



NATIONAL PREPAREDNESS REPORT

DECEMBER 2024

[BASED ON DATA AS OF DECEMBER 31, 2023]



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Foreword

I am pleased to present the 2024 National Preparedness Report (NPR), an essential assessment of our nation's preparedness for the evolving landscape of threats and hazards. The 2024 NPR builds on a foundation laid by previous reports, highlighting progress made and challenges we still face in fostering a resilient nation. The data referenced here is current as of December 31, 2023.

Over the past year, our nation confronted an array of disasters ranging from extreme weather events exacerbated by climate change to sophisticated cyber incidents. These events underscore the urgency of advancing our preparedness efforts across all sectors and levels of government. As we navigate these complex challenges, resilience must be a collective endeavor, requiring the active participation of the whole community.



Deanne Criswell

FEMA Administrator

This year, we place particular emphasis on four core capabilities: Mass Care Services, Public Information and Warning, Infrastructure Systems, and Cybersecurity. These areas—identified through ongoing assessments, leadership priorities, and recent disaster impacts—continue to present significant challenges, but also opportunities for enhancing our national resilience.

Our preparedness efforts must also prioritize equity. Ensuring all community members, especially those who are socially vulnerable, have the resources and support they need before, during, and after disasters remains paramount.[1]

As we look forward, the 2024 NPR addresses the work that needs to be done at all levels – federal, state, local, tribal, and territorial – to strengthen national preparedness. While emerging threats and hazards will test us as a nation, our collective efforts across the whole community will drive our progress toward a safer, more resilient future. Together, we can ensure every individual and community is better prepared to face the uncertainties of tomorrow.



Introduction and Executive Summary

Through the National Preparedness Report (NPR), FEMA assesses our nation's preparedness and identifies challenges and opportunities for improvement. In alignment with the Post-Katrina Emergency Management Reform Act, FEMA developed the NPR for the past eleven years as an annual requirement of Presidential Policy Directive 8. The NPR provides partners across our nation with risk and capability insights that support decisions about program priorities, resource allocations, and community actions. The NPR's intended audience includes; whole community partners, all levels of government, individuals, families, community organizations, nonprofits, and businesses.

The 2024 NPR outlines progress towards achieving the national preparedness goal of, "A secure and resilient nation with the capabilities required across the whole community to prevent, protect against, mitigate, respond to, and recover from the threats and hazards that pose the greatest risk." It also offers recommendations for closing gaps. The report draws on various data sources, including open-source data, FEMA and community preparedness data sets, and submissions from federal departments and agencies. While FEMA acknowledges the role of critical infrastructure owners and operators in emergency management and community resilience, the 2024 NPR does not include insights into preparedness from this group, as this research extends beyond the report's scope.

The NPR focuses on domestic preparedness and emergency management challenges facing our nation. For information regarding international threats and hazards, refer to the 2024 Office of Director of National Intelligence Annual Threat Assessment. For information regarding homeland security threats and hazards, refer to the 2023 Quadrennial Homeland Security Review and the Department of Homeland Security's (DHS) 2024 Homeland Threat Assessment.

The following sections provide an executive summary of 2024 NPR key findings, recommendations, and structure.

1. Report Structure

The 2024 NPR summarizes progress made toward building and sustaining capabilities required to prevent, protect against, mitigate, respond to, and recover from threats and hazards that pose the greatest risk to our nation. This annual report offers practical insights into preparedness and capabilities at federal, state, local, tribal, and territorial levels to support decisions about program priorities, resource allocations, and actions for increasing whole community resilience.

The 2024 NPR covers calendar year 2023 and builds on content from previous national preparedness reports to analyze trends over time. The report contains the following key sections:

A **Risks** section that describes our nation's most challenging threats and hazards, the level of capability among high-risk communities, and national risk levels.

A **Capabilities** section that describes preparedness trends for individuals and households (e.g., preparedness actions), communities (e.g., community level of capability and preparedness grant investments), and the nation (e.g., Planning, Organizing, Equipping, Training and Exercising [POETE] capability gaps) based on data from the 2023 National Household Survey, and the Threat Hazard Identification and Risk Assessment and the Stakeholder Preparedness Review (THIRA/SPR).

