation Board. "The Value and Impact of Public Health Department Accreditation A Review of Quantitative and Qualitative Data." July 2022. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://phaboard.org/wp-content/uploads/PHAB-Value-and-Impact.pdf. Accessed January 24, 2023.

56 Kuehnert, Paul, Jessica Kronstadt, and Marita Chilton. "Version 2022 – Reaccreditation Webinar." Public Health Accreditation Board, February 23, 2022. https://phaboard.org/accreditation-recognition/version-2022/. Accessed January 24, 2023.

57 Emergency Management Accreditation Program. Applicant Guide to Accreditation, 2017. Falls Church, VA: Emergency Management Accreditation Program, 2017. https://www.emap.org/images/2017_Applicant_Guide_.pdf. Accessed January 24, 2023.

58 Public Health Accreditation Board. "Public Health Accreditation Board Standards: An Overview." Public Health Accreditation Board, December 2013. http://www.phaboard.org/wp-content/uploads/StandardsOverview1.5_Brochure.pdf. Accessed January 24, 2023.

59 Emergency Management Accreditation Program. 2016 Emergency Management Standard. Falls Church, VA: Emergency Management Accreditation Program, 2016. https://www.emap.org/index.php/root/about-emap/96-emap-em-4-2016/file. Accessed January 24, 2023.

60 Public Health Accreditation Board. "Twenty-One Health Departments Awarded Accreditation or Reaccreditation Status by the Public Health Accreditation Board." Press release, March 17, 2022. https://www.prweb.com/releases/twenty_one_health_departments_awarded_accreditation_or_reaccreditation_status_by_the_public_health_accreditation_board/prweb18564194.htm#. Accessed January 24, 2023.

61 Public Health Accreditation Board. "Accreditation Activity." https://phaboard.org/accreditation-recognition/accreditation-activity/. Accessed January 24, 2023.

62 Emergency Management Accreditation Program. "EMAP Accredited Programs." https://www.emap.org/index.php/what-is-emap/who-is-accredited. Accessed January 24, 2023.

63 Public Health Activities and Services Tracking. "About Us." https://phastdata.org/about. Accessed January 24, 2023.

64 Association of State and Territorial Health Officials. "Profile of State and Territorial Public Health." https://www.astho.org/profile/#close. Accessed January 24, 2023.

65 National Association of County and City Health Officials. 2019 National Profile of Local Health Departments. Washington: NACCHO, 2020. https://www.naccho.org/uploads/downloadable-resources/Programs/Public-Health-Infrastructure/NACCHO_2019_Profile_final.pdf. Accessed January 24, 2023.

66 U.S. Geological Survey. "Domestic Water Use." March 1, 2019. https://www.usgs.gov/mission-areas/water-resources/science/domestic-water-use?qt-science_center_objects=0#qt-science_center_objects. Accessed January 24, 2023.

67 U.S. Environmental Protection Agency. "National Primary Drinking Water Regulations." Updated January 9, 2023. https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations. Accessed January 24, 2023.

68 U.S. Environmental Protection Agency. "Safe Drinking Water Information System (SDWIS) Federal Reporting Services." Updated September 6, 2022. https://www.epa.gov/ground-water-and-drinking-water/safe-drinking-water-information-system-sdwis-federal-reporting. Accessed January 24, 2023.

69 Ibid.

70 Centers for Disease Control and Prevention. "CDC Investigation: Blood Lead Levels Higher After Switch to Flint River Water." Press release, June 24, 2016. http://www.cdc.gov/media/releases/2016/p0624-water-lead.html. Accessed January 24, 2023.

71 Iati, Marisa. "Toxic Lead, Scared Parents and Simmering Anger: A Month Inside a City Without Clean Water." *The Washington Post*, October 3, 2019. https://www.washingtonpost.com/climate-environment/2019/10/03/toxic-lead-scared-parents-simmering-anger-month-inside-city-without-clean-water/. Accessed January 24, 2023.

72 Armstrong, Kevin. "'Hallelujah Moment': How This City Overcame Its Lead Crisis." *The New York Times*, August 11, 2021. https://www.nytimes.com/2021/08/11/nyregion/newark-lead-pipes-drinking-water.html. Accessed January 24, 2023.

73 Mayo Clinic. "Lead Poisoning." https://www.mayoclinic.org/diseases-conditions/lead-poisoning/symptoms-causes/syc-20354717. Accessed January 24, 2023.

74 Harvard University Sustainability. "4 Ways to Measure a 5 Minute Shower: Save Water and Energy: Reduce Your Shower Time!" https://green.harvard.edu/tools-resources/green-tip/4-ways-measure-5-minute-shower. Accessed January 24, 2023.

75 Romero, Simon. "How New Mexico's Largest Wildfire Set Off a Drinking Water Crisis." *The New York Times*, September 28, 2022. https://www.nytimes.com/2022/09/26/us/new-mexico-las-vegas-fire-water.html. Accessed January 24, 2023.

76 Ibid.

77 Reidmiller, D.R., C.W. Avery, D.R. Easterling, et al (eds.). *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II*. Washington, DC: U.S. Global Change Research Program, 2018. https://nca2018.globalchange.gov/. Accessed January 24, 2023.

78 Robertson, Campbell, and Richard Fausset. "Another Challenge for Hardest-Hit Parts of Florida: Finding Clean Drinking Water." *The New York Times*, October 1, 2022. https://www.nytimes.com/2022/10/01/us/florida-water-hurricane-ian.html. Accessed January 24, 2023.

79 Ibid

80 Flavelle, Christopher, Rick Rojas, Jim Tankersley, and Jack Healy. "Mississippi Crisis Highlights Climate Threat to Drinking Water Nationwide." *The New York Times*, September 1, 2022. https://www.nytimes.com/2022/09/01/us/mississippi-water-climate-change.html?searchResultPosition=5. Accessed January 24, 2023.

81 Allen, Jonathan. "Running Water Scarce in Jackson, Mississippi, After Frigid Weather." *Reuters*, December 29, 2022. https://www.reuters.com/world/us/running-water-again-scarce-jackson-mississippi-after-frigid-weather-2022-12-29/. Accessed January 28, 2023.

82 U.S. Environmental Protection Agency. "50 Years of Drinking Water Research." December 2, 2020. https://www.epa.gov/sciencematters/50-years-drinking-water-research. Accessed January 24, 2023.

83 Centers for Disease Control and Prevention. National Center for Emerging and Zoonotic Diseases. "Waterborne Disease". Waterborne Disease | What We Do | NCEZID | CDC Accessed February 6, 2023.

84 Centers for Disease Control and Prevention. "Waterborne Disease and Outbreak Surveillance Reporting." Updated January 4, 2023. https://www.cdc.gov/healthywater/surveillance/burden/findings.html. Accessed January 24, 2023.

85 U.S. Environmental Protection Agency. "Summary of the Clean Water Act." Updated July 6, 2022. https://www.epa.gov/laws-regulations/summary-clean-water-act. Accessed January 24, 2023.

86 U.S. Environmental Protection Agency. "Summary of the Safe Drinking Water Act." Updated September 12, 2022. https://www.epa.gov/laws-regulations/summary-safe-drinking-water-act. Accessed January 24, 2023.

87 Gleick, Peter, Amanda Bielawski, and Heather Cooley. "The U.S. Infrastructure Plan: Water Components." Pacific Institute, November 8, 2021. https://pacinst.org/the-u-s-infrastructure-plan-water-components/. Accessed January 24, 2023.

88 Infrastructure Investment and Jobs Act. H.R.3684, November 15, 2021. https://www.congress.gov/bill/117th-congress/house-bill/3684. Accessed January 24, 2023.

