Ready or Not:

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

2024

SPECIAL FEATURE on the health impacts of extreme heat and its disproportionate risk for some populations

Trust *for* America's Health

TFAH.ORG

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 makes the prevention of illness and injury a national priority. Review TFAH's 2023–2026 Strategic Plan at *tfah.org*.

Table of Contents

Executive Summary

In 2023, the United States faced multiple public health emergencies. The COVID-19 pandemic, although no longer a declared emergency as of May, continued to pose significant concerns. In addition, the country experienced 28 weather-related disasters that each caused at least $1 billion in damage, a record number of such high-impact events. Severe storms in Mississippi caused extensive damage, underscoring the need for effective emergency responses. Wildfires in Maui, Hawaii, led to 100 known deaths and substantial destruction and economic losses. Additionally, smoke from Canadian wildfires severely affected air quality in the Midwest and Northeast, impacting vulnerable populations. Hurricane Idalia in the southeast U.S. and Typhoon Mawar in Guam further highlighted the growing threat of weather-related disasters, testing the resilience of public health infrastructures. These events emphasized the need for a comprehensive approach to public health preparedness, one that integrates immediate responses with long-term strategies for prevention, mitigation, and recovery.

Ready or Not: Protecting the Public's Health from Diseases, Disasters, and Bioterrorism, now in its 21st edition, continues its crucial role tracking national public health emergency preparedness. This edition remains as vital as ever for policymakers, offering actionable data and recommendations to enhance emergency preparedness in their jurisdictions. The report's key indicators provide state officials with benchmarks to assess progress, identify gaps in all-hazards preparedness, and compare their state's performance with others, serving as a vital tool for targeted policy and fiscal decision-making.

In addition, the report's special section discusses the increasing health impacts of extreme heat, particularly on population groups at disproportionate risk, and outlines action steps officials should take to protect health during heat waves.

EFFECTIVE EMERGENCY PREPAREDNESS REQUIRES COMPREHENSIVE PUBLIC HEALTH INVESTMENT AND SYSTEMS

Critical to public health preparedness and resilience is investment in the full range of public health activities across the Centers for Disease Control and Prevention (CDC), other federal agencies and at the state, local, tribal, and territorial levels. Public health emergencies, including extreme weather events and infectious disease outbreaks, repeatedly demonstrate the interconnectedness of the underlying health of the population and disaster resilience.

People with chronic diseases or behavioral health conditions typically have the worst outcomes during infectious disease outbreaks or natural disasters. Preventing chronic diseases and improving the underlying health of communities is therefore key to averting severe health impacts during emergencies. An effective public health response also requires experts from a range of disciplines, such as maternal health, child and adolescent health, older adult health, behavioral health, environmental health, and health equity.

Investing only in one aspect of public health preparedness while neglecting chronic disease prevention is short-sighted and makes the nation more vulnerable in the long run. Investing in programs that promote health in every community is an important first step in emergency preparedness.

This Year's Findings

In this 2024 report, as in past years, states were scored by Trust for America's Health (TFAH) relative to one another for each indicator and overall.

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 indicators. This year, 21 states and the District of Columbia scored in the high-performance tier, 13 placed in the middle-performance tier, and 16 were in the low-performance tier (see Table 2). (See "Appendix B: Methodology" for more information on the scoring process.)

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

Source: National Health Security Preparedness Index[1]

Notes: The National Council of State Boards of Nursing organizes the Nurse Licensure Compact. 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 nonprofit 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 edition of Ready or Not does not include the Public Health System Comprehensiveness indicator. This indicator, which has been a valuable part of our report since 2022, assesses the percentage of state populations served by a comprehensive public health system. Unfortunately, we were unexpectedly unable to access updated data from the latest National Longitudinal Survey of Public Health Systems (NALSYS) by Systems for Action, data that were needed to include the indicator in this year's report. Instead, this year's assessment of state public health emergency readiness is based on nine indicators rather than the usual 10. States' placement within the performance tiers may have been affected by this change, either negatively or positively. As we do every year, TFAH will evaluate the mix of performance indicators used in the report for the 2025 edition; we expect to return to 10 indicators at that time.

TABLE 2: State Public Health Emergency Preparedness State performance, by scoring tier, 2023		
Performance Tier	**States**	**Number of States**
High Tier	AL, AZ, CO, CT, DC, FL, GA, KS, MA, ME, MS, NC, NE, NJ, OH, PA, RI, SC, TN, VA, VT, WA	21 states and DC
Middle Tier	AR, DE, IA, ID, IL, MD, MO, MT, NH, NM, OK, UT, WI	13 states
Low Tier	AK, CA, HI, IN, KY, LA, MI, MN, ND, NV, NY, OR, SD, TX, WV, WY	16 states

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

TFAH's analysis found:

A significant number of states have proactively prepared to enhance healthcare and public health laboratory capacities in response to emergencies. As of this report, 39 states have joined the Nurse Licensure Compact, a notable increase from 26 states in 2017.[2] This compact permits registered nurses and licensed practical or vocational nurses to practice across multiple jurisdictions under a single license. Such an arrangement is particularly beneficial in emergencies, as it allows for rapid augmentation of healthcare staffing. Nurses, for instance, can cross state boundaries to assist at evacuation centers or other medical facilities as needed.

Furthermore, all states have developed written plans to significantly expand public health laboratory capacity for periods ranging from six to eight weeks, with the exception of four: California, Missouri, Utah, and Virginia. This expansion is critical for managing simultaneous emergencies or handling large-scale outbreaks. These efforts reflect a growing commitment to emergency healthcare readiness and the ability to respond effectively to a variety of challenging scenarios.

A large majority of U.S. residents who access their household water from a community water system had access to safe drinking water. In 2022, on average, only 5 percent of state residents were served by a community water system that failed to meet all relevant health-based standards. This represents a marginal improvement

from 2018, where 7 percent of residents were in similar circumstances. Water systems that do not comply with these standards pose a heightened risk of water-based emergencies, potentially leading to contaminated water supplies that endanger public health. To enhance safety, continuous monitoring and improvement of water system standards are essential to reduce these risks and ensure the provision of clean, safe water for all residents.

A significant number of states have achieved accreditation in either public health, emergency management, or both, demonstrating their commitment to maintaining high standards in these critical areas. As of January 2024, either the Public Health Accreditation Board or the Emergency Management Accreditation Program had accredited 43 states and the District of Columbia. Notably, 29 of these states, along with the District of Columbia, have received accreditation from both organizations. However, seven states—Alaska, Hawaii, New Hampshire, South Dakota, Texas, West Virginia, and Wyoming—had not been accredited by either body. Accreditation from these programs is an important indicator of a state's preparedness and capability in handling emergencies. It helps ensure that there are effective prevention and response systems in place, operated by adequately trained and qualified personnel. This dual accreditation is vital for enhancing state-level readiness and response to public health and emergency situations, contributing to a higher standard of

safety and preparedness for residents. However, the lack of accreditation does not necessarily mean that a state failed to earn accreditation. It could mean that the state chose not to apply for accreditation or its accreditation process is ongoing.

Seasonal flu vaccination rates in the United States have experienced notable shifts over the past few years. While the country saw a significant rise in flu vaccination rates in earlier years, recent seasons have seen a decline. Specifically, the vaccination rate among Americans ages 6 months and older increased from 42 percent in the 2017–2018 season to a peak of 52 percent in both the 2019–2020 and 2020–2021 seasons. However, this was followed by a slight decrease to 51 percent in the 2021–2022 season. More concerning is the 2022–2023 flu season, where CDC reported a vaccination rate of just 49 percent, the lowest since the 2018–2019 season.[3] The Healthy People 2030 initiative, a federal program establishing decade-long goals for national health improvement, has set a target of achieving a 70 percent annual seasonal influenza vaccination rate.[4] This target underscores the importance of continued efforts to promote flu vaccination, which is key to reducing the incidence and severity of seasonal flu outbreaks. Enhancing public awareness and the accessibility of flu vaccines will be crucial in striving to exceed this target and thereby prevent flu hospitalizations and deaths.

In the United States, the utilization of paid time off (PTO) among workers varies across states, reflecting disparities in public health preparedness and workforce policies. During the period from March 2018 to March 2023, an average of 55 percent of workers reported using some form of paid time off, including sick leave, vacation, and holidays. This measure, crucial for public health, allows workers to stay home during illnesses, reducing the spread of diseases and easing the burden on healthcare systems. The U.S. approach to PTO is unique, lacking comprehensive federal mandates and relying instead on individual employer policies or state or local legislation. The significance of PTO was highlighted during the COVID-19 pandemic, when temporary federal mandates for sick leave helped reduce virus transmission rates. However, the absence of a uniform national policy underscores the need for more consistent and comprehensive approaches to ensure workforce health and resilience. This variability in PTO access and usage not only impacts individual health but also has broader implications for public health emergency preparedness and response.

In a fall 2023 assessment, only 25 percent of U.S. hospitals on average earned an "A" grade for patient safety. This rating measures a hospital's capability to ensure patient safety and manage public health emergencies. Historically, U.S. hospital safety has evolved dramatically, from improving medical education standards to integrating advanced technology and systematic safety protocols. However, despite these advancements, hospital errors still rank as a leading cause of death, necessitating continuous improvement in hospital practices. This indicator serves as a barometer of a hospital's performance in areas that are critical for preparedness, including intensive care capacity, prevention of hospital-associated infections, error prevention, and readiness for emergencies.

Report Purpose and Methodology

TFAH annually publishes the *Ready or Not* report series, which evaluates states' preparedness for public health emergencies. This assessment is based on key indicators that collectively form a checklist of crucial issues and actions for states and localities to address continually. The report, encompassing all 50 states and the District of Columbia, enables states to compare their performance with that of prior years and of similar jurisdictions. This analysis was completed following consultations with a diverse group of subject-matter experts and practitioners.

The report's indicators, primarily sourced from the National Health Security Preparedness Index (NHSPI),[5] include a unique measure: the trend in state public health funding levels, with data collected by TFAH. This indicator specifically gauges the resource adequacy of key agencies for emergency preparation and response. The NHSPI, historically an initiative of the Robert Wood Johnson Foundation, was produced with scientific and administrative direction from the University of Kentucky and the University of Colorado. For a comprehensive understanding of how TFAH selected and scored these indicators, see "Appendix B: Methodology."

Ready or Not and the NHSPI 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 fewer 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 both work to help federal, state, and local officials use data and findings from each project to make Americans safer and healthier.

SPECIAL FEATURE:

The Health Impacts of Extreme Heat and its Disproportionate Risk for Some Populations

Everyone living in the United States will experience the impacts of climate change, including unprecedented heatwaves, but some population groups are at heightened risk.

Episodes of extreme heat, already the most frequent cause of climate related illness and mortality, are becoming more frequent, involve higher temperatures, are longer in duration, and are occurring in more regions of the country. These events have led to new and expanded threats to health, particularly among populations at greater risk for heat-related illness and in places where extreme heat and/or sustained climate-related health risks are new occurrences, thus residents have not acclimated to them. In 2022, more people died in the United States due to extreme heat than due to any other type of weather-related event.[6]

Climate scientists predict that episodes of extreme and prolonged heat waves will be the new norm. Extreme heat deaths are known to disproportionately affect Black and Native Americans (due to socioeconomic factors) and people living in urban or rural communities.[7] Protecting people from the health effects of heat is therefore an urgent public health need, as is understanding and responding to the ways in which some population groups are at increased risk.

Record Heat: Who is at Heightened Risk?

According to NASA, the summer of 2023 was the hottest ever recorded since record-keeping started in 1880.[8] Many parts of the United States, including regions normally associated with cooler summer temperatures, experienced days of record-breaking heat. In August, an estimated 57 million people living in the South and Southwest regions of the country spent days under an excessive heat warning, and an additional 54 million people were under a heat advisory.[9] Examples of extended extreme high temperatures occurred in the Phoenix, Arizona area, which experienced 54 consecutive days of temperatures reaching 110 degrees.[10] In August, heat index measures reached 110 degrees in traditionally warm parts of the country but also reached record levels as far north as Southern Illinois.[11]

Most healthy adults are able to manage heat within typical ranges, but experts postulate that new levels of extreme heat has led to more heat-related illness nationwide particularly among disproportionately impacted groups, including under-resourced and low-income communities, many communities of color, Tribes, immigrant populations, people with chronic diseases, people using medications that increase their heat-associated risks, people with a substance misuse disorder, pregnant people, infants, children, older adults, people who work outdoors, people who live in urban heat islands, people living without air conditioning (or those who cannot afford to use it) and people who live alone.[12] Furthermore, belonging to more than one of these groups, such as an older adult living in an under-resourced community, adds to the risk of heat-related illness.

A further complication of protecting people from the health impacts of extreme heat is that heat effects happen to different people at different levels of exposure. In other words, being outside or inside without air conditioning on a hot day might present little or no risk for some people but high risk for others, making general heat warnings less effective.

How Intersecting Risk Factors Increase Heat Impacts on Some Groups

Many population groups are at the highest risk of heat-related illness due to their age (including children and older adults), health, or economic status. Typically, groups at heightened risk include people with low incomes, people with a disability, and some

communities of color. In addition, the circumstances and built environment in which people live—such as people who are unhoused, have limited access to transportation, work outdoors or in workplaces without air conditioning, people whose homes are not air conditioned, and people who live in urban heat islands (areas with little or no green space that are without shade-producing tree canopies and that have a high proportion of asphalt)—experience overlapping vulnerabilities that increase people's risk for heat-related illness and mortality. Furthermore, redlining, which was the practice of systemically driving Black residents to certain neighborhoods, such as by denying home loans, created segregated and under resourced communities. Many of which continue to experience disproportionate levels of poor health outcomes and limited economic opportunity.[13]

Medical conditions such as heart disease, obesity, diabetes, kidney disease, and asthma—often occurring at higher prevalence in communities that experience social, economic, and environmental disadvantages, including income disparities and lack of access to health promoting resources —can worsen the health impacts of extreme heat and other climate-related events.

In addition, the conditions in which a person lives have a strong correlation to their ability to protect their health during heat waves. Research shows that many communities of color are disproportionately vulnerable to the effects of extreme heat and air pollution due to long standing impacts of structural racism. For example, the effects of discriminatory banking practices greatly limited property values and buying power within communities of color.[14]

Redlined communities typically were core urban neighborhoods and Black neighborhoods.[15] The effects of redlining continue to impact health in many communities of color today as more Black people live in under resourced communities, in urban heat islands or near contaminated land or waterways, putting them at greater risk of heat or other environmental health threats.[16]

People who are unhoused are likely to have no or limited access to air conditioning and may also have limited or no access to shade and cooling centers. Furthermore, a 2014 study in New York City found a strong association between older adults who lived in deteriorating and dilapidated housing and their vulnerability to the impacts of extreme heat.[17] Rural populations can also be at heightened risk of heat-related illness due to lack of air conditioning, lack of access to healthcare or social services, and geographic isolation.[18]

Heat and Pregnancy

Pregnant people exposed to high levels of environmental heat are at higher risk of developing labor and delivery complications than expectant people not experiencing chronic heat exposure, according to a study published in *The Journal of the American Medical Association*.[19] The study results linked exposure to environmental heat to severe maternal morbidity, including increased risk of cardiac arrest, eclampsia, heart failure, and sepsis.[20] The study's authors noted that the heat many parts of the country experienced during the summer of 2023 would qualify as chronic exposure to extreme heat,[21] which can lead to pre-term births. In 2019, one out of every 10 infants was a pre-term birth, and health professionals are concerned that the number of such

births will continue to rise due to the increasing amount of extreme heat.[22] Short and long term exposure to heat is also a risk factor for stillbirth.[23]

Impacts of Extreme Heat on Infants and Young Children

Children are often at higher risk for the health impacts of climate change, including extreme heat, than other age groups for a number of reasons: their bodies are still developing, they breathe at a faster rate, and they often spend more time outdoors.[24] Heat stroke is particularly dangerous for children and can lead to damage to their brains, hearts, kidneys, and muscles.[25]

Exposure to extreme heat is also dangerous for infants. Such exposure puts babies at increased risk for preterm birth and low birth weight. Babies can overheat quickly; one reason is that their sweat glands are not fully developed. Therefore, one of the body's primary methods of remaining cool, sweating, is not as effective in infants as it is in older groups.[26]

Poor air quality, often related to wildfire smoke (wildfires are often fueled by the dry conditions created by extreme heat) or ground-level ozone, can cause health problems for everyone but is especially dangerous for the developing lungs of a child and can lead to increased risk for adverse birth outcomes, developmental disorders, and asthma.[27]

The impact of extreme heat and other climate change on children is a strong example of the ways social, economic, and environmental inequities can exacerbate health risks. For example, more children of color live in communities where the impact of extreme heat is a more significant health risk than it is in affluent communities. A community with few trees and more industry, traffic, and

asphalt becomes a heat island with few places for kids to play or cool off.

As longer and more intense heat waves and wildfire smoke events increase, preventing and monitoring these events and their impact on children will become more critical. School districts need to be alert to the health risks associated with excessive heat and/ or poor air quality in school buildings. A 2020 Government Accountability Office report found that an estimated 41 percent of U.S. public school districts needed to update or replace their heating/ventilation and air conditioning systems in at least half of their school buildings.[28] The environmental safety of school buildings is another place where certain populations groups, often people of color, are disproportionately impacted, with schools in Black and Hispanic neighborhoods more likely to lack air conditioning or have poor indoor air quality.[29]

Impact of Extreme Heat on Older Adults

Older adults, people ages 65 and older, are more prone to heat-related illness, due to medications or chronic conditions that impact their ability to regulate body temperature or when their condition is exacerbated by the heat. They are also more susceptible to the negative health effects of air pollution.[30] People 65 and older accounted for more heat-related hospitalizations in the United States than did any other age group.[31] Increases in overall average temperatures and increasing numbers of heat waves in communities across the country are expected to lead to more heat-related illnesses and deaths among populations at higher risk of poor outcomes, including older adults.[32]

Because more people of color live in urban heat islands, their life conditions increases their heat vulnerability.[33] National data show that nearly 90 percent of U.S. households use air conditioning, but about 12 percent of households living below the poverty line lack home air conditioning.[34] When looked at through the lens of the number of older adults living at or near the poverty line, the lack of in-home air conditioning creates health risks for many older Americans. According to the Congressional Research Service, in 2021 about 5.8 million people above the age of 65 lived in poverty.[35] An additional consideration is older adults who have air conditioning but cannot afford to use it.

Reliance on public transportation to get to a store, a medical appointment, or a cooling center during a heat wave is another example of an increased vulnerability for some older adults. According to a University of Maryland School of Medicine study, 20 percent of senior adults report that they rely on public transportation to get to their medical appointments.[36]

Heat and Indigenous Populations

Native Americans, Native Alaskans, and Native Hawaiians are often at higher risk for health impacts during periods of extreme heat. According to CDC data and reporting, between 2004 and 2018, indigenous groups experienced the highest rate of heat-related deaths in the United States.[37] One primary reason is the higher levels of chronic disease within Indigenous populations due to long-standing inequities in the social determinants of health such as access to education, employment, and healthcare.[38] Other factors include threats to natural resources and ecosystems produced by climate change as well as a lack of health promoting infrastructure in some Indigenous communities.[39]

Heat Impacts on People Who Live in Public Housing

People who live in public housing often have higher rates of chronic disease often associated with income levels, access to transportation and healthcare, and environmental hazards. They are also typically older. These factors put them at higher risk for heat-related illness. Adding to the risk factors are poor indoor air quality and a lack of air conditioning and green space within many communities with public housing.[40]

Heat and People with Existing Medical or Behavioral Health Conditions or Disabilities

Extreme heat multiplies the health risks for people with mental and cognitive health conditions, as well as for people with chronic health conditions and disabilities.[41] People with behavioral health conditions are often at higher risk of harm during heat waves as the use of alcohol, drugs, and psychotropic medications increase the risk of heat-related illness and death.[42] Periods of extreme heat have also been found to be associated with increases in insomnia, depressive feelings, suicidal ideation, and suicide.[43]

What Action Steps are Needed?

Protecting health from the impacts of extreme heat requires attention and action steps at many levels and by many sectors, including federal, state, and local government; employers; the public health system; the healthcare sector; and schools, among others. An issue in many communities is what agency has lead or coordinating responsibility for protecting residents from the health impacts of extreme heat. Clarity is needed about who is in charge and that office or agency needs the resources to do the job. Emergency response

and public health systems need to be involved and working together as does the healthcare delivery system. Community partners are also needed.

Programs to protect residents from the health impacts of extreme heat will need to focus on increasing the community, family, and individual ability to adapt to the environmental impacts of climate change and on advancing environmental justice.

Heat response plans describe and organize activities to prevent heat-related illness and deaths.[44] CDC advises that in creating heat response plans, local health departments, working with other partners—such as emergency response agencies, fire, police, emergency services, and social service providers—should consider local conditions, capacities, resources, and populations.[45]

In addition to community-level conditions, an individual's or household's ability to adapt to the impacts of heat and/or air quality is a consequential factor in how they fare during heat or other climate-related emergencies, and that ability is often related to income, health status, age, English proficiency, and where people live. Therefore, heat adaptation programs should be designed and implemented in ways that prioritize equity and address the needs of communities most at risk first. The needs of pregnant people, young children, older adults, and people with chronic illness or disabilities must be recognized in all planning.

A variety of programs are recommended, being piloted, or are in place in states and localities to create more heat-resilient communities. The following is a sampling of such programs:

CDC recommends that municipal heat response plans include:

- An overview of the anticipated impacts of extreme heat
- A description of thresholds for activation
- Identification of at-risk populations and geographies
- Relevant community considerations
- Identification of preparedness, response, and recovery actions and partnerships
- Delineated roles and responsibilities, including how efforts will be coordinated
- An evaluation and revision process

Heat response actions can include:

- Surveillance
- Heat-health messaging and communications, including in the workplace
- Frontline healthcare and social services interventions
- Neighbor outreach
- Cooling centers
- Water distribution
- Fan distribution
- Changes to the built environment
- Energy assistance[46]

Also at the federal level, in July 2023, the U.S. Department of Labor's Occupational Safety and Health Administration released a heat hazard alert to share information with employers about their responsibility to protect workers against heat-related illness and how to go about doing so.[47]

- A 2022 examination of 21 local government heat action plans found that all the plans included surveillance systems and activation triggers, heat health messaging and risk communication, the use of cooling centers, and interagency coordination.[48]

- California has identified six areas for state action to protect residents from the effects of extreme heat:

  1. Implement a state-wide monitoring system to identify extreme heat and heat illness events before they are impacting people, to monitor trends, and to intervene early.

  2. Accelerate readiness to protect communities most impacted by extreme heat, including through cooling more schools and homes, supporting community resilience centers, and expanding nature-based solutions.

3. Reaches communities that are disproportionately impacted.

4. Expand economic opportunities that will address extreme heat impacts.

5. Increase public awareness about the health risks of extreme heat.

6. Protect natural and working lands, ecosystems, and biodiversity from the impacts of extreme heat.[49]

- Some cities are working to reduce urban heat islands through green infrastructure investments, including planting trees and encouraging the creation of green and cool roofs through grant and tax-credit programs.[50] Shade is particularly important near public transportation stops and walking routes to shops and schools.

- Many municipalities have heat early warning systems, including planning with healthcare and social service providers. Planning should ensure that heat related public messaging reaches vulnerable populations.[51]

- Municipalities are partnering with community-based organizations to plan and execute programs to protect residents during periods of extreme heat.

- When building or resurfacing roads, some jurisdictions are using surfaces that produce less heat. A number of cool pavement systems and materials are currently in use or being studied.[52]

ADDITIONAL RESOURCES:

The National Integrated Heat Health Information System was created by the National Oceanic and Atmospheric Administration and CDC to develop and provide actionable, science-based information to help protect people from the effects of heat. *heat.gov*

CDC's Climate and Health Program Heat & Health Tracker provides heat and health information at the local level to allow community officials to better prepare for and respond to extreme heat events, including heat exposure and heat-related illness data. *Ephtracking. cdc.gov/Applications/heatTracker/*

The health threats created by extreme heat are serious and increasing, which makes continued research, funding, piloting, and scaling programs that can mitigate the impact of heat on health critically important. Public health must play a key role in helping to implement these programs, and policymakers must provide the public health system with the resources to do so.

Interview with Marta Segura, MPH

Chief Heat Officer, City of Los Angeles

Marta Segura was appointed the city of Los Angeles' first-ever Chief Heat Officer in June 2022 while also serving as the Director of the Climate Emergency Mobilization Office in a dual role. She is one of only ten chief heat officers worldwide and the first Latina and person of color to hold this position within the United States.

TFAH: What does your day-to-day work as a heat officer look like? Which types of partners do you engage with most frequently?

Ms. Segura: As the founding Chief Heat Officer and the Director of the Climate Emergency Mobilization Office for the city of Los Angeles, and with heat as our most dangerous climate hazard, I hit the ground running. I had to start executing, planning, and growing our team while simultaneously putting out fires, creating policy, and planning for the long term. You're planning, hiring staff, and developing the data and the policy reports so that your office is positioned to create long-term impacts, and in our case, with public health and equity as a throughline. We have a staff of six now but started as an office of one. My team and I combine the work of resilience officers, emergency response officers and climate officers while also addressing public outreach, media, and communications so that we keep the public informed about what to do and how to protect themselves from the risks of extreme heat. A key day-to-day role is influencing equitable climate policy within the city, state, and federal governments, and meeting with colleagues across the globe through various climate cohorts, such as C-40 Cities, Ten Across, and others.

So, you have at least five key pillars in doing this work – extreme heat and climate planning, climate policy reporting, emergency response, public awareness/stakeholder engagement, and coordination and collaboration with various departments who have a key role in heat mitigation and adaptation. Every day, I ask myself 'how does this improve the health and livability of our most vulnerable communities,' because if we improve conditions for them, we improve climate and extreme heat solutions for all.

If you ask some leaders in other cities they often say, 'oh, cities exist to spur economic development' or 'we're here to create economic vitality.' But I would say those are means and metrics, not the ultimate results we seek. Our city charter plainly states that protecting the health and safety of our residents is our reason to exist as a city. Strategies and climate investments to reduce the effects of extreme heat and other climate hazards should be leveraged to create healthy communities. We can do much of that through equitable investments and green job creation. But only by measuring a reduction in health disparities and by evaluating livability metrics will we know if we are succeeding in our role as a city.

TFAH: How does your office coordinate with emergency services during extreme heat events, and what protocols are in place to ensure rapid response to heat-related emergencies?

Ms. Segura: Fortunately, the city of Los Angeles has a terrific emergency management department, led by our general manager, Carol Parks. They're a phenomenal department and partner that consistently seeks to be innovative and collaborative. They've embraced my role from day one and we have worked most closely on our cooling center strategies and on our forthcoming local hazard mitigation plan, which will include heat and equity for the first time. They have protocols for all climate and natural disaster emergencies and an adverse weather task force that works with the National Weather Service, which I am a part of. When the National Weather Service predicts that we will have a heat alert, the emergency management team calls the task force together. That includes our office, the police and fire departments, and [Los Angeles] county's public works and public health departments. We all strategize and ensure that we have the resources necessary to address whatever the National Weather Service tells us the potential challenges will be. And that's where we identify how many cooling centers we need, how much outreach to the unhoused to get them sheltered we need, and deployment of emergency responders, etc. I am very grateful for their support.

Our next local hazard mitigation plan (LHMP), which the Federal Emergency Management Agency requires, will include heat mitigation as a central section, and that then informs FEMA and the state of California on the most vulnerable areas of L.A. and the resources we need for preventing harm, preparing our infrastructure and our emergency response to extreme heat. Only a few cities in the nation have addressed extreme heat in their LHMPs.

TFAH: Do you have specific outreach strategies to communicate with populations at higher risk due to extreme heat? Do you tailor your

efforts culturally or linguistically for specific populations that might not have immediate access to traditional media channels?

Ms. Segura: First, our office has an annual heat awareness campaign that addresses many vulnerable populations, and we publish materials in several languages. And we channel these to various multi-ethnic media outlets. I'm proficient in Spanish, so Latino media sources in Los Angeles also interview us. We also have Korean, Chinese, Armenian, and Tagalog materials. We plan to add more languages for the next heat season. We collaborate with many departments and nonprofits to execute our social media campaign and our PSA campaigns as well.

With regard to the unhoused, fortunately, this is a priority for our mayor. The mayor's office has an extensive network of staff and offices that directly address outreach for the unhoused. The mayor's office and the Los Angeles Homeless Services Authority created and invested in what they call climate stations, like cooling centers. And these climate stations have water, showers, shade, and triage. The University of Southern California's street medicine team responds to the unsheltered no matter where they are. The public works department and the L.A. Sanitation Department also have outreach teams to address the unhoused. The heat action plan that we're developing will assess our existing resources. Not only so we don't duplicate efforts but also so that we are more synergistic.

The other strategy we will expand involves working directly with nonprofit organizations in those hard-to-reach communities and promoting the community health educator model. Some of those organizations already have community health educators. It's a natural partnership to connect with

the local organizations that are already experts in reaching these communities. Additionally, the media has been beneficial. The press has been interested in conveying to these communities how to protect themselves. I'm also part of a regional climate collaborative, and last year, we put this information on all of our buses. We had 2,400 buses and all had information on how people should protect themselves during heat events.

TFAH: What kind of data does your office collect or monitor? How does it inform your longer-term strategies or your day-to-day work?

Ms. Segura: One of our primary roles in our charter is protecting public health and safety. Thus, health must be a key factor in our data and metrics to effectively measure our success as a city. One of the fortunate things about Los Angeles is that we have a city-wide equity index and the UCLA Heat Maps. The data from the UCLA heat maps show the excess emergency room visits and deaths during heat waves for the past ten years. We must also look for any correlation between preexisting health conditions and vulnerable communities with high pollution burdens. Cities should also identify data for infant mortality rates or injuries to mothers during heat waves. We know there are excessive infant mortality rates in our Black and Brown communities, for example. We need to see the degree to which heat plays a role in these disparities. If we could correlate these higher rates with heat waves, we could do more to protect pregnancies. More tools and data allow us to accelerate solutions. My role is to ensure that equitable climate metrics are grounded in local data and accelerate climate solutions to reflect the climate disparities in homes and communities and how city-wide investments impact communities.

TFAH: Do you have advice for other municipalities that want to install their heat officer, even if they don't have the same resources that Los Angeles has?