A **Focus Areas** section that examines a subset of core capabilities. FEMA selected focus areas based on a combination of leadership priorities and recommendations, whole community capabilities impacted by disasters in 2023, and challenging areas FEMA can assess over time to explore progress and close capability gaps. The four areas that continue to challenge emergency management partners working to build and sustain capability and capacity include:

- Mass Care Services
- Public Information and Warning
- Infrastructure Systems
- Cybersecurity

Each focus area contains more detailed information on risk, capabilities, and management opportunities related to core capabilities, which whole community partners can use to develop strategies to reduce risk and increase disaster resilience.

A **Conclusion** that summarizes key findings and recommendations.

2. Findings

Analysis presented in this report shows the nation faces persistent challenges in an evolving threat and hazard landscape. Awareness of these challenges mitigates risks, lessens vulnerabilities, and drives all levels of governments to strategically direct investments to build resilience.

Disasters are becoming costlier and deadlier. Between 1980 and 1989, the average number of billion-dollar disasters per month was 0.3 (or approximately 3.6 per year). In recent years, between 2020 and 2023, that number rose to 1.8 per month, or 21.6 per year, on average. Since 1980, the U.S. experienced 376 individual billion-dollar weather and climate disasters, amounting to a cumulative cost exceeding $2.665 trillion.[1] In 2023, 28 incidents resulted in losses exceeding $1 billion each, totaling $92.9 billion.[2] Approximately 400 people a year die from natural disasters.[1] Since 1980,

around 16,350 fatalities occurred in association with billion-dollar disasters. Tropical cyclones and hurricanes are some of the most deadly events, having contributed to nearly 6,900 deaths during this period.[1]

Sophisticated data analysis tools are essential to develop effective, place-based recovery strategies. Of the top five most stressing threats and hazards identified by communities in 2023, four were natural hazards including earthquakes, hurricanes/typhoons, tornadoes, and floods.[3] Historically, state, local, tribal, and territorial (SLTT) responses to natural disasters focused on fortifying and/or rebuilding post-disaster, but in some situations such as flooding, managed retreat—defined as the voluntary movement of people away from areas vulnerable to natural disasters—may be the most effective intervention to reduce risk to both people and property in the long-term.[4] Leveraging sophisticated tools with large-scale data processing helps identify and prioritize top threats and hazards based on community input, ultimately facilitating more effective recovery strategies.

Individuals and households are taking disaster preparedness more seriously and improving their risk literacy. FEMA's 2023 National Household Survey found that 51 percent of adults believed they were prepared for a disaster, which is a 9 percent increase in preparedness perception from 42 percent in 2017. The survey also reported an overall trend of more adults taking preparedness actions in the same timeframe. This indicates that people are becoming more proactive and better informed about their risks.

Decaying legacy infrastructure and outdated building codes continue to pose a significant vulnerability nationwide for the foreseeable future. The Inflation Reduction Act (IRA) and Bipartisan Infrastructure Law (BIL) funding are only a starting point for addressing residential, institutional, and commercial building safety across this nation, which increases vulnerability to threats and hazards. As of 2023, 35 states receive FEMA's lowest ranking for adoption of hazard-resistant building codes. Despite the U.S. receiving a C- grade for critical infrastructure from the American Society of Civil Engineers (ASCE), much of the nation's existing infrastructure, housing, and buildings are expected to remain in use for decades.[5] Between the ASCE 2017 and 2021 infrastructure report, five category grades increased in resiliency, while bridges decreased.[5] Outdated infrastructure can leave communities and the nation vulnerable to critical system disruptions, impacting transportation routes, services, and the economy.

The rapid advancement of Artificial Intelligence (AI) technology allows determined adversaries to strike harder and with less warning. The proliferation of accessible AI tools likely will bolster our adversaries' tactics. Cyber actors use AI to develop new tools that allow them to compromise more victims and enable larger scale cyber-attacks, while nation-states seeking to undermine trust in our government institutions, social cohesion, and democratic processes are using AI to create more believable foreign malign influence campaigns. Of particular concern are impacts of AI attacks on critical infrastructure, which could result in nefarious actors disrupting or denying activities related to Internet of Things (IoT) technologies or networked industrial systems. Generating and passing poisoned data into a critical

sensor could trigger downstream impacts, such as service disruptions or system shut-offs. AI enabled technologies are also being used to undermine the trust we place in information derived from digital content and is distinct from traditional cybersecurity threats, requiring additional research to understand and build knowledge to inform protections. Similarly, while AI has already enabled innovation in the physical and biological sciences, it also has the potential to substantially lower the barrier of entry for non-experts to design, synthesize, acquire, or use chemical, biological, radiological, or nuclear weapons.