89 U.S. Environmental Protection Agency. "Celebrating A Year of Historic Water Progress." Updated November 15, 2022. https://www.epa.gov/infrastructure/celebrating-year-historic-water-progress. Accessed January 24, 2023.

90 The National Health Security Preparedness Index. "Prepared." September 2021. https://nhspi.org/. Accessed January 24, 2023.

91 U.S. Environmental Protection Agency. "Private Drinking Water Wells." Updated May 26, 2022. https://www.epa.gov/privatewells. Accessed January 24, 2023.

92 The National Health Security Preparedness Index. "Prepared." September 2021. https://nhspi.org/. Accessed January 24, 2023.

93 Ibid.

94 Blau, Francine D., Pamela A. Meyerhofer, and Josefine Koebe. "Essential and Frontline Workers in the COVID-19 Crisis (UPDATED)." *EconoFACT*, March 22, 2022. https://econofact.org/essential-and-frontline-workers-in-the-covid-19-crisis. Accessed January 24, 2023.

95 National Partnership for Women and Families. "Paid Sick Days Improve Public Health." Fact Sheet, November 2022. http://www.nationalpartnership.org/research-library/work-family/psd/paid-sick-days-improve-our-public-health.pdf. Accessed January 24, 2023.

96 U.S. Bureau of Labor Statistics. "Employee Benefits Survey." *National Compensation Survey*, March 2022. https://www.bls.gov/ncs/ebs/benefits/2019/ownership/civilian/table31a.pdf. Accessed January 24, 2023.

97 Rho, Hye Jin, Hayley Brown, and Shawn Fremstad. "A Basic Demographic Profile of Workers in Frontline Industries." *Center for Economic and Policy Research*, April 2020. https://cepr.net/wp-content/uploads/2020/04/2020-04-Frontline-Workers.pdf. Accessed January 24, 2023.

98 Kumar, Supriya, John J. Grefenstette, David Galloway, et al. "Policies to Reduce Influenza in the Workplace: Impact Assessments Using an Agent-Based Model." *American Journal of Public Health*, 103(8): 1406-1411, 2013. https://www.ncbi.nlm.nih.gov/pubmed/23763426. Accessed January 24, 2023.

99 Pichler, Stefan, and Nicolas Robert Ziebarth. "The Pros and Cons of Sick Pay Schemes: Contagious Presenteeism and Noncontagious Absenteeism Behaviour." *Vox EU CEPR Policy Portal*, May 12, 2018. https://voxeu.org/article/pros-and-cons-sick-pay. Accessed January 24, 2023.

100 Ibid.

101 National Partnership for Women and Families. "Paid Sick Days Improve Public Health." Fact Sheet, November 2022. http://www.nationalpartnership.org/research-library/work-family/psd/paid-sick-days-improve-our-public-health.pdf. Accessed January 24, 2023.

102 Pichler, Stefan, and Nicolas Robert Ziebarth. *The Pros and Cons of Sick Pay Schemes: Testing for Contagious Presenteeism and Shirking Behavior*. Cambridge, MA: National Bureau of Economic Research, Working Paper 22530, August 2016. https://www.nber.org/papers/w22530. Accessed January 24, 2023.

103 Pichler, Stefan, Katherine Wen, and Nicolas R. Ziebarth. "COVID-19 Emergency Sick Leave Has Helped Flatten the Curve in the United States." *Health Affairs*, 39(12), October 15, 2020. https://www.healthaffairs.org/doi/10.1377/hlthaff.2020.00863#:~:text=Our%20findings%20show%20that%20states,mandates%20before%20enactment%20of%20the. Accessed January 24, 2023.

104 National Partnership for Women and Families. "Paid Sick Days Improve Public Health." Fact Sheet, November 2022. http://www.nationalpartnership.org/research-library/work-family/psd/paid-sick-days-improve-our-public-health.pdf Accessed January 24, 2023.

105 Pichler, Stefan, Katherine Wen, and Nicolas R. Ziebarth. "COVID-19 Emergency Sick Leave Has Helped Flatten the Curve in the United States." *Health Affairs*, 39(12), October 15, 2020. https://www.healthaffairs.org/doi/10.1377/hlthaff.2020.00863. Accessed January 24, 2023.

106 Fields, Samantha. "Congress Lets Paid Sick, Family and Medical Leave Mandate Expire." *Marketplace*, January 1, 2021. https://www.marketplace.org/2021/01/01/congress-lets-paid-sick-family-and-medical-leave-mandate-expire/. Accessed January 24, 2023.

107 U.S. Department of Labor. "COVID-19 and the Family and Medical Leave Act Questions and Answers." https://www.dol.gov/agencies/whd/fmla/pandemic. Accessed January 24, 2023.

108 Ranji, Usha, Michelle Long, and Alina Salganicoff. "Coronavirus Puts a Spotlight on Paid Leave Policies." *Kaiser Family Foundation*, December 14, 2020. https://www.kff.org/coronavirus-covid-19/issue-brief/coronavirus-puts-a-spotlight-on-paid-leave-policies/. Accessed January 24, 2023.

109 Bureau of Labor Statistics. "Labor Force Statistics from the Current Population Survey." *Current Population Survey*, U.S. Department of Labor. https://www.bls.gov/cps/. Accessed January 24, 2023.

110 Ibid.

111 The National Health Security Preparedness Index. "Prepared." September 2021. https://nhspi.org/. Accessed January 24, 2023.

112 National Center for Health Statistics. "Table 68. Influenza Vaccination Among Adults Aged 18 and Over, by Selected Characteristics: United States, Selected Years 1989–2016." Centers for Disease Control and Prevention, 2017. https://www.cdc.gov/nchs/data/hus/2017/068.pdf. Accessed January 24, 2023.

113 U.S. Department of Health and Human Services. "Increase the Proportion of People Who Get the Flu Vaccine Every Year—IID-09." *Healthy People 2030*, Office of Disease Prevention and Health Promotion. https://health.gov/healthypeople/objectives-and-data/browse-objectives/vaccination/increase-proportion-people-who-get-flu-vaccine-every-year-iid-09. Accessed January 24, 2023.

114 Leuchter, Richard K., Nicholas J. Jackson, John N. Mafi, and Catherine A. Sarkisian. "Association Between Covid-19 Vaccination and Influenza Vaccination Rates." *New England Journal of Medicine*, 386: 2531-2532, June 30, 2022. https://www.nejm.org/doi/full/10.1056/NEJMc2204560. Accessed January 24, 2023.

115 Jacobs, Andrew, and Roni Caryn Rabin. "Flu and R.S.V. Hit the Holidays, Heightening Demand for Antibiotics and Antivirals." *The New York Times*, November 23, 2022. https://www.nytimes.com/2022/11/23/health/drug-shortages-flu-holidays.html. Accessed January 24, 2023.

116 Baumgaertner, Emily. "'This Is Our March 2020': Children's Hospitals Are Overwhelmed by R.S.V." *The New York Times*, November 3, 2022. https://www.nytimes.com/2022/11/01/science/rsv-children-hospitals.html. Accessed January 24, 2023.

117 Advisory Board. "Charted: Has the 'tripledemic' peaked?" January 24, 2023. Charted: Has the 'tripledemic' peaked? (advisory.com) Accessed February 6, 2023.

118 Arevalo, Claudia P., Marcus J. Bolton, Valerie Le Sage, et al. "A Multivalent Nucleoside-Modified mRNA Vaccine Against All Known Influenza Virus Subtypes." *Science*, 378(6622): 899-904, November 24, 2022. https://www.science.org/doi/10.1126/science.abm0271. Accessed January 24, 2023.