Ms. Segura: You should prioritize your goals based on the resources in your city. In my case, we collaborate with public safety, public health, and emergency management departments and engage in emergency operations with them to fill gaps they have not addressed for heat response and mitigation. Cooling centers are more than Band-Aids for our communities that lack thermal comfort or AC at home, they are life saving measures. But cities need to ensure people know about them and that they are comfortable and accessible. We are promoting the use of our libraries more than ever because we have 73 of them and they are very local to most communities and are well equipped to serve families and children and even our unhoused. To prevent the greatest harm, you must acknowledge your emergency response role, not just a climate policy role. It elevates the position to a new level. So, if a city is looking to address the effects and disparities caused by extreme heat, that officer needs a high level of influence, collaboration, and resources to coordinate with various agencies across the city. Also, make sure that these priorities are legislated and in your job description. Maintain open communication with the city council, mayor's office, and the various departments through the creation of a heat action plan - also a critical part of coordination and execution. We will launch our first heat action plan this June. Fundamentally, you have to be very good at collaboration and leveraging existing resources and doing so through plan integration and alignment, with an eye towards reducing the health disparities and harm caused by extreme heat.

Interview with Gredia Huerta-Montañez, M.D., FAAP

San Juan, Puerto Rico

Dr. Huerta-Montañez is a pediatrician and the past president of the Puerto Rico Chapter of the American Academy of Pediatrics (AAP). She is a current member of the Executive Committee of AAP's Council of Environmental Health and Climate Change.

TFAH: What do you consider to be the most pressing challenge related to extreme heat exposure in children?

Dr. Huerta-Montañez: The first thing we need to recognize is that children are more vulnerable to extreme heat. The most pressing challenge to protecting children's health, safety, and security amid climate change challenges, including extreme heat, is that society is not placing children as a priority. If we placed a premium on children's health and well-being, we would address their needs and protect them now, while having the will to take steps necessary to bequeath them a healing planet, invest in climate resilient and healthier infrastructures, including safer green spaces that support community living. With 2023 being the hottest year on record, it is imperative that we strengthen our efforts, be intentional in the work, and invest the time and resources needed to protect children from the risks related to extreme heat. These risks can be easily overlooked by our recognition of the need for children to spend time outside connecting with nature, playing sports, rather than being plugged to screens, sedentary and socially isolated.

We have a long way to go regarding public awareness and achieving positive impact in communities, and more so with climate change, a crisis that can be perceived as abstract. I remember after the 2017 hurricanes in Puerto Rico, I thought, this is a wakeup call, but today we still see the consequences of a painfully slow response. It's been over five years and there are families that still have blue tarps on their roofs. How can a family with a broken roof be prepared for extreme heat? This leads me to a higher order, root problem: children living in poverty. They are the most vulnerable. Anything that we do to protect children's health and our environment is going to improve everybody's health and readiness for all these challenges.

In 2007, the American Academy of Pediatrics was the first major medical society to publish an evidence-based policy statement about climate change and children's health. Recommendations are written, we just need to put them into practice.

TFAH: Given the accelerating impact of climate change on heat, what shorter-term actions should be taken to protect children from its effects?

Dr. Huerta-Montañez: One component of the solution to the climate crisis is in the hands of the government and businesses. But parents, caretakers, and families can also become advocates for children's health and help to increase awareness in their community. For example, talking to their children's sports coaches to make sure that practice and game planning consider the weather forecast and avoid hours of extreme heat. Even on days when temperatures are below 90 degrees, children must take appropriate and frequent water and cooling breaks. Tragedies happen on the sports field due to heat related illnesses and the risks are increasing with climate change. Protecting the skin and the eyes from the sun and learning the signs and symptoms of heat related illness and what to do are other examples of important actions.

Parents must also be aware that people are more irritable in extreme heat, including children, especially if they can't play outdoors, which can make them more restless and demanding.

For extremely hot days, families can plan for indoor activities, so kids don't end up spending several hours with electronic devices in their hands. This can be an opportunity to create family time. If the home does not have air conditioning or they live in places with frequent power outages like in Puerto Rico, it is important to identify a safe place to go on those extreme days—a shopping mall, church, a library, or as in the case of communities that are ahead on preparedness, a place designated as a cooling center that provide protection from heat.

TFAH: How can public health and healthcare providers better communicate heat-related challenges to parents and caregivers?

Dr. Huerta-Montañez: First, we need to support climate change and health curricula, including mental health, in medical and nursing schools

and other healthcare professional training programs, and in continued education for those already in practice. It is essential that clinicians be well prepared to prevent, recognize, and treat heat-related illnesses. Secondly, there is an urgent need to revise the role of medical insurance. Payers of healthcare have a huge responsibility in the adaptation of our healthcare system to climate change. Physicians need support to allocate more time to patients to discuss climate and health-related topics. In pediatrics, the well-child care visit should be an opportunity to discuss primary prevention and health promotion topics with the families including anticipatory guidance on heat-related illness. But preventive services are paid at a lower rate for children than for adults, which affects the time physicians can dedicate to one-on-one education and counseling. Thirdly, the medical home is the ideal place to educate parents and caregivers about these challenges and how to protect their children. The medical home model has been well defined by the American Academy of Pediatrics as an approach centered on the family to provide comprehensive care based on the patient needs from infancy to adulthood. Unfortunately, the payer system does not support the medical home model, so there are many inconsistencies and inequities in access to comprehensive care, leaving many families vulnerable to a range of health risks, including heat.

Collaborations are fundamental to communicate and raise awareness among families, clinicians, and healthcare providers about the climate change effects on children's health. For example,

the Puerto Rico chapter of the American Academy of Pediatrics has built a strong coalition with the Supplemental Nutrition Program for Women, Infants, and Children (WIC) program as more than 50 percent of children younger than 5 years of age in Puerto Rico receive nutritional services through WIC. We've already trained almost all nutritionists in the WIC program about climate change and health, food and water security in Puerto Rico, and the role of nutrition in protecting children from the health impacts of environmental exposures. In particular, we are emphasizing the importance of the growth and development in the first 1,000 [days] of life for healthier kids, to ensure they have the resilience needed for climate change.

TFAH: We are seeing the closure of children's hospitals and shortages of pediatric hospital beds, often in areas facing risks of extreme heat. What should policymakers at state and national levels be thinking about to alleviate these challenges?

Dr. Huerta-Montañez: It's not a new problem. It's been happening for at least a decade and the causes are multifactorial. In 2018, almost a quarter of children in the U.S. had to travel farther for pediatric beds compared to 2009. Imagine a situation of increased childhood illness and trauma in the context of climate change. It magnifies what is already happening. We learned some lessons [about pediatric care] from COVID-19, but there are so many lessons we didn't learn and unfortunately, climate change is the next lesson.

Some factors responsible for closures are shortages in the pediatric workforce and lack of optimal training for other

healthcare professionals in pediatric care. Children are not little adults and there's a specific level of inpatient and acute care that they need. For hospitals struggling financially, there is, unfortunately, a tendency to assign pediatric beds to adult patients, which makes children even more vulnerable. We need to increase consistent, sustainable funding for pediatric-ready emergency departments, licensed beds, and increase the workforce to provide trauma-informed, evidence-based care, including for mental health. Support should also include loan repayment and the recruitment of underrepresented populations in the pediatric workforce. Given the burnout of the pediatric healthcare workforce during the pandemic, we also need to support the well-being of healthcare providers in an intentional way. We should also address regulatory challenges, including telemedicine models that are financially sustainable, and invest in increasing the capacity to support continuity of care during disasters.

TFAH: How does extreme heat and its related disasters impact children's mental and emotional well-being?

Dr. Huerta-Montañez: Prenatal exposures during climate-related events, including high heat, can increase a baby's risk for psychiatric and developmental health outcomes later in life. These outcomes are magnified by social determinants such as living in poverty, living in highly contaminated areas, or poor access to medical care, etc. Heat and other climate events create interruptions in our normal routines and can lead to stress and disruption of family life. Children are at

greater risk of developing anxiety and depression in association to extreme heat and can also respond to heat with behavioral problems. Psychiatric medications can also interfere with their body's ability to respond to heat. Heat has been linked to violent behavior and crime which can impact children directly and indirectly. Suicidality has also been linked to climate change.

Sleep is fundamental to brain growth and development, but heat waves bring extremely hot nights, which leads to poor quantity and quality of sleep. Poor sleep leads to poor cognitive function associated with depression, stress, anxiety, and decision making. These risks are exacerbated in children with no air conditioning at home or attending schools with no AC or living in a heat island or very urbanized areas that experience higher temperatures.

Another area that needs focus to be better prepared for the impact of climate change on mental health is school health. The school setting could be part of an effective model to screen for these problems and refer for care based on guidelines in climate preparedness and mental health.

TFAH: How should states and territories better prepare for pediatric needs during times of heat extremes, and how can the federal government support that preparedness?

Dr. Huerta-Montañez: States and territories are key for translating federal policy into action, and all state and territory actions should be community-based. Community leaders know about the day-to-day struggles and understand

those social determinants that lead to injustices and inequities in their communities. We need to listen and empower communities to act if we really want to make a difference. That also means better collaboration with local governments and NGOs, medical organizations, the education sector—all the key components—and be clear about their specific role and goals, especially for individuals who have leadership or elected roles at state and territory levels.

We also need to listen to the best existing evidence, translate that science and share it with the communities because we are not going to protect children with opinions. For example, there is evidence that cities with highly urbanized areas are at higher risk, so those local governments need to take steps to invest in infrastructure to protect people from extreme heat; invest in early warning systems, urban cooling centers, and educate the communities about risk factors. This communication isn't a one-time thing. The message has to be repetitive, creative, and intentional; it must consider people's beliefs and cultures; and be accessible to people with neurodiversity and physical challenges. Cities must be supported to implement energy-efficient measures to make sure we use more resilient materials in our infrastructure while protecting nature. It is important to invest in vegetation and trees, as part of long-term planning to lower urban temperatures by increasing canopies and green spaces, which has been shown to improve mental health and well-being for everybody.

States and territories are key for translating federal policy into action, and all state and territory actions should be community-based.

PUBLIC HEALTH'S ROLE IN PROTECTING OLDER ADULTS DURING EXTREME WEATHER EVENTS

The growth in the older adult population in the United States is a public health success story. As such, it is crucial that the public health sector attends to the complex health and social needs that older people and their families and caregivers face. The COVID-19 pandemic underscored public health's role in addressing the vulnerability of older adults to infectious disease. The potentially fatal impact of extreme heat is a second area in which the public health sector needs to be prepared to safeguard older adult health. Older adults are at higher risk for serious health impacts during weather events including extreme heat due to their often-complex health conditions and because more older people are socially isolated or live in understaffed senior-living facilities. Knowing and planning for the needs of older adults during extreme weather events is key to protecting their health.

The following are examples of how local health departments are working to protect the health of older adults during heat waves.

Public Health–Seattle & King County, Washington

The Pacific Northwest experienced a long-duration, unprecedented heat wave in the summer of 2021, resulting in 157 heat-related deaths, 67 percent of which occurred in adults 65 and older.[53] In response, Public Health–Seattle & King County (PHSKC) developed an Extreme Heat Response Plan to outline strategies the public health sector can take to protect the community and limit poor health outcomes from extreme heat events.[54] Strategies include a new notification and warning system, collaboration with local emergency management for incident action planning, and the development of heat health and safety guidance that identifies lead and enforcement agencies. The plan also includes communication strategies, such as disseminating information about cooling center availability and locations and promoting heat safety messaging specifically for vulnerable populations such as people in homeless shelters and assisted-living facilities. These messages are also provided in multiple languages.

PHSKC has been participating in TFAH's Age-Friendly Public Health Systems (AFPHS) movement since 2020, raising awareness of the public health roles in healthy aging and identifying healthy aging strategies within the AFPHS 6Cs Framework.[55] As a result, PHSKC conducted a survey of the county's senior centers to determine readiness for heat-related emergencies, provided training for public health practitioners to respond to heat-related emergencies, and created emergency kits for older adults determined to have the highest need for support. PHSKC is working to share these resources with other local health jurisdictions in the state to enhance the public health role in preventing harm to older adults during heat-related emergencies.[56]

In other states:

- The New York State Department of Health, in partnership with the New York State Office for the Aging, offers tips and resources for older adults and their families and caregivers to stay safe during excessive heat events,[57] including recognizing symptoms of heat-related illness and information about cooling centers.[58]

- The city of Chicago developed a system in which city workers call older adults and are authorized to turn city buildings into cooling centers when temperatures rise.

- The Department of Human Services in Oregon created tip sheets for caregivers with information about heat-related illnesses and contact information for cooling centers.[59]

- Some county health departments in Florida have conducted walk-throughs of their jurisdictions' emergency-needs shelters to identify and eliminate fall risks and to ensure adequate space for caregivers and needed medical equipment.

In addition to the public health sector's activities to protect older people from extreme heat, there is a growing movement of older adults who are engaged in the climate change issue. As noted by the National Council on Aging, "older adults have enormous resources and represent an engaged and energized group of climate activists who are 'rolling up their sleeves' to impact the climate crisis."[60] Climate experts, retired physicians, and others are pooling their experience to raise awareness and develop tools to educate older people and equip communities to prevent harm from heat-related climate events. Promoting services like checking in on older adults who are socially isolated and disseminating fact sheets for families and health providers are key strategies.

Through the AFPHS movement,[61] many state and local health departments are implementing healthy aging policies and programs. TFAH's AFPHS "6Cs Framework" offers guidance for health departments to enhance efforts to protect older adults from the effects of extreme heat events:

1. **Create and lead** efforts to prioritize older adults' health and well-being during emergencies by including older adults in emergency preparedness policies and plans.

2. **Connect and convene** key partners across aging services, emergency services, and healthcare to build a high-level coalition committed to optimizing emergency preparedness systems and support for older adults.

3. **Coordinate** existing emergency preparedness supports and tools to produce a centralized hub of emergency protocols, evidence-based toolkits, and accessible resources for both older adults and their caregivers to use before and during an emergency.

4. **Collect, analyze, and translate** data on shortcomings of existing emergency systems to identify needs and disparities among older adults as well as pathways for strengthening their emergency resiliency.

5. **Communicate** the heightened risks older adults face during emergencies and ensure that this population and their caregivers are well informed on available resources for maintaining health and well-being during an emergency.

6. **Complement** general support systems for older adults by distinguishing and addressing the additional needs of certain groups among older adults, such as those with Alzheimer's disease and related dementias, those with impaired mobility, or those who live in disaster-prone areas, or in homes without air-conditioning.

SECTION 1:

Ready or Not 2024

Assessing States' Preparedness

In the wake of numerous and diverse public health challenges—including the COVID-19 pandemic, the overdose epidemic, climate change–induced health crises, infectious disease outbreaks like measles and Mpox, and the simultaneous health threats of flu, COVID, and respiratory syncytial virus (RSV)—it is clear that states must be equipped to handle a range of potential crises. This necessitates an understanding of each state's strengths, risks, and vulnerabilities in terms of emergency preparedness.

To assist states in evaluating their readiness and to underscore key areas of concerns and necessary actions, this report presents an analysis of nine critical indicators. These indicators, largely consistent from year to year, are informed significantly by the National Health Security Preparedness Index (NHSPI). The NHSPI, historically spearheaded by the Robert Wood Johnson Foundation, has been produced under the scientific and administrative direction of the University of Kentucky and the University of Colorado. These indicators are designed to encapsulate and inform fundamental aspects of states' emergency preparedness.

Each state's performance in these indicators, detailed in "Appendix B: Methodology," has been analyzed. Based on this analysis, states have been categorized into three distinct performance tiers: high, middle, and low (see Table 3). This categorization aims to provide a clear framework for states to identify areas needing improvement and to strategize effectively for future emergencies.

TABLE 3: State Public Health Emergency Preparedness State performance, by scoring tier, 2023		
Performance Tier	**States**	**Number of States**
High Tier	AL, AZ, CO, CT, DC, FL, GA, KS, MA, ME, MS, NC, NE, NJ, OH, PA, RI, SC, TN, VA, VT, WA	21 states and DC
Middle Tier	AR, DE, IA, ID, IL, MD, MO, MT, NH, NM, OK, UT, WI	13 states
Low Tier	AK, CA, HI, IN, KY, LA, MI, MN, ND, NV, NY, OR, SD, TX, WV, WY	16 states

Note: For the criteria and scoring methodology, refer to "Appendix B: Methodology." Data for U.S. territories were not fully available.

Note: The significance of this evaluation transcends individual state or local entities and mandates ongoing enhancement efforts from a variety of stakeholders. Effective progress usually necessitates consistent involvement and collaboration among diverse policymakers and administrators. While certain indicators fall within the direct control of state lawmakers, others demand comprehensive, multisectoral efforts, including community participation.

INDICATOR 1: ADOPTION OF THE NURSE LICENSURE COMPACT (NLC)

KEY FINDING: Participation in the NLC has expanded to 39 states, enhancing interstate nursing workforce mobility.

Workforce shortages, vividly evidenced during the most acute phases of the COVID-19 pandemic, have strained healthcare systems, at times pushing them to and even beyond capacity. Notably, during critical periods—December 2020, September 2021, and January 2022—at least 20 percent of U.S. hospitals anticipated imminent staff shortages.[62] The ability to rapidly mobilize medical personnel across state lines is crucial for healthcare responsiveness during such crises.

However, newly graduated or relocating nurses often experience a bottleneck in the licensure process, which can extend for months according to an NPR analysis of 32 states' licensing records, particularly in larger states.[63]

This indicator assesses the adoption of the NLC, established in 2000 by the National Council of State Boards of Nursing, which enables registered and practical nurses to practice in any member state with a single multistate license, eliminating the need for emergency declarations. This agreement streamlines cross-state healthcare responses by reducing administrative complexities.

Before the implementation of the NLC, nurses were required to obtain individual licenses for each state in which they wished to practice, navigating a complex web of applications, fees, and state-specific requirements that often included differing continuing education standards. This arduous and time-intensive process hindered their employment mobility, making it difficult for nurses to swiftly address workforce shortages, respond to emergencies, or explore cross-border career opportunities. Consequently, the restrictive licensing regime contributed to delays in healthcare delivery,

particularly in regions lacking sufficient medical personnel or during times of critical need, such as natural disasters or widespread health crises.

The introduction of the NLC has significantly improved the mobility of nurses, allowing them to practice across multiple states with a single license and thus enhancing the flexibility of the nursing workforce. This increased mobility has proved to be especially valuable during public health emergencies, enabling a swift and effective response as nurses are promptly deployed to areas in need without the hindrance of obtaining individual state licenses. Additionally, as nurses can now provide care to patients across state lines, the NLC has been instrumental in the expansion of telehealth services, which broadens access to healthcare and makes it more efficient.

Membership in the NLC is a significant indicator of a state's public health emergency preparedness for several reasons. First, it allows for rapid mobilization of nursing staff across state lines during emergencies, enhancing the state's capacity to respond quickly to health crises. This is particularly crucial during unexpected surges in healthcare demand, such as pandemics or natural disasters. Secondly, the NLC facilitates telehealth services, essential for providing care in remote or underserved areas during emergencies. Lastly, by standardizing licensure requirements, the NLC helps ensure a consistent level of nursing care across states, maintaining quality healthcare standards even in emergency situations.

In addition to enabling nurses to provide surge capacity across state lines, the compact has also been pivotal to the expansion of telehealth services, allowing

nurses to remotely manage chronic conditions and offer behavioral health care to patients during natural disasters or for patients for whom travel is difficult. Additionally, the NLC has addressed chronic nursing shortages by allowing for the seamless recruitment of nurses into areas with persistent staffing gaps, notably improving healthcare delivery in rural and underserved communities.

During the COVID-19 pandemic, hospitals across the country faced extraordinary pressure as surging infections dramatically increased admissions. States that were members of the NLC had an advantage: they could more readily bring in nurses from other member states, avoiding harmful delays, or send nurses to assist when other states experienced acute shortages. Reflecting on this, NLC Director Jim Puente said in June 2020: "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. 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."[64]

As of October 2023, the NLC had been adopted by 39 states, with Rhode Island and Washington being the latest to join.[65] This marked a net increase of 13 states since 2017.

In June 2023, Rhode Island Governor Daniel J. McKee signed the NLC into state law.[66] Rhode Island initially joined the NLC in 2008 but opted out in 2018 before reinstating it.[67] Senator Joshua Miller, supporting the bill, highlighted its role in addressing the state's nursing shortage and improving staffing in hospitals and health facilities. "Our state is grappling with a severe shortage of nurses," Miller said. "Returning to the compact is a way we can make it easier and more appealing for nurses to come here for a job, making it easier for our hospitals and health facilities to fill their staffing needs. Rejoining the compact is good for our public health and safety."[68]

TABLE 4: 39 States Participate in the Nurse Licensure Compact				
Participants and nonparticipants, 2023				
Participants			**Nonparticipants**	
Alabama	Maine	Pennsylvania	Alaska	Massachusetts
Arizona	Maryland	Rhode Island	California	Michigan
Arkansas	Mississippi	South Carolina	Connecticut	Minnesota
Colorado	Missouri	South Dakota	District of Columbia	Nevada
Delaware	Montana	Tennessee	Hawaii	New York
Florida	Nebraska	Texas	Illinois	Oregon
Georgia	New Hampshire	Utah		
Idaho	New Jersey	Vermont		
Indiana	New Mexico	Virginia		
Iowa	North Carolina	Washington		
Kansas	North Dakota	West Virginia		
Kentucky	Ohio	Wisconsin		
Louisiana	Oklahoma	Wyoming		

Note: As of January 2024, in Pennsylvania, nurses holding active compact licenses from other states were permitted to practice, but resident nurses in these states were not yet able to apply for a compact license.

Source: National Council of State Boards of Nursing[69]

INDICATORS 2 AND 3:
ACCREDITATION STATUS OF STATE PUBLIC HEALTH AND EMERGENCY MANAGEMENT SYSTEMS

KEY FINDING: Most states are accredited by the Public Health Accreditation Board and/or the Emergency Management Accreditation Program, but seven states lack accreditation from either body.

The Public Health Accreditation Board (PHAB) is dedicated to advancing the quality and performance of public health departments across the United States. As an independent entity, PHAB administers a national public health accreditation program that sets rigorous standards for public health services and operational efficiency. This accreditation process involves a comprehensive evaluation against a set of nationally recognized, evidence-based standards designed to improve the effectiveness of public health departments. These standards cover various aspects of public health practices, including community health assessment, policy development, environmental health, health education, and emergency response. The goal of PHAB accreditation is to ensure that participating health departments meet a high level of performance and provide optimal health services to their communities. Accreditation by PHAB signifies a health department's commitment to continual quality improvement, transparency in operations, and accountability to the communities they serve. It is a mark of excellence that indicates a department's dedication to meeting the health needs of the population effectively and efficiently.

PHAB accreditation includes several standards and measures that are relevant to assessing and improving state public health departments' emergency preparedness capabilities. For example, Standard 2.2 focuses specifically on health departments' roles in preparing for and responding to various types of public health emergencies.[70,71] This standard requires health departments to have emergency operations plans, continuity of operations plans, risk communication plans, and processes for coordinating response efforts with partners. Health departments must also conduct exercises to test emergency plans and use after-action reports to drive improvements. Additionally, while focused more broadly on public health law and regulation, Standard 6.1 includes measures related to monitoring and enforcing orders that could be relevant during emergency situations.[72]

The standards also contain a number of measures that, while not emergency-specific, relate to capabilities like surveillance, data analysis, communication, workforce development, and information technology management that provide an underlying foundation to facilitate an effective emergency response. For example, strong routine surveillance and analysis capacity improves situational awareness when threats emerge.

In all, conforming to the range of applicable standards provides a mechanism for health departments to demonstrate and improve their level of emergency preparedness and response capability. The standards help drive health departments to collaborate with partners, maintain up-to-date plans, develop supportive systems and infrastructure, and employ continuous quality improvement practices that enable an agile and effective response when public health threats or emergencies occur.

In 2022, PHAB introduced Version 2022, updating its standards to incorporate recent public health challenges, including the COVID-19 pandemic, racism as a public health crisis, climate change impacts, and effective communication strategies. This revision underscores the need for

health departments to be perpetually ready for emergencies and to consider social determinants of health and equity in their threat mitigation strategies.[73]

PHAB accreditation serves as a valid and meaningful indicator of state public health emergency preparedness due to its comprehensive evaluation of key capabilities necessary for effective crisis response. The accreditation process requires public health departments to meet stringent standards that encompass essential aspects of emergency preparedness, such as surveillance, epidemiology, laboratory capacity, and emergency response planning. By adhering to these rigorous criteria, accredited departments demonstrate their readiness to handle public health emergencies, including disease outbreaks, natural disasters, and bioterrorism events. The process also helps ensure that departments maintain a robust infrastructure, trained workforce, and effective communication strategies, all crucial for quick and effective action during crises. Furthermore, PHAB accreditation emphasizes continual quality improvement and community engagement, which are vital for adapting to evolving public health challenges and maintaining trust and collaboration with the public. Hence, PHAB accreditation not only reflects a department's current preparedness but also its commitment to evolving and enhancing its emergency response capabilities over time.

The Emergency Management Accreditation Program (EMAP) is a voluntary assessment and accreditation process for government agencies responsible for disaster preparedness and emergency response functions.

Established by a consortium of key emergency management organizations, EMAP promotes standardization and excellence in public emergency programs by evaluating them against a comprehensive set of standards and best practices.

To become EMAP accredited, an emergency management program must undergo a lengthy evaluation involving careful self-assessment across dozens of standards, peer review by independent practitioners, and meticulous site visits by EMAP assessors. These standards encompass a wide range of critical emergency preparedness areas including program administration, legal authorities, fiscal management, communications systems, training programs, operational planning, exercise evaluation, and crisis response procedures.

The EMAP accreditation process assists emergency agencies in identifying capability and procedural gaps—driving continuous improvement and building frameworks for robust crisis coordination with other accredited entities.

PHAB and EMAP accreditations stand as valid and meaningful indicators of public health emergency preparedness due to their comprehensive evaluation criteria and adherence to national best practices. PHAB accreditation, with its focus on public health departments, ensures that accredited entities meet rigorous standards in key areas such as epidemiology, emergency response planning, and community health assessment. This accreditation demonstrates a health department's capability to effectively manage public health emergencies, from preparedness and response to recovery. Similarly, EMAP accreditation evaluates

emergency management programs across a wide range of preparedness and response capabilities, including crisis communication, resource management, and operational coordination. By meeting EMAP's standards, agencies validate their proficiency in handling various emergency situations. Together, these accreditations provide some assurance that a state or locality not only has robust public health systems in place but also has the operational capacity to respond to emergencies effectively. The combination of PHAB and EMAP accreditations serves as a comprehensive benchmark, indicating a well-rounded and tested readiness for public health emergencies, making them reliable indicators for evaluating public health emergency preparedness.

As of January 2024, 29 states plus the District of Columbia held accreditation from both PHAB and EMAP. Fourteen states had single-entity accreditation. Louisiana and Virginia were previously accredited by both but only held PHAB accreditation as of October 2023. (See Table 5.)

Notably, seven states—Alaska, Hawaii, New Hampshire, South Dakota, Texas, West Virginia, and Wyoming—have not attained accreditation from either PHAB or EMAP. Lack of accreditation does not necessarily indicate denial but may reflect a state's barriers to the accreditation process, such as workforce or financial limitations, or a state's accreditation could be in-process. This analysis focuses on state-level accreditation and does not account for local, tribal, or territorial health departments that may hold accreditation independently.

TABLE 5: 43 States and the District of Columbia Accredited by the PHAB and/or the EMAP Accreditation status by state, January 2024					
PHAB and EMAP			**PHAB ONLY**	**EMAP ONLY**	**No Accreditation**
Alabama	Illinois	Oklahoma	Indiana	Michigan	Alaska
Arizona	Kansas	Pennsylvania	Iowa	Nevada	Hawaii
Arkansas	Maryland	Rhode Island	Kentucky	Tennessee	New Hampshire
California	Massachusetts	South Carolina	Louisiana		South Dakota
Colorado	Mississippi	Utah	Maine		Texas
Connecticut	Missouri	Vermont	Minnesota		West Virginia
Delaware	New Jersey	Washington	Montana		Wyoming
District of Columbia	New York	Wisconsin	Nebraska		
Florida	North Carolina		New Mexico		
Georgia	North Dakota		Oregon		
Idaho	Ohio		Virginia		
29 states + DC			**11 states**	**3 states**	**7 states**

Note: This table tracks state accreditations by PHAB and EMAP. States with conditional or pending accreditation statuses at the time of data collection are listed as not accredited. Some states may comply with applicable standards without seeking formal accreditation. This analysis is limited to state-level accreditations and excludes local or tribal health departments, which may hold their own accreditations separate from state health departments.

Sources: PHAB[74] and EMAP[75]

INDICATOR 4: STATE PUBLIC HEALTH FUNDING TRENDS

KEY FINDING: A majority of states held their public health funding steady or increased it in fiscal year (FY) 2023, but at least 11 states reduced funding. (Data were not available for two states.)

Recent public health emergencies have highlighted the critical need for sufficient, flexible, and sustained funding for public health systems. This funding is essential for preparedness and response capacity, including the detection, prevention, and control of disease outbreaks, and for mitigating the health consequences of disasters. An additional challenge to public health budgets is the fact that the infusion of funding (both federal and state) to respond to COVID-19 was one-time funding that has been spent, is set to expire, or in some cases has been rescinded by Congress, creating budgeting cliffs in many departments.

Core public health capabilities, such as epidemiology, environmental hazard detection and control, infectious disease prevention and control, and risk communications, along with targeted emergency response resources, are vital. These competencies help officials maintain routine functions and have surge capacity readily available for emergencies. A trained, ready, and community-aware public health workforce is essential for this surge capacity and requires sustained, predictable funding.

The Public Health Activities and Services Tracking project at the University of Washington identifies six core areas of state public health programming and services:[76]

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.

Public health's infrastructure enables states to promote health equity and build resilience in populations in addition to carrying out emergency response activities. However, public health funding, often discretionary, is prone to neglect or reduction, especially in tight fiscal periods. Decades of underfunding have weakened emergency preparedness and response capabilities. State investments play a crucial role in health agencies' operations: about 28 percent of state and territorial health department revenues[77] and 21 percent of local health department revenues come from state sources, on average.[78]

Fortunately, at least 37 states and the District of Columbia either maintained or increased their public health

funding in FY 2023, as indicated in Table 6. Nonetheless, at least 11 states reduced their funding, potentially compromising their preparedness and responsiveness in critical situations. (This indicator does not assess the adequacy of states' public health funding. Notably, due to inflation and population growth, stable funding may effectively represent a reduction.)