National assessments enhance our understanding of evolving risk and resilience challenges for disadvantaged communities. Risk and resilience across the nation is evolving, but not uniformly. Publicly available risk assessment tools and resources including the White House Council on Environmental Quality's (CEQ) Climate and Economic Justice Screening Tool (CEJST), the U.S. Global Change Research Program's (USGCRP) 5th National Climate Assessment, and FEMA tools such as the National Risk Index (NRI), Community Disaster Resilience Zones (CDRZ), Community Resilience Challenges Index (CRCI), HAZUS 6.1, and Building Code Adoption Tracking (BCAT) highlight these changes and how they intersect. These tools support decision making, enable collaboration with governmental and private sector partners, and identify areas for improvement within resilience.[7, 8, 9] Tools such as CEJST and CDRZ identify disadvantaged communities that could be prioritized for increasing resilience,[7, 1] while the USGCRP and NRI allow states and communities to make informed decisions about their preparedness for climate disasters by assessing past and future risk data in each region.[9, 11]

3. Recommendations

The whole community can enhance resilience against the nation's evolving threat and hazard landscape through the following actions:

Support community needs through strategies aimed at creating the most benefit for the greatest number of people, while acknowledging place-based disparities in recovery resources and social capital. Leveraging resources and tools (both new and existing) that allow for nuanced assessments of risk at the community level, federal, state, local, tribal, and territorial governments should continue to support programs and training opportunities targeted at high-risk communities to improve resilience. These resources and tools include programs that improve affordable housing accessibility for low-income households in the context of mass care; programs for food and nutrition services and waivers during disasters; training programs for individual assistance staff and public emergency warning system managers; training of emergency managers on civil rights obligations, including disability access and language access; and state earthquake assistance program grant workshops.

Strengthen and expand inclusive, participatory disaster preparedness planning at all levels of government. Encourage collaboration across all levels of government to develop or enhance policies,

strategies, plans, and tools that build resilience and capacity. This inclusive planning should consider the needs of individuals with disabilities, people who are limited English proficient, and others who may have access and functional needs. All approaches and activities should align with applicable all-hazards and all-threats policies, strategies, plans, and tools.

Table of Contents

Foreword 1

Introduction and Executive Summary 2

1. Report Structure 2
2. Findings 3
3. Recommendations 5

Table of Contents 7

Risks 8

4. Most Challenging Threats and Hazards 11
5. Risk and Vulnerability Intersections 12

Capabilities 17

6. Community Preparedness 17
7. Individual and Household Preparedness 19

Focus Areas 22

8. Mass Care Services 22
9. Public Information and Warning 25
11. Infrastructure Systems 32
12. Cybersecurity 37

Conclusion 43

References i



Risks

Escalating trends in disaster declarations over the past decade, combined with high frequency emerging hazards such as extreme heat, highlights the substantial costs associated with climate risk. The cumulative financial toll of disasters places a strain on national preparedness and emergency response resources. The Risks section of the 2024 NPR details how communities use FEMA's tools to assess and address preparedness for a range of evolving threats and hazards, highlighting challenges posed by interconnected systems and regional variability in disaster impacts.

In 2023, the President declared 71 major disasters, 13 emergencies, and 30 Fire Management Assistance declarations.[12, 13] Not all disasters meet the threshold for a major disaster declaration. In 2023, NOAA reported 28 weather and climate events in the U.S. that each caused losses over $1 billion and led to at least 492 direct or indirect fatalities.[2] These 28 incidents, depicted in **Figure 1**, included 17 severe weather/hail events, four floods, two tropical cyclones, two tornado outbreaks, one drought/heat wave, one wildfire, and one winter storm/cold wave. Altogether, these incidents resulted in $92.9 billion in damages. Since 1980, the U.S. experienced an estimated 376 billion-dollar (or more) weather and climate disasters, the cumulative cost of which exceeds $2.665 trillion (adjusted for inflation).[3] The escalating trend in emergency declarations over the past decade, combined with the high frequency of billion-dollar weather and climate incidents in 2023, highlights the substantial economic and human costs impacting the nation.