119 Mandavilli, Apoorva. "Scientists Are Gaining on R.S.V., a Persistent Threat to Children." *The New York Times*, November 1, 2022. https://www.nytimes.com/2022/11/01/health/rsv-children-vaccines.html. Accessed January 24, 2023.

120 NORC. "37% of Americans Do Not Plan to Get a Flu Shot This Season." University of Chicago, December 3, 2019. https://www.norc.org/NewsEventsPublications/PressReleases/Pages/37-of-americans-do-not-plan-to-get-a-flu-shot-this-season.aspx. Accessed January 24, 2023.

121 Centers for Disease Control and Prevention. "Vaccine Effectiveness: How Well Do Flu Vaccines Work?" Updated August 25, 2022. https://www.cdc.gov/flu/vaccines-work/vaccineeffect.htm. Accessed January 24, 2023.

122 Bartsch, Sarah M., Michael S. Taitel, Jay V. DePasse, et al. "Epidemiologic and Economic Impact of Pharmacies as Vaccination Locations During an Influenza Epidemic." *Vaccine*, 36(46): 7054-7063, November 12, 2018. https://pubmed.ncbi.nlm.nih.gov/30340884/. Accessed January 24, 2023.

123 Cruz, Noah. "Flu Vaccination." National Conference of State Legislatures, updated July 26, 2021. https://www.ncsl.org/health/flu-vaccination. Accessed January 24, 2023.

124 Association of State and Territorial Health Officials. "Immunization: A Cornerstone of Public Health." December 12, 2022. https://www.astho.org/advocacy/state-health-policy/legislative-prospectus-series/immunization/. Accessed January 24, 2023.

125 https://www.annualreviews.org/doi/10.1146/annurev-publhealth-032013-182452

126 Kolman, Shannon. "State Actions on Infectious Diseases Save Lives and Money." National Conference of State Legislatures, State Legislatures News, April 20, 2022. https://www.ncsl.org/resources/details/state-actions-on-infectious-diseases-save-lives-and-money. Accessed January 24, 2023.

127 Ibid.

128 Centers for Disease Control and Prevention. "Influenza Vaccination Coverage for Persons 6 Months and Older." *FluVaxView*, National Center for Immunization and Respiratory Diseases, updated May 28, 2021. https://www.cdc.gov/flu/fluvaxview/interactive-general-population.htm. Accessed January 24, 2023.

129 Ibid.

130 Johns Hopkins Bloomberg School of Public Health. "Study Suggests Medical Errors Now Third Leading Cause of Death in the U.S." Press release, May 3, 2016. https://www.hopkinsmedicine.org/news/media/releases/study_suggests_medical_errors_now_third_leading_cause_of_death_in_the_us. Accessed January 24, 2023.

131 Leapfrog Hospital Safety Grade. "Errors, Injuries, Accidents, Infections." http://www.hospitalsafetygrade.org/what-is-patient-safety/errors-injuries-accidents-infections. Accessed January 24, 2023.

132 Richterman, Aaron, Eric A. Meyerowitz, and Muge Cevik. "Hospital-Acquired SARS-CoV-2 Infection: Lessons for Public Health." *JAMA*, 324(21): 2155-2156, 2020. https://jamanetwork.com/journals/jama/fullarticle/2773128. Accessed January 24, 2023.

133 French, Geoffrey, Mary Hulse, Debbie Nguyen, et al. "Impact of Hospital Strain on Excess Deaths During the COVID-19 Pandemic — United States, July 2020–July 2021." *Morbidity and Mortality Weekly Report*, 70(46): 1613–1616, November 19, 2021. http://dx.doi.org/10.15585/mmwr.mm7046a5. Accessed January 24, 2023.

134 Leapfrog Group. Leapfrog *Hospital Safety Grade: Scoring Methodology, Spring 2021*. Washington, DC: Leapfrog Hospital Safety Grade, April 20, 2021. https://www.hospitalsafetygrade.org/media/file/Safety-Grade-Scoring-Methodology-Spring-2021_2.pdf. Accessed January 24, 2023.

135 Leapfrog Hospital Safety Grade. "How Safe Is Your Hospital." https://www.hospitalsafetygrade.org/state-rankings. Accessed January 24, 2023.

136 Association of Public Health Laboratories. "About Public Health Laboratories." https://www.aphl.org/aboutAPHL/Pages/aboutphls.aspx. Accessed January 24, 2023.

137 Association of Public Health Laboratories. *Surge Capacity Planning Tool for the Laboratory Response Network for Biological Threats Preparedness (LRN-B)*. Silver Spring, MD: Association of Public Health Laboratories, January 2015. https://www.aphl.org/aboutAPHL/publications/Documents/PHPR_SurgeCapacityLRNB_JAN2015.pdf. Accessed January 24, 2023.

138 Ibid.

139 Association of Public Health Laboratories. "Responding to the Coronavirus Disease (COVID-19) Pandemic." https://www.aphl.org/programs/preparedness/Crisis-Management/COVID-19-Response/Pages/default.aspx. Accessed January 24, 2023.

140 Ibid.

141 Mangal, Chris (Director, Public Health Preparedness and Response, Association of Public Health Laboratories). Interview with Trust for America's Health, December 8, 2021.

142 Clark, Carol. "Viral Sequencing Can Reveal How SARS-COV-2 Spreads and Evolves." Emory Health Sciences, Emory University, Emory University News, January 28, 2021. https://news.emory.edu/stories/2021/01/esc_viral_sequencing_sars_cov_2/campus.html#:~:text=Analyses%20of%20SARS%2DCoV%2D2,some%20new%20variants%20of%20concern. Accessed January 24, 2023.

143 Centers for Disease Control and Prevention. "Variants of the Virus." Updated August 11, 2021. https://www.cdc.gov/coronavirus/2019-ncov/variants/about-variants.html. Accessed January 24, 2023.

144 Anthes, Emily. "Why Didn't the U.S. Detect Omicron Cases Sooner?" *The New York Times*, December 2, 2021. https://www.nytimes.com/2021/12/02/health/omicron-variant-genetic-surveillance.html. Accessed January 24, 2023.

145 Zimmer, Carl, and Noah Weiland. "C.D.C. Announces $200 Million 'Down Payment' to Track Virus Variants." *The New York Times*, February 21, 2021. https://www.nytimes.com/2021/02/17/health/coronavirus-variant-sequencing.html. Accessed January 24, 2023.

146 The White House. "Fact Sheet: Biden Administration Announces $1.7 Billion Investment to Fight COVID-?19 Variants." April 16, 2021. https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/16/fact-sheet-biden-administration-announces-1-7-billion-investment-to-fight-covid-19-variants/. Accessed January 24, 2023.

147 Centers for Disease Control and Prevention. "CDC Launches Traveler-Based SARS-CoV-2 Genomic Surveillance Program." Updated May 27, 2022. https://www.cdc.gov/amd/whats-new/airport-genomic-surveillance.html. Accessed January 24, 2023.

148 Centers for Disease Control and Prevention. "CDC Announces Negative COVID-19 Test Requirement from Air Passengers Entering the United States from the People's Republic of China." Press release, December 28, 2022. https://www.cdc.gov/media/releases/2022/p1228-COVID-china.html. Accessed January 24, 2023.

149 Centers for Disease Control and Prevention. "Traveler-Based Genomic Surveillance for Early Detection of New SARS-CoV-2 Variants." Updated January 17, 2023. https://wwwnc.cdc.gov/travel/page/travel-genomic-surveillance. Accessed January 24, 2023.