From FY 2019 to FY 2022, state-supported funding for public health services experienced significant fluctuations due to pandemic-related actions. In some instances, a temporary infusion of state-supported funds was allocated for just one year. In other cases, state-supported funding was temporarily cut and supplanted by federal pandemic aid. This reliance on federal aid highlights the need for states to develop robust, adaptable funding models that can effectively integrate federal funds, ensuring a cohesive financial strategy for long-term public health goals.

Moreover, the distribution and adequacy of public health funding are pivotal for advancing health equity. Funding disparities can lead to inequitable access to health services, particularly among communities that are under resourced or marginalized. A funding strategy that prioritizes health equity ensures that all communities, regardless of socioeconomic status, have access to essential health resources. This approach is crucial for building a resilient, equitable, and inclusive public health system that meets the diverse needs of its entire population.

TFAH requests that states report only their state-supported funding, which forms a significant part of the public health funding landscape.

The trend in a state's public health funding serves as a valid and meaningful indicator of its preparedness for public health emergencies. Adequate and consistent funding is the cornerstone of building and maintaining a robust public health infrastructure, which includes developing a well-trained workforce, advanced surveillance systems, effective use of technology, and robust communication channels. These are essential for rapid and efficient responses to health crises. When funding is stable or increasing, it indicates a state's commitment to strengthening its public health systems, enhancing its capacity to respond to emergencies such as disease outbreaks, natural disasters, or bioterrorism events. Conversely, declining or fluctuating funding can create vulnerabilities in the public health system, potentially leading to gaps in emergency preparedness and response capabilities. Therefore, monitoring funding trends provides critical insights into a state's readiness to protect its population's health in the face of unforeseen challenges, making it a key metric for evaluating overall public health emergency preparedness.

Note: Caution should be exercised when comparing across states due to variations in organizational responsibilities, budgeting practices, and fiscal structures that can affect public health funding data. For fiscal year 2023, Nevada and West Virginia did not submit their public health funding data to TFAH. To understand the nuances and methodology behind the data collection, including TFAH's specific criteria for defining public health funding, please refer to "Appendix B: Methodology."
Source: TFAH analysis of states' publicly available funding data.

TABLE 6: State Public Health Funding Held Stable or Increased in at least 37 States and DC
Funding by state FY 2022 to 2023

State	Trend
Alabama	↑
Alaska	↓
Arizona	↑
Arkansas	↓
California	↓
Colorado	↑
Connecticut	↑
Delaware	↑
District of Columbia	↑
Florida	↑
Georgia	↑
Hawaii	↑
Idaho	↓
Illinois	↑
Indiana	↓
Iowa	↑
Kansas	↑
Kentucky	↑
Louisiana	↑
Maine	↑
Maryland	↓
Massachusetts	↑
Michigan	↓
Minnesota	↑
Mississippi	↑
Missouri	↑
Montana	↑
Nebraska	↑
Nevada	Not reported
New Hampshire	↑
New Jersey	↑
New Mexico	↑
New York	↑
North Carolina	↑
North Dakota	↔
Ohio	↓
Oklahoma	↑
Oregon	↑
Pennsylvania	↑
Rhode Island	↓
South Carolina	↑
South Dakota	↑
Tennessee	↑
Texas	↓
Utah	↑
Vermont	↑
Virginia	↑
Washington	↑
West Virginia	Not reported
Wisconsin	↓
Wyoming	↑

INDICATOR 5: COMMUNITY WATER SYSTEM SAFETY

KEY FINDING: Although most Americans receive water from community systems that comply with the health-based standards mandated by the Safe Drinking Water Act, there is still potential for further improvement.

Access to safe water is crucial for consumption, sanitation, hygiene, healthcare, and the operation of other critical infrastructure. In the United States, the vast majority of the population relies on public water systems.[79] The U.S. Environmental Protection Agency (EPA) establishes legal limits on contaminants in drinking water, including microorganisms (bacteria and viruses), disinfectants (e.g., chlorine) and their byproducts, various chemicals (e.g., industrial pollutants and lead), and radionuclides (radioactive materials).[80] The EPA also requires states to regularly report on the quality of drinking water from public water systems within their jurisdictions.[81] These water systems are obligated to report any violations, such as non-compliance with established monitoring and reporting schedules, treatment techniques, maximum contaminant levels, and customer-notification requirements.[82]

The development of drinking water safety and regulation in the United States dates back to the late 19th and early 20th centuries, coinciding with rapid urbanization and industrialization that underscored the need for improved water-quality standards. The U.S. Public Health Service established initial guidelines in 1914, concentrating on the bacteriological quality of drinking water.[83] Significant progress occurred with the Federal Water Pollution Control Act of 1948. However, the cornerstone was the Safe Drinking Water Act (SDWA) of 1974, which laid the groundwork for current water safety and regulation.[84] This act authorized the EPA to set national health-based standards, regulate contaminants in public water systems, and supervise

water providers. Amendments to the Safe Drinking Water Act in 1986 and 1996 further broadened these regulations, including safeguards for drinking water sources. The ongoing battle against contaminants such as lead and per- and polyfluoroalkyl substances continues to influence the evolution of water safety policies.

The United States is home to one of the world's safest public drinking water supplies. However, some communities, particularly those with a high proportion of low-income residents, lack consistent access to safe water. When water safety issues arise, a multisector emergency and long-term public health response is necessary. The most prominent water-contamination crisis in recent years occurred in Flint, Michigan, in 2014 and 2015, when a change in the water source caused distribution pipes to corrode, leading to the leaching of lead and other contaminants into the drinking water. This incident exposed tens of thousands of residents, including young children, to high levels of contaminants.[85]

In 2019, Newark, New Jersey, residents had to resort to bottled water due to high lead levels in their tap water. Subsequently, nearly all of the city's 23,000 lead service lines were replaced with copper pipes. In July 2021, the state enacted laws requiring public water systems to inventory and replace lead service lines within 10 years.[86,87] Newark made such progress that Vice President Kamala Harris commended it for removing thousands of lead pipes in under three years, suggesting it could serve as a model for other U.S. communities.[88] She highlighted this achievement as addressing not only a public health crisis but also

correcting racial disparities. In children, even low levels of lead exposure can harm the nervous system and lead to developmental delays, learning disabilities, and issues with weight and hearing.[89] These incidents have the potential for long-term impacts on children's health and brain development, as well as on the mental health and trust of the community.

Climate change has increased the frequency of wildfires, creating a residual risk of toxic chemicals contaminating community water systems. For instance, following the Hermits Peak and Calf Canyon fire in northeastern New Mexico in 2022—a result of Forest Service officials losing control of two prescribed burns—officials in Las Vegas, Nevada, faced challenges in maintaining safe and accessible drinking water. The city's main reservoir was overwhelmed by ashy sludge, leading to a limit of 44 gallons per person per day (about two showers' worth[90]).[91] Pollution from major wildfires can include natural debris, silt, asbestos, heavy metals, radioactive isotopes, and carcinogens from decomposing wells.[92]

Climate change also intensifies major storms and flooding,[93] which can damage water infrastructure, contaminate waterways, and cause power outages, leading to issues with potable water access and safety. For example, when Hurricane Ian struck coastal Florida in September 2022, it disrupted the water infrastructure in Lee County, including Fort Myers, and severed water lines.[94] This situation left three of the county's hospitals without water, necessitating the evacuation of some patients. In Polk County, dozens of lift stations pumping wastewater to treatment plants went offline, and

officials warned residents against overwhelming the local system to the extent that it could cause untreated water to backflow into homes. At one point, the Florida Department of Health issued nearly 50 boil-water advisories.[95]

In Jackson, Mississippi, a heavy downpour in August 2022 overwhelmed the city's water system, cutting off water access for 150,000 residents for several days. This event followed a prolonged boil-water notice due to flooding.[96] In December 2022, subfreezing temperatures caused further damage to the water system. As a result, the community faced another boil-water order, and some residents had no water at all.[97] According to an analysis by The Washington Post, this crisis disproportionately affected less affluent communities in Jackson. Between 2017 and 2022, areas with median household incomes under $50,000 experienced twice as many boil-water notices than higher income areas.[98] Fortunately, federal officials have taken significant steps to resolve the crisis. In late 2022, a third-party administrator was brought in to lead repair efforts,[99] and Congress allocated

$600 million to fund the work, with at least $115 million already invested.[100]

In 2023, communities along the Mississippi River, particularly in New Orleans and surrounding areas in Louisiana, faced a crisis due to saltwater intrusion from the Gulf of Mexico.[101] Exacerbated by drought conditions, this environmental challenge threatened the region's drinking water supply. Salty water poses health risks, especially for pregnant people, and can corrode old pipes, potentially releasing harmful materials. The situation led to emergency actions from local and state authorities, including New Orleans Mayor LaToya Cantrell and then-Louisiana Governor John Bel Edwards, as well as a federal emergency declaration approved by President Biden. Efforts to address the issue included constructing an underwater sill in the Mississippi River[102]—though this is a temporary solution. This crisis underscores the growing challenges posed by climate change and environmental degradation, emphasizing the need for long-term strategies to protect essential water resources.

The United States also faces challenges from harmful algal blooms, which are exacerbated by climate change, and produce algal toxins, and the increasing presence of per- and polyfluoroalkyl substances (PFAS) from industrial chemicals.[103] In March 2023, the EPA initiated a significant regulatory step concerning PFAS, a group of chemicals known for their durability and resistance to heat, water, and oil.[104] These chemicals, found in various consumer and industrial products, have raised significant health concerns due to their persistence in the environment and potential links to a range of adverse health outcomes, including cancer, liver damage, and immune system disruption. The EPA proposed enforceable maximum contaminant levels for six specific PFAS compounds in drinking water, representing the highest allowable levels of these contaminants in public water systems. The proposal also introduced a novel approach to regulating some types of PFAS, using a Hazard Index method to assess the collective risk of these substances when present together in water. This action is part of the EPA's broader PFAS Strategic Roadmap, which outlines its commitment to comprehensively addressing PFAS pollution. The proposal requires public water systems to monitor these PFAS, inform the public if levels exceed the set standards, and implement measures to reduce PFAS concentrations. This initiative by the EPA marks a crucial step toward nationally standardized regulation of PFAS in drinking water, aiming to mitigate their long-term health impacts and ensure safer water quality across the United States.

CDC data indicate that waterborne pathogens—just one type of contamination—cause approximately 7,000 deaths, 7 million illnesses, and more than $3 billion in healthcare costs annually.[105] The risks from contaminated drinking water disproportionately affect communities of color, highlighting the impact of structural racism on a critical resource that most Americans consider a basic service.

The federal Infrastructure Investment and Jobs Act, enacted in November 2021, took several significant steps to expand access to safe drinking water. Its provisions included $24 billion in grants to states under the Clean Water Act (focused on regulating pollution and protecting surface-water quality[106]) and the Safe Drinking Water Act (focused on protecting waters actually or potentially designated for drinking[107]). The Act allocated $15 billion to replace lead pipes and service lines, $9 billion to address emerging PFAS, and several initiatives to provide dedicated assistance to small, disadvantaged, low-income, rural, and/or tribal communities.[108,109]

In the first two years of the law's implementation, the EPA made significant strides in enhancing drinking water safety.[110] The agency received over $11 billion to support a wide array of water infrastructure projects nationwide. A substantial portion of this, amounting to $7.7 billion, has been specifically allocated to fund 350 drinking water projects, highlighting a strong emphasis on improving water infrastructure and safety. Additionally, a major initiative has been the removal and replacement of lead service lines, with the administration committing more than $6.5 billion to this cause. This effort aims to replace all lead service lines across the country, a critical step in ensuring safer drinking water, especially in communities with older, potentially hazardous infrastructure.

According to the EPA, in 2022, an average of 5 percent of residents in each state used a community water system that did not meet all applicable health-based standards, a decrease from 7 percent in 2018.[111] In several states—Connecticut, Delaware, Hawaii, Nevada, North Dakota, Vermont, and Washington—this proportion was effectively 0 percent. (See Table 7.) However, in five states, namely Louisiana, Maryland, New York, Oklahoma, and Oregon, at least 15 percent of residents relied on community water systems with health-based violations.

It is important to note that approximately 23 million U.S. households obtain their drinking water from private wells.[112] The data presented by this indicator do not account for the water quality in these households.

This indicator draws from the EPA's Safe Drinking Water Information System (SDWIS), established by the Safe Drinking Water Act of 1974 and its amendments. SDWIS tracks public water systems' adherence to maximum contaminant levels, treatment techniques, and reporting requirements. States, acting as primary enforcement authorities under the Safe Drinking Water Act, ensure these systems meet both EPA and state standards and report compliance, violations, and enforcement actions to the SDWIS Fed Data Warehouse, a comprehensive federal repository. Key health-based standards in SDWIS include limits for various chemicals, microbial contaminants, radionuclides, and disinfectants, along with their byproducts.

This metric directly reflects a state's capability to provide one of the most fundamental necessities—safe drinking water—which is a cornerstone of public health. Effective management and regulation of water quality are vital for preventing waterborne diseases and safeguarding against health crises. High compliance rates indicate robust water and public health infrastructure and effective oversight, essential for responding to emergencies and protecting public health. Conversely, higher percentages of noncompliance reveal potential vulnerabilities in a state's public health system, signaling a need for enhanced focus on infrastructure, regulation, and crisis preparedness. Therefore, monitoring this percentage offers critical insights into the overall readiness of a state to handle public health emergencies related to water safety and quality.

TABLE 7: Few Americans Used Contaminated Community Water Systems
Percent of state populations who used a community water system in violation of health-based standards, 2022

States	Percent of Population
CT, DE, HI, ND, NV, VT, WA	0%
CA, IA, IL, ME, MI, MN, MO, NE, VA	1%
AR, FL, KY, NC, OH, RI, SC, UT, WI	2%
AZ, DC, ID, NH	3%
AL, CO, GA, KS, TN	4%
AK, IN, PA, SD, WY	5%
MT, NM, TX	6%
NJ	10%
MS	11%
MA, WV	14%
OR	15%
OK	18%
LA	22%
MD, NJ	26%
LA, NY	45%

Source: NHSPI analysis of data from the EPA[113]

Note: The EPA estimates that over 23 million U.S. households obtain their drinking water from private wells.[114] While these households are accounted for in the population percentage calculations, this indicator's data do not represent their water quality. The data reported here only include regulated contaminants and exclude water safety on Indian reservations. Additionally, state percentages may be influenced predominantly by violations in larger towns and cities (e.g., Shreveport, Louisiana; Baltimore, Maryland; New York City; Moore, Oklahoma; and Portland, Oregon).

INDICATOR 6: USE OF PAID TIME OFF

KEY FINDING: Slightly over half of the workers in states, on average, utilized some form of paid time off—encompassing sick leave, vacation, and holidays. Most states displayed percentages close to this average, with a few notable exceptions.

Note: The specification of this indicator has been refined in recent years, shifting from a measure of those who received paid time off to a measure of actual usage. These figures represent a one-month snapshot and are meant to illustrate relative usage across states, not the total percentage of workers who used paid time off throughout the year.

The history of paid time off (PTO) and paid leave in the United States is defined by the absence of comprehensive federal mandates, relying instead on employer policies. According to the Center for Law and Social Policy, 34 million workers—22 percent of the civilian labor force—lack even a single day of paid sick leave.[115] In contrast to many high-income nations, there is no federal legislation in the United States mandating paid vacation or sick days. The first significant legislation in this area was the Family and Medical Leave Act of 1993, which provides eligible employees with up to 12 weeks of unpaid, job-protected leave for certain family and medical reasons, but it does not require this leave to be compensated. Throughout the 20th and into the 21st century, policies around PTO and paid leave have largely been determined by individual employers, leading to significant variability across different workplaces and industries. Some states and cities have enacted their own laws mandating paid leave, but there remains no nationwide standard for PTO or paid leave in the United States, making the U.S. approach unique among peer nations.

Paid time off is vital for public health as it plays a critical role in preventing the spread of illnesses and promoting overall well-being. Employees with access to paid time off are more inclined to stay home when ill, thus reducing the transmission of contagious diseases to coworkers and the public. PTO also helps enable proactive health management, including regular medical check-ups and chronic disease management, leading to improved long-term health. Additionally, PTO aids mental health by offering necessary breaks from work, which help prevent burnout and stress-related conditions. In a broader context, the availability of PTO can lead to a healthier workforce, lower healthcare costs, and increased productivity, underlining its significance in promoting public health.

The need for paid time off became especially apparent during the COVID-19 pandemic. Frontline and essential workers, often unable to work remotely, faced the dilemma of working while sick or caring for ill family members. Low-wage workers[116,117] and Black and Hispanic workers generally have less access to paid sick leave and are disproportionately represented among frontline workers.[118] The lack of paid leave forces workers into tough decisions between earning their wages, meeting family obligations, and paying bills, and/or risking public health. Consequently, access to and the ability to utilize job-protected PTO, particularly dedicated paid sick leave, are critical for enhancing infection control[119,120] and financial security, especially in public-facing industries and occupations.

The public health benefits are evident: there are lower flu rates in cities and states with mandated paid sick leave.[121,122] A June 2023 CDC

study highlighted that 40 percent of foodborne illness outbreaks were linked to contamination by ill or infectious food workers, underscoring the public health implications of PTO.[123] Access to PTO also promotes preventive healthcare uptake; workers without paid sick days are less likely to engage in routine health maintenance for themselves and their children.[124]

During the COVID-19 pandemic, the availability of paid sick leave was instrumental in slowing the virus's spread.[125] The Families First Coronavirus Response Act of March 2020 provided temporary relief, mandating paid sick leave for employees under certain conditions, which contributed to reducing transmission. A 2020 study indicated that states with access to emergency paid sick leave under the law experienced significantly fewer confirmed cases of the virus,[126] underscoring the ongoing need for paid leave to manage public health crises.[127,128] However, these protections were not extended beyond the end of 2020. Employer tax credits were available from January 1, 2021, to September 30, 2021, for those who voluntarily complied.[129]

State and local paid leave laws have partially addressed the gap left by federal legislation.[130] As reported by Paycor, a human resources and payroll software firm, several states and municipalities require employers to offer paid sick leave, with provisions also covering "safe time" for those affected by domestic violence, sexual assault, or stalking.[131] As of January 2023, states with mandatory paid sick leave laws included Arizona, California,

Colorado, Connecticut, Maryland, Massachusetts, Michigan, New Jersey, New Mexico, New York, Oregon, Rhode Island, Vermont, Washington, and the District of Columbia. Maine and Nevada require accrued paid time off that is not exclusively for sick leave.

From March 2018 to 2023, the Current Population Survey reported that 55 percent of workers, on average, took some form of PTO, consistent with previous years.[132] Mississippi (65 percent), Texas (63 percent), the District of Columbia (63 percent), New York (61 percent), Massachusetts (61 percent), Maine (61 percent), Kansas (60 percent), and Connecticut (60 percent) stood out as states with high usage rates, whereas Michigan (50

percent), Utah (50 percent), Kentucky (50 percent), Minnesota (50 percent), Illinois (49 percent), South Carolina (48 percent), and Rhode Island (48 percent) saw lower usage.[133] (See Table 8.)

The percentage of workers who utilize PTO is a meaningful gauge of public health emergency preparedness. In situations like pandemics, the ability for workers to stay home without financial loss is key to curbing disease spread. States with higher PTO usage likely possess more robust workforce policies, allowing employees to take necessary leave for health reasons, thereby reducing healthcare system burdens and fostering a healthier workforce. This metric is indicative of a state's public health resilience and preparedness.

TABLE 8: 55 Percent of Workers, On Average, Used Paid Time Off Percent of employed population that took PTO during March, 2018 to 2023	
States	**Percent of Workers**
MS	65%
DC, TX	63%
MA, ME, NY	61%
CT, KS	60%
AK, OK, VA	59%
NM, WA	58%
AL, CO, HI	57%
AZ, NC, NJ, OH, OR	56%
CA, DE, FL, MD, NH	55%
GA, IA, IN, LA, MO, MT, VT, WI	54%
AR, ID, NE, SD, WV, WY	53%
ND, NV, PA, TN	52%
KY, MI, MN, UT	50%
IL	49%
RI, SC	48%

Source: NHSPI analysis of data from the Annual Social and Economic Supplement of the Current Population Survey.[134]

Note: "Paid time off" encompasses sick leave, vacations, and holidays. These data are derived from a survey sampling the general population. The definition of this indicator has been refined from tracking the receipt of PTO to tracking its actual usage. The figures represent a one-month snapshot to illustrate comparative usage across states and do not reflect the total percentage of workers who used PTO over the entire year.

INDICATOR 7: FLU VACCINATION RATE

KEY FINDING: During the 2022–2023 season, flu vaccination coverage in the United States dipped slightly. Only 49 percent of residents ages 6 months and older were vaccinated, falling short of the 70 percent target for annual population vaccination.

Editor's note: Adding to concern about low vaccination rates was CDC data showing that, from late October 2023 to late January 2024, only about 47 percent of U.S. adults had been vaccinated against the flu.[135]

Each year, seasonal flu affects millions of people in the United States, leading to a substantial number of medical visits, hospitalizations, and deaths. The severity of a flu season can vary, influenced by factors such as the specific strains circulating, the effectiveness of the annual vaccine, and the population's immunity levels. Vulnerable groups, including older people, young children, and those with certain chronic health conditions, are at higher risk for serious complications. Beyond health, the flu has a considerable economic impact, including healthcare costs and lost productivity due to illness and caregiving. This burden can strain healthcare resources, especially during severe flu seasons. Moreover, the flu often coexists with other health challenges, such as COVID-19 or respiratory syncytial virus (RSV).

Central to combating the flu is the annual vaccination campaign, the primary defense against the virus, especially for individuals at high risk of serious flu-related complications. Establishing a culture of vaccination, robust infrastructure, and supportive policies not only protects against the flu but also aids in averting other vaccine-preventable diseases. Vaccine development and distribution necessitate collaboration across government, healthcare providers, and the public.

In the 2022–2023 flu season, CDC reported a vaccination rate of 49 percent among U.S. residents ages 6 months and older, marking the lowest uptake since the 2018–2019 season.[136] Following a modest increase from 2010–11 to 2018–19, rates slightly peaked in 2020–21—likely due to increased awareness of respiratory infections amid the COVID-19 pandemic—and subsequently stabilized, albeit with a minor decrease in the latest season. Notably, a higher percentage of children, 57 percent of those ages 6 months to 17 years, were vaccinated compared with 47 percent of adults. Older adults ages 65 and over had the highest vaccination rate at 70 percent. Adults ages 50–64 had moderately lower

rate (50 percent) and the 18–49 age group had the lowest overall vaccination rate (35 percent).[137] Flu vaccination rates are also typically lower among Black and Hispanic populations as compared to whites.[138]

Massachusetts (65 percent), Rhode Island (64 percent), the District of Columbia (63 percent), Connecticut (62 percent), and Vermont (61 percent) had the highest coverage, while vaccination rates were lowest in Idaho (37 percent), Mississippi (40 percent), Nevada (40 percent), Kentucky (40 percent), and Wyoming (40 percent). (See Table 9.)

Seasonal flu vaccination rates serve as a critical indicator of a state's public health emergency preparedness, reflecting the effectiveness of healthcare infrastructure and the ability to carry out large-scale vaccine distribution efforts. High vaccination coverage is indicative of robust public health surveillance, effective communication, and the ability to mobilize community trust in adhering to health measures during emergencies. The operational logistics involved in flu vaccination campaigns, including supply management and distribution, mirror the logistics required for responding to public health emergencies, showcasing a state's logistical capability and readiness to handle medical surges.

Moreover, high vaccination rates enhance herd immunity, which is essential in reducing the spread of diseases and the strain on healthcare resources, particularly during outbreaks. This results in a lighter burden on the healthcare delivery system, allowing for the reallocation of critical resources and ensuring the system is not overburdened by concurrent health issues. It also

provides vital protection to populations at increased risk of severe outcomes from infectious diseases.

Additionally, the ongoing administration of vaccines contributes to public health systems that are well-practiced in orchestrating mass vaccination drives, a key component of emergency preparedness. Overall, high levels of vaccination-induced immunity underscore a state's capability to function efficiently in the face of preventable diseases and to bolster community resilience against outbreaks, further solidifying the state's comprehensive emergency preparedness.

Despite the availability of vaccines, vaccination rates can vary, influenced by public perception, access to healthcare, and educational efforts. CDC advises annual flu shots for everyone over 6 months, with rare exceptions. Despite a gradual increase in adult vaccination rates over the past 30 years,[139] only about half of the population adheres to this recommendation. Healthy People 2030 set federal 10-year benchmarks for improving the health of all Americans, including an overall seasonal influenza vaccination rate target of 70 percent annually.[140]

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.[141]

Fortunately, scientists have made encouraging strides recently in developing better tools for preventing serious cases of flu or RSV. In the case of

The operational logistics involved in flu vaccination campaigns, including supply management and distribution, mirror the logistics required for responding to public health emergencies, showcasing a state's logistical capability and readiness to handle medical surges.

flu, the effectiveness of annual vaccines has historically varied significantly. This variability is attributed to the flu virus's constant mutation, making it challenging for vaccine makers to predict and target the dominant strain each season. To address this, there have been recent efforts to develop a more effective, universal vaccine. Multiple vaccine candidates are in various phases of clinical trials. Some scientists have shifted their focus from a "universal flu vaccine" to what they term a "super seasonal vaccine," which would be an improvement over current seasonal vaccines. The goal is to create a vaccine that is at least 75 percent effective for at least one season, preferably longer.[142]

With respect to RSV, recent developments in vaccines and immunizations reflect significant progress in combating a virus that is a leading cause of hospitalization among infants and older adults in the United States. In 2023, the U.S. Food and Drug Administration (FDA) approved two vaccines for adults over 60, Pfizer's Abrysvo and GSK's Arexvy. For infants, FDA approved a monoclonal antibody therapy, nirsevimab, developed by AstraZeneca. This therapy provides temporary immunity by infusing prefabricated antibodies, essential for babies with still-developing immune systems. Additionally, FDA approved giving the Pfizer vaccine to pregnant people to pass antibodies to their babies.[143] CDC recommends all infants under 8 months at the start of RSV season receive nirsevimab. Older infants with increased risk factors are also eligible.[144]

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 well, misconceptions about the safety of the vaccine, or, a belief that the flu does not present serious risks.[145] The reality is flu vaccines prevent millions of illnesses and health visits each year and tens of thousands of hospitalizations, including significantly reducing the risk of intensive care and death, and have proved to be safe.[146,147]

There are a number of policy options available to states and localities seeking to increase flu and other vaccination rates. States can implement policies to expand vaccine availability in a variety of settings, such as pharmacies, schools, workplaces, and community centers. This approach can help reach a broader segment of the population, including those who may not regularly visit a healthcare provider. Additionally, states can reduce financial barriers by ensuring that flu vaccines are covered under Medicaid and by providing free or low-cost vaccines to uninsured or underinsured individuals. Other strategies include providing in-home vaccinations, locating vaccine clinics near public transportation or providing credits for transportation services. Engaging in public awareness campaigns to educate people about the importance and safety of flu vaccines is another effective strategy. States can also collaborate with local healthcare providers and community organizations to organize vaccination drives and outreach programs, particularly tailored to groups at higher risk such as older residents, people in long-term care facilities, children, and those with chronic health conditions. Broader policies like paid sick leave may also

facilitate vaccinations by removing barriers for workers. A multi-pronged strategy, starting with investment in immunization information systems, and across state and local governments has the greatest chance of improving vaccination rates.

One strategy for states to improve vaccine accessibility is to broaden the pool of qualified healthcare providers authorized to administer vaccines. Evidence suggests that pharmacists, for instance, are instrumental in widening vaccine access and managing the spread of epidemics.[148] Additionally, by restricting nonmedical exemptions for school-required vaccinations, including flu and other diseases, states can enhance vaccination rates and curb outbreak occurrences.[149]

In recent years, states have taken innovative steps to improve flu vaccination rates.[150] California, for example, has authorized dentists and podiatrists to independently prescribe and administer influenza vaccines to people ages 3 years and older. In Connecticut, any licensed pharmacist can administer FDA-approved vaccines listed on CDC's Adult Immunization Schedule to adults and, with parental consent, to individuals between 12 and 17 years for influenza vaccines. Delaware allows pharmacists to administer a wide range of vaccines, including influenza.

Georgia has lowered the age to 50 years for hospitals to offer inpatients influenza vaccinations prior to discharge. Illinois has mandated that hospitals adopt an influenza immunization policy targeting patients ages 50 or older and has also authorized podiatrics to provide certain vaccinations, including influenza, to adult patients. Maryland has extended the authority of paramedics to administer influenza immunizations. New Hampshire has empowered pharmacists, pharmacy interns, and licensed advanced pharmacy technicians to administer various vaccines, including influenza, to adults.

New Jersey has established requirements for optometrists to administer immunizations against influenza, and Oregon has authorized pharmacists to administer the influenza vaccine to certain individuals. Virginia, in its efforts to expand access to influenza vaccines, has allowed pharmacists to initiate treatment with, dispense, or administer controlled substances or devices for the treatment of influenza virus infection to adults or those otherwise authorized to consent. These legislative measures represent a concerted effort by states to enhance flu vaccination coverage through expanded access and diversified healthcare provider involvement.

TABLE 9: Just Under Half of U.S. Residents Received a Seasonal Flu Vaccination States' seasonal flu vaccination rates for people ages 6 months and older, 2022–2023	
State	Vaccination Rate, Ages 6 Months or Older
Massachusetts	64.9
Rhode Island	63.6
District of Columbia	62.9
Connecticut	61.9
Vermont	61.1
Maryland	59.8
Maine	56.9
Pennsylvania	56.8
New Hampshire	54.7
Virginia	54.6
Washington	54.4
New Jersey	54
Wisconsin	53.9
Colorado	53.6
New York	52.6
Delaware	52
Minnesota	51.8
California	51.7
Hawaii	51.4
Nebraska	51.1
Iowa	50.9
North Carolina	50.8
South Dakota	50.7
Illinois	50.5
Ohio	50.3
Oregon	49.8
New Mexico	48.6
Michigan	48
Kansas	47.6
Missouri	47.1
Utah	45.9
Indiana	45.6
Arkansas	45.5
Arizona	45
West Virginia	44.8
South Carolina	44.6
Tennessee	44
Georgia	43.9
Alabama	43.4
Texas	43.4
Florida	42.9
Alaska	42.8
Louisiana	42.7
Oklahoma	41.6
Montana	41.3
North Dakota	41.3
Wyoming	40.3
Kentucky	40.1
Nevada	39.9
Mississippi	39.7
Idaho	36.9

Source: Centers for Disease Control and Prevention.[151]

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

INDICATOR 8: PATIENT SAFETY IN HOSPITALS

KEY FINDING: On average, 25 percent of hospitals received an "A" grade in the fall 2023 hospital safety assessment administered by the Leapfrog Group, a nonprofit advocate for safety, quality, and transparency in hospitals.

The history of hospital patient safety in the United States has evolved significantly, influenced by key developments and milestones. The 20th century witnessed technological advances and the introduction of antibiotics, which improved care but also introduced new risks. The rise of medical malpractice litigation in the late 20th century highlighted the frequency of medical errors. This culminated in the 1999 *To Err is Human* report, a critical turning point that spurred a national focus on patient safety, leading to systematic safety protocols and the integration of technology like electronic health records.[152] The COVID-19 pandemic further underscored the importance of patient safety, emphasizing infection control and healthcare system resilience. This journey reflects a continuous progression toward safer, higher quality patient care in U.S. hospitals.

Still, approximately 200,000 people die each year from hospital errors, injuries, accidents, and infections, collectively making such incidents one of the leading causes of death in the United States.[153,154] Keeping hospital patients safe from preventable harm is an important element of preparedness; hospitals excelling in safety are less likely to cause or contribute to a public health emergency and are better positioned to handle emergencies that test routine quality standards.

During the COVID-19 pandemic, hospitals were among the numerous settings ripe for viral transmission, threatening the safety of patients, staff, and visitors. The pandemic also prevented some people in need of urgent or emergency care from visiting the emergency department, likely contributing to overall excess mortality.[155]

Measures such as universal masking, availability and proper use of personal protective equipment (PPE), adequate ventilation, limiting the sharing of patient rooms, and universal hand hygiene proved critical in preventing outbreaks in hospitals. However, hospital crowding during regional waves of infection has been shown to contribute to adverse outcomes, including increased medical errors, reduced quality of care, treatment delays, medication errors, longer patient stays, poorer outcomes, and increased mortality.[156]

The Leapfrog Group, founded in 2000 by large employers and healthcare purchasers, is a nonprofit organization dedicated to improving healthcare quality and patient safety in the United States. It is known for its Leapfrog Hospital Safety Grade and annual hospital survey, which promote transparency and help people make informed healthcare decisions. The Hospital Safety Grade assesses nearly 3,000 general acute-care hospitals across the United States twice annually, using up to 22 national patient safety measures sourced from the Centers for Medicare & Medicaid Services, the Leapfrog Hospital Survey, and other supplemental data sources.[157] The Safety Grade produces a single letter grade representing a hospital's overall performance in keeping patients safe from preventable harm and medical errors.

The safety measures used in the Safety Grade are divided into two main domains: Process/Structural Measures and Outcome Measures, each accounting for 50 percent of the Safety Grade. Measures such as computerized physician order entry and various infection-control metrics are crucial for public health emergency preparedness.

Computerized physician order entry is vital for reducing medication errors, especially in high-pressure emergency situations, by ensuring accurate and timely medication administration. Infection-control measures—including rates of MRSA (Methicillin-resistant Staphylococcus aureus); C. diff (Clostridioides difficile); bloodstream, urinary tract, and surgical site infections; and sepsis post-surgery—are pivotal for gauging a hospital's ability to prevent and control infections. These aspects are particularly critical during infectious disease outbreaks, as they reflect a hospital's capacity to manage and contain the spread of infections effectively. Together, these measures provide a comprehensive view of a hospital's readiness to handle public health emergencies, focusing on key areas of patient safety and operational efficiency.

The Leapfrog Hospital Safety Grade is a meaningful measure of a state's public health emergency preparedness, underscored by its focus on patient safety, which is fundamental in managing health crises. The comprehensive evaluation of key safety measures, such as infection control and medication safety, highlights the importance of maintaining high safety standards, especially in emergency scenarios where the risk of errors and infections can be heightened. This standardized, evidence-based assessment ensures a consistent and objective understanding of a hospital's ability to respond to emergencies, with patient safety at its core. Moreover, the capability for benchmarking and tracking improvements over time helps states to effectively monitor and enhance their readiness for public health emergencies.

Leapfrog weights each measure within the Hospital Safety Grade by determining four criteria: impact, evidence, opportunity, and the number of component measures. Leapfrog assigns a standard weight to each measure, indicating its relative importance within the Safety Grade.

To make data from different performance scales comparable, Leapfrog employs a standardization method. This method shows whether a hospital's score on a specific measure is better, worse, or the same as the average score across all hospitals. In calculating a hospital's overall safety score, each measure's standardized score is multiplied by its assigned importance weight. The total of these weighted scores for all measures gives the hospital's combined score for process and structural aspects. This approach ensures a uniform and evidence-based evaluation of hospital safety performance, allowing for fair and consistent comparisons across different hospitals.

In the Leapfrog Group's fall 2023 assessment, 25 percent of general acute-care hospitals across the United States, on average, met the requirements for an "A" grade—a slight decrease from fall 2022, when the share was 26 percent. However, results varied widely from state to state, with no hospitals in the District of Columbia, North Dakota, Vermont, Delaware, and Wyoming receiving the top score, compared with a majority of hospitals in Utah (52 percent) and Virginia (51 percent). (See Table 10.)

TABLE 10: Hospital Patient Safety Scores Vary Significantly by State
State percentage of hospitals with "A" grade, fall 2023

State	Percent of Hospitals
Utah	52%
Virginia	51%
North Carolina	48%
Pennsylvania	44%
South Carolina	43%
Connecticut	43%
Montana	40%
Tennessee	39%
Florida	38%
Texas	38%
Kansas	38%
Colorado	37%
New Jersey	36%
Louisiana	36%
Maine	35%
Massachusetts	33%
Rhode Island	33%
Maryland	32%
New Hampshire	31%
California	31%
Georgia	30%
Nebraska	30%
Michigan	29%
Idaho	29%
Washington	28%
Hawaii	25%
Ohio	25%
Illinois	25%
Indiana	24%
Oregon	24%
Missouri	21%
Minnesota	21%
Arizona	20%
Arkansas	20%
Mississippi	20%
Oklahoma	20%
Kentucky	20%
Alaska	17%
Nevada	17%
New Mexico	15%
Alabama	12%
New York	11%
Wisconsin	10%
South Dakota	10%
Iowa	9%
West Virginia	5%
Delaware	0%
District of Columbia	0%
North Dakota	0%
Vermont	0%
Wyoming	0%

Note: This measure applies exclusively to general acute-care hospitals.

Source: The Leapfrog Group.[158]

INDICATOR 9: STATE PUBLIC HEALTH LABORATORY SURGE CAPACITY

KEY FINDING: In 2023, all states except four, as well as the District of Columbia, reported having a written plan for a six-to-eight-week surge in laboratory-testing capacity to respond to an outbreak or other public health event.

State public health laboratories play a critical and evolving role in public health, dating back to the late 19th and early 20th centuries. Initially focusing on controlling communicable diseases like tuberculosis, diphtheria, and typhoid fever, these laboratories have since expanded their roles to include activities such as environmental health testing, emergency response, bioterrorism preparedness, and the surveillance and control of chronic diseases and conditions.

These laboratories are essential in detecting and responding to health threats. They provide vital services, including disease testing and identification, quality assurance of food and water supplies, and research that advances public health initiatives. Working closely with federal agencies like CDC, state public health laboratories are key in implementing national health programs at the state level. They also play a pivotal role in training and educating laboratory professionals and developing new testing methods and technologies to address emerging health threats. Their ability to quickly adapt and respond was particularly highlighted during public health emergencies, such as the H1N1 influenza pandemic and the COVID-19 outbreak, demonstrating their critical role in safeguarding public health.

During the COVID-19 pandemic, state public health laboratories were instrumental in managing the crisis. As the backbone of the Laboratory Response Network (LRN) in every state and U.S. territory, these labs led early testing and diagnosis efforts, playing a key role in the initial detection and confirmation of cases.[159] They were central in conducting genomic sequencing for surveillance, which aided in tracking the virus's spread and evolution, including by identifying various strains and variants. Their role in data collection, analysis, and dissemination efforts played a crucial role in shaping public health policies and decisions.

When disaster or disease outbreaks occur, public health laboratories must be capable of surging to meet increased demand, akin to 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."[160] Surging capacity may require staff reassignment or movement, extra shifts, and hiring. Laboratories also need to plan for infrastructure factors like adequate biological safety cabinets, chemical fume hoods, sufficient supplies, and appropriate space for intake, processing, and storage of samples; versatility and capacity of analytical equipment and instruments; availability of PPE; and power supply.[161]

Public health laboratories develop detailed plans for such events, designed to rapidly scale up capacity and capabilities. Effective surge plans detail how laboratory services can be efficiently expanded and adapted to various public health threats. These plans consider adequate facilities, state-of-the-art equipment, reliable supply chains, a well-trained staff ready for deployment or reallocation, well-defined operational guidelines for various scenarios, collaboration with

other laboratories, healthcare facilities, and government agencies, as well as clear communication channels within the laboratory network and with public health authorities and the public. Regular testing and updating of these plans, based on new technologies, emerging threats, and lessons learned from past incidents, ensure their continual relevance and effectiveness.

Going forward, challenges to the effectiveness of public health laboratory preparedness include funding gaps for infrastructure and modernization; a lack of standardized platforms for electronic data exchange; limited ability to detect radiological, nuclear, and chemical threats; and perhaps most significantly, workforce shortages.[162]

Scott Becker, CEO of the Association of Public Health Laboratories, highlights the U.S. response to Mpox as an example of both the diagnostic contributions of public health labs and the need to better support them.[163] In May 2022, when the first U.S. case of Mpox was detected, public health labs were quickly able to provide testing. However, the assays provided years earlier were not designed for use on efficient automated machines that facilitate large-scale testing; they required highly trained staff and elevated biosafety practices in laboratory spaces. Becker emphasizes the need for federal funding to update existing tests used by public health labs to modern standards, allowing them to adapt quickly, to test large numbers of specimens, and to detect new pathogens.

In 2023, California, Missouri, Utah, and Virginia were the only jurisdictions that reported to the Association of Public Health Laboratories that they did not have a written plan for a six- to eight-week surge in testing capacity (See

Table 11). Amidst a reorganization at the California Department of Public Health, the newly formed Center for Laboratory Sciences had not yet completed a written surge capacity plan, with previous versions residing in now-consolidated centers. Missouri and Virginia both had operational surge plans, though Missouri's written documentation and Virginia's formal written plan were still pending. Utah was actively updating its Continuity of Operations Plan to encapsulate their surge testing capacity plan, which remained under development. Each state acknowledged the importance of such preparedness plans and was working towards finalizing them.

The existence of a written public health laboratory surge plan is a crucial indicator of a state's emergency preparedness. It signifies readiness for a rapid and effective response, highlighting the state's capacity to quickly scale up laboratory operations in crisis situations. The plan reflects comprehensive planning that extends beyond laboratory capacity, including staff training, supply-chain robustness, and interagency coordination. Its adaptability to various threats, such as infectious diseases and bioterrorism, underscores the state's preparedness for a wide range of emergencies. The plan's emphasis on collaboration and coordination with other entities, continual updating based on emerging threats and technologies, and resource allocation toward emergency preparedness contribute to a robust public health response system. The presence of such a plan not only enhances the state's ability to manage health crises effectively but also fosters public confidence and trust in its public health infrastructure.

TABLE 11: Nearly Every State Planned for a Laboratory Surge
State public health laboratories with a written plan for a six- to eight-week surge in testing capacity, 2023

Had a Plan			No Plan
Alabama	Kentucky	North Dakota	California
Alaska	Louisiana	Ohio	Missouri
Arkansas	Maine	Oklahoma	Utah
Arizona	Maryland	Oregon	Virginia
Colorado	Massachusetts	Pennsylvania	
Connecticut	Michigan	Rhode Island	
Delaware	Minnesota	South Carolina	
District of Columbia	Mississippi	South Dakota	
Florida	Montana	Tennessee	
Georgia	Nebraska	Texas	
Hawaii	Nevada	Vermont	
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[164]

Note: This indicator solely tracks the existence of a written plan and does not assess its quality, comprehensiveness, or the frequency of its utilization or testing.

TABLE 12: INDICATORS OF PUBLIC HEALTH EMERGENCY PREPAREDNESS BY STATE						
	Nurse Licensure Compact (NLC)	**Public Health Accreditation Board (PHAB)**	**Emergency Management Accreditation Program (EMAP)**	**Public Health Funding**	**Water Security**	
	State participates in NLC, 2023	Accredited by PHAB, 2023	Accredited by EMAP, 2023	Funding change, FY 2022-23	Percent of population who used a community water system in violation of health-based standards, 2022	
Alabama	✓	✓	✓	↑	4%	
Alaska				↓	5%	
Arizona	✓	✓	✓	↑	3%	
Arkansas	✓	✓	✓	↓	2%	
California		✓	✓	↓	1%	
Colorado	✓	✓	✓	↑	4%	
Connecticut		✓	✓	↑	0%	
Delaware	✓	✓	✓	↑	0%	
D.C.		✓	✓	↑	3%	
Florida	✓	✓	✓	↑	2%	
Georgia	✓	✓	✓	↑	4%	
Hawaii				↑	0%	
Idaho	✓	✓	✓	↓	3%	
Illinois		✓	✓	↑	1%	
Indiana	✓	✓		↓	5%	
Iowa	✓	✓		↑	1%	
Kansas	✓	✓	✓	↑	4%	
Kentucky	✓	✓		↑	2%	
Louisiana	✓	✓		↑	22%	
Maine	✓	✓		↑	1%	
Maryland	✓	✓	✓	↓	26%	
Massachusetts		✓	✓	↑	14%	
Michigan			✓	↓	1%	
Minnesota		✓		↑	1%	
Mississippi	✓	✓	✓	↑	11%	
Missouri	✓	✓	✓	↑	1%	
Montana	✓	✓		↑	6%	
Nebraska	✓	✓		↑	1%	
Nevada			✓	Not reported	0%	
New Hampshire	✓			↑	3%	
New Jersey	✓	✓	✓	↑	10%	
New Mexico	✓	✓		↑	6%	
New York		✓	✓	↑	45%	
North Carolina	✓	✓	✓	↑	2%	
North Dakota	✓	✓	✓	→	0%	
Ohio	✓	✓	✓	↓	2%	
Oklahoma	✓	✓	✓	↑	18%	
Oregon		✓		↑	15%	
Pennsylvania	✓	✓	✓	↑	5%	
Rhode Island	✓	✓	✓	↓	2%	
South Carolina	✓	✓	✓	↑	2%	
South Dakota	✓			↑	5%	
Tennessee	✓		✓	↑	4%	
Texas	✓			↓	6%	
Utah	✓	✓	✓	↑	2%	
Vermont	✓	✓	✓	↑	0%	
Virginia	✓	✓		↑	1%	
Washington	✓	✓	✓	↑	0%	
West Virginia	✓			Not reported	14%	
Wisconsin	✓	✓	✓	↓	2%	
Wyoming	✓			↑	5%	
51-state average	**N/A**	**N/A**	**N/A**	**N/A**	**5%**	

Note: See "Appendix B: Methodology" for a description of TFAH's data-collection process and scoring details. States with conditional or pending accreditation at the time of data collection were classified as having no accreditation. Public health funding data for FY 2023 were not reported for Nevada and West Virginia. 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. Paid time off includes sick leave, vacations, and holidays. The patient safety measure captures only general acute-care hospitals.

TABLE 12: 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 2018-23	Seasonal flu vaccination rate for people ages 6 months or older, 2022–23	Percentage of hospitals with "A" grade, fall 2023	Public health laboratories had a written plan for a six- to eight-week surge in testing capacity, 2023	Scoring tier, 2023
Alabama	57%	43.4	12%	✓	High
Alaska	59%	42.8	17%	✓	Low
Arizona	56%	45	20%	✓	High
Arkansas	53%	45.5	20%	✓	Middle
California	55%	51.7	31%		Low
Colorado	57%	53.6	37%	✓	High
Connecticut	60%	61.9	43%	✓	High
Delaware	55%	52	0%	✓	Middle
D.C.	63%	62.9	0%	✓	High
Florida	55%	42.9	38%	✓	High
Georgia	54%	43.9	30%	✓	High
Hawaii	57%	51.4	25%	✓	Low
Idaho	53%	36.9	29%	✓	Middle
Illinois	49%	50.5	25%	✓	Middle
Indiana	54%	45.6	24%	✓	Low
Iowa	54%	50.9	9%	✓	Middle
Kansas	60%	47.6	38%	✓	High
Kentucky	50%	40.1	20%	✓	Low
Louisiana	54%	42.7	36%	✓	Low
Maine	61%	56.9	35%	✓	High
Maryland	55%	59.8	32%	✓	Middle
Massachusetts	61%	64.9	33%	✓	High
Michigan	50%	48	29%	✓	Low
Minnesota	50%	51.8	21%	✓	Low
Mississippi	65%	39.7	20%	✓	High
Missouri	54%	47.1	21%		Middle
Montana	54%	41.3	40%	✓	Middle
Nebraska	53%	51.1	30%	✓	High
Nevada	52%	39.9	17%	✓	Low
New Hampshire	55%	54.7	31%	✓	Middle
New Jersey	56%	54	36%	✓	High
New Mexico	58%	48.6	15%	✓	Middle
New York	61%	52.6	11%	✓	Low
North Carolina	56%	50.8	48%	✓	High
North Dakota	52%	41.3	0%	✓	Low
Ohio	56%	50.3	25%	✓	High
Oklahoma	59%	41.6	20%	✓	Middle
Oregon	56%	49.8	24%	✓	Low
Pennsylvania	52%	56.8	44%	✓	High
Rhode Island	48%	63.6	33%	✓	High
South Carolina	48%	44.6	43%	✓	High
South Dakota	53%	50.7	10%	✓	Low
Tennessee	52%	44	39%	✓	High
Texas	63%	43.4	38%	✓	Low
Utah	50%	45.9	52%		Middle
Vermont	54%	61.1	0%	✓	High
Virginia	59%	54.6	51%		High
Washington	58%	54.4	28%	✓	High
West Virginia	53%	44.8	5%	✓	Low
Wisconsin	54%	53.9	10%	✓	Middle
Wyoming	53%	40.3	0%	✓	Low
51-state average	**55%**	**49.3**	**25%**	**N/A**	**N/A**

SECTION 2:

Ready or Not 2024

Recommendations for Policymakers, Health Officials, Community Leaders, and the Healthcare & Business Sectors

For the past two decades, TFAH has issued recommendations for action by policymakers, public health officials, healthcare providers, community leaders, and businesses. Taken together, these recommendations could help build a nation that is more resilient and better prepared for longstanding and emerging health threats. However, the progress of the past two decades is at risk, as political divisions, proposed deep cuts to public health funding, and misinformation and distrust of science continue to gain traction. For example, Congress has rescinded hundreds of millions of dollars intended to bolster public health workforce and readiness and response efforts. In addition, lawmakers extended some expiring provisions of the Pandemic and All-Hazards Preparedness Act but failed to reauthorize the law in its entirety. Without sustained attention to the nation's preparedness and response capabilities, the country could be at a significant disadvantage for the next public health crisis.

TFAH based the following policy recommendations on research and analysis, consultation with experts, and a review of gaps in federal and state preparedness. The recommendations are intended to build a stronger and more equitable 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 would be contingent on appropriate levels of funding to support public health infrastructure within these jurisdictions.

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

Short-term funding provided in response to the COVID-19 pandemic spurred significant progress in public health data, infrastructure, and the workforce. Initial investments in data modernization, for example, are already bearing fruit: electronic case reporting has grown from 187 healthcare facilities before the pandemic to over 22,000 today, saving staff hours and money that would have been spent on paperwork.[166] Yet, there are numerous indications that the nation is already entering the austerity phase of the "boom and bust" cycle of public health funding. In July 2023, Congress rescinded an estimated $1.3 billion from CDC's budget as part of the Fiscal Responsibility Act,[167] and House appropriators proposed another $1.6 billion in cuts in FY 2024.[168] The short-term nature of supplemental investments will also create funding cliffs in the coming years.[169] Building and sustaining public health preparedness capabilities requires more than one-time investments. Importantly, the limited scope and time frame for emergency supplemental money does not make up for decades of underfunding America's public health capabilities. Major gaps remain in cross-cutting, foundational capabilities and services 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.

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 this short-term funding will expire and create significant funding cliffs that put recent progress at risk. Congress should provide ongoing investment in these cross-cutting public health capacities, as proposed in the Public Health Infrastructure Saves Lives Act.[170]

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.

HOW WILL INFRASTRUCTURE INVESTMENT AND DATA MODERNIZATION STRENGTHEN EMERGENCY PREPAREDNESS?

Decades of underfunding and disease-specific funding have left the nation's public health infrastructure unprepared to meet today's public health challenges. Increased investment in cross-cutting capabilities would allow for a stronger foundation for every community to quickly address health threats, including:

- **Data:** Tracking and responding to health emergencies requires comprehensive and timely data. A modernized data system would allow public health officials to collect, analyze, and share health data in real time, enabling decision-making and resource allocation that will save lives. More comprehensive data systems will also provide greater insight into population-specific health risks and how to address them.

- **Workforce:** The public health workforce needs to be larger, more diverse, and to enhance its skill sets. New funding would allow health departments to recruit, retain, and support public health practitioners, including epidemiologists, data scientists, health communicators, and community health workers.
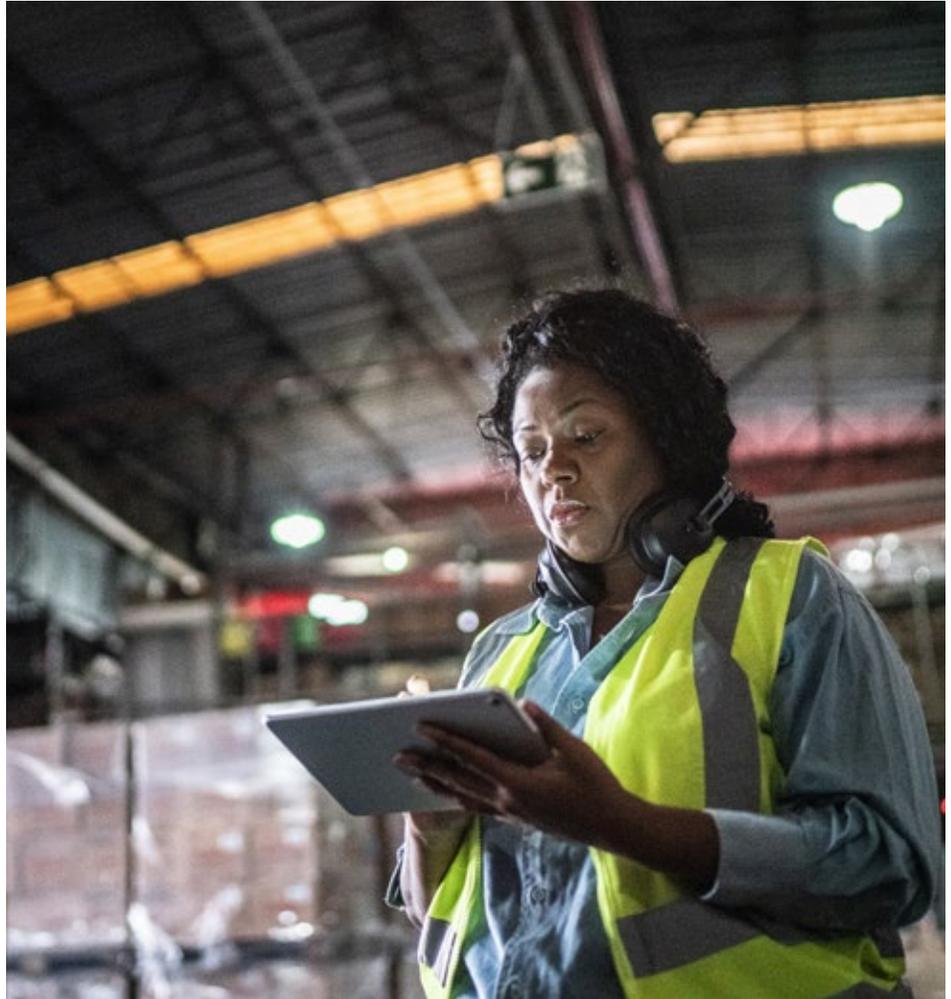
- **Foundational Capabilities:** Additional infrastructure funding would allow health departments to invest in their functional capabilities, such as assessment and surveillance, emergency preparedness and response, community partnerships, communications, policy development, and performance management.

- **Congress should continue to increase funding for Public Health Emergency Preparedness.** Congress should continue to restore funding in the amount of at least $1 billion in FY 2024 for the Public Health Emergency Preparedness 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 20 percent since FY 2003, or by about half, after adjusting for inflation.[171] The Public Health Emergency Preparedness 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 must recognize that the progress from these initial investments is at risk without continued investment. Funding for CDC's Data Modernization Initiative is needed to continue to build and sustain 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 to strengthen public health data collection and reporting at the state and local levels.[172]

- **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 to ensure these critical activities receive the sustainable resources necessary to secure Americans' health, economic, and national security.[173] Budget caps and competing priorities in the nondefense discretionary budget category continue to constrain annual discretionary appropriations, making it nearly impossible to invest in medium- to long-term health defense.

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

- **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 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. States should remove barriers to hiring in governmental health departments, such as lengthy timelines between application and start date, especially in times of emergency. Schools and programs of public health should incorporate health equity, data equity, and cultural competency into their curricula and training programs in actionable ways.

- **Congress should accelerate the country's capacity to respond through existing crisis-response mechanisms and faster, flexible 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 Diseases Rapid Response Reserve Fund to serve as available funding that may provide a temporary bridge between preparedness and supplemental emergency funds. 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 partner countries 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. port health system, including information technology systems, port health stations, 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. The pandemic exposed shortcomings in public health legal authorities and coordination, but some states and members of Congress continue to consider or enact limits on legal health authorities.[174]

The White House launched the Office of Pandemic Preparedness and Response Policy in 2023 as a permanent office in the Executive Office of the President to better coordinate actions across the federal government, a recommendation from previous TFAH reports. Policymakers at all levels must continue to shore up the leadership, coordination, and legal authorities 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 to collect public health data in a timely and coordinated way.** 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.[175] A uniform approach to data collection, such as the approach 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.

- **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 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.

Federal agencies should implement the recommendations from the Equitable Data Working Group to ensure a more robust picture of health threats and their impacts on all populations.[176] In addition, HHS should stand up its own data-equity 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. 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.[177]

- **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 of and response to 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.

- **Congress should create an independent COVID-19 commission to examine the pandemic and make recommendations to Congress.** Congress should authorize and fund an independent commission to investigate the preparedness for and response to the pandemic across the federal government and make concrete recommendations for addressing gaps and missteps and identifying and sustaining areas of success. 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 the 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—for example, by implementing CDC's Moving Forward plan. 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.

- **Policymakers should act to strengthen public health protections.** Federal and state lawmakers, governors, and courts should reject laws that weaken or preempt 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, creating mechanisms for effectively engaging and listening to communities, 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 and community partners to research and test effective messaging, counter and prevent misinformation and disinformation, assist in message development, help deliver messages, and conduct outreach. 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.[178]

Priority Area 3: Prevent and Respond to Outbreaks and Pandemics

The United States must be able to prevent and control both known and unknown pathogens. The world continues to see emerging infectious disease threats, such as the Mpox virus and COVID-19, while other diseases, such as malaria, spread in the United States for the first time in decades.[179] The latest vaccine exemption rate for children entering school was the highest ever reported in the United States, putting children and their communities at risk for outbreaks of preventable diseases.[180] The nation also continues to see disparities in Americans' access to vaccines and treatments for a range of infections,[181] especially among those who are uninsured, Black, Latino, or living below the federal poverty level.[182] Policymakers across the country have proposed or enacted legislation to make vaccination and infection control more difficult.[183] The United States must be able to protect all residents from pandemics, emerging infectious diseases, and localized outbreaks.

RECOMMENDATIONS FOR FEDERAL AND STATE GOVERNMENT AND HEALTHCARE:

- **Congress should provide at least $1.1 billion per year to support 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 worse outcomes, improve vaccine confidence, establish partnerships, and improve information systems. Yet, funding has not kept up with needs, as states have had to spend immunization dollars to respond to outbreaks[184] in an attempt to manage the impact of vaccine underutilization. Congress should also increase annual funding for CDC's seasonal influenza program and post-licensure vaccine safety monitoring, as well as appropriations to HHS to study and address the causes of vaccine hesitance, improve community engagement, and 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 have access to vaccines with no cost-sharing thanks to the Inflation Reduction Act,[185] but barriers remain for many adults. To address these barriers, Congress should enact an adult vaccine safety-net program, such as the Vaccines for Adults program proposed in the president's FY 2024 Budget Request. HHS should also encourage states to adopt the Inflation Reduction Act's Medicaid extension so low-income adults have access to this vaccine benefit through Medicaid.

- **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 domestic and global healthcare-associated infection/antimicrobial

resistance programs. Through ARSI and CDC's investment, support is provided for prevention measures in every state, several large cities, and territories. This support aims to strengthen lab capacity, track infections across healthcare systems, detect new threats, slow or stop the spread of pathogens, coordinate prevention strategies, implement strategies to improve appropriate antibiotic and antifungal use including by educating both human and animal healthcare providers, and support for research and development of other innovations. In addition, Congress should increase funding to build global capacity to prevent, detect, and contain antimicrobial resistant infections.[186]

- **Centers for Medicare & Medicaid Services (CMS), CDC, and healthcare entities should decrease over-prescription of antibiotics through the implementation of antibiotic stewardship and antibiotic-use reporting.** CMS should enforce stewardship requirements for hospitals and work with public health stakeholders to track progress in prescribing rates and resistance patterns.[187] CMS and CDC should work with healthcare, public health, and patient advocates to develop improvements to the current stewardship Condition of Participation, such as by 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.[188]

- **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, other school personnel, and the public are protected from vaccine-preventable diseases. This includes eliminating nonmedical exemptions and opposing legislation to expand exemptions.[189] 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.

- **Congress and states should provide job-protected paid leave.** 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, such as the policy proposed in the FAMILY Act, and dedicated paid sick days protections, such as the protection outlined in the Healthy Families Act. Until federal protections are passed, states should enact paid leave laws and/ or remove preemption exemptions for localities that enact these policies.

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, have more limited 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 among community-based organizations and leaders, governmental agencies, and community health and healthcare organizations. However, these partnerships will likely dissolve without sustained attention and funding.