150 Association of Public Health Laboratories. *Surge Capacity Planning Tool for the Laboratory Response Network for Biological Threats Preparedness (LRN-B)*. Silver Spring, MD: Association of Public Health Laboratories, January 2015. https://www.aphl.org/aboutAPHL/publications/Documents/PHPR_SurgeCapacityLRNB_JAN2015.pdf. Accessed January 24, 2023.

151 Becker, Scott J. "After COVID and Monkeypox, It's Time to Rethink How U.S. Responds to Infectious Diseases." *USA Today*, November 5, 2022. https://www.usatoday.com/story/opinion/2022/11/05/covid-monkeypox-us-infectious-disease-response-testing/8247536001/. Accessed January 24, 2023.

152 Mangal, Chris (Director, Public Health Preparedness and Response, Association of Public Health Laboratories). Interview with Trust for America's Health, December 19, 2022.

153 Ibid.

154 Orozco Rodriguez, Jazmin. "Mistrust and Polarization Steer Rural Governments to Reject Federal Public Health Funding." *Kaiser Health News*, November 18, 2022. https://khn.org/news/article/mistrust-and-polarization-steer-rural-governments-to-reject-federal-public-health-funding/. Accessed January 24, 2023.

155 Trust for America's Health. "The Public Health Infrastructure Saves Lives Act of 2021 (S.-674) Background." Fact Sheet, September 2020. https://www.tfah.org/wp-content/uploads/2020/09/PHI_FactSheet.pdf. Accessed January 24, 2023.

156 McKillop, Matt, and Dara Lieberman. *The Impact of Chronic Underfunding on America's Public Health System: Trends, Risks, and Recommendations, 2021*. Washington, DC: Trust for America's Health, May 2021. https://www.tfah.org/report-details/pandemic-proved-underinvesting-in-public-health-lives-livelihoods-risk/. Accessed January 24, 2023.

157 Data: Elemental to Health. "Modernize Public Health Data: A Call to Congress." chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://cdn.ymaws.com/www.cste.org/resource/resmgr/data_health/DMI_Costs_One_Pager_FINAL_08.pdf. Accessed January 24, 2023.

158 Health Defense Operations. *Prevent Epidemics*. https://preventepidemics.org/health-defense-operations-hdo/

159 Christopher, Gail C., Emily B. Zimmerman, Anita Chandra, and Laurie T. Martin (eds.). *Charting a Course for an Equity-Centered Data System: Recommendations from the National Commission to Transform Public Health Data Systems*. Washington, DC: Robert Wood Johnson Foundation, October 19, 2021. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.nationalcollaborative.org/wp-content/uploads/2021/10/RWJF-Transforming-Public-Health-Data-Systems.pdf. Accessed January 24, 2023.

160 NACCHO Voice. "Public Health Workforce Loan Repayment Passes Congress". December 22, 2022. Public Health Workforce Loan Repayment Passes Congress - NACCHO Accessed February 6, 2023.

161 Weber, Lauren, and Anna Maria Barry-Jester. "Over Half of States Have Rolled Back Public Health Powers in Pandemic." *Kaiser Health News*, September 15, 2021. https://khn.org/news/article/over-half-of-states-have-rolled-back-public-health-powers-in-pandemic/. Accessed January 24, 2023.

162 U.S. Government Accountability Office. *COVID-19: Federal Efforts Could Be Strengthened by Timely and Concerted Actions*. Washington, DC: U.S. Government Accountability Office, September 21, 2020. https://www.gao.gov/reports/GAO-20-701/. Accessed January 24, 2023.

163 Schneider, Eric C., Arnav Shah, Pratha Sah, et al. "Impact of U.S. COVID-19 Vaccination Efforts: An Update on Averted Deaths, Hospitalizations, and Health Care Costs Through March 2022." *The Commonwealth Fund,* April 8, 2022. https://www.commonwealthfund.org/blog/2022/impact-us-covid-19-vaccination-efforts-march-update. Accessed January 24, 2023.

164 Bozzi, Debra, Bianca Silva Gordon, Daniel Kurowski, et al. *Prevention and Screening Rates Among ESI Enrollees Are Lower in Rural and Socially Vulnerable Areas, with Smaller Differences in Medication Adherence*. Washington: Health Care Cost Institute, November 10, 2022. https://healthcostinstitute.org/hcci-research/prevention-and-screening-rates-among-esi-enrollees-are-lower-in-rural-and-socially-vulnerable-areas-with-smaller-differences-in-medication-adherence. Accessed January 24, 2023.

165 Goldstein-Street, Jake. "Cost of Washington's Measles Outbreak Tops $1M." *Associated Press*, February 23, 2019. https://www.apnews.com/a88d9198385a4e04a3491c9e8dc6404e. Accessed January 24, 2023.

166 Hughes, Richard IV. "The Inflation Reduction Act Will Help the U.S. Achieve Maximum Vaccine Access and Uptake, But Access Gaps Remain." *STAT*, September 27, 2022. https://www.statnews.com/2022/09/27/inflation-reduction-act-improves-vaccine-access-but-gaps-remain/. Accessed January 24, 2023.

167 National Academies of Sciences, Engineering, and Medicine. *Combating Antimicrobial Resistance and Protecting the Miracle of Modern Medicine*. Washington, DC: The National Academies Press, 2022. https://nap.nationalacademies.org/catalog/26350/combating-antimicrobial-resistance-and-protecting-the-miracle-of-modern-medicine. Accessed January 24, 2023.

168 Centers for Disease Control and Prevention. "Core Elements of Antibiotic Stewardship." Updated April 7, 2021. https://www.cdc.gov/antibiotic-use/core-elements/index.html. Accessed January 24, 2023.

169 Centers for Disease Control and Prevention. "National Healthcare Safety Network." Updated October 15, 2021. https://www.cdc.gov/nhsn/index.html. Accessed January 24, 2023.

170 Infectious Diseases Society of America. "Infectious Diseases Society of America's Policy on State Immunization Mandates." June 23, 2012. https://www.idsociety.org/globalassets/idsa/policy–advocacy/current_topics_and_issues/immunizations_and_vaccines/statements/062312-idsa-policy-statement-on-state-immunization-mandates.pdf. Accessed January 24, 2023.

171 Substance Abuse and Mental Health Services Administration. "Greater Impact: How Disasters Affect People of Low Socioeconomic Status." *SAMHSA Disaster Technical Assistance Center Supplemental Research Bulletin*, July 2017. https://www.samhsa.gov/sites/default/files/dtac/srb-low-ses_2.pdf. Accessed January 24, 2023.

172 The White House. "American Pandemic Preparedness: Transforming Our Capabilities." September 2021. https://www.whitehouse.gov/wp-content/uploads/2021/09/American-Pandemic-Preparedness-Transforming-Our-Capabilities-Final-For-Web.pdf?page=29. Accessed January 24, 2023.

173 Johns Hopkins Center for Health Security. "Implications of Clade X for National Policy." *Clade X: A Pandemic Exercise*, Johns Hopkins Bloomberg School of Public Health. http://www.centerforhealthsecurity.org/our-work/events/2018_clade_x_exercise/pdfs/Clade-X-policy-statements.pdf. Accessed January 24, 2023.

174 National Academies of Sciences, Engineering and Medicine. *Ensuring an Effective Public Health Emergency Medical Countermeasures Enterprise*. Washington: National Academies Press, 2021. https://www.nap.edu/catalog/26373/ensuring-an-effective-public-health-emergency-medical-countermeasures-enterprise. Accessed January 24, 2023.

175 U.S. Government Accountability Office. *COVID-19: Federal Efforts Could Be Strengthened by Timely and Concerted Actions*. GAO-20-701. Washington: Government Accountability Office, September 21, 2020. https://www.gao.gov/reports/GAO-20-701/. Accessed January 24, 2023.