It is vital to support the full range of public health activities across CDC and the country. The nation is especially vulnerable to outbreaks and disasters because of high rates of chronic disease and mental health conditions. Health emergencies also contribute to chronic conditions—such as Long COVID[190]—and mental health concerns.[191] Keeping people healthier in the first place will contribute to more resilient communities during health emergencies. 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:

- **Congress should invest in 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.[192] Addressing these nonmedical factors, sometimes called social determinants of health (SDOH), can improve community resilience. Congress should increase funding for CDC's SDOH work, which enables research into best practices and provides grants for cross-sector partnerships and community solutions to SDOH.

- **Agencies at all levels of government should plan with communities, rather than for them, and provide resources and** technical assistance to communities and community-based organizations 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. All sectors involved in emergency planning and response must conduct meaningful engagement, partnerships, and listening efforts and work together to identify and plan with communities at higher risk of health impacts during an emergency, such as older adults, people with disabilities, people experiencing homelessness, and individuals with chronic health conditions. Doing so will help ensure emergency plans, procedures, communications strategies, and evacuation shelters meet the needs of all in the community.

These steps include:

- 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. 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.

- 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. Such planning would allow organizations to hire and engage community members to ensure emergency plans better reflect the community, as well as improve their data collection and sharing.

- Federal and state governments and philanthropies should ensure that existing grants and sub-awards reach the grassroots level and communities most in need, and they should support the partnerships built during the COVID-19 pandemic for broader health equity and resilience work.

- **All levels of government, from the White House and federal agencies to state and local governments should continue to strengthen their health equity leadership and adopt strategies and accountability metrics to incorporate equity into preparedness.**

These steps include:

- CDC has updated its "notice of funding" opportunity (NOFO) template to incorporate health equity guidance.[193] HHS should strive to integrate these changes across its NOFO development, and awardees should implement meaningful multisector engagement

wherever feasible. All jurisdictions and federal grant makers should establish metrics and procedures for ensuring emergency responses are equitable and for addressing inequities as they occur.

- 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.

- HHS, CDC, state, local, tribal, and territorial governments should build up internal infrastructure to promote health 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.

- **HHS should increase transparency of its progress on the recommendations of the National Advisory Committee on**

Children and Disasters, the National Advisory Committee on Individuals with Disabilities and Disasters, and the National Advisory Committee on Seniors and Disasters. The federal government should formally respond to the Advisory Committees' recommendations (where possible), including an explanation of how the government plans to implement the recommendations and, if not, what the barriers to implementation are.

- **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 strengthening its support for population-level approaches for mental health resilience, increasing research, surveillance, and monitoring of the impact of climate emergencies and extreme weather on behavioral health, as well as researching the most effective post-disaster interventions. *For additional discussion of strengthening the 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

An effective medical countermeasure (MCM) enterprise has the power to disarm future biological threats. 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.[194] But thus far federal investments have not matched what is needed to reach these goals.[195] The U.S. program has achieved notable successes in the past year, including advancing new vaccines and diagnostics[196] and launching Project NextGen to accelerate the next generation of COVID-19 countermeasures,[197] but some of these achievements were advanced with short-term funding. The success of the MCM system depends on sustained funding from initial research through distribution and dispensing.

RECOMMENDATIONS FOR FEDERAL GOVERNMENT AND PRIVATE-SECTOR PARTNERS:

- **Congress should provide significant, long-term funding for the entire MCM enterprise.** The MCM enterprise involves multisector partners that leverage their 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, the Strategic National Stockpile, CDC, FDA, the National Institutes of Health, and other components of the Public Health Emergency Medical Countermeasure Enterprise 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 personal protective equipment. The United States should continue to grow its investment in innovative, flexible technologies and platforms that will enable faster production of items for a range of threats, rather than focusing on products for a single pathogen.[198]

- **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 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.

- **Congress should create incentives for new-product discovery to prevent and fight resistant infections including therapeutics, diagnostics, and prevention products such as vaccines.** The antimicrobial development pipeline is inadequate, leaving patients at risk for antimicrobial-resistant infections.[199] Congress should enact legislation that includes sustainable development incentives for novel antibiotics and antifungals that address unmet needs and are de-linked from sales and contain strong stewardship and surveillance provisions, such as the PASTEUR Act,

to strengthen the market for antibiotic and antifungal developers, improving patient access for those who need it most without encouraging overuse.

- **Congress should strengthen the pipeline of influenza vaccines, diagnostics, and therapeutics.** The Protecting America from Seasonal and Pandemic Influenza Act is a comprehensive authorizing bill that would implement and build upon the National Influenza Vaccine Modernization Strategy. The bill would take steps to speed up vaccine development, support immunization information systems, strengthen the supply chain for these products, and authorize sustainable funding for the federal influenza ecosystem.

- **HHS should clarify and strengthen the Public Health Emergency Medical Countermeasures Enterprise (PHEMCE), leadership of MCM, and supply chain management for emergencies.** HHS should continue to reinvigorate interagency PHEMCE coordination,[200] including through regular interagency meetings; engagement with private-sector and nonprofit supply-chain partners; 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. The supply chain should be visible to federal, state, and local officials and the private sector so delays can be identified early. Federal agencies should continue to 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 it should develop and disseminate best practices for supply management.[201]

- **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 infants, children, pregnant and postpartum people, older adults, people with disabilities, and people who are homebound. 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. 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/or 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. Workforce shortages and hospital closures are disrupting how people receive care, especially in underserved areas. Add in a natural disaster, severe flu and RSV season, or a pandemic, and many healthcare facilities are strained beyond the breaking point. Health system readiness is an essential element of health security and recovery. Readiness benefits healthcare systems, their patients and staff, and the communities they serve.

RECOMMENDATIONS FOR FEDERAL GOVERNMENT AND HEALTHCARE:

- **Congress, HHS, and healthcare leaders should strengthen Health Care Readiness and Recovery.** Congress must increase annual funding to at least $500 million for the ASPR-managed Health Care Readiness and Recovery Portfolio, which supports the readiness of the healthcare delivery system for disasters, including through the Hospital Preparedness Program (HPP). 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 addressing gaps in the program.

    - Strengthening requirements under the program, such as requiring crisis standards of care planning as a condition of funding for HPP.[202]

    - Ensuring healthcare leaders take the lead on HPP planning and implementation, including crisis standards of care, 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.

    - Building readiness for pediatric patients in emergencies by requiring hospital participants in HPP to complete a Pediatric Readiness Assessment, as recommended by the National Advisory Committee on Children and Disasters.[203] This self-assessment tool helps facilities to evaluate overall pediatric readiness in emergency departments. Emergency departments with a high degree of pediatric readiness have lower mortality among children.[204]

  - 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.

- **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[205] 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.[206]

- **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. With the end of the COVID-19 public health emergency declaration and continuous coverage requirements, millions of Americans have been disenrolled from Medicaid across the country.[207] Congress and the administration should strengthen incentives for states to expand Medicaid, make marketplace coverage more affordable, and improve outreach and marketing for enrollment.[208] States should streamline Medicaid renewal processes and ensure continuity of coverage for children and adults.[209]

- **Congress and HHS should create incentives and ramifications to build sustainable preparedness and surge capacity across healthcare systems.** 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 such as:

  - 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.[210]

  - Payment incentives could sustain preparedness, surge capacity, regional disaster partnerships, and reward facilities that maintain specialized disaster care.

RECOMMENDATIONS FOR STATE GOVERNMENT AND THE HEALTHCARE SECTOR:

- **State and local emergency planners should work with the healthcare sector to integrate healthcare delivery into emergency preparedness and response.** Jurisdictions should continue to 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 through training and workforce protections, regular exercises, 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. To promote healthcare readiness and ease the ability to surge care and services, states should also adopt policies such as the Nurse Licensure Compact, the Interstate Medical Licensure Compact, the Recognition of EMS Personnel Licensure Interstate CompAct,[211] the Uniform Emergency Volunteer Health Practitioners Act,[212] emergency prescription refill laws and protocols, and implementation and education of providers regarding crisis standards of care guidelines.[213,214] 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

When a freight train carrying hazardous materials derailed in East Palestine, Ohio, in February 2023, the environmental disaster that followed required a multiagency response to address the health and environmental impacts in both the near- and long-term. 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 impacts are also the least prepared to deal with them. 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 should increase investments for programs that identify and mitigate the health impacts of climate change, environmental hazards, and extreme weather.** That includes funding HHS's Office of Climate Change and Health Equity[215] to expand its work to address the health effects of climate change and CDC's National Center for Environmental Health, which oversees the Climate and Health Program and the National Environmental Public Health Tracking Network. Congress should increase funding so these programs reach all 50 states and all eligible jurisdictions.

- **Congress should address the impact of extreme heat on health.** The burden of extreme heat is not evenly distributed across populations; older adults, young children, those with chronic conditions, low-income individuals, and some communities of color face the most risk.[216] Extreme heat can also be a significant contributor to severe maternal morbidity.[217] Congress should sustain funding for multiagency efforts to address health impacts of extreme heat, including the National Integrated Heat Health Information System.[218,219]

- **The federal government and states should strengthen indoor air-quality standards in public spaces.** States should enact comprehensive policies, such as the Model State Indoor Air Quality Act developed by the Center for Health Security, to ensure residents are protected from health risks such as airborne infectious diseases and wildfire smoke.[220] These policies should include monitoring and publicly reporting indoor air quality in facilities such as public schools, maintaining standards for air quality, investing to improve indoor air, and planning for emergencies.[221] Federal agencies should also establish guidelines for indoor air quality in public buildings and schools and provide incentives for retrofitting existing buildings.[222]

- **Congress should support sustainable state and local vector-control programs.** As the threat and geographic distribution of mosquitos, ticks, and other vectors change, 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.

- **Congress should increase investment for the Agency for Toxic Substances and Disease Registry.** ATSDR provides critical assistance and expertise to help federal, state, and local entities respond to environmental emergencies and emerging environmental health threats; advance on-the-ground science to address emerging environmental health issues; build capacity in disaster epidemiology to better prepare for and respond to public health emergencies; provide unique expertise and training regarding radiation exposure and radiological and nuclear events; and ensure that the nation has a strong and knowledgeable environmental health workforce now and in the future.

- **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 ensure 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 state should develop a comprehensive climate vulnerability assessment and adaptation plan, integrating public health in line with CDC's Building Resilience Against Climate Effects (BRACE) framework.** This calls for collaboration between public health and environmental agencies at both state and local levels to monitor climate-related health risks, manage them effectively, and communicate appropriately. It is crucial for states and localities to identify additional capacities needed, especially for populations and communities that are at heightened risk. Completing all steps of the BRACE framework, including the implementation of evidence-based interventions to safeguard residents, is essential. State and local public health officials should also weave environmental health considerations into their emergency operations planning and incident command systems. As interventions are put into practice, continuous evaluation and quality improvement should be prioritized to ensure their effectiveness.

Year in Review: An Overview of 2023's Major Public Health Emergencies, Threats, Reports, and Strategies

Infectious Disease Outbreaks and Control

Bird Flu

Avian influenza was confirmed in commercial and backyard bird flocks during 2022, and 2023, accounting for approximately 81 million domestic cases in poultry. There was one reported case of bird flu in humans in the United States.[223]

Cholera

An outbreak of Cholera in Hatiti in the fall of 2022 and into 2023 included 20,000 suspected cases.[224] In addition, Malawi, a small nation in southern Africa, experienced over 28,000 cholera infections and at least 900 deaths in 2022 and 2023 after coming close to eradicating the disease in prior years. UNICEF warned that Malawi's outbreak could intensify without immediate help from the global community.[225] The death rate was particularly high because the country's hospitals lacked basic supplies and many people sought medical help only after they were seriously ill.[226] In March, the WHO and UNICEF announced the launch of a cholera vaccination campaign in parts of northwestern Syria that were devastated by recent earthquakes.[227]

Congenital Syphilis

U.S. syphilis cases in newborns (congenital syphilis) were 10 times higher in 2022 than in 2012, according to CDC data. CDC attributes the increase to higher rates of syphilis among women of reproductive age and limited availability to prenatal care and treatment services. Lack of timely testing and treatment during pregnancy contributed to 88 percent of new cases of congenital syphilis [228]

COVID-19

Through September 2023, the total number of COVID-19 U.S. deaths exceeded 1.1 million. The number of deaths was highest among people 85 years and older.[229] Among racial groups, Indigenous Americans had the highest COVID-19 mortality rates.[230]

Dengue

Worldwide, cases of dengue numbered over 6 million and lead to over 6,000 deaths.[231]

Ebola

Officials in Uganda reported dealing with and closing a four-month outbreak of a rare strain of Ebola. During the outbreak, approximately 142 people were infected and at least 55 people died.[232]

Locally Acquired Malaria

Ten cases of locally acquired mosquito transmitted malaria were reported in Arkansas, Florida, Maryland, and Texas. Typically, malaria cases in the United States are diagnosed in people who have traveled to places where malaria is widespread.[233] Affected states stepped up mitigation and surveillance efforts, with assistance from CDC.[234]

Marburg Virus

Outbreaks of Marburg virus were reported in Equatorial Guinea and Tanzania.[235]

Measles

Worldwide, measles cases increased by an estimated 18 percent in 2022, numbering 9 million cases and 136,200 deaths, mostly among children. Outbreaks occurred in 37 countries, including nations in Africa, the Mediterranean, and Southeast Asia.[236] In the United States, a measles outbreak in Ohio in November and December 2022 infected 85 children, all of whom were not fully vaccinated. The outbreak did not result in any deaths, but 36 of the children required hospitalization.[237] As of November 2023, 41 measles outbreaks were reported nationwide, down from the 121 cases reported in 2022.[238]

Mpox

Since the start of the U.S. Mpox outbreak (summer 2022) and through May 2023, there have been 30,395 confirmed cases and 42 associated deaths. Vaccine outreach programs led to 37 percent first-dose coverage and 23 percent second-dose coverage in the at-risk population. Vaccine effectiveness is estimated to be 70 to 86 percent.[239] Research reported by CDC in December found that while the primary mode of Mpox transmission continues to be sexual contact, a limited number of cases due to close but non-sexual contact have occurred.[240]

Polio

According to the World Health Organization (WHO), only 11 cases of polio (wild type 1 poliovirus) were reported worldwide between May 2022 and May 2023, five in Pakistan and six in Afghanistan.[241] CDC reports that in

order for Pakistan to fully eradicate polio, it needs to identify children who have not been vaccinated, especially in areas of the country experiencing political conflict.[242] According to CDC, full polio eradication requires international commitment to vaccinating every child and rapid response to polio outbreaks.

Rocky Mountain Spotted Fever

During the latter half of the year, five cases of Rocky Mountain Spotted Fever were diagnosed in the United States in people who had traveled to Tecate, Baja California. Three of the known five cases resulted in death.[243]

Seasonal Flu

During the 2023- 2024 flu season through early February 2024, CDC estimates that in the U.S. there were at least 20 million flu illnesses, approximately 230,000 flu hospitalizations, and 14,000 flu deaths.[244]

Tick-borne Illness

Tick-borne illness in the United States is up by 25 percent since 2011. That includes babesiosis, a rare illness reported throughout the country.[245]

Tuberculosis

There were approximately 8,300 cases of tuberculosis nationwide in 2022, a 6 percent increase over 2021. New York City experienced about 500 cases of tuberculosis during 2022, a roughly 1.3 percent increase over 2021.[246] In addition, tuberculosis caused more deaths worldwide in 2022 than any other infectious disease except COVID-19.[247]

West Nile Virus

West Nile virus is the most common mosquito-borne disease in the United States with about 3,000 cases reported in 2021.[248]

COVID-19 RESPONSE, IMPACTS, RACIAL AND ETHNIC DISPARITIES

- Hospitalizations and deaths due to COVID-19 dropped considerably during 2023 after peaking in 2022. In January 2022, weekly COVID-19 related deaths numbered over 21,000, by January 2023 that number dropped to under 4,000. During the summer of 2023, weekly deaths dropped to under 600 but increased to approximately 1,900 per week in December.[249]

- According to CDC data, one in three U.S. households used free at-home COVID-19 tests, and 60 percent of U.S. households ordered the free tests at some point during the pandemic. Use of the free at-home tests was higher among Black and Hispanic people than among white people.[250]

- According to CDC, 53 jurisdictions across the United States used wastewater surveillance to monitor COVID-19 circulation during the pandemic, and many jurisdictions have increased capacity to test for additional respiratory viruses via wastewater monitoring.[251]

Health Impacts and Racial Disparities

- During the three years of the acute phase of the pandemic, over 1.1 million Americans died due to COVID-19. Overall COVID-19 death rates were highest among men, people over 85 years of age, and American Indian and Alaska Native people.[252] An observational study found that American Indian and Alaska Native people were three times more likely to become severely ill if infected with COVID-19 than were their white or Hispanic peers and they had double

the risk of in-hospital death despite being younger and having less chronic disease.[253]

- About 60 percent of patients who were hospitalized due to COVID-19 showed abnormalities in multiple organs six months after the infection as compared with 27 percent for patients who never got COVID.[254]

- CDC estimates that approximately 61 million measles vaccinations were missed between 2020 and 2022, increasing the risk of measles outbreaks worldwide.[255] In addition, according to a CDC/WHO report, missed childhood vaccinations during the pandemic has led to large outbreaks of childhood diseases worldwide. The report estimates that during the pandemic more than 60 million children missed initial doses of routine childhood vaccinations. These "zero-dose" children account for about half of all child deaths from vaccine-preventable disease.[256]

- The National Cancer Institute estimates that about 9.4 million routine cancer screenings (for breast, colorectal, and prostate cancer) were missed in 2020 due to the pandemic.[257] A second study found that early-stage cancer diagnoses were down by about 15 percent during the first year of the pandemic.[258]

- A study of over 350,000 people hospitalized due to COVID-19 found higher rates of severe illness among Hispanic, Black, and American Indian and Alaska Native people persisted even once the COVID-19 vaccine

was widely available. However, the vaccine did narrow the difference in hospitalization rates between white people and people of color. The study authors conclude that employing strategies to ensure equitable access to COVID-19 vaccination and treatment remains important.[259]

- Two new reports, published by CDC's National Center for Health Statistics, found that, in 2022, 6.9 percent of adults—equivalent to about 18 million Americans—reported ever having Long COVID while 3.4 percent—about 8.8 million—said they currently had the condition. Four out of five people who had Long COVID reported having trouble completing day-to-day activities.[260] Rates of Long COVID were higher among Black and Hispanic people than they were for whites.[261] One in four adults with Long COVID reported "significant activity limitations."[262] Research shows that patients over age 40, those with existing health problems, and those who had severe COVID-19 infections were at higher risk for developing Long COVID. If people were vaccinated, they were at lower risk of developing Long COVID.[263]

- HHS launched the Office of Long COVID Research and Practice in 2023 to coordinate the whole-of-government response to longer-term effects of COVID-19.[264]

- Rates of new cases of type 2 diabetes increased by 62 percent among U.S. youth once the pandemic began, with increases highest among Black and Hispanic children.[265]

Vaccines and Immunizations

Researchers at the University of Southern California and Brown University estimate that the COVID-19 vaccine averted 2.4 million excess deaths worldwide by August 2021 and would have prevented 670,000 additional deaths if the vaccine was more equitably distributed.[266]

A November 2023 CDC *Morbidity and Mortality Weekly Report* analyzed coverage with selected vaccines and exemption from school vaccine requirements among U.S. kindergarteners for the 2022–2023 school year. The report found that vaccination coverage among children in kindergarten (93 percent) remains lower than the pre-pandemic level (95 percent), while vaccination exemptions increased to 3 percent, the highest vaccination exemption rate ever reported in the United States. A 93 percent coverage rate leaves approximately 250,000 kindergarten students unprotected against preventative childhood diseases including measles, mumps, and rubella.[267]

Overall vaccination coverage for children up to 2 years of age remains high for those born in 2019 and 2020, but disparities exist. Children of families living at or above the poverty line had higher rates of immunization as did children covered only by private insurance. Children in urban areas are vaccinated at higher rates than children in rural areas, and white children had higher rates than Black, Hispanic, and American Indian/Alaska Native children.[268]

During the year, the Food and Drug Administration approved a number of vaccines to protect against RSV. It approved Arexvy and Abrysvo for use by adults 60 years and older. Abrysvo is also recommended for use by pregnant people. For infants younger than eight months who were born shortly before or are entering their first RSV season, a different product was approved for use under certain circumstances – nirsevimab (monoclonal Ab). For children 8 through 19 months at increased risk and entering their second season, nirsevimab is also recommended.[269]

Data from CDC's National Immunization Survey of teens showed that immunization against HPV in teens was flat or declined during the pandemic for the first time since 2013.[270]

The introduction of the rubella vaccine to countries in WHO's South-East Asia region increased rubella vaccination from 12 percent in 2013 to a high of 93 percent in 2019. Rubella infection has declined by 80 percent in the region.[271]

During the year, the U.S. government transitioned coverage of the costs of COVID-19 countermeasures, including vaccines, to public and private payers.[272] In September, the Department of Health and Human Services (HHS) launched the Bridge Access Program for COVID-19 vaccines and treatments. Administered through CDC, the program created public-private partnerships to ensure access to COVID vaccines and treatments for people without health insurance.[273]

Drug Development/Medical Countermeasures

The Administration for Strategic Preparedness and Response (ASPR) announced $500 million in new funding for three phase 2b clinical trials for "next generation" vaccines and numerous therapeutics designed to respond to new COVID variants, reducing transmission and infections. The funding is part of the Biden-Harris administration's $5 billion Project NextGen. The effort will be overseen by ASPR and the Biomedical Advanced Research and Development Authority.[274]

A WHO report found that there are only 27 new antibiotics for the most serious infections were in clinical trials. In contrast, over 1,300 cancer drugs were in clinical trials during the same period. According to WHO, a small number of the antibiotics now in testing will be able to target the most resistant bacteria.[275]

In October, HHS announced an agreement with Pfizer to ensure access to the antiviral Paxlovid as the drug is transitioned into the commercial market. The federal government has purchased tens of millions of doses of the medicine at a discounted price, and Pfizer has agreed to provide an additional 1 million treatment courses to the ASPR.[276]

Some drugs, including some cancer drugs, were in short supply during the year. Some experts believe the supply issues have been created in part by problems with the pharmaceutical supply chain and with issues created as drugs transition to generic status.

In response, the Biden-Harris administration has created a work group to study the issue.[277]

In November, FDA announced approval of a single-shot vaccine to prevent the chikungunya virus. The vaccine is the first preventative shot for a mosquito-borne disease to be FDA approved. It was approved for use by people 18 years and older at increased risk of exposure to the virus.[278]

Foodborne Illness

During 2023, CDC investigated suspected salmonella outbreaks in cantaloupes, onions, flour, raw cookie dough, and ground beef.[279] In December, granola bars and cereals sold in all 50 states were recalled by the manufacturer due to possible salmonella contamination.[280]

Additional outbreaks were investigated due to listeria monocytogenes in peaches, nectarines, plums, ice cream, and leafy greens. A suspected hepatitis A outbreak in frozen strawberries was also investigated.[281] According to CDC, approximately 48 million people across the United States are sickened by a foodborne illness annually.[282]

High lead levels in children's blood were reported in multiple states in October and November, leading to an FDA investigation, a CDC health advisory, and a manufacturer's recall of cinnamon-containing applesauce in pouches products.[283] In December, FDA reported that it was investigating whether the product was intentionally contaminated.[284]

Severe Weather and Natural Disasters

In 2023, the United States experienced 28 weather-related disasters that each caused at least $1 billion in damage, a record number of such high-impact events.[285]

Drought

As of November, 31 percent of the United States, including Puerto Rico, was experiencing drought conditions, impacting over 96 million people.[286]

Flooding

Intense rain and flooding, sometimes referred to as atmospheric rivers, poured approximately 24 trillion gallons of water onto California between December 2022 and January 2023, causing widespread flooding and landslides and an estimated $4.6 billion in damage.[287] In July, flash floods swamped parts of Vermont, New York, Pennsylvania, and Connecticut.[288]

Heat

Extreme heat reached levels never before recorded during the year. In August, an estimated 57 million people living in the South, Southwest and Pacific Northwest regions of the country were under an excessive heat warning, and an additional 54 million people were under a heat advisory.[289] The Phoenix area experienced 54 days of temperatures of 110 degrees.[290] According to the National Oceanic and Atmospheric Administration, September 2023 was the warmest September on record,[291] and climate scientists report "with near certainty" that 2023 will be the warmest year on record.[292]

Global temperatures between November 2022 and October 2023 were the hottest ever recorded for a one-year period according to a report by Climate Central. In 170 countries, mean temperatures during the one-year period were higher than 30-year norms and exposed 7.8 billion people to above average heat.[293]

Hurricanes

The 2023 Atlantic hurricane season included 20 named storms and ranked as the fourth most active year for named storms since 1950.[294] In August, hurricane Idalia hit Florida's northwest coast and parts of Georgia causing $2.5 billion in damage.[295]

Tornadoes

During the first quarter of the year, the United States experienced its third most active months of tornado activity going back seven decades.[296] Between January and February, 220 tornadoes were reported. In January, a tornado carved an 82-mile path across the state of Alabama, one of the longest in state history. It was one of 14 tornadoes to touch down in the state on January 12. Also, between January and March, 49 tornadoes were reported within the state.[297] In Tennessee, multiple tornadoes on March 31 and April 1 caused 15 deaths and massive damage.[298] In March, 14 tornadoes touched down in the central and southern regions of Oklahoma.[299] In December, tornadoes struck Tennessee again, leading to six deaths and dozens of injuries.[300]

Wildfires and Smoke

In June, smoke from wildfires in Canada effected air quality across the Mid-Atlantic region, parts of the south and into Minnesota and Indiana. Particulate matter from the smoke led to air that was dangerous to breathe in many places and created an orange haze in New York City.[301] Asthma-related emergency department visits were 17 percent higher than would be typical as measured during the 19 days of the wildfire smoke event.[302]

In August, wildfires accelerated by strong winds and drought devasted the town of Lahaina on Maui, Hawaii, causing a known 100 deaths and an estimated $5.6 billion in damage. It was the nation's deadliest wildfire in over 100 years.[303]

Reports, Studies, Strategies, Legislation, Funding Investments and Convenings

Challenges to Public Health Authorities

As of March 2023, at least 30 states had passed laws since 2020 that limit public health authority, according to a *Washington Post* analysis of laws collected by *Kaiser Health News* and the Associated Press as well as the Association of State and Territorial Health Officials, and the Center for Public Health Law Research at Temple University. Health officials and governors in more than half the country are now restricted from issuing mask mandates, school closures, and other protective measures, or they must seek permission from their state legislatures before renewing emergency orders, the analysis showed.[304]

According to a review of state laws intended to limit public health authorities, conducted by the Center for Public Health Law Research at the Temple University Beasley School of Law, between January of 2021 and May 2022, state legislators introduced 1,531 bills to change the scope or levers of public health and/or emergency response authorities during the reviewed timeframe. Approximately 12 percent of the bills were enacted.[305]

Environmental Health and Climate Change

The White House Summit on Improving Indoor Air Quality, held in October 2022, identified a number of steps businesses, organizations, and schools should take to improve indoor air quality, including actions outlined in the Clean Air in Buildings Challenge.[306]

In January, the Center for American Progress published an issue brief, "How the Office of Climate Change and Health Equity Can Respond to the Health Threats of the Climate Crisis." The resource examines how the Office of Climate Change and Health Equity (OCCHE) can provide the linkages needed to harness and align resources, leverage authorities, and coordinate expertise across HHS and the federal government in order to protect the nation's health from risks of climate change.[307]

The Federal Emergency Management Agency released the first Community Disaster Resilience Zones designation for 483 areas in 50 states and DC.[308] This designation aims to build community resilience by driving resources to communities at most risk of natural hazards and in most need of resilience-related activities.