176 Toner, Eric, Monica Schoch-Spana, Richard Waldhorn, et al. *A Framework for Healthcare Disaster Resilience: A View to the Future*. Baltimore: Center for Health Security, 2018. http://www.centerforhealthsecurity.org/our-work/pubs_archive/pubs-pdfs/2018/180222-framework-healthcare-disaster-resilience.pdf. Accessed January 24, 2023.

177 Administration for Strategic Preparedness & Response. "Regional Disaster Health Response System." https://aspr.hhs.gov/RDHRS/Pages/default.aspx. Accessed January 24, 2023.

178 Hick, John L., Dan Hanfling, Matthew K. Wynia, and Eric Toner. "Crisis Standards of Care and COVID-19: What Did We Learn? How Do We Ensure Equity? What Should We Do?" *National Academy of Medicine*, August 30, 2021. https://nam.edu/wp-content/uploads/2021/08/Crisis-Standards-of-Care-and-COVID-19-What-Did-We-Learn.pdf. Accessed January 24, 2023.

179 Harvey, Melissa. "Using the Energy Sector As a Model for Healthcare Reliability." U.S. Department of Homeland Security, presentation at 2019 National Healthcare Preparedness Conference, December 5, 2019.

180 Aron-Dine, Aviva. "House Bill Would Help Millions Get Health Coverage, Cut Costs for Millions More." Center on Budget and Policy Priorities, *Off the Charts*, June 29, 2020. https://www.cbpp.org/blog/house-bill-would-help-millions-get-health-coverage-cut-costs-for-millions-more. Accessed January 24, 2023.

181 Toner, Eric, Monica Schoch-Spana, Richard Waldhorn, et al. *A Framework for Healthcare Disaster Resilience: A View to the Future*. Baltimore: Center for Health Security, 2018. http://www.centerforhealthsecurity.org/our-work/pubs_archive/pubs-pdfs/2018/180222-framework-healthcare-disaster-resilience.pdf. Accessed January 24, 2023.

182 National Registry of Emergency Medical Technicians. "The EMS Compact." https://www.nremt.org/rwd/public/document/replica. Accessed January 24, 2023.

183 The American College of Surgeons. "Uniform Emergency Volunteer Health Practitioners Act." https://www.facs.org/advocacy/state/uevhpa. Accessed January 24, 2023.

184 TRACIE Healthcare Emergency Preparedness Information Gateway. "Topic Collection: Crisis Standards of Care." U.S. Department of Health and Human Services. Updated January 25, 2023. https://asprtracie.hhs.gov/technical-resources/63/crisis-standards-of-care/0. Accessed January 26, 2023.

185 National Academies of Sciences Engineering and Medicine. "Crisis Standards of Care: Ten Years of Successes and Challenges from the Past Ten Years: Proceedings of a Workshop." 2020. https://www.nationalacademies.org/our-work/crisis-standards-of-care-successes-and-challenges-from-the-past-ten-years–a-workshop. Accessed January 25, 2023.

186 U.S. Department of Health and Human Services. "About the Office of Climate Change and Health Equity (OCCHE)." Updated July 25, 2022. https://www.hhs.gov/ocche/about/index.html. Accessed January 25, 2023.

187 Centers for Disease Control and Prevention. "Antimicrobial Resistance." Updated December 17, 2021. https://www.cdc.gov/drugresistance/index.html. Accessed January 25, 2023.

188 Centers for Disease Control and Prevention. *COVID-19: U.S. Impact on Antimicrobial Resistance, Special Report 2022*. Atlanta: Centers for Disease Control and Prevention, 2022. https://www.cdc.gov/drugresistance/covid19.html. Accessed January 25, 2023.

189 WHO Global Antimicrobial Resistance Surveillance System. *Global Antimicrobial Resistance and Use Surveillance System (GLASS) Report:2022*. Geneva: World Health Organization, December 9, 2022. https://www.who.int/publications/i/item/9789240062702. Accessed January 25, 2023.

190 Seither, Ranee, Jessica Laury, Agnes Mugerwa-Kasujja, et al. "U.S. Centers for Disease Control and Prevention Vaccination Coverage with Selected Vaccines and Exemption Rates Among Children in Kindergarten – United States, 2020-2021 School Year." *Morbidity and Mortality Weekly Report,* 71(16): 561–568, April 22, 2022. https://www.cdc.gov/mmwr/volumes/71/wr/mm7116a1.htm?s_cid=mm7116a1_w. Accessed January 25, 2023.

191 World Health Organization. "Shortage of Cholera Vaccines Leads to Temporary Suspension of Two-Dose Strategy, As Cases Rise Worldwide." Press release, October 19, 2022. https://www.who.int/news/item/19-10-2022-shortage-of-cholera-vaccines-leads-to-temporary-suspension-of-two-dose-strategy–as-cases-rise-worldwide. Accessed January 25, 2023.

192 Centers for Disease Control and Prevention. "Foodborne Outbreaks: List of Multistate Foodborne Outbreak Notices." Updated December 30, 2022. https://www.cdc.gov/foodsafety/outbreaks/lists/outbreaks-list.html. Accessed January 25, 2023.

193 Centers for Disease Control and Prevention. "Notes From the Field: Outbreak of Ebola Virus Disease Caused by Sudan ebolavirus – Uganda, August-October 2022." *Morbidity and Mortality Weekly Report*, 71(45);1457-1459, November 11, 2022. https://www.cdc.gov/mmwr/volumes/71/wr/mm7145a5.htm?s_cid=mm7145a5_w. Accessed January 25, 2023.

194 Centers for Disease Control and Prevention. *Viral Hepatitis Surveillance Report – United States, 2020*. Atlanta: Centers for Disease Control and Prevention, September 2022. https://www.cdc.gov/hepatitis/statistics/2020surveillance/index.htm. Accessed January 25, 2023.

195 World Health Organization. "The Global Health Observatory. HIV". HIV (who.int) Accessed February 6, 2023.

196 World Health Organization. "HIV: Key Facts." November 9, 2022. https://www.who.int/news-room/fact-sheets/detail/hiv-aids. Accessed January 26, 2022.

197 Centers for Disease Control and Prevention. "HIV: Basic Statistics." Updated June 21, 2022. https://www.cdc.gov/hiv/basics/statistics.html. Accessed January 25, 2023.

198 Centers for Disease Control and Prevention. "Lyme Disease: How Many People Get Lyme Disease?" Updated January 19, 2021. https://www.cdc.gov/lyme/stats/humancases.html. Accessed January 25, 2023.

199 Centers for Disease Control and Prevention. "Measles Cases and Outbreaks." Updated January 20, 2023. https://www.cdc.gov/measles/cases-outbreaks.html. Accessed January 25, 2023.

200 Centers for Disease Control and Prevention. "Nearly 40 million children Are dangerously susceptible to growing measles threat." Updated November 23, 2022. https://www.cdc.gov/media/releases/2022/p1123-measles-threat.html. Accessed January 25, 2023.

201 World Health Organization. "Nearly 40 million children are dangerously susceptible to growing measles threat". November 23, 2022. Nearly 40 million children are dangerously susceptible to growing measles threat (who.int) January 23, 2023.

202 *Nature*. "Get childhood immunizations back on track after COVID." Nature, 608: 7-8, August 3, 2022. https://www.nature.com/articles/d41586-022-02087-y. Accessed January 25, 2023.

203 Centers for Disease Control and Prevention. "Malaria". CDC - Parasites - Malaria Access February 6, 2023.

204 WHO Global Malaria Programme. *World Malaria Report 2022*. Geneva: World Health Organization, December 8, 2022. World malaria report 2022 (who.int) Accessed January 25, 2023.

205 The Global Fund. "Global Fund Partners Pledge Record Level of Support to End Deadly Diseases, Prevent Future Pandemics." Press release, September 21, 2022. https://www.theglobalfund.org/en/news/2022/2022-09-21-global-fund-partners-pledge-support-to-end-deadly-diseases-prevent-future-pandemics/. Accessed January 25, 2023.

206 Centers for Disease Control and Prevention. "mpox: 2022 Outbreak Cases and Data." Updated January 25, 2023. https://www.cdc.gov/poxvirus/monkeypox/response/2022/index.html. Accessed January 25, 2023.

207 Rachlin, Audrey, Jaymin C. Patel, Cara C. Burns, et al. "Progress Toward Polio Eradication – Worldwide, January 2020-April 2022." *Morbidity and Mortality Weekly Report*, 71(19): 650-655, May 13, 2022. https://www.cdc.gov/mmwr/volumes/71/wr/mm7119a2.htm?s_cid=mm7119a2_w. Accessed January 25, 2023.

208 Precision Vaccinations. "Polio Outbreaks 2023." Updated January 28, 2023. https://www.precisionvaccinations.com/polio-outbreaks-2022. Accessed January 28, 2023.

209 Centers for Disease Control and Prevention. "2022-2023 U.S. Flu Season: Preliminary In-Season Burden Estimates." Updated January 27, 2023. https://www.cdc.gov/flu/about/burden/preliminary-in-season-estimates.htm#:~:text=During%20the%202021%2D2022%20influenza,10%2C000%20hospitalizations%2C%20and%205%2C000%20deaths. Accessed January 28, 2023.

210 Smith-Schoenwalder, Cecelia. "'Tripledemic' of COVID-19, Flu and RSV Prompts Return of Some Mask Recommendations." *U.S. News & World Report*, December 12, 2022. https://www.usnews.com/news/health-news/articles/2022-12-12/tripledemic-of-covid-19-flu-and-rsv-prompts-return-of-some-mask-recommendations. Accessed January 28, 2023.

211 Centers for Disease Control and Prevention. "Inequities in Flu Vaccine Uptake." Updated October 18, 2022. https://www.cdc.gov/vitalsigns/flu-inequities/index.html. Accessed January 28, 2023.

212 Centers for Disease Control and Prevention. "Tuberculosis." Updated March 17, 2022. https://www.cdc.gov/tb/default.htm. Accessed January 28, 2023.

213 Centers for Disease Control and Prevention. "West Nile Virus: Preliminary Maps & Data for 2022." Updated December 13, 2022. https://www.cdc.gov/westnile/statsmaps/preliminarymapsdata2022/index.html. Accessed January 28, 2023.

214 Mervosh, Sarah, and Ashley Wu. "Math Scores Fell in Nearly Every State, and Reading Dipped on National Exam." *The New York Times*, October 24, 2022. https://www.nytimes.com/2022/10/24/us/math-reading-scores-pandemic.html?searchResultPosition=10. Accessed January 28, 2023.

215 Turner, Cory. "6 Things We've Learned About How the Pandemic Disrupted Learning." All Things Considered, *NPR*, June 22, 2022. https://www.npr.org/2022/06/22/1105970186/pandemic-learning-loss-findings. Accessed January 28, 2023.

216 Hernandez, Sergio, Byron Manley, Sean O'Key, and Henrik Pettersson. "Tracking Covid-19 Cases in the US." *CNN Health*, updated January 28, 2023. https://www.cnn.com/interactive/2020/health/coronavirus-maps-and-cases/. Accessed January 28, 2023.

217 Wang, Haidong, Katherine R. Paulson, Spencer A. Pease, et al. "Estimating Excess Mortality Due to the COVID-19 Pandemic: A Systematic Analysis of COVID-19 Related Mortality, 2020-21." *The Lancet*, 399(10334): 1513-1536, April 16, 2022. https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)02796-3/fulltext. Accessed January 28, 2023.

218 Ortaliza, Jared, Krutika Amin Twitter, and Cynthia Cox. "COVID-19 Leading Cause of Death Ranking." *Peterson-KFF Health Tracker System*, November 10, 2022. https://www.healthsystemtracker.org/brief/covid-19-leading-cause-of-death-ranking/. Accessed January 28, 2023.

219 Sharon LaFraniere and Noah Weiland. *The New York Times*. "U.S. Plans to End Public Health Emergency for Covid in May." Biden Administration Plans to End Covid Public Health Emergency in May - The New York Times (nytimes.com) Accessed February 2, 2023.

220 Arias, Elizabeth, Betzaida Tejada-Vera, Kenneth Kochanek, and Farida B. Ahmad. "Provisional Life Expectancy Estimates for 2021." Vital *Statistics Rapid Release,* Report No. 23, August 2022 https://www.cdc.gov/nchs/data/vsrr/vsrr023.pdf. Accessed January 28, 2023.

221 Ahmad, Farida B., Robert N. Anderson, Jodi Cisewski, and Paul D. Sutton. "Identification of Deaths with Post-acute Sequelae of COVID-19 from Death Certificate Literal Text: United States, January 1, 2020-June 30, 2022." *Vital Statistics Rapid Release*, Report No., December 2022. https://www.cdc.gov/nchs/data/vsrr/vsrr025.pdf. Accessed January 28, 2023.

222 Schneider, Eric C., Arnav Shah, Pratha Sah, et al. "Impact of U.S. COVID-19 Vaccination Efforts: An Update on Averted Deaths, Hospitalizations, and Health Care Costs Through March 2022." *The Commonwealth Fund*, April 8, 2022. https://www.commonwealthfund.org/blog/2022/impact-us-covid-19-vaccination-efforts-march-update. Accessed January 24, 2023.

223 Amin, Kruitka, Jared Ortaliza, Cynthia Cox, et al. "COVID-19 mortality preventable by vaccines." *Peterson-KFF Health Tracker System*, April 21, 2022. https://www.healthsystemtracker.org/brief/covid19-and-other-leading-causes-of-death-in-the-us/. Accessed January 28, 2023.

224 Seither, Ranee, Jessica Laury, Anges Mugerwa-Kasujja, et al. "Vaccination Coverage with Selected Vaccines and Exemption Rates Among Children in Kindergarten – United States, 2020-2021 School Year." *Morbidity and Mortality Weekly Report,* 71(16): 561-568, April 22, 2022. https://www.cdc.gov/mmwr/volumes/71/wr/mm7116a1.htm?s_cid=mm7116a1_w. Accessed January 28, 2023.

225 Mcallister, Edward, and Jennifer Rigby. "COVID Disrupted Measles Vaccinations in Africa and Now Cases Are Surging." *Reuters,* October 24, 2022. https://www.reuters.com/business/healthcare-pharmaceuticals/covid-disrupted-measles-vaccinations-africa-now-cases-are-surging-2022-10-24/. Accessed January 28, 2023.

226 Nature. "Get Childhood Immunizations Back on Track After COVID." *Nature*, 608: 7-8, August 3, 2022. https://www.nature.com/articles/d41586-022-02087-y. Accessed January 28, 2023.

227 U.S. Government Accountability Office. "Maternal Health: Outcomes Worsen and Disparities Persisted During the Pandemic." GAO-23-105871, October 19, 2022. https://www.gao.gov/products/gao-23-105871. Accessed January 28, 2023.

228 Perlis, Roy, Mauricio Santillana, and Katherine Ognyanova. "Prevalence and Correlates of Long COVID Symptoms Among US Adults." *JAMA Network Open*, 5(10): e2238804, October 27, 2022. https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2797782. Accessed January 28, 2023.