In April, Environmental Health Sciences, Beyond Plastics, and the Plastic Pollution Coalition reported on health risks associated with the use of PVC plastic in pipes that deliver water and called on public officials to stop using the material in community water systems.[309]

In May, CDC announced its recommendation that buildings aim for at least five air changes per hour to improve ventilation.[310]

A study published in July suggests that so-called "100-year floods" will happen every year in many coastal communities by the end of this century due to rising sea levels.[311]

In September, the Biden-Harris administration released the *National Climate Resilience Framework*, which identifies key values, priorities, and objectives to create and expand community-driven climate-resilience strategies across the nation.[312] In addition, the White House Interagency Working Group on Extreme Heat began

work with the National Integrated Heat Health Information System to develop a National Heat Strategy centered on environmental justice.[313]

The October *Climate and Health Outlook* from the HHS Office of Climate Change and Health Equity (OCCHE) explored the climate-related health hazards of heat, wildfire, drought, and hurricanes and provided information on how to reduce health risks associated with each. It also featured findings from new research on heat-related illness increasing among veterans as well as an association between peat bog wildfire smoke and cardiopulmonary emergency department visits. OCCHE has a portal with interactive maps of county-level data on these climate hazards and individual-level risk factors for health impacts.[314]

The 2023 Global Report of the Lancet Countdown reported that lack of action on the climate is a serious and growing threat to health and called for immediate action to address the causes of climate change and to support adaptation programs.[315]

A report authored by EcoAmerica, Climate for Health, and the American Psychological Association concluded that the impacts of climate change intersect with and compound other factors in children's lives creating mental health risks for young people. The report found that climate events can create immediate trauma and stress in children's lives and can intersect with other challenges to a child's well-being, such a poverty or housing insecurity, to create long-term negative effects.[316]

In October, the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) adopted an airborne infection risk mitigation standard for buildings. ASHRAE Standard 241, Control of Infectious Aerosols "establishes minimum requirements to reduce the risk of disease transmission by exposure to infectious aerosols in new buildings, existing buildings, and major renovations." The standard includes infection risk-management mode, requirements for equivalent clean airflow rate, requirements for use of filtration and air cleaning technology, and planning and commissioning.[317]

In November, the Biden-Harris administration released the *Fifth National Climate Assessment*, which provided a review of the current and future impacts of climate change. According to the report, the impacts of climate change are growing at an unprecedented rate, all regions of the country are at risk due to climate change, and the current level of investment to address those risks is "insufficient." The report concluded that the changing climate will have "profound negative effects on human health," especially for communities impacted by systemic discrimination. The Assessment also noted growing evidence of the effects of climate change on mental and emotional health.[318]

The UN Climate Change Conference (COP28) was held November 30–December 12 in the United Arab Emirates. The conference brought countries throughout the world together to address the threats of climate change. At the close of the two-week conference, the nearly 200 nations in attendance reached an agreement on a plan to triple renewable energy capacity and double energy efficiency by 2030, in order to transition the world away from dependence on fossil fuels.[319]

Health Equity

Atlantic hurricanes have been more lethal, and they disproportionately impact socially vulnerable groups, including older adults, Indigenous communities, and Black and Brown people, according to a study published in August by Science Advances.[320]

An August University of Houston study found that pharmacy closures disproportionately impact underserved communities leading to greater health disparities, including disparities in access to medications and vaccines.[321]

An early draft of a global pandemic agreement calls on governments to reserve drugs and vaccines for WHO to distribute in poorer countries to avoid a repeat of the "catastrophic failure" during the COVID-19 pandemic. The draft proposal includes a measure to reserve 20 percent of any tests, vaccines, or treatments for use in poorer countries. The draft also states that intellectual property rights should be waived during pandemics, to allow for wider and faster access to life-saving drugs and vaccines.[322]

In April, WHO launched the Health Inequity Data Repository. The project is designed to be a comprehensive, global repository of publicly available disaggregated data on population health and determinants.[323]

Infectious Disease Prevention and Preparedness/Immunization

In its *World Disasters Report 2022* released on January 30, 2023, the International Federation of the Red Cross and Red Crescent Societies wrote, "[A]ll countries remain dangerously unprepared for future outbreaks" despite COVID-19 killing more people than any earthquake, drought, or hurricane in history. The report said

that countries need to invest more in the readiness of local communities.[324]

In a January op-ed in *The Washington Post*, Lawrence H. Summers, Robert Hecht, and Shan Soe-Lin wrote: "Regrettably, only $1.6 billion has been committed to the Global Pandemic Fund by more than 20 governments and philanthropies, including just $250 million from the United States. This is woefully inadequate. A recent blue-ribbon panel (on which one of the authors served) estimates that strengthening global capacity for pandemic preparedness requires $20 billion to $50 billion per year." The essay called the $1.6 billion "a down payment" and called for much larger contributions from the United States and other wealthy nations. The authors also said that the increased investment must be true increases and not taken from other global health funding.[325]

In March, four global health agencies called for intensified action on multiple health issues under a "One Health" umbrella, including zoonotic disease, antimicrobial resistance, food safety, and the impacts of climate change. The groups include the UN Food and Agriculture Organization, the UN Environment Programme, WHO, and the World Organisation for Animal Health.[326]

An analysis in *The Lancet Global Health* examined real-world implementation of the 7-1-7 target (seven days to detect a suspected disease outbreak, one day to notify relevant public health authorities, and seven days to complete early response actions). Of 41 public health events reviewed worldwide, 22 (54 percent) met a target of seven days to detect, 29 (71 percent) met a target of one day to notify, and 20 (49 percent) met a target of seven days to complete all early response actions. Eleven (27 percent) events met the full

7-1-7 target, with some variation among event types. The analysis found that fast resource mobilization at the national level enabled speedier responses. The analysis concludes that the 7-1-7 target is feasible and that assessment with this framework can identify performance improvement needs and help prioritize national planning.[327]

The PASTEUR Act (Pioneering Antimicrobial Subscriptions to End Upsurging Resistance Act), reintroduced in April by a bipartisan group of senators and representatives is designed to support the development of drugs that would target the most resistant infections, encourage the appropriate use of antibiotics, and ensure antibiotic availability.[328]

According to a June CDC report, restaurant employees who went to work sick were linked to about 40 percent of food-poisoning outbreaks with a known cause between 2017 and 2019. The report was based on a review of 800 food-poisoning outbreaks, using data provided by 25 state and local health departments.[329]

A modeling study conducted by a collaboration between researchers at WHO and the Centre for Infectious Disease Epidemiology and Control at the University of Hong Kong estimated that more than 5 million antimicrobial resistance-related deaths could occur in WHO's Western Pacific Region over the next decade.[330]

The Biden-Harris administration's FY 2024 budget proposal has the goal of eliminating hepatitis C from the United States by creating a nationwide intervention. If funded by Congress, the five-year, $11.3 billion program would expand testing, expand access to antiviral drugs, and promote awareness.[331]

The Protecting America from Seasonal and Pandemic Influenza Act was introduced by Senators Tammy Baldwin (Wisconsin), Amy Klobuchar (Minnesota), Richard Blumenthal (Connecticut), and Tina Smith (Minnesota). If adopted, the act would modernize and strengthen the country's influenza vaccine development, bolster manufacturing and the supply chain, and improve access to and coverage of flu testing and therapeutics.[332]

Public Health Infrastructure, Preparedness and Response

A January U.S. Government Accountability Office (GAO) report looking at five states showed that HHS's distribution of federal pandemic relief funds to support communities disproportionately affected by COVID-19 was often hampered by challenges, including delays in state acceptance of funding and hiring and workforce resource issues.[333]

Also in January, the Center for Strategic and International Studies released its report, *Building the CDC the Country Needs.* This rapid review of CDC capabilities related to epidemic preparedness and response outlined steps that need to be taken to improve CDC's performance both within the agency, in other parts of the federal government, and by Congress—steps including bolstering the agency's communications; improving its operational, surge, and data capacities; developing its workforce; and gaining greater budget flexibility.[334]

A March GAO report, *Actions Needed to Address Long-Standing Challenges*, identified shortcomings in the nation's biodefense preparations and made recommendations for improvements.[335]

Senator Patty Murray (Washington) reintroduced the Public Health Infrastructure Saves Lives Act. If enacted, the bill would provide new and sustained funding for state, local, tribal, and territorial public health capacity, public health workforce, and public health capabilities.[336]

As of May 2023, CDC had awarded $3.84 billion in Strengthening U.S. Public Health Infrastructure, Workforce, and Data Systems grants to states, cities, counties, and territories. CDC expects to award more than $4.5 billion in such grants over the five-year grant period from 2022 to 2027.[337]

In July, the White House announced the creation of the Office of Pandemic Preparedness and Response Policy. As a permanent office within the Executive Office of the President, the new team will lead, coordinate, and implement actions related to preparedness for and response to biological issues and/or pathogens that could threaten the public's health, including pandemic preparedness and response. The new office assumed duties that had been assigned to the COVID-19 Response Team and the Mpox Team.[338]

A July report, *GAO Recommendations Can Help Federal Agencies Better Prepare for Future Public Health Emergencies*, includes recommendations based on COVID-19 oversight reports and covers public health preparedness, improper payments and fraud, vulnerable populations, distribution of response funding, and the pandemic's impact on the U.S. economy.[339]

An August GAO report, *Public Health Preparedness: HHS Reserve Funding for Emergencies*, reviews the purpose, availability, and use of funding for the Public Health Emergency Fund and the Infectious Diseases Rapid Response Reserve Fund.[340]

Also in August, the Department of Defense (DOD) released its *Biodefense Posture Review*, providing findings and strategic guidance and suggesting reforms necessary to ensure the DOD can meet any challenges posed by biological threats.[341]

The National Association of County and City Health Officials released its *2022 Preparedness Profile Study* in September. The study of a nationally representative sample of local health departments assesses public health preparedness and identifies ways to strengthen the public health workforce and improve readiness.[342]

The *Testing Playbook for Biological Emergencies*, released in October, is designed to give decision makers easy access to data to inform their planning for equitable access to testing during a biological emergency. The playbook is a joint project of the Pandemic Center at the Brown University School of Public Health, the Arizona State University College of Health Solutions, Illumina Ventures, and the Association of Public Health Laboratories.[343]

In November, GAO published *Public Health Preparedness: Building and Maintaining Infrastructure beyond the COVID-19 Pandemic*. The report found that the most significant challenges to building public health infrastructure include the temporary nature of public health funding, varying levels of jurisdictional funding, and barriers to building the public health workforce.[344]

In November, CDC announced updated guidelines for the prevention and treatment of anthrax, including best practices for clinical management. An estimated 20,000–100,000 anthrax cases occur annually throughout the world.[345]

CDC's Center for Forecasting and Outbreak Analytics launched *Insight Net* in November. The network, comprising 13 funded partners and over 100 organizations in 24 states including health departments, is designed to improve forecasting data and analytics. It will share data with public health decision makers, especially at the state and local level, to support and enhance decision making at the earliest signs of an outbreak.[346]

In December, the Biden-Harris Administration released its annual report, *Strengthening Health Security Across the Globe: Progress and Impact of U.S. Government Investments in Global Health Security*. The report outlined progress toward the administration's goal of directly supporting at least 50 countries by 2025 to strengthen their capabilities to prevent, detect, and respond to biological threats.[347]

Report Methodology

Ready or Not 2024

TFAH significantly refined its methodology for the "Ready or Not" series in 2018. For detailed information, refer to the 2019 edition, "Appendix A: Methodology."[348]

Criteria for indicators:

- **Significant:** Indicators must meaningfully measure states' readiness for public health emergencies. The significance was initially determined by NHSPI through a multistage Delphi process involving a panel of experts and later reassessed by TFAH through additional expert interviews.

- **Broadly Relevant and Accessible:** Indicators should be universally relevant, with timely, accessible data for all states and the District of Columbia. TFAH seeks to also include U.S. territories and some federally recognized tribes in its analyses, contingent upon the availability of data, its potential for sustained availability, and its relevance.

- **Timely:** Data for each indicator must be regularly updated.

- **Scientifically Valid:** The supporting data should be credible and rigorously constructed.

- **Nonpartisan:** Indicators and their supporting data must be free from political biases.

TFAH aims to select a broad set of actionable indicators with which it—and other stakeholders, including states themselves—can track states' progress. (Complete data for U.S. territories were unavailable.) TFAH's goal is to maintain indicators over several years for consistent tracking.

TFAH primarily uses National Health Security Preparedness Index (NHSPI) measures but includes a unique measure of state public health funding trends not tracked by the NHSPI.

Public Health Funding Data Collection and Verification

TFAH surveyed state officials to gather public health funding data. The definition of public health programming and services, informed by the University of Washington's Public Health Activities and Services Tracking project, includes:

- **Communicable disease control** (e.g., epidemiology, COVID-19, hepatitis, HIV/AIDS).

- **Chronic disease prevention** (e.g., asthma, cancer, cardiovascular disease).

- **Injury prevention** (e.g., firearms, motor vehicles, substance-use disorders).

- **Environmental public health** (e.g., air and water quality, food safety).

- **Maternal, child, and family health** (e.g., family planning, newborn screening).

- **Access to and linkage with clinical care** (e.g., beneficiary eligibility).

Insurance coverage programs and inpatient clinical facilities are excluded from TFAH's definition.

TFAH, under the guidance of state respondents, revised data for the base year: FY 2022. For some states, this was necessary to improve comparability between the two years when a reorganization of departmental responsibilities occurred.

All states and the District of Columbia verified earlier funding data and provided new funding data, with two exceptions: Nevada and West Virginia.

Scoring and Tier Placements

States were grouped based on performance across nine indicators, with partial credit assigned to some. States were then placed into high, middle, or low tiers based on relative performance.

Indicators were scored as follows:

- Adoption of the NLC: 0.5 point. No adoption: 0 points.

- Accreditation by the PHAB and EMAP: 0.5 point each (not accredited: 0 points).

- Change in nominal state public health funding (increase or no change: 0.5 point; decrease: 0 points).

  - A score of .25—halfway between 0 points and .5 point—was assigned to Nevada and West Virginia, which did not provide data for FY 2023.

- 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 written 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 6.5 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 to 34th range in the middle tier. TFAH placed states with scores ranked between the 35th to 51st range 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 to 6; states in the middle tier had scores ranging from 4.5 to 4.75; and states in the low tier had scores ranking from 3 to 4.25.

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 the state public health funding data collection, each verified file was systematically inspected for errors, inconsistencies, or incompleteness. Respondents were then contacted for data completion or correction.

Endnotes

1 The National Health Security Preparedness Index. "Prepared." September 2021. https://nhspi.org/. Accessed January 30, 2024.

2 Nurse Licensure Compact. "41 States Have Enacted the NLC." https://www.nursecompact.com/files/NLC_Map.pdf. Accessed January 30, 2024.

3 Centers for Disease Control and Prevention. "Influenza Vaccination Coverage for Persons 6 Months and Older." https://www.cdc.gov/flu/fluvaxview/interactive-general-population.htm. Accessed January 30, 2024.

4 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 30, 2024.

5 The National Health Security Preparedness Index. "Prepared." September 2021. https://nhspi.org/. Accessed January 30, 2024.

6 National Weather Service, Weather Related Fatality and Injury Statistics. "Weather Fatalities 2022." https://www.weather.gov/hazstat/. Accessed January 30, 2024.

7 National Oceanic and Atmospheric Administration. "Biden Administration launches Heat.gov with tools for communities facing extreme heat". July 26, 2022. Biden Administration launches Heat.gov with tools for communities facing extreme heat | National Oceanic and Atmospheric Administration (noaa.gov) Accessed February 7, 2024.

8 NASA. "NASA Announces Summer 2023 Hottest on Record." September 14, 2023. https://www.nasa.gov/news-release/nasa-announces-summer-2023-hottest-on-record/. Accessed January 30, 2024.

9 Cameron, Chris. "More Than 111 Million People in the U.S. Face Extreme Heat." *The New York Times*, August 26, 2023. https://www.nytimes.com/2023/08/26/us/heat-wave-south-gulf-coast.html. Accessed January 30, 2024.

10 Associated Press. "Phoenix Hit 110 Degrees on 54 Days in 2023, Setting Another Heat Record." *PBS Newshour*, September 10, 2023. https://www.pbs.org/newshour/nation/phoenix-hit-110-degrees-on-54-days-in-2023-setting-another-heat-record. Accessed January 30, 2024.

11 Cameron, Chris. "More Than 111 Million People in the U.S. Face Extreme Heat." *The New York Times*, August 26, 2023. https://www.nytimes.com/2023/08/26/us/heat-wave-south-gulf-coast.html. Accessed January 30, 2024.

12 Kenny, Glen P., Sean R. Notley, Andreas D. Flouris, and Andrew Grundstein. "Climate Change and Heat Exposure: Impact on Health in Occupational and General Populations." In: Adams, Williams, and John Jardine, (eds.). *Exertional Heat Illness* (New York: Springer, 2020). https://link.springer.com/chapter/10.1007/978-3-030-27805-2_12. Accessed January 30, 2024.

13 Egede, Leonard, E., Walker, Rebekah, J., Campbell, Jennifer, A. et al. Journal of General Internal Medicine. "Modern Day Consequences of Historic Redlining: Finding a Path Forward". Modern Day Consequences of Historic Redlining: Finding a Path Forward - PMC (nih.gov) Accessed February 7, 2024.

14 Federal Reserve History. Redlining. Redlining | Federal Reserve History. Accessed February 7, 2024.

15 Ibid

16 McKinsey Institute for Black Economic Mobility. "Impacts of Climate Change on Black populations in the United States". November 30, 2033. Climate change and race: The impact on Black lives | McKinsey Accessed February 7, 2024.

17 Klein Rosenthal, Joyce, Patrick L. Kinney, and Kristina B. Metzger. "Intra-Urban Vulnerability to Heat-Related Mortality in New York City, 1997-2006." *Health & Place*, 30: 45-60, November 2014. https://www.sciencedirect.com/science/article/pii/S1353829214001087?via%3Dihub. Accessed January 30, 2024.

18 Abbinett, Jessica, Paul J. Schramm, Stasia Widerynski, et al. "Heat Response Plans: Summary of Evidence and Strategies for Collaboration and Implementation." *Climate Health Program, Centers for Disease Control and Prevention*, January 2020. Chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.cdc.gov/climateandhealth/docs/HeatResponsePlans_508.pdf. Accessed January 30, 2024.

19 Jiao, Anqi, Yi Sun, and Chantal Avila. "Analysis of Heat Exposure During Pregnancy and Severe Maternal Morbidity." *JAMA Open Network*, 6(9), September 7, 2023. https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2809055. Accessed January 30, 2024.

20 Ibid

21 Kutz, Jessica. "Extreme Heat Exposure During Pregnancy Can Raise Risk of Severe Delivery Complications, New Study Finds." *PBS NewsHour*, September 10, 2023. https://www.pbs.org/newshour/health/extreme-heat-exposure-during-pregnancy-can-raise-risk-of-severe-delivery-complications-new-study-finds. Accessed January 30, 2024.

22 U.S. Environmental Protection Agency. "Climate Change and the Health of Pregnant, Breastfeeding, and Postpartum Women." Climate Change Impacts, last updated December 27, 2023. https://www.epa.gov/climateimpacts/climate-change-and-health-pregnant-breastfeeding-and-postpartum-women. Accessed January 30, 2024.

23 Bonell A, Part C, Okomo U, Cole R, Hajat S, Kovats S, et al. An expert review of environmental heat exposure and stillbirth in the face of climate change: Clinical implications and priority issues. BJOG. https://doi.org Accessed February 7, 2024.

24 U.S. Environmental Protection Agency. "Climate Change and Children's Health." Updated December 27, 2023. https://www.epa.gov/climateimpacts/climate-change-and-childrens-health. Accessed January 30, 2024.

25 Harvard T.H. Chan School of Public Health. "Heat and Health." https://www.hsph.harvard.edu/c-change/subtopics/climate-change-heatwaves-and-health/. Accessed January 30, 2024.

26 Woo, Marcus. "Why Don't New Borns Have Tears or Sweat?" *Live Science*, September 15, 2019. https://www.livescience.com/newborns-no-tears-or-sweat.html. Accessed January 30, 2024.

27 Ibid.

28 Walker, Tim. "It's Getting Hot in Here: Without Air Conditioning, Students and Staff Suffer." *NEA Today*, June 9, 2023. https://www.nea.org/nea-today/all-news-articles/its-getting-hot-here-without-air-conditioning-students-and-staff-suffer. Accessed January 30, 2024.

29 Ibid.

30 U.S. Environmental Protection Agency. "Climate Change and the Health of Older Adults." Updated December 27, 2023. https://www.epa.gov/climateimpacts/climate-change-and-health-older-adults. Accessed January 30, 2024.

31 U.S. Environmental Protection Agency. "Climate Change Indicators: Heat-Related Illness." Updated July 21, 2023. https://www.epa.gov/climate-indicators/heat-related-illnesses. Accessed January 30, 2024.

32 Crimmins, Allison, John Balbus, Janet L. Gamble, et al. "Executive Summary." In: *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment* (Washington, DC: U.S. Global Change Research Program, 2016). http://dx.doi.org/doi:10.7930/J00P0WXS. Accessed January 30, 2024.

33 Dutchen, Stephanie. "The Effects of Heat on Older Adults." *Harvard Medicine*, Autumn 2021. https://magazine.hms.harvard.edu/articles/effects-heat-older-adults. Accessed January 30, 2024.

34 U.S. Energy Information Administration. "Nearly 90% of U.S. Households Used Air Conditioning in 2020." *Today in Energy*, May 31, 2022. https://www.eia.gov/todayinenergy/detail.php?id=52558. Accessed January 30, 2024.

35 Li, Zhe, and Joseph Dalaker. "Poverty Among the Population Aged 65 and Older." *Congressional Research Service*, R4579, Updated December 6, 2022. Chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://sgp.fas.org/crs/misc/R45791.pdf. Accessed January 30, 2024.

36 University of Maryland School of Medicine. "Significant Number of Seniors Rely on Failing Public Transit Systems to Get to Medical Appointments". October 24, 2022. 2022 Archive - Significant Number of Seniors Rely on Failing Public Transit Systems to Get to Medical Appointments | University of Maryland School of Medicine (umaryland.edu) Accessed February 6, 2024.

37 Vaidyanathan, Ambarish, Josephine Malilay, Paul Schramm, and Shubhayu Saha. "Heat Related Deaths – United States, 2004 – 2018." *Morbidity and Mortality Weekly Report*, 69(24): 729–734, June 19, 2020. https://www.cdc.gov/mmwr/volumes/69/wr/mm6924a1.htm. Accessed January 30, 2024.

38 Lee, Naomi, R., King, Alexandra, M.D., Deionna Vigil, et al. "Infectious diseases in indigenous populations in North America: learning from the past to create a more equitable future". The Lancet Infectious Diseases. May 3, 2023. Infectious diseases in Indigenous populations in North America: learning from the past to create a more equitable future - *The Lancet Infectious Diseases*. Accessed February 6, 2024.

39 U.S. Environmental Protection Agency. "Climate Change and the Health of Indigenous Populations." Updated December 27, 2023. https://www.epa.gov/climateimpacts/climate-change-and-health-indigenous-populations. Accessed January 30, 2024.

40 Rao, Arya, and Shira Hornstein. "How the Twin Crisis of Climate Change and Poor Public Housing Are Harming People's Health." *STAT*, August 29, 2023. https://www.statnews.com/2023/08/29/climate-change-public-housing-health-consequences/. Accessed January 30, 2024.

41 Abbinett, Jessica, Paul J. Schramm, Stasia Widerynski, et al. "Heat Response Plans: Summary of Evidence and Strategies for Collaboration and Implementation." *Climate Health Program, Centers for Disease Control and Prevention*, January 2020. Chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.cdc.gov/climateandhealth/docs/HeatResponsePlans_508.pdf. Accessed January 30, 2024.

42 Berger, Mitchell, and Margie Jarry. "Heat Health Awareness: Why it's important for Persons with Substance Use Disorders and Mental Health Conditions, Caregivers, and Health Care Providers." Substance Abuse and Mental Health Services Administration, *SAMHSA Blog*, May 15, 2023 https://www.samhsa.gov/blog/heat-health-awareness-why-its-important-persons-substance-use-disorders-mental-health. Accessed January 30, 2024.

43 Cooper, Robin, M.D. "The Impacts of Extreme Heat on Mental Health". *Psychiatric Times* The Impacts of Extreme Heat on Mental Health (psychiatrictimes.com) Accessed February 8, 2024.

44 Abbinett, Jessica, Paul J. Schramm, Stasia Widerynski, et al. "Heat Response Plans: Summary of Evidence and Strategies for Collaboration and Implementation." *Climate Health Program, Centers for Disease Control and Prevention*, January 2020. Chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.cdc.gov/climateandhealth/docs/HeatResponsePlans_508.pdf. Accessed January 30, 2024.

45 Ibid.

46 Ibid.

47 U.S. Department of Labor. "Department of Labor Announces Hazard Alert, Steps Up Enforcement as Extreme Heat Endangers Workers Across the Nation." Press release, July 27, 2023. https://www.dol.gov/newsroom/releases/osha/osha20230727. Accessed January 30, 2024.

48 Randazza, Juliette M., Jeremy J. Hess, Ann Bostrom, et al. "Planning to Reduce the Health Impacts of Extreme Heat: A Content Analysis of Heat Action Plans in Local United States Jurisdictions." *American Journal of Public Health*, 113(5): 559-567, May 1, 2023. https://ajph.aphapublications. org/doi/full/10.2105/AJPH.2022.307217. Accessed January 30, 2024.

49 State of California. "Protecting Californians From Extreme Heat: A State Action Plan to Build Community Resilience." *California Natural Resources Agency*, April 2022. chrome-extension:// efaidnbmnnnibpcajpcglclefindmkaj/ https://resources.ca.gov/-/media/ CNRA-Website/Files/Initiatives/ Climate-Resilience/2022-Final-Extreme-Heat-Action-Plan.pdf. Accessed January 30, 2024.

50 U.S. Environmental Protection Agency. "Reduce Urban Heat Island Effect." Updated January 22, 2024. https://www. epa.gov/green-infrastructure/reduce-urban-heat-island-effect. Accessed January 30, 2024.

51 World Health Organization. "Heat-Health Action Plans: Guidance." January 1, 2008. https://www.who.int/publications/i/ item/9789289071918. Accessed January 30, 2024.

52 U.S. Department of Environmental Protection. "Using Cool Pavements to Reduce Heat Islands." Updated October 31, 2023. https://www.epa.gov/ heatislands/using-cool-pavements-reduce-heat-islands. Accessed January 30, 2024.

53 Washington State Department of Health. Heat Wave 2021. Heat Wave 2021 | Washington State Department of Health Accessed February 8, 2024.

54 Seattle and King County Public Health. "Extreme Heat Response Plan." June 23, 2023. chrome-extension:// efaidnbmnnnibpcajpcglclefindm-kaj/https://cdn.kingcounty.gov/-/ media/king-county/depts/dph/ documents/safety-injury-prevention/ emergency-preparedness/phskc-extreme-heat-response-plan-2023.pdf?rev=1585a686bac-144c9aa2d7d4fe6e498ed&hash=A-97B9518E169E95C9D987E0E2490A35E. Accessed January 30, 2024.

55 Age-Friendly Public Health Systems. Training: Health Equity, Social Determinants of Health, and the AFPHS 6Cs Framework. December 15, 2022. Past Training - AFPHS December Training - Health Equity, Social Determinants of Health, and the AFPHS 6C Framework - Age-Friendly Public Health Systems Accessed February 7, 2024.

56 Seattle and King County Public Health. "Extreme Heat Response Plan." June 23, 2023. chrome-extension:// efaidnbmnnnibpcajpcglclefindm-kaj/https://cdn.kingcounty.gov/-/ media/king-county/depts/dph/ documents/safety-injury-prevention/ emergency-preparedness/phskc-extreme-heat-response-plan-2023.pdf?rev=1585a686bac-144c9aa2d7d4fe6e498ed&hash=A-97B9518E169E95C9D987E0E2490A35E. Accessed January 30, 2024.

57 New York State Department of Health. "Older Adults Among Those at Highest Risk for Heat-Related Illness." Press release, June 21, 2023. health.ny.gov/press/ releases/2023/2023-06-21_heat_related_ illness.htm. Accessed January 30, 2024.

58 New York State Department of Health. "Extreme Heat Advice." Updated July 2023. https://www.health.ny.gov/envi-ronmental/emergency/weather/hot/. Accessed January 30, 2024.

59 Oregon Department of Human Services. "Extreme Heat Advisory: Tips and Resources." Press release: August 11, 2023. chrome-extension://efaidnbmnnnibpca-jpcglclefindmkaj/https://www.oregon. gov/odhs/licensing/apd/provider-alerts/ODHS-23-060-cbc-nf-heat-advisory. pdf. Accessed January 30, 2024.

60 Cooper, Robin. "Climate Change and Older Adults: Planning Ahead to Protect Your Health." *National Council on Aging*, April 21, 2022. https://www.ncoa.org/ article/climate-change-and-older-adults-planning-ahead-to-protect-your-health. Accessed January 30, 2024.

61 Trust for America's Health: *Age-Friendly Public Health Systems*. https://afphs.org/. Accessed January 30, 2024.

62 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 30, 2024.

63 Ibid.

64 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 30, 2024.

65 Nurse Licensure Compact. "41 States Have Enacted the NLC." https://www. nursecompact.com/files/NLC_Map.pdf. Accessed January 30, 2024.

66 National Council of State Boards of Nursing. "Rhode Island Enacts Nurse Licensure Compact (NLC)." Press release, July 10, 2023. https://www.ncsbn. org/news/rhode-island-enacts-nurse-licensure-compact-nlc. Accessed January 30, 2024.

67 Bauer, Lauren, Aidan Creeron, Joy Dada, and Luiza Macedo. "Nurse Licensure Compacts Before, During, and After COVID." *The Brookings Institution*, February 8, 2023. https://www. brookings.edu/articles/nurse-licensure-compacts-before-during-and-after-covid/. Accessed January 30, 2024.

68 NCSBN. "Rhode Island Enacts Nurse Licensure Compact (NLC)". July 10, 2023. https://www.ncsbn.org/news/ rhode-island-enacts-nurse-licensure-compact-nlc. Accessed February 8, 2024.

69 Nurse Licensure Compact. "41 States Have Enacted the NLC." https://www. nursecompact.com/files/NLC_Map.pdf. Accessed January 30, 2024.

70 Public Health Accreditation Board. "Standards & Measures for Initial Accreditation." February 2022. https://phaboard.org/wp-content/ uploads/Standards-Measures-Initial-Accreditation-Version-2022.pdf. Accessed January 30, 2024.

71 Public Health Accreditation Board. "Standards & Measures for Reaccreditation." February 2022. https://phaboard.org/wp-content/uploads/Standard-Measures-Version-2022-Reaccreditation.pdf. Accessed January 30, 2024.

72 Ibid.

73 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 30, 2024.

74 Public Health Accreditation Board. "Accreditation Activity." https://phaboard.org/accreditation-recognition/accreditation-activity/. Accessed January 30, 2024.

75 Emergency Management Accreditation Program. "EMAP Accredited Programs." https://www.emap.org/index.php/what-is-emap/who-is-accredited. Accessed January 30, 2024.

76 Public Health Activities and Services Tracking. "About Us." https://phastdata.org/about. Accessed January 30, 2024.

77 Association of State and Territorial Health Officials. "Profile of State and Territorial Public Health." 2022. https://www.astho.org/profile/#close. Accessed January 30, 2024.

78 National Association of County and City Health Officials. "2019 National Profile of Local Health Departments." NACCHO, 2020. https://www.naccho.org/uploads/downloadable-resources/Programs/Public-Health-Infrastructure/NACCHO_2019_Profile_final.pdf. Accessed January 30, 2024.

79 Water Resources Mission Area. "Domestic Water Use." *U.S. Geological Survey*, 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.

80 U.S. Environmental Protection Agency. "National Primary Drinking Water Regulations." Updated January 2, 2024. https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations. Accessed January 30, 2024.

81 U.S. Environmental Protection Agency. "Safe Drinking Water Information System (SDWIS) Federal Reporting Services." Updated March 21, 2023. https://www.epa.gov/ground-water-and-drinking-water/safe-drinking-water-information-system-sdwis-federal-reporting. Accessed January 30, 2024.

82 Ibid.

83 U.S. Environmental Protection Agency. "The History of Drinking Water Treatment." February 2000. https://nepis.epa.gov/Exe/ZyPDF.cgi/P1002SMN.PDF?Dockey=P1002SMN.PDF. Accessed January 30, 2024.

84 Centers for Disease Control and Prevention. "History of Drinking Water Regulations." Updated April 25, 2019. https://www.cdc.gov/healthywater/surveillance/drinking-water-reg-history.html. Accessed January 30, 2024.

85 Centers for Disease Control and Prevention. "CDC Investigation: Blood Lead Levels Higher After Switch to Flint River Water." Press release, June 24, 2016. https://archive.cdc.gov/#/details?url=https://www.cdc.gov/media/releases/2016/p0624-water-lead.html. Accessed January 30, 2024.

86 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 30, 2024.

87 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 30, 2024.

88 Kanno-Youngs, Zolan. "Harris Says Replacing Lead Pipes Is a Priority, Despite Limited Funding." *The New York Times*, February 11, 2022. https://www.nytimes.com/2022/02/11/us/politics/kamala-harris-lead-pipes-newark.html. Accessed January 30, 2024.