229 Centers for Disease Control and Prevention. *Diagnoses of HIV Infection in the United States and Dependent Areas 2020. HIV Surveillance Reports, Volume 33.* Atlanta: Centers for Disease Control and Prevention, 2020. https://www.cdc.gov/hiv/library/reports/hiv-surveillance.html. Accessed January 28, 2023.

230 National Cancer Institute. "Working to Close the Cancer Screening Gap Caused by COVID". May 17, 2022. Closing the COVID-Induced Cancer Screening Gap - NCI Accessed February 6, 2023.

231 Johnson, Akilah, and Dan Keating. "Whites Now More Likely to Die From Covid Than Blacks: Why the Pandemic Shifted." *The Washington Post*, October 19, 2022. https://www.washingtonpost.com/health/2022/10/19/covid-deaths-us-race/. Accessed January 28, 2023.

232 U.S. Centers for Disease Control and Prevention. COVID-19: Risk for COVID-19 Infection, Hospitalization, and Death by Race/Ethnicity. Updated November 8, 2022. Risk for COVID-19 Infection, Hospitalization, and Death By Race/Ethnicity | CDC Accessed December 13, 2022.

233 Ansari, Talal, and Jennifer Calfas. "Men Died from COVID-19 at Much Higher Rate than Women in Pandemic's First Year." *The Wall Street Journal*, October 25, 2022. https://www.wsj.com/articles/men-died-from-covid-19-at-much-higher-rate-than-women-during-the-first-year-of-pandemic-11666662323?mod=Searchresults_pos1&page=1. Accessed January 28, 2023.

234 Payne, Daniel. "The South's Health Care System Is Crumbling Under COVID-19: Enter Tennessee." *Politico*, March 19, 2022. https://www.politico.com/news/2022/03/19/covid-closed-rural-hospitals-tennessee-deaths-anti-vax-conspiracies-00018204. Accessed January 28, 2023.

235 Sparks, Grace, Lunna Lopes, Alex Montero, et al. "KFF COVID-19 Vaccine Monitor: Pregnancy Misinformation – May 2022." *Kaiser Family Foundation*, May 27, 2022. https://www.kff.org/coronavirus-covid-19/poll-finding/kff-covid-19-vaccine-monitor-pregnancy-misinformation-may-2022/. Accessed January 28, 2023.

236 Kaiser Family Foundation. "COVID-19 Misinformation is Ubiquitous: 78% of the Public Believes or is Unsure About At Least One False Statement, and Nearly a Third Believe At Least Four of Eight False Statements Tested." *KFF*, November 8, 2021. https://www.kff.org/coronavirus-covid-19/press-release/covid-19-misinformation-is-ubiquitous-78-of-the-public-believes-or-is-unsure-about-at-least-one-false-statement-and-nearly-at-third-believe-at-least-four-of-eight-false-statements-tested/. Accessed January 28, 2023.

237 Hillis, Susan, Joel-Pascal Ntwali N'konzi, William Msemburi, et al. "Orphanhood and Caregiver Loss Among Children Based on New Global Excess COVID-19 Death Estimates." *JAMA Pediatrics*, 176(11): 1145-1148, September 6, 2022. https://jamanetwork.com/journals/jamapediatrics/fullarticle/2795650. Accessed January 28, 2023.

238 Treglia, Dan, Cutuli, J.J., Arasteh, Kamyar, et al. "Parental and Other Caregiver Loss Due to COVID-19 in the United States: Prevalence by Race, State, Relationship, and Child Age". *Journal of Community Health.* December 14, 2022. Parental and Other Caregiver Loss Due to COVID-19 in the United States: Prevalence by Race, State, Relationship, and Child Age - PMC (nih.gov) Accessed March 6, 2023

239 UN Inter-Agency Task Force on Financing for Development. *Financing for Sustainable Development Report 2022: Bridging the Finance Divide.* New York: United Nations, 2022. https://developmentfinance.un.org/fsdr2022. Accessed January 28, 2023.

240 Select Sub-Committee on the Coronavirus Crisis. *Preparing for and Preventing the Next Public Health Emergency: Lessons Learned from the Coronavirus Crisis.* Washington: U.S. House of Representatives, December 2022. https://coronavirus.house.gov/sites/democrats.coronavirus.house.gov/files/2022.12.09. Accessed January 28, 2023.

241 Iacurci, Greg. "Millions Suffer From Long Covid—and it Costs Them $9,000 a Year in Health-Care Expenses, on Average." *CNBC*, December 1, 2022. https://www.cnbc.com/2022/12/01/long-covid-costs-patients-an-average-9000-a-year-in-medical-expenses.html. Accessed January 28, 2023.

242 Dietz, Richard. "Long COVID Appears to Have Led to a Surge of the Disabled in the Workplace." *Liberty Street Economics*, October 20, 2022. https://libertystreeteconomics.newyorkfed.org/2022/10/long-covid-appears-to-have-led-to-a-surge-of-the-disabled-in-the-workplace/. Accessed January 28, 2023.

243 USDA Economic Research Service. "Drought in the Western United States." U.S. Department of Agriculture, updated December 5, 2022. https://www.ers.usda.gov/newsroom/trending-topics/drought-in-the-western-united-states/. Accessed January 28, 2023.

244 NASA. "2022 Drought and Fire in the United States." *Earth Observatory*, 2022. https://earthobservatory.nasa.gov/images/event/149612/2022-drought-and-fire-in-the-united-states. Accessed January 28, 2023.

245 Masterson, Victoria. "These Are Some of the Unexpected Impacts of Heatwaves." World Economic Forum, Centre for Nature and Climate, October 11, 2022. https://www.weforum.org/agenda/2022/10/heatwaves-unexpected-impact-diverse-communities/#:~:text=Record%20heatwaves%20in%202022%20have,warming%20atmosphere%20drives%20climate%20change. Accessed January 28, 2023.

246 NASA. "A Long-Lasting Western Heatwave." *Earth Observatory*, September 6, 2022. https://earthobservatory.nasa.gov/images/150318/a-long-lasting-western-heatwave. Accessed January 28, 2023.

247 National Weather Service. "NWS Preliminary US Flood Fatality Statistics." National Oceanic and Atmospheric Administration, updated January 23, 2023. https://www.weather.gov/arx/usflood. Accessed January 28, 2023.

248 Gilligan, Chris. "States That See the Most Flooding Damage." *U.S. News & World Report*, October 13, 2022. https://www.usnews.com/news/best-states/articles/2022-10-13/states-with-the-most-flood-damage-in-the-u-s. Accessed January 28, 2023.

249 National Centers for Environmental Information. "Annual 2022 Tornadoes Report". Annual 2022 Tornadoes Report | National Centers for Environmental Information (NCEI) (noaa.gov) Accessed January 28, 2023.

250 National Centers for Environmental Information. "U.S. Tornadoes." National Oceanic and Atmospheric Administration, updated December 2022. https://www.ncei.noaa.gov/access/monitoring/tornadoes/. Accessed January 28, 2023.

251 Godwin, Cody. "Tornadoes Hit Texas, Oklahoma, Louisiana, Severe Weather Hits US." *USA Today*, December 14, 2022. https://www.usatoday.com/videos/news/nation/2022/12/14/tornadoes-hit-texas-oklahoma-louisiana-severe-weather-hits-us/10894786002/. Accessed January 28, 2023.

252 Center for Disaster Philanthropy. "2022 North American Wildfires." Updated January 19, 2023. https://disasterphilanthropy.org/disasters/2022-north-american-wildfires/. Accessed January 28, 2023.

253 Mallen, Evan, Matthew Roach, Elizabeth Gillespie, et al. "Extreme Health Exposure: Access and Barriers to Cooling Center – Maricopa and Yuma Counties, Arizona, 2019-2020." *Morbidity and Mortality Weekly Report*, 71(24): 781-785, June 2022. https://www.cdc.gov/mmwr/volumes/71/wr/mm7124a1.htm?s_cid=mm7124a1_w&ACSTrackingID=FCP_14_USCDC_449-DM82830&ACSTrackingLabel=%5BProof%2014%5D%20New%20Vital%20Signs%20Report%E2%80%94Cooling%20Centers&deliveryName=FCP_14_USCDC_449-DM82830. Accessed January 28, 2023.

254 UN Environment Programme. *Adaptation Gap Report 2022: Too Little, Too Slow: Climate Adaptation Failure Puts World at Risk*. New York: United Nations, November 1, 2022. https://www.unep.org/resources/adaptation-gap-report-2022. Accessed January 28, 2023.

255 Prillaman, McKenzie. "Climate Change Is Making Hundreds of Diseases Much Worse." *Nature*, August 12, 2022. https://www.nature.com/articles/d41586-022-02167-z. Accessed January 28, 2023.

256 Fitzpatrick, Meagan C., Seyed M. Moghadas, Abhishek Pandey, and Alison P. Galvani. "Two Years of U.S. COVID-19 Vaccines Have Prevented Millions of Hospitalizations and Deaths." *The Commonwealth Fund*, December 13, 2022. https://www.commonwealthfund.org/blog/2022/two-years-covid-vaccines-prevented-millions-deaths-hospitalizations. Accessed January 28, 2023.

257 Soucheray, Stephanie. "New Vaccine Roadmap Eyes Future Threats of Coronaviruses." University of Minnesota, Center for Infectious Disease Research and Policy, *CIDRAP News*, October 24, 2022. https://www.cidrap.umn.edu/news-perspective/2022/10/new-vaccine-roadmap-eyes-future-threats-coronaviruses. Accessed January 28, 2023.

258 Lazarus, Jeffrey V., Diana Romero, Christopher J. Kopka, et al. "A Multinational Delphi Consensus to End the COVID-19 Public Health Threat." *Nature*, 611: 332-345, November 3, 2022. https://www.nature.com/articles/s41586-022-05398-2. Accessed January 28, 2023.

259 Independent Panel for Pandemic Preparedness & Response. *COVID-19: Make It the Last Pandemic*. Geneva: World Health Organization, May 2022. https://theindependentpanel.org/wp-content/uploads/2021/05/COVID-19-Make-it-the-Last-Pandemic_final.pdf. Accessed January 28, 2023.

260 World Health Organization. "WHO Releases First Data on Global Vaccine Market Since COVID-19." Press release, November 9, 2022. https://www.who.int/news/item/09-11-2022-who-releases-first-data-on-global-vaccine-market-since-covid-19. Accessed January 28, 2023.

261 Sachs, Jeffrey D., Salim Abdool Karim, Lara Aknin, et al. "The Lancet Commission on Lessons for the Future from the COVID-19 Pandemic." *The Lancet*, 400(10359), September 14, 2022. https://covid19commission.org/. Accessed January 28, 2023.

262 U.S. Government Accountability Office. *Public Health Preparedness: COVID-19 Medical Surge Experiences and Related HHS Efforts. GAO-22-105461*. Washington: U.S. Government Accountability Office, August 2022. https://www.gao.gov/assets/gao-22-105461.pdf. Accessed January 28, 2023.

263 Centers for Disease Control and Prevention. "CDC Moving Forward." Updated August 17, 2022. https://www.cdc.gov/about/organization/cdc-moving-forward.html. Accessed January 28, 2023.

264 U.S. Senate Committee on Homeland Security & Governmental Affairs. *Historically Unprepared: Examination of the Federal Government's Pandemic Preparedness and Initial COVID-19 Response*. Washington: U.S. Senate, December 2022. https://www.hsgac.senate.gov/media/majority-media/peters-investigation-finds-significant-failures-in-federal-governments-pandemic-preparedness-and-initial-covid-19-response-. Accessed January 28, 2023.

265 Select Sub-Committee on the Coronavirus Crisis. *Preparing for and Preventing the Next Public Health Emergency: Lessons Learned from the Coronavirus Crisis*. Washington: U.S. House of Representatives, December 2022. https://coronavirus.house.gov/sites/democrats.coronavirus.house.gov/files/2022.12.09. Accessed January 28, 2023.

266 Abbasi, Jennifer. "Amid Ohio Measles Outbreak, New Global Report Warns of Decreased Vaccination During COVID-19 Pandemic." *JAMA*, 329(1): 9-11, December 15, 2022. https://jamanetwork.com/journals/jama/fullarticle/2799834. Accessed January 28, 2023.

267 Lopes, Lunna, Shannon Schumacher, Grace Sparks, et al. "KFF COVID-19 Vaccine Monitor: December 2022." *Kaiser Family Foundation*, December 16, 2022. https://www.kff.org/coronavirus-covid-19/poll-finding/kff-covid-19-vaccine-monitor-december-2022/. Accessed January 28, 2023.

268 Henney, Jane E., Francisco Diez-Gonzalez, James Jones, et al. *Operational Evaluation of the FDA Human Foods Program*. Reagan-Udall Foundation. Washington: Food and Drug Administration, December 6, 2022. https://reaganudall.org/operational-evaluation-fdas-human-foods-programs. Accessed January 28, 2023.

269 Association of State and Territorial Health Officials. "Responding to Emerging Food Safety Threats Policy Statement." Press release, December 4, 2022. https://www.astho.org/globalassets/pdf/policy-statements/responding-to-emerging-food-safety-threats.pdf?utm_source=informz&utm_medium=email&utm_campaign=asthophw&utm_content=PolicyStatement&utm_term=FoodSafety. Accessed January 28, 2023.

270 *Health.gov*. "Equitable Long-Term Recovery and Resilience." U.S. Department of Health and Human Services, updated November 18, 2022. https://health.gov/our-work/national-health-initiatives/equitable-long-term-recovery-and-resilience. Accessed January 28, 2023.

271 Hepburn, Matt, Andrew Hebbeler, and Steph Guerra. "The 2022 National Biodefense Strategy Builds Upon Administration S&T Priorities for Pandemic Preparedness." The White House, October 18, 2022. https://www.whitehouse.gov/ostp/news-updates/2022/10/18/the-2022-national-biodefense-strategy-builds-upon-administration-st-priorities-for-pandemic-preparedness/. Accessed January 28, 2023.

272 Administration for Strategic Preparedness & Response. "ASPR Strategic Plan for 2022-2026." U.S. Department of Health and Human Services, December 12, 2022. https://aspr.hhs.gov/stratplan/Pages/default.aspx. Accessed January 28, 2023.

273 Centers for Disease Control and Prevention Newsroom. CDC Awards More Than $3 Billion to Improve U.S. Public Health Workforce and Infrastructure". November 29, 2022. CDC Awards More Than $3 Billion to Improve U.S. Public Health Workforce and Infrastructure | CDC Online Newsroom | CDC Accessed January 28, 2023.

274 Center for Disease Control and Prevention. "Public Health Infrastructure Grant Program." Updated November 29, 2022. https://www.cdc.gov/infrastructure/. Accessed January 28, 2023.

275 Trust for America's Health. *Ready or Not: Protecting the Public's Health from Diseases, Disasters and Bioterrorism, 2019*. Washington, DC: Trust for America's Health, 2019. https://www.tfah.org/report-details/ready-or-not-protecting-the-publics-health-from-diseases-disasters-and-bioterrorism-2019/. Accessed January 28, 2023.

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