89 Mayo Clinic. "Lead Poisoning." https://www.mayoclinic.org/diseases-conditions/lead-poisoning/symptoms-causes/syc-20354717. Accessed January 30, 2024.

90 U.S. Environmental Protection Agency. "Save Water and Energy by Showering Better!" Water Sense. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.epa.gov/sites/default/files/2017-02/documents/ws-ourwater-shower-better-learning-resource_0.pdf. Accessed January 30, 2024.

91 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 30, 2024.

92 Ibid.

93 Reidmiller, David, Christopher W. Avery, Alexa Jay, et al (eds.). "Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II." *U.S. Global Change Research Program*, 2018. https://nca2018.globalchange.gov/. Accessed January 30, 2024.

94 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 30, 2024.

95 Ibid.

96 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 30, 2024.

97 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 30, 2024.

98 Samuels, Roberts, and Emmanuel Martinez. "The problem in the pipes." *The Washington Post*, February 18, 2023. https://www.washingtonpost.com/nation/interactive/2023/jackson-mississippi-water-crisis/. Accessed January 30, 2024.

99 Reily, Ross. "Jackson Water System Handed to the 'Elon Musk of the Water Utility Industry.'" *Clarion Ledger*, November 30, 2022. https://www.clarionledger.com/story/news/2022/12/01/jackson-water-system-called-utility-industry-elon-musk/69688444007/. Accessed January 30, 2024.

100 Wang, Amy B. "Biden Administration Sending $115 Million to Address Jackson, Miss., Water Crisis." *The Washington Post*, June 6, 2023. https://www.washingtonpost.com/politics/2023/06/06/biden-water-jackson-mississippi/. Accessed January 30, 2024.

101 Fortin, Jacey. "Storms, Rising Seas and Salty Drinking Water Threaten Lower Louisiana." *The New York Times*, November 15, 2023. https://www.nytimes.com/2023/11/15/us/louisiana-saltwater-climate.html. Accessed January 30, 2024.

102 US Army Corps of Engineers. "USACE begins construction of Mississippi River saltwater barrier". July 12, 2023. USACE begins construction of Mississippi River saltwater barrier > New Orleans District > News Releases (army.mil) Accessed February 8, 2023.

103 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 30, 2024.

104 U.S. Environmental Protection Agency. "EPA's Proposal to Limit PFAS in Drinking Water." March 2023. https://www.epa.gov/system/files/documents/2023-04/Fact%20Sheet_PFAS_NPWDR_Final_4.4.23.pdf. Accessed January 30, 2024.

105 Centers for Disease Control and Prevention. "Waterborne Disease." *National Center for Emerging and Zoonotic Diseases*. Updated March 9, 2022. https://www.cdc.gov/ncezid/what-we-do/2021-highlights/waterborne-disease.html. Accessed January 30, 2024.

106 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 30, 2024.

107 U.S. Environmental Protection Agency. "Summary of the Safe Drinking Water Act." Updated June 22, 2023. https://www.epa.gov/laws-regulations/summary-safe-drinking-water-act. Accessed January 30, 2024.

108 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 30, 2024.

109 Infrastructure Investment and Jobs Act. H.R.3684, November 15, 2021. https://www.congress.gov/bill/117th-congress/house-bill/3684. Accessed January 30, 2024.

110 U.S. Environmental Protection Agency. "EPA Celebrates Two Years of Progress Under President Biden's Bipartisan Infrastructure Law." Press release, November 15, 2023. https://www.epa.gov/newsreleases/epa-celebrates-two-years-progress-under-president-bidens-bipartisan-infrastructure-law. Accessed January 30, 2024.

111 The National Health Security Preparedness Index. "Prepared." September 28, 2021. https://nhspi.org/. Accessed January 30, 2024.

112 U.S. Environmental Protection Agency. "Private Drinking Water Wells." Updated January 5, 2024. https://www.epa.gov/privatewells. Accessed January 30, 2024.

113 The National Health Security Preparedness Index. "Prepared." September 28, 2021. https://nhspi.org/. Accessed January 30, 2024.

114 U.S. Environmental Protection Agency. "Private Drinking Water Wells." Updated January 5, 2024. https://www.epa.gov/privatewells. Accessed January 30, 2024.

115 Mehta, Sapna, and Milli, Jessica. "Millions of Working People Still Don't Have Access to a Single Paid Sick Day." *The Center for Law and Social Policy*, June 2, 2023. https://www.research2impact.org/articles-research/access-to-paid-sick-leave. Accessed January 30, 2024.

116 U.S. Bureau of Labor Statistics. "Employee Benefits." March 2023. https://www.bls.gov/ncs/ebs/benefits/2019/ownership/civilian/table31a.pdf. Accessed January 30, 2024.

117 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 30, 2024.

118 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 30, 2024.

119 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 30, 2024.

120 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 30, 2024.

121 Ibid.

122 National Partnership for Women and Families. "Paid Sick Days Improve Public Health." Fact Sheet, November 2023. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://nationalpartnership.org/wp-content/uploads/2023/02/paid-sick-days-improve-our-public-health.pdf. Accessed January 30, 2024.

123 Moritz, Erin D., Shideh Delrahim Ebrahim-Zadeh, Beth Wittry, et al. "Foodborne Illness Outbreaks at Retail Food Establishments — National Environmental Assessment Reporting System, 25 State and Local Health Departments, 2017–2019." *Morbidity and Mortality Weekly Report*, Surveillance Summaries, 72(6): 1-11, June 2, 2023. https://www.cdc.gov/mmwr/volumes/72/ss/ss7206a1.htm?s_cid=ss7206a1_w. Accessed January 30, 2024.

124 National Partnership for Women and Families. "Paid Sick Days Improve Public Health." Fact Sheet, November 2023. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://nationalpartnership.org/wp-content/uploads/2023/02/paid-sick-days-improve-our-public-health.pdf. Accessed January 30, 2024.

125 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 30, 2024.

126 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.

127 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.

128 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.

129 Internal Revenue Service. "Under the American Rescue Plan, employers are entitled to tax credits for providing paid leave to employees". Employer tax credits for employee paid leave due to COVID-19 | Internal Revenue Service (irs.gov) Accessed February 9, 2024.

130 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 30, 2024.

131 Paycor. "Paid Sick Leave Laws by State for 2024." December 7, 2023. https://www.paycor.com/resource-center/articles/paid-sick-leave-laws-by-state/. Accessed January 30, 2024.

132 Bureau of Labor Statistics. "Labor Force Statistics from the Current Population Survey." https://www.bls.gov/cps/. Accessed January 30, 2024.

133 Ibid.

134 The National Health Security Preparedness Index. "Prepared." September 2021. https://nhspi.org/. Accessed January 30, 2024.

135 Centers for Disease Control and Prevention. "Vaccination Trends—Adults." https://www.cdc.gov/respiratory-viruses/data-research/dashboard/vaccination-trends-adults.html. Accessed January 30, 2024.

136 Centers for Disease Control and Prevention. "Influenza Vaccination Coverage for Persons 6 Months and Older." Updated May 28, 2021. https://www.cdc.gov/flu/fluxaview/interactive-general-population.htm. Accessed January 30, 2024.

137 Centers for Disease Control and Prevention. "Flu Vaccination Coverage, United States, 2022–23 Influenza Season." Updated October 10, 2023. https://www.cdc.gov/flu/fluxaview/coverage-2223estimates.htm. Accessed January 30, 2024.

138 Centers for Disease Control and Prevention. Health Equity and Flu. Health Equity and Flu | CDC. Accessed February 7, 2024.

139 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 30, 2024.

140 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 30, 2024.

141 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 30, 2024.

142 McKenna, Maryn. "The Long Quest for a Universal Flu Vaccine Finally Takes Its First Steps." *Wired*, November 10, 2023. https://www.wired.com/story/the-long-quest-for-a-universal-flu-vaccine-finally-takes-its-first-steps/. Accessed January 30, 2024.

143 Smith, Dana G. "What to Know About the New R.S.V. Immunizations." *The New York Times*, August 22, 2023. https://www.nytimes.com/article/rsv-vaccine.html?smid=url-share. Accessed January 30, 2024.

144 Centers for Disease Control and Prevention. "Use of Nirsevimab for Prevention of RSV disease among young children and infants". Use of Nirsevimab for the Prevention of Respiratory Syncytial Virus Disease Among Infants and Young Children: Recommendations of the Advisory Committee on Immunization Practices — United States, 2023 | MMWR (cdc.gov) Accessed February 8, 2024.

145 University of Chicago, NORC. "37% of Americans Do Not Plan to Get a Flu Shot This Season." Press release: 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 30, 2024.

146 Centers for Disease Control and Prevention. "Vaccine Effectiveness: How Well Do Flu Vaccines Work?" Updated February 8, 2023. https://www.cdc.gov/flu/vaccines-work/vaccineeffect.htm. Accessed January 30, 2024.

147 Centers for Disease Control and Prevention. "Past Seasons Estimated Influenza Disease Burden Prevented by Vaccination." Updated December 29, 2023. https://www.cdc.gov/flu/vaccines-work/past-burden-prevented-est.html. Accessed January 30, 2024.

148 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 30, 2024.

149 Diekema, Douglas S. "Personal Belief Exemptions From School Vaccination Requirements." *Annual Review of Public Health*, 35: 275-292, March 2014. https://www.annualreviews.org/doi/10.1146/annurev-publhealth-032013-182452. Accessed January 30, 2024.

150 National Conference of State Legislatures. "State Public Health Legislation Database." Updated January 05, 2024. https://www.ncsl.org/health/state-public-health-legislation-database. Accessed January 30, 2024.

151 Centers for Disease Control and Prevention. "Influenza Vaccination Coverage for Persons 6 Months and Older." *FluVaxView*, May 28, 2021. https://www.cdc.gov/flu/fluvaxview/interactive-general-population.htm. Accessed January 30, 2024.

152 Bates, David W., and Hardeep Singh. "Two Decades Since To Err Is Human: An Assessment of Progress and Emerging Priorities in Patient Safety." *Health Affairs*, 37(11), November 2018. https://www.healthaffairs.org/doi/10.1377/hlthaff.2018.0738. Accessed January 30, 2024.

153 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 30, 2024.

154 Leapfrog Hospital Safety Grade. "Errors, Injuries, Accidents, Infections." http://www.hospitalsafetygrade.org/what-is-patient-safety/errors-injuries-accidents-infections. Accessed January 30, 2024.

155 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 30, 2024.

156 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 30, 2024.

157 Leapfrog Hospital Safety Grade. "Scoring Methodology." Fall 2023. https://www.hospitalsafetygrade.org/media/file/Safety-Grade-Methodology-Fall2023.pdf. Accessed January 30, 2024.

158 Leapfrog Hospital Safety Grade. "How Safe Is Your Hospital: Fall 2023 Leapfrog Hospital Safety Grade State Rankings." https://www.hospitalsafetygrade.org/state-rankings. Accessed January 30, 2024.

159 Association of Public Health Laboratories. "About Public Health Laboratories." https://www.aphl.org/aboutAPHL/Pages/aboutphls.aspx. Accessed January 30, 2024.

160 Association of Public Health Laboratories. "Surge Capacity Planning Tool for the Laboratory Response Network for Biological Threats Preparedness (LRN-B)." January 2015. https://www.aphl.org/aboutAPHL/publications/Documents/PHPR_SurgeCapacityLRNB_JAN2015.pdf. Accessed January 30, 2024.

161 Ibid.

162 Ibid.

163 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 30, 2024.

164 Ibid.

165 Congressional Research Service. "Public Health Funding and Fiscal Responsibility Act of 2023". IN12208 (congress.gov). Accessed February 9, 2024.

166 Centers for Disease Control and Prevention. "What Does Data Modernization Look Like?" Updated April 11, 2023. https://www.cdc.gov/surveillance/data-modernization/snapshot/2022-snapshot/data-modernization-looks-like.html. Accessed January 30, 2024.

167 McPhillips, Deidre, and Brenda Goodman. "CDC Facing Major Funding Cuts, With Direct Impact on State and Local Health Departments." *CNN*, July 14, 2023. https://www.cnn.com/2023/07/14/health/cdc-funding-cuts-debt-deal/index.html. Accessed January 30, 2024.

168 U.S. House of Representatives. "Departments of Labor, Health and Human Services, and Education and Related Agencies Appropriation Bill, 2024." https://kffhealthnews.org/wp-content/uploads/sites/2/2023/10/FY24-LHHS-Report-3-2.pdf. Accessed January 30, 2024.

169 Congressional Research Service. "Public Health Funding and the Fiscal Responsibility Act of 2023." *Insight*, July 31, 2023. https://crsreports.congress.gov/product/pdf/IN/IN12208. Accessed January 30, 2024.

170 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 30, 2024.

171 McKillop, Matt, and Dara Lieberman. "The Impact of Chronic Underfunding on America's Public Health System: Trends, Risks, and Recommendations, 2021." *Trust for America's Health*, May 2021. https://www.tfah.org/report-details/pandemic-proved-underinvesting-in-public-health-lives-livelihoods-risk/. Accessed January 30, 2024.

172 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 30, 2024.

173 Prevent Epidemics. "Health Defense Operations (HDO)." https://preventepidemics.org/health-defense-operations-hdo/. Accessed January 30, 2024.

174 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 30, 2024.

175 U.S. Government Accountability Office. "COVID-19: Federal Efforts Could Be Strengthened by Timely and Concerted Actions." September 21, 2020. https://www.gao.gov/reports/GAO-20-701/. Accessed January 30, 2024.

176 The White House. "A Vision for Equitable Data: Recommendations from the Equitable Data Working Group." 2022. https://www.whitehouse.gov/wp-content/uploads/2022/04/eo13985-vision-for-equitable-data.pdf. Accessed January 30, 2024.

177 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." *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 30, 2024.

178 National Academies of Sciences, Engineering, and Medicine. "Effective Health Communications Within the Current Information Environment and the Role of the Federal Government: Proceedings of a Workshop." *The National Academies Press*, 2023. Accessed January 30, 2024.

179 Winny, Annalies. "What to Know About Malaria in the U.S." *Johns Hopkins Bloomberg School of Public Health*, September 05, 2023. https://publichealth.jhu.edu/2023/malarias-comeback-in-the-us. Accessed January 30, 2024.

180 Seither, Ranee, Oyindamola Bidemi Yusuf, Devon Dramann, et al. "Coverage with Selected Vaccines and Exemption from School Vaccine Requirements Among Children in Kindergarten — United States, 2022–23 School Year." *Morbidity and Mortality Weekly Report*, 72(45): 1217-1224, November 10, 2023. https://www.cdc.gov/mmwr/volumes/72/wr/mm7245a2.htm?s_cid=mm7245a2_w. Accessed January 30, 2024.

181 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." *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 30, 2024.

182 Hill, Holly A., David Yankey, Laurie D. Elam-Evans, et al. "Vaccination Coverage by Age 24 Months Among Children Born in 2017 and 2018 — National Immunization Survey-Child, United States, 2018–2020." *Morbidity and Mortality Weekly Report*, 70(41): 1435-1440, October 15, 2021. https://www.cdc.gov/mmwr/volumes/70/wr/mm7041a1.htm. Accessed January 30, 2024.

183 Roth, Ella. "Trends in Vaccine-Related Legislation — 2023 Legislative Sessions." *National Academy for State Health Policy, Blog*, September 25, 2023. https://nashp.org/trends-in-vaccine-related-legislation-coming-out-of-2023-state-legislative-sessions/. Accessed January 30, 2024.

184 Goldstein-Street, Jake. "Cost of Washington's Measles Outbreak Tops $1M." *Associated Press*, February 23, 2019. https://www.apnews.com/a88d9198385a4e04a3491c9e8dc6404e. Accessed January 30, 2024.

185 Hughes IV, Richard. "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 30, 2024.

186 National Academies of Sciences, Engineering, and Medicine. "Combating Antimicrobial Resistance and Protecting the Miracle of Modern Medicine." *The National Academies Press*, 2022. https://nap.nationalacademies.org/catalog/26350/combating-antimicrobial-resistance-and-protecting-the-miracle-of-modern-medicine. Accessed January 30, 2024.

187 Centers for Disease Control and Prevention. "Core Elements of Antibiotic Stewardship." Updated September 7, 2023. https://www.cdc.gov/antibiotic-use/core-elements/index.html. Accessed January 30, 2024.

188 Centers for Disease Control and Prevention. "National Healthcare Safety Network." Updated January 4, 2024. https://www.cdc.gov/nhsn/index.html. Accessed January 30, 2024.

189 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 30, 2024.

190 Centers for Disease Control and Prevention. "Long COVID or Post-COVID Conditions." Updated July 20, 2023. https://www.cdc.gov/coronavirus/2019-ncov/long-term-effects/index.html. Accessed January 30, 2024.

191 World Health Organization. "Ensuring a Coordinated and Effective Mental Health Response in Emergencies." https://www.who.int/activities/ensuring-a-coordinated-and-effective-mental-health-response-in-emergencies. Accessed January 30, 2024.

192 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 30, 2024.

193 The White House. "The U.S. Playbook to Address Social Determinants of Health." Domestic Policy Council Office of Science and Technology Policy, November 2023. https://www.whitehouse.gov/wp-content/uploads/2023/11/SDOH-Playbook-3.pdf. Accessed January 30, 2024.

194 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 30, 2024.

195 Administration for Strategic Preparedness and Response. "ASPR Releases Public Health Emergency Medical Countermeasure Enterprise Multiyear Budget Assessment." Press release, March 28, 2023. https://aspr.hhs.gov/newsroom/Pages/PHEMCE-Budget-28March23.aspx. Accessed January 30, 2024.

196 Administration for Strategic Preparedness and Response. "FDA Approvals, Licensures & Clearances for BARDA-Supported Products." MedicalCountermeasures.gov. https://medicalcountermeasures.gov/barda/fdaapprovals. Accessed January 30, 2024.

197 Administration for Strategic Preparedness and Response. "Project NextGen: Enhancing Preparedness for Future COVID-19 Strains & Variants with Next Generation Medical Countermeasures." https://aspr.hhs.gov/NextGen/Pages/Default.aspx. Accessed January 30, 2024.

198 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 30, 2024.

199 World Health Organization. "Lack of innovation set to undermine antibiotic performance and health gains". June 22, 2022. Lack of innovation set to undermine antibiotic performance and health gains (who.int) Accessed February 7, 2024.

200 National Academies of Sciences, Engineering and Medicine. "Ensuring an Effective Public Health Emergency Medical Countermeasures Enterprise." *National Academies Press,* 2021. https://www.nap.edu/catalog/26373/ensuring-an-effective-public-health-emergency-medical-countermeasures-enterprise. Accessed January 30, 2024.

201 U.S. Government Accountability Office. "COVID-19: Federal Efforts Could Be Strengthened by Timely and Concerted Actions." GAO-20-701, September 21, 2020. https://www.gao.gov/reports/GAO-20-701/. Accessed January 30, 2024.

202 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 30, 2024.

203 Administration for Strategic Preparedness and Response. "2022-2023 Recommendations from the National Advisory Committee on Children and Disasters (NACCD): The mental health crisis in the aftermath of the COVID-19 pandemic and other lessons learned." January 18, 2023. https://aspr.hhs.gov/AboutASPR/WorkingwithASPR/BoardsandCommittees/Documents/NACDD/NACCD-Recommendations-18Jan2023-PblcMtg.pdf. Accessed January 30, 2024.

204 Newgard, Craig D., Amber Lin, Susan Malveau, et al. "Emergency Department Pediatric Readiness and Short-term and Long-term Mortality Among Children Receiving Emergency Care." *JAMA Network Open,* 6(1): e2250941, January 13, 2023. https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2800400. Accessed January 30, 2024.

205 Centers for Medicare & Medicaid Services. "Emergency Preparedness Rule." Updated September 6, 2023. https://www.cms.gov/medicare/health-safety-standards/quality-safety-oversight-emergency-preparedness/emergency-preparedness-rule. Accessed January 30, 2024.

206 Toner, Eric, Monica Schoch-Spana, Richard Waldhorn, et al. "A Framework for Healthcare Disaster Resilience: A View to the Future." *Johns Hopkins Bloomberg School of Public Health, Center for Health Security*, 2018. https://centerforhealthsecurity.org/sites/default/files/2022-11/180222-framework-healthcare-disaster-resilience.pdf. Accessed January 30, 2024.

207 KFF. "Medicaid Enrollment and Unwinding Tracker." February 01, 2024. https://www.kff.org/report-section/medicaid-enrollment-and-unwinding-tracker-overview/. Accessed January 30, 2024.

208 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 30, 2024.

209 Tolbert, Jennifer, and Meghana Ammula. "10 Things to Know About the Unwinding of the Medicaid Continuous Enrollment Provision." *KFF*, June 9, 2023. https://www.kff.org/medicaid/issue-brief/10-things-to-know-about-the-unwinding-of-the-medicaid-continuous-enrollment-provision/. Accessed January 30, 2024.

210 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. Accessed January 30, 2024.

211 National Registry of Emergency Medical Technicians. "The EMS Compact." https://www.nremt.org/rwd/public/document/replica. Accessed January 30, 2024.

212 The American College of Surgeons. "Uniform Emergency Volunteer Health Practitioners Act." https://www.facs.org/advocacy/state/uevhpa. Accessed January 30, 2024.

213 TRACIE Healthcare Emergency Preparedness Information Gateway. "Topic Collection: Crisis Standards of Care." U.S. Department of Health and Human Services. https://asprtracie.hhs.gov/technical-resources/63/crisis-standards-of-care/0. Accessed January 31, 2024.

214 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." *The National Academies Press*, 2020. https://www.nationalacademies.org/our-work/crisis-standards-of-care-successes-and-challenges-from-the-past-ten-years--a-workshop. Accessed January 31, 2024.

215 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 31, 2024.

216 Centers for Disease Control and Prevention. "Protecting Disproportionately Affected Populations from Extreme Heat." Updated August 25, 2022. https://www.cdc.gov/disasters/extremeheat/specificgroups.html. Accessed January 31, 2024.

217 Jiao, Anqi, Yi Sun, Chantal Avila,, et al. "Analysis of Heat Exposure During Pregnancy and Severe Maternal Morbidity." *JAMA Network Open*, 6(9): e2332780, 2023. https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2809055 . Accessed January 31, 2024.

218 Climate Program Office. "National Integrated Heat Health Information System." https://cpo.noaa.gov/national-integrated-heat-health-information-system/. Accessed January 31, 2024.

219 Heat.gov. https://www.heat.gov/. Accessed January 31, 2024.

220 Johns Hopkins Bloomberg School of Public Health. "Model State Indoor Air Quality Act." *Center for Health Security*, 2023. https://centerforhealthsecurity.org/sites/default/files/2023-08/230801-msiaqa-final.pdf. Accessed January 31, 2024.

221 American Lung Association. "Public Policy Position - Healthy Air." October 22, 2022. https://www.lung.org/policy-advocacy/public-policy-positions/public-policy-position-healthy-air. Accessed January 31, 2024.

222 Prescott, Nina, Mike Henchen, Emma Hines, and Brady Seals. "The Need for US Indoor Air Quality Guidelines: Advancing Policy for Healthy Buildings at the Federal and State Level." *RMI*, October 11, 2023. https://rmi.org/the-need-for-us-indoor-air-quality-guidelines/. Accessed January 31, 2024.

223 Centers for Disease Control and Prevention. "H5N1 Bird Flu: Current Situation Summary." Updated January 31, 2024. https://www.cdc.gov/flu/avianflu/avian-flu-summary.htm. Accessed January 31, 2024.

224 Vega Ocasio, Denisse, Stanley Juin, David Berendes, et al. "Cholera Outbreak – Haiti, September 2022 – January 2023." Centers for Disease Control and Prevention." Morbidity and *Mortality Weekly Report*, 72(2): 21-25, January 13, 2023. https://www.cdc.gov/mmwr/volumes/72/wr/mm7202a1.htm?s_cid=mm7202a1_w. Accessed January 31, 2024.

225 World Health Organization. "WHO and UNICEF Launch Cholera Vaccination Campaign in Northwest Syria Amidst Earthquake Response." Press release, March 8, 2023. worldhealthorganization.cmail19.com/t/d-e-zhyjtdl-jyyhcddb-j/. Accessed January 31, 2024.

226 Matonga, Golden, and John Eligon. "In a Nation That Nearly Wiped Out Cholera, the Disease is Surging Back." *The New York Times*, January 22, 2023. https://www.nytimes.com/2023/01/22/world/africa/malawi-cholera-outbreak.html?searchResultPosition=28. Accessed January 31, 2024.

227 World Health Organization and UNICEF. worldhealthorganization.cmail19.com/t/d-e-zhyjtdl-jyyhcddb-j/ Accessed November 17, 2023.

228 Centers for Disease Control and Prevention. "Syphilis in Babies Reflects Health System Failures." *Vital Signs*, November 7, 2023. https://www.cdc.gov/vitalsigns/. Accessed January 31, 2024.

229 Statista. "Number of coronavirus disease 2019 (COVID-19) deaths in the U.S. as of June 14, 2023, by age". COVID-19 deaths by age U.S. 2023 | Statista Accessed February 9, 2024.

230 Gawthrop, Elisabeth. APM Research Lab. "The Color of Coronavirus: COVID-19 Deaths by Race and Ethnicity in the U.S." October 19, 2023. Accessed February 9, 2024.

231 European Centre for Disease Prevention and Control. "Dengue Worldwide Overview." Updated January 2023. https://www.ecdc.europa.eu/en/dengue-monthly. Accessed January 10, 2024.

232 Bariyo, Nicholas. "Uganda Declares End of Deadly Ebola Outbreak." *The Wall Street Journal*, January 11, 2023. https://www.wsj.com/articles/uganda-declares-end-of-deadly-ebola-outbreak-11673427283?mod=Searchresults_pos1&page=1. Accessed January 31, 2024.

233 Blackburn, Dawn, Michael Drennon, Kelly Broussard, et al. "Outbreak of Locally Acquired Mosquito-Transmitted (Autochthonous) Malaria – Florida and Texas, May – July 2023." *Morbidity and Mortality Weekly Report*, 72(36): 973-978, September 8, 2023. https://www.cdc.gov/mmwr/volumes/72/wr/mm7236a1.htm?s_cid=mm7236a1_w. Accessed January 31, 2024.

234 Centers for Disease Control and Prevention. "Locally Acquired Cases of Malaria in Florida, Texas, and Maryland." Updated August 22, 2023. https://www.cdc.gov/malaria/new_info/2023/malaria_florida.html. Accessed January 31, 2024.

235 Centers for Disease Control and Prevention. "Marburg Virus Disease Outbreaks." Updated June 9, 2023. https://www.cdc.gov/vhf/marburg/outbreaks/chronology.html?ACSTrackingID=USCDC_511-DM102951&ACSTrackingLabel=HAN%20489%20-%20Professional%20and%20Media%20Partners&deliveryName=USCDC_511-DM102951. Accessed January 31, 2024.

236 Minta, Anna A., Matt Ferrari, Sebastien Antoni, et al. "Progress Toward Measles Elimination – Worldwide, 2000- 2022." *Morbidity and Mortality Weekly Report*, 72(46): 1262-1268, November 17, 2023. https://www.cdc.gov/mmwr/volumes/72/wr/mm7246a3.htm?s_cid=mm7246a3_w. Accessed January 31, 2024.

237 Howard, Jacqueline. "Measles Outbreak in Central Ohio Ends After 85 Cases, All Among Children Who Were Not Fully Vaccinated." *CNN*, February 5, 2023. https://www.cnn.com/2023/02/05/health/measles-outbreak-ohio-over/index.html. Accessed January 31, 2024.

238 Centers for Disease Control and Prevention. "Measles (Rubeola): Measles Cases and Outbreaks." Updated January 26, 2024. https://www.cdc.gov/measles/cases-outbreaks.html. Accessed January 31, 2024.

239 McQuiston, Jennifer H., Christopher R. Braden, Michael D. Bowen, et al. "The CDC Domestic Mpox Response — United States, 2022–2023." *Morbidity and Mortality Weekly Report*, 72(20): 547-552, May 19, 2023. https://www.cdc.gov/mmwr/volumes/72/wr/mm7220a2.htm#:~:text=Initial%20cases%20of%20mpox%20were%20associated%20with%20international,and%2042%20mpox-associated%20deaths%20were%20reported%20to%20CDC. Accessed January 31, 2024.

240 Thomas, Ebony S., Zachary J. Madewell, William L. Still, et al. "Notes from the Field: Transmission of Mpox to Nonsexual Close Contacts – Two U.S. Jurisdictions, May 1 – July 31, 2022." *Morbidity and Mortality Weekly Report*, 72(50): 1351-1352, December 15, 2023. https://www.cdc.gov/mmwr/volumes/72/wr/mm7250a3.htm?s_cid=mm7250a3_w. Accessed January 31, 2024.

241 World Health Organization. "Global Wild Poliovirus 2017 – 2023." chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://polioeradication.org/wp-content/uploads/2023/11/weekly-polio-analyses-WPV-20231114.pdf. Accessed January 31, 2024.

242 Mbaeyi, Chukwuma, Shahzad Baig, Rana Muhammad Safdar, et al. "Progress Toward Poliomyelitis Eradication – Pakistan, January 2022 – June 2023." *Morbidity and Mortality Weekly Report*, 72(33): 880-885, August 18, 2023. https://www.cdc.gov/mmwr/volumes/72/wr/mm7233a1.htm?s_cid=mm7233a1_w. Accessed January 31, 2024.

243 Centers for Disease Control and Prevention. "Severe and Fatal Confirmed Rocky Mountain Spotted Fever Among People with Recent Travel to Tecate, Mexico." *CDC Health Alert Network*, December 8, 2023. https://emergency.cdc.gov/han/2023/han00502.asp. Accessed January 31, 2024.

244 Centers for Disease Control and Prevention. "2023-2024 U.S. Flu Season: Preliminary In-Season Burden Estimates." Updated January 2024. https://www.cdc.gov/flu/about/burden/preliminary-in-season-estimates.htm. Accessed January 31, 2024.

245 Centers for Disease Control and Prevention. "Overview of Tickborne Diseases." Updated August 5, 2022. https://www.cdc.gov/ticks/tickbornediseases/overview.html. Accessed January 31, 2024.

246 Centers for Disease Control and Prevention. Reported Tuberculosis in the United States 2022. Reported TB in the US 2022 | Data & Statistics | TB | CDC Accessed February 7, 2024.

247 World Health Organization. "Global Tuberculosis Report 2023." 9789240083851-eng.pdf (who.int). Accessed January 31, 2024.

248 Fagre, Anna C., Shelby Lyons, J. Erin Staples, et al. "West Nile Virus and Other Nationally Notifiable Arboviral Disease – United States, 2021." *Morbidity and Mortality Weekly Report*, 72(34): 901-906, August 25, 2023. https://www.cdc.gov/mmwr/volumes/72/wr/mm7234a1.htm?s_cid=mm7234a1_w. Accessed January 31, 2024.

249 *The New York Times.* "Track Covid-19 in the U.S." Updated January 31, 2024. https://www.nytimes.com/interactive/2023/us/covid-cases.html. Accessed January 31, 2024.

250 Luisi, Nicole, Patrick S. Sullivan, Travis Sanchez, et al. "Use of COVIDTest. gov At-Home Tests Among Adults in a National Household Probability Sample – United States, 2022." *Morbidity and Mortality Weekly Report*, 72(16): 445-449, April 21, 2023. https://www.cdc.gov/mmwr/volumes/72/wr/mm7216a6.htm. Accessed January 31, 2024.

251 Valencia, Diana, Alexander T. Yu, Allison Wheeler, et al. "Notes from the Field: The National Wastewater Surveillance System's Centers of Excellence Contributions to Public Health Action During the Respiratory Virus Season – Four U.S. Jurisdictions, 2022 – 23." *Morbidity and Mortality Weekly Report*, 72(48): 1309-1312, December 1, 2023. https://www.cdc.gov/mmwr/volumes/72/wr/mm7248a4.htm?s_cid=mm7248a4_w. Accessed January 31, 2024.

252 Ahmad, Farida B., Jodi A. Cisewski, Jiaquan Xu,, et al. "COVID-19 Mortality Update – United States, 2022." *Morbidity and Mortality Weekly Report*, 72(18): 493-496, May 5, 2023. https://www.cdc.gov/mmwr/volumes/72/wr/mm7218a4.htm?s_cid=mm7218a4_w. Accessed January 31, 2024.

253 Van Beusekom, Mary. "Native Americans at Outsized Risk of Severe COVID-19, Death." *CIDRAP. University of Minnesota*, August 30, 2023. https://www.cidrap.umn.edu/covid-19/native-americans-outsized-risk-severe-covid-19-death. Accessed January 31, 2024.

254 Offord, Catherine. "Months After Hospitalization for COVID-19, MRIs Reveal Multiorgan Damage." *Science*, September 22, 2023. https://www.science.org/content/article/months-after-hospitalization-covid-19-mris-reveal-multiorgan-damage. Accessed January 31, 2024.

255 Centers for Disease Control and Prevention. "Global Measles Outbreaks." Updated January 12, 2024. https://www.cdc.gov/globalhealth/measles/data/global-measles-outbreaks.html. Accessed January 31, 2024.

256 Minta, Anna A., Matt Ferrari, Sebastien Antoni, et al. "Progress Toward Measles Elimination – Worldwide, 2000- 2022." *Morbidity and Mortality Weekly Report*, 72(46): 1262-1268, November 17, 2023. https://www.cdc.gov/mmwr/volumes/72/wr/mm7246a3.htm?s_cid=mm7246a3_w. Accessed January 31, 2024.

257 Wang, Linda. "Working to Close the Cancer Screening Gap Caused by COVID." *National Cancer Institute*, May 17, 2022. https://www.cancer.gov/news-events/cancer-currents-blog/2022/covid-increasing-cancer-screening. Accessed January 31, 2024.

258 Han, Xuesong, Nuo Nova Yang, Leticia Nogueira, et al. "Changes in Cancer Diagnoses and Stage Distribution During the First Year of the COVID-19 Pandemic in the USA: A Cross-Sectional Assessment." *Lancet Oncology*, 24: 855-67, 2023. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.thelancet.com/pdfs/journals/lanonc/PIIS1470-2045(23)00293-0.pdf. Accessed January 31, 2024.

259 Ko, Jean Y., Huong Pham, Onika Anglin, et al. "Vaccination Status and Trends in Adults Coronavirus Disease 2019 – Associated Hospitalizations by Race and Ethnicity: March 2020 – August 2022." *Clinical Infectious Diseases*, 77(6): 827-838, September 15, 2023. https://academic.oup.com/cid/article/77/6/827/7148597. Accessed January 31, 2024.

260 Centers for Disease Control and Prevention. "Long COVID." *Household Pulse Survey*, 2022–2023, 2023. https://www.cdc.gov/nchs/covid19/pulse/long-covid.htm. Accessed January 31, 2024.

261 Ibid.

262 Ford, Nicole D., Douglas Slaughter, Deja Edwards, et al. "Long COVID and Significant Activity Limitation Among Adults, by Age – United States, June 1 – 13, 2022 to June 7 – 19, 2023." *Morbidity and Mortality Weekly Report*, 72(32): 866-870, August 11, 2023. https://www.cdc.gov/mmwr/volumes/72/wr/mm7232a3.htm?s_cid=mm7232a3_w. Accessed January 31, 2024.

263 Tsampasian, Vasiliki, Hussein Elghazaly, Rahul Chattopadhyay, et al. "Risk Factors Associated with Post COVID-19 Condition A Systemic Review and Meta-Analysis." *JAMA Internal Medicine*, 183(6): 566-580, March 23, 2023. https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2802877?guestAccesssKey=8f8bc65e-6dec-4d95-a405-2fbfea2e1adc&utm_source=For_The_Media&utm_medium=referral&utm_campaign=ftm_links&utm_content=tfl&utm_term=032323. Accessed January 31, 2024.

264 U.S. Department of Health and Human Services. "The Office of Long COVID Research and Practice (OLC)." Updated November 30, 2023. https://www.hhs.gov/longcovid/index.html. Accessed January 31, 2024.

265 Van Beusekom, Mary. "Type 2 Diabetes Rates in US Youth Rose 62% After COVID Pandemic Began, Study Suggests." *CIDRAP, University of Minnesota*, September 22, 2023. https://www.cidrap.umn.edu/covid-19/type-2-diabetes-rates-us-youth-rose-62-after-covid-pandemic-began-study-suggests. Accessed January 31, 2024.

266 Agrawal, Virat, Neeraj Sood, and Christopher M. Whaley. "The Impact of the Global COVID-19 Vaccination Campaign on All-Cause Mortality." *National Bureau of Economic Research*, October 2023. https://www.nber.org/papers/w31812. Accessed January 31, 2024.

267 Seither, Ranee, Oyindamola Bidemi Yusuf, Devon Dramann, et al. "Coverage with Selected Vaccines and Exemption from School Vaccine Requirements Among Children in Kindergarten – United States, 2022-23 School Year." *Morbidity and Mortality Weekly Report*, 72(45): 1217-1224, November 10, 2023. https://www.cdc.gov/mmwr/volumes/72/wr/mm7245a2.htm?s_cid=mm7245a2_w. Accessed January 31, 2024.

268 Hill, Holly A., David Yankey, Laurie D. Elam-Evans, et al. "Vaccination Coverage by Age 24 Months Among Children Born in 2019 and 2020 – National Immunization Survey-Child, United States, 2020-2022." *Morbidity and Mortality Weekly Report*, 72(44): 1190-1196, November 3, 2023. https://www.cdc.gov/mmwr/volumes/72/wr/mm7244a3.htm. Accessed January 31, 2024.

269 Centers for Disease Control and Prevention. "Vaccines and Preventable Diseases: RSV Immunization for Children 19 months and Younger." Updated September 28, 2023. https://www.cdc.gov/vaccines/vpd/rsv/public/child.html. Accessed January 31, 2024.

270 Pingali, Cassandra, David Yankey, Laurie D. Elam-Evans, et al. "Vaccination Coverage Among Adolescents Aged 13-17 Years – National Immunization Survey – Teen, United States, 2022." *Morbidity and Mortality Weekly Report*, 72(34): 912-919, August 25, 2023. https://www.cdc.gov/mmwr/volumes/72/wr/mm7234a3.htm?s_cid=mm7234a3_w. Accessed January 31, 2024.

271 World Health Organization. "Striving to Eliminate Measles and Rubella in the WHO South-East Asia Region." May 3, 2023. https://www.who.int/southeastasia/news/feature-stories/detail/striving-to-eliminate-measles-and-rubella-in-the-who-south-east-asia-region. Accessed January 31, 2024.

272 U.S. Department of Health and Human Services. "COVID-19 Commercialization." Updated July 13, 2023. https://www.hhs.gov/coronavirus/commercialization/index.html#:~:text=Commercialization%20is%20the%20transition%20of,i.e.%2C%20the%20traditional%20health%20care. Accessed January 31, 2024.

273 Centers for Disease Control and Prevention. "HHS Launches Bridge Access Program to Safeguard Free COVID-19 Vaccination for Uninsured and Underinsured Adults." Press release, September 14, 2023. https://www.cdc.gov/media/releases/2023/p0914-uninsured-vaccination.html. Accessed January 31, 2024.

274 U.S. Department of Health and Human Services. "Project NextGen Selects Initial Vaccine Candidates and Awards Over $500 Million to Advance Development of Vaccines and Therapeutics." Press release, October 13, 2023. https://www.hhs.gov/about/news/2023/10/13/project-nextgen-selects-initial-vaccine-candidates-awards-over-500-million-advance-development-vaccines-therapeutics.html. Accessed January 31, 2024.

275 *EurekAlert.* "Not Enough New Antibiotics in the Pipeline, Concludes WHO Review – Especially Those Targeting Deadly Drug-Resistant Microbes." Press release, March 15, 2023. https://www.eurekalert.org/news-releases/982758. Accessed January 31, 2024.

276 Choi, Joseph. "HHS Pledges to Keep Paxlovid Available as it Transitions to Commercial Market." *The Hill*, October 13, 2023. https://thehill.com/policy/healthcare/4255242-hhs-pledges-to-keep-paxlovid-available-as-it-transitions-to-commercial-market/. Accessed January 31, 2024.

277 Jewett, Christina. "Drug Shortages Near an All-Time High, Leading to Rationing." *The New York Times*, May 18, 2023. https://www.nytimes.com/2023/05/17/health/drug-shortages-cancer.html. Accessed January 31, 2024.

278 U.S. Food & Drug Administration. "FDA Approves First Vaccine to Prevent Disease Caused by Chikungunya Virus." Press release, November 9, 2023. https://www.fda.gov/news-events/press-announcements/fda-approves-first-vaccine-prevent-disease-caused-chikungunya-virus. Accessed January 31, 2024.

279 Centers for Disease Control and Prevention. "Foodborne Outbreaks: List of Multistate Foodborne Outbreak Notices." Updated January 5, 2023. https://www.cdc.gov/foodsafety/outbreaks/lists/outbreaks-list.html. Accessed January 31, 2024.

280 U.S. Food & Drug Administration. "Quaker Recalls Granola Bars and Granola Cereals Due to Possible Health Risk." Press release, December 15, 2023. https://www.fda.gov/safety/recalls-market-withdrawals-safety-alerts/quaker-recalls-granola-bars-and-granola-cereals-due-possible-health-risk. Accessed January 31, 2024.

281 Centers for Disease Control and Prevention. "Foodborne Outbreaks: List of Multistate Foodborne Outbreak Notices." Updated January 5, 2023. https://www.cdc.gov/foodsafety/outbreaks/lists/outbreaks-list.html. Accessed January 31, 2024.

282 Centers for Disease Control and Prevention. "Estimates of Food Borne Illness in the United States." Updated November 5, 2018. https://www.cdc.gov/foodborneburden/index.html. Accessed January 31, 2024.

283 U.S. Food & Drug Administration. "Investigation of Elevated Lead Levels: Cinnamon Applesauce Pouches." November 12, 2023. https://www.fda.gov/food/outbreaks-foodborne-illness/investigation-elevated-lead-chromium-levels-cinnamon-applesauce-pouches-november-2023. Accessed January 31, 2024.

284 Snider, Mike. "Applesauce pouches recalled for lead could have been contaminated intentionally." *USA Today*, December 16, 2023. https://www.msn.com/en-us/health/other/applesauce-pouches-recalled-for-lead-could-have-been-contaminated-intentionally-reports/ar-AA1lBMrz. Accessed January 31, 2024.

285 NOAA National Centers for Environmental Information. Billion-Dollar Weather and Climate Disasters. https://www.ncei.noaa.gov/access/billions/. Accessed January 31, 2024.

286 NOAA National Centers for Environmental Information. "U.S. Billion-Dollar Weather and Climate Disasters." 2024. https://www.ncei.noaa.gov/access/billions/. Accessed January 31, 2024.

287 Fishman, Kate. "California is Deluged by Record Rain with More Storms Coming." *Reuters*, January 12, 2023. https://www.reuters.com/world/us/more-heavy-rains-powerful-gales-tap-northern-california-2023-01-11/. Accessed January 31, 2024.

288 Erdman, Jonathan. "2023's Record Number of US Billion-Dollar Disasters Count Now 25, And There's Still Two Months Left." *The Weather Channel*, November 8, 2023. https://weather.com/news/climate/news/2023-11-08-billion-dollar-disasters-record-2023-october. Accessed January 31, 2024.

289 Cameron, Chris. "More Than 111 Million People in the U.S. Face Extreme Heat." *The New York Times*, August 26, 2023. https://www.nytimes.com/2023/08/26/us/heat-wave-south-gulf-coast.html. Accessed January 30, 2024.

290 Associated Press. "Phoenix Hit 110 Degrees on 54 Days in 2023, Setting Another Heat Record." *PBS Newshour*, September 10, 2023. https://www.pbs.org/newshour/nation/phoenix-hit-110-degrees-on-54-days-in-2023-setting-another-heat-record. Accessed January 30, 2024.

291 National Oceanic and Atmospheric Administration. "Topping the Charts: September 2023 Was Earth's Warmest September in 174-Year Record." October 13, 2023. https://www.noaa.gov/news/topping-charts-september-2023-was-earths-warmest-september-in-174-year-record. Accessed January 30, 2024.

292 Dance, Scott. "Why a sudden surge of broken heat records is scaring scientists." *The Washington Post*, July 6, 2023. https://www.washingtonpost.com/weather/2023/07/06/earth-record-heat-climate-extremes/. Accessed January 30, 2024.

293 *Climate Central*. "October 2023 Capped the Hottest 12-Month Span in Recorded History." November 9, 2023. https://www.prnewswire.com/news-releases/october-2023-capped-the-hottest-12-month-span-in-recorded-history-301981682.html. Accessed January 30, 2024.

294 National Oceanic and Atmospheric Administration. "2023 Atlantic Hurricane Season Ranks 4th for Most-Named Storms in a Year." November 28, 2023. https://www.noaa.gov/news-release/2023-atlantic-hurricane-season-ranks-4th-for-most-named-storms-in-year. Accessed January 30, 2024.

295 Erdman, Jonathan. "2023's Record Number of US Billion-Dollar Disasters Count Now 25, And There's Still Two Months Left." *The Weather Channel*, November 8, 2023. https://weather.com/news/climate/news/2023-11-08-billion-dollar-disasters-record-2023-october. Accessed January 31, 2024.

296 Loehrke, Janet. "Snapshot: Near-Record Tornadoes Start 2023 as Major Storm System Threatens US." *USA Today*, March 2, 2023. https://www.usatoday.com/story/graphics/2023/03/02/tornadoes-record-numbers-2023/11381847002/. Accessed January 30, 2024.

297 Morgan, Leigh. "Deadly Alabama Tornado Traveled a 82-Mile Path, One of the Longest in State History." *AL.com*, January 18, 2023. https://www.al.com/news/2023/01/deadly-alabama-tornado-travelled-a-77-mile-path-one-of-the-longest-in-state-history.html. Accessed January 30, 2024.

298 Gonzalez, Tony, and Blaise Gainey. "Deadly Tornado Outbreak Causes Damage Across Tennessee." *WPLN News*, April 1, 2023. https://wpln.org/post/tornado-outbreak-causes-damage-across-tennessee/. Accessed January 30, 2024.

299 Loehrke, Janet. "Snapshot: Near-Record Tornadoes Start 2023 as Major Storm System Threatens US." *USA Today*, March 2, 2023. https://www.usatoday.com/story/graphics/2023/03/02/tornadoes-record-numbers-2023/11381847002/. Accessed January 30, 2024.

300 Rose, Andy, Sarah Dewberry, and Elisa Raffa. "At Least 6 People Confirmed Dead, Dozens Injured as Tornados Strike Tennessee." *CNN*, December 10, 2023. https://www.msn.com/en-us/news/other/3-people-killed-including-child-after-tornado-strikes-clarksville-tennessee/ar-AA1lgjBA. Accessed January 30, 2024.

301 Dong, Madison, Bea Malsky, Lazaro Gamio, et al. "Maps: Tracking Air Quality and Smoke From Wildfires." *The New York Times*, January 30, 2024. https://www.nytimes.com/interactive/2023/us/smoke-maps-canada-fires.html. Accessed January 30, 2024.

302 McArdle, Cristin E., Tia C. Dowling, Kelly Carey, et al. "Asthma-Associated Emergency Department Visits During the Canadian Wildfire Smoke Episodes – United States, April – August 2023." *Morbidity and Mortality Weekly Report*, 72(34): 926-932, August 25, 2023. https://www.cdc.gov/mmwr/volumes/72/wr/mm7234a5.htm?s_cid=mm7234a5_w. Accessed January 30, 2024.

303 Erdman, Jonathan. "2023's Record Number of US Billion-Dollar Disasters Count Now 25, And There's Still Two Months Left." *The Weather Channel*, November 8, 2023. https://weather.com/news/climate/news/2023-11-08-billion-dollar-disasters-record-2023-october. Accessed January 31, 2024.

304 Weber, Lauren, and Joel Achenbach. "COVID Backlash Hobbles Public Health and Future Pandemic Response." *The Washington Post*, March 8, 2023. https://www.washingtonpost.com/health/2023/03/08/covid-public-health-backlash/. Accessed January 30, 2024.

305 Platt, Elizabeth, and Kathleen Moran-McCabe. "State Legislation Addressing Public Health Emergency Authority." *Center for Public Health Law Research, Temple University Beasley School of Law*, January 24, 2023. https://phlr.org/product/state-legislation-addressing-public-health-emergency-authority. Accessed January 30, 2024.

306 The White House. "Readout of the White House Summit on Improving Indoor Air Quality." October 12, 2022. https://www.whitehouse.gov/briefing-room/statements-releases/2022/10/12/readout-of-the-white-house-summit-on-improving-indoor-air-quality/. Accessed January 30, 2024.

307 Rosenthal, Jill, and Marquisha Johns. "How the Office of Climate Change and Health Equity Can Respond to the Health Threats of the Climate Crisis." *Center for American Progress*, January 30, 2023. https://www.americanprogress.org/article/how-the-office-of-climate-change-and-health-equity-can-respond-to-the-health-threats-of-the-climate-crisis/. Accessed January 30, 2024.

308 Federal Emergency Management Agency. "Community Disaster Resilience Zones." https://experience.arcgis.com/experience/3fdfd-0639ba0403e9414d05654449d32/page/Home/. Accessed January 30, 2024.

309 Beyond Plastics. "Report: The Perils of PVC Plastic Pipes." April 2023. https://www.beyondplastics.org/publications/perils-of-pvc-pipes. Accessed January 30, 2024.

310 Centers for Disease Control and Prevention. "Improving Ventilation in Buildings." Updated May 11, 2023. https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/improving-ventilation-in-buildings.html. Accessed January 30, 2024.

311 Boumis, Georgios, Hamed R. Moftakhari, and Hamid Moradkhani. "Coevolution of Extreme Sea Levels and Sea Level Rise Under Global Warming." *Earth's Future, Advancing Earth and Space Sciences*, July 5, 2023. https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2023EF003649. Accessed January 30, 2024.

312 The White House. "National Climate Resilience Framework." September 2023. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.whitehouse.gov/wp-content/uploads/2023/09/National-Climate-Resilience-Framework-FINAL.pdf. Accessed January 30, 2024.

313 The White House. "Fact Sheet: Biden-Harris Administration Takes Action to Protect Communities from Extreme Heat Fueled by the Climate Crisis." July 11, 2023. https://www.whitehouse.gov/briefing-room/statements-releases/2023/07/11/fact-sheet-biden-harris-administration-takes-action-to-protect-communities-from-extreme-heat-fueled-by-the-climate-crisis/. Accessed January 30, 2024.

314 U.S. Department of Health and Human Services. "Climate and Health Outlook." Updated December 4, 2023. https://www.hhs.gov/climate-change-health-equity-environmental-justice/climate-change-health-equity/climate-health-outlook/index.html. Accessed January 30, 2024.

315 Romanello, Marina, di Napoli, Claudia, Green, Carol, et al. "The 2023 Global Report of the Lancet Countdown". *The Lancet*. November 14, 2023. The 2023 report of the Lancet Countdown on health and climate change: the imperative for a health-centred response in a world facing irreversible harms - The Lancet Accessed February 6, 2024,

316 EcoAmerica. "Mental Health and Our Changing Climate: Children and Youth Report 2023." October 2023. https://ecoamerica.org/mental-health-and-our-changing-climate-children-and-youth-report/?utm_source=Climate+for+Health+-+Newsletter&utm_campaign=8e22683f36-EMAIL_CAMPAIGN_2023_10_16_03_54&utm_medium=email&utm_term=0_-8e22683f36-%5BLIST_EMAIL_ID%5D&mc_cid=8e22683f36&mc_eid=27594e6aca. Accessed January 30, 2024.

317 ASHRAE. "ASHRAE Standard 241, Control of Infectious Aerosols." October 2023. https://www.ashrae.org/technical-resources/bookstore/ashrae-standard-241-control-of-infectious-aerosols. Accessed January 30, 2024.

318 The White House. "Fact Sheet: Fifth National Climate Assessment Details Impacts of Climate Change on Regions Across the United States." November 9, 2023. https://www.whitehouse.gov/ostp/news-updates/2023/11/09/fact-sheet-fifth-national-climate-assessment-details-impacts-of-climate-change-on-regions-across-the-united-states/. Assessed January 30, 2024.

319 Reuters. "EU Welcomes COP 28 Climate Agreement, van de Leyen Says." December 13, 2023. https://www.reuters.com/business/environment/eu-welcomes-cop-28-climate-agreement-von-der-leyen-says-2023-12-13/. Accessed January 30, 2024.

320 Parks, Robbie M., Vasilis Kontis, G. Brooke Anderson, et al. "Short-Term Excess Mortality Following Tropical Cyclones in the United States." *Science Advances*, 9(33), August 16, 2023. https://www.science.org/doi/10.1126/sciadv.adg6633. Accessed January 30, 2024.

321 Luhn, Bryan. "Pharmacy Closures Impacting Medically Underserved Communities." *University of Houston, Tilan J. Fertitta Family College of Medicine*, August 28, 2023. https://uh.edu/medicine/news-events/stories/2023/08aug/pharmacy-closures-impacting-medically-underserved-communities.php. Accessed January 30, 2024.

322 Rigby, Jennifer, and Gabrielle Tetrault-Farber, "Draft WHO Pandemic Deal Pushes for Equity to Avoid COVID 'Failure' Repeat." *Reuters*, February 2, 2023. https://www.reuters.com/business/healthcare-pharmaceuticals/draft-who-pandemic-deal-pushes-equity-avoid-covid-failure-2023-02-01/. Accessed January 30, 2024.

323 World Health Organization. "WHO Releases the Largest Global Collection of Health Inequality Data." Press release, April 20, 2023. https://www.who.int/news/item/20-04-2023-who-releases-the-largest-global-collection-of-health-inequality-data. Accessed January 30, 2024.

324 International Federation of the Red Cross. "World Disasters Report, 2022." January 30, 2023. https://www.ifrc.org/document/world-disasters-report-2022. Accessed January 30, 2024.

325 Summers, Lawrence H., Robert Hecht, and Shan Soe-Lin. "How the Global Pandemic Fund Can Live Up to its Great Potential." *The Washington Post*, January 30, 2023. https://www.washingtonpost.com/opinions/2023/01/30/world-bank-pandemic-fund-disease-outbreaks/. Accessed January 30, 2024

326 World Health Organization. "Quadripartite Call to Action for One Health for a Safer World." Press release, March 27, 2023. https://www.who.int/news/item/27-03-2023-quadripartite-call-to-action-for-one-health-for-a-safer-world. Accessed January 30, 2024.

327 Bochner, Aaron F., Issa Makumbi, Olaolu Aderinola, et al. "Implementation of the 7-17 Target for Detection, Notification, and Response to Public Health Threats in Five Countries: A Retrospective, Observational Study." *The Lancet*, 11(6): e871-879, June 2023. https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(23)00133-X/fulltext. Accessed January 30, 2024.

328 Office of Michael Bennet, U.S. Senate. "Bennet, Young Bipartisan House Colleagues Reintroduce Bipartisan PASTEUR Act to Fight Antimicrobial Resistance." Press Release, April 27, 2023. https://www.bennet.senate.gov/public/index.cfm/2023/4/bennet-young-bipartisan-house-colleagues-reintroduce-bipartisan-pasteur-act-to-fight-antimicrobial-resistance. Accessed January 30, 2024.

329 Moritz, Erin D., Shideh Delrahim Ebrahim-Zadeh, Beth Wittry, et al. "Foodborne Illness Outbreaks at Retail Food Establishments — National Environmental Assessment Reporting System, 25 State and Local Health Departments, 2017–2019." *Morbidity and Mortality Weekly Report*, Surveillance Summaries, 72(6): 1-11, June 2, 2023. https://www.cdc.gov/mmwr/volumes/72/ss/ss7206a1.htm?s_cid=ss7206a1_w. Accessed January 30, 2024.

330 World Health Organization. "Health and Economic Impacts of Antimicrobial Resistance in the Western Pacific Region, 2020-2030." June 13, 2023. https://www.who.int/publications/i/item/9789290620112. Accessed January 30, 2024.

331 Leslie, Mitch. "White House Budget Includes Ambitious Push to Eliminate Hepatitis." *Science*, March 10, 2023. https://www.science.org/content/article/white-house-budget-includes-ambitious-push-eliminate-hepatitis-c. Accessed January 30, 2024.

332 Office of Tammy Baldwin, U.S. Senate. "Baldwin Leads Legislation to Help Protect Americans from Flu." Press release, November 2, 2023. https://www.baldwin.senate.gov/news/press-releases/baldwin-leads-legislation-to-help-protect-americans-from-flu. Accessed January 30, 2024.

333 U.S. Government Accountability Office. "COVID-19: HHS Funds Allocated to Support Disproportionately Affected Communities." January 24, 2023. https://www.gao.gov/products/gao-23-105500. Accessed January 30, 2024.

334 Morrison, Stephen, J., and Tom Inglesby. "Building the CDC the Country Needs." Center for Strategic and International Studies, January 12, 2023. https://www.csis.org/analysis/building-cdc-country-needs. Accessed January 30, 2024.

335 U.S. Government Accountability Office. "Biodefense: Actions Needed to Address Long-Standing Challenges." March 9, 2023. https://www.gao.gov/products/gao-23-106476. Accessed January 30, 2024.

336 Office of Patty Murray, U.S. Senate. "Senator Murray Reintroduces Public Health Infrastructure Saves Lives Act, Continuing to Push to Strengthen Nation's Public Health System as New Report Chronicles Perils of Underinvestment." Press release, June 14, 2023. https://www.murray.senate.gov/senator-murray-reintroduces-public-health-infrastructure-saves-lives-act-continuing-push-to-strengthen-nations-public-health-system-as-new-report-chronicles-perils-of-underinvestment/. Accessed January 30, 2024.

337 Centers for Disease Control and Prevention. "Public Health Infrastructure Grant: Grant Overview." Updated January 29, 2024. https://www.cdc.gov/infrastructure/phig/program-overview.html. Accessed January 30, 2024.

338 The White House. "White House Launches Office of Pandemic Preparedness and Response Policy." Press release, July 21, 2023. https://www.whitehouse.gov/briefing-room/statements-releases/2023/07/21/fact-sheet-white-house-launches-office-of-pandemic-preparedness-and-response-policy/. Accessed January 30, 2024.

339 U.S. Government Accountability Office. "COVID-19: GAO Recommendations Can Help Federal Agencies Better Prepare for Future Public Health Emergencies." July 11, 2023. https://www.gao.gov/products/gao-23-106554. Accessed January 30, 2024.

340 U.S Government Accountability Office. "Public Health Preparedness: HHS Reserve Funding for Emergencies." August 15, 2023. https://www.gao.gov/products/gao-23-106102. Accessed January 30, 2024.

341 U.S. Department of Defense. "2023 Biodefense Posture Review." August 2023. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://media.defense.gov/2023/Aug/17/2003282337/-1/-1/1/2023_BIODEFENSE_POSTURE_REVIEW.PDF. Accessed January 30, 2024.

342 National Association of County and City Health Officials. "2022 Preparedness Profile Study." September 2023. 2022-Preparedness-Profile-Full-Report.pdf (naccho.org). Accessed January 30, 2024.

343 Better Testing Now. "Testing Playbook for Biological Emergencies." October 2023. https://www.bettertestingnow.org/testing-playbook-for-biological-emergencies. Accessed January 30, 2024.

344 U.S. Government Accountability Office. "Public Health Preparedness: Building and Maintaining Infrastructure beyond the COVID-19 Pandemic." November 7, 2023. https://www.gao.gov/products/gao-24-105891. Accessed January 30, 2024.

345 Bower, William A., Yon Yu, Marissa K. Person, et al. "CDC Guidelines for the Prevention and Treatment of Anthrax, 2023." *Morbidity and Mortality Weekly Report*, 72(6): 1-47, November 17, 2023. https://www.cdc.gov/mmwr/volumes/72/rr/rr7206a1.htm. Accessed January 30, 2024.

346 Centers for Disease Control and Prevention. "Insight Net: National Outbreak analytics & Disease Modeling Network." Center for Forecasting and Outbreak Analytics, Updated November 8, 2023. https://www.cdc.gov/forecast-outbreak-analytics/partners/insightnet/index.html. Accessed January 30, 2024.

347 The White House. "Fact Sheet: Biden-Harris Administration Releases Global Health Security Partnerships Annual Progress Report Demonstrating Results from United States Investments." December 30, 2023. https://www.whitehouse.gov/briefing-room/statements-releases/2023/12/30/fact-sheet-biden-%e2%81%a0harris-administration-releases-global-health-security-partnerships-annual-progress-report-demonstrating-results-from-united-states-investments/. Accessed January 30, 2024.

348 Trust for America's Health. "Ready or Not: Protecting the Public's Health from Diseases, Disasters and Bioterrorism, 2019." 2019. https://www.tfah.org/report-details/ready-or-not-protecting-the-publics-health-from-diseases-disasters-and-bioterrorism-2019/. Accessed January 30, 2024.