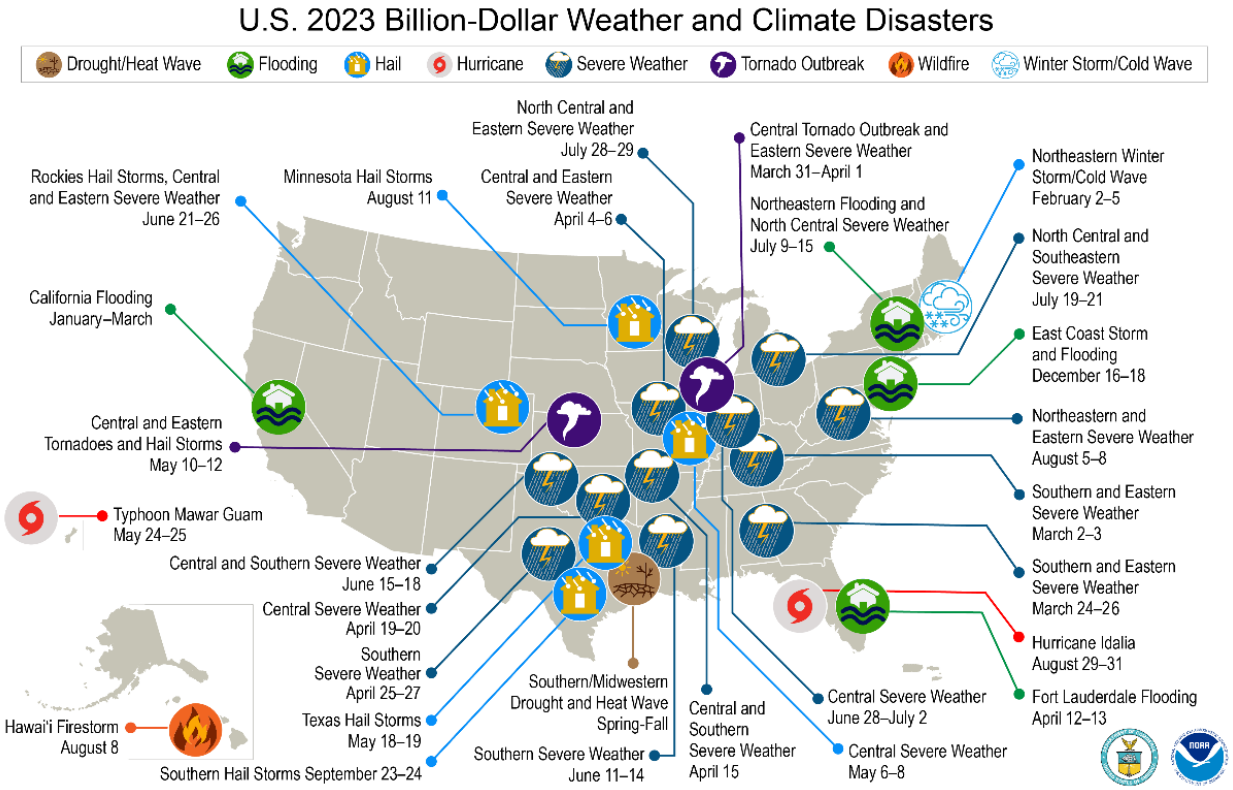


Figure 1: 2023 billion-dollar weather and climate disasters.[3]

Emergency resources across federal, state, local, tribal, and territorial entities face strains due to a surge of concurrent disasters.[2] Since the 1990s, the number of simultaneously open disaster declarations more than doubled, rising from 392 to 757 between 2010 and 2019.[14] Since January 2020, the number of simultaneously open disaster declarations has rarely dropped below 836, and peaked at 1,016 declarations in 2022 (**Figure 2**).[14] This surge, exacerbated by COVID-19 and the rising cost of disasters, exerts immense pressure on emergency management resources and personnel, necessitating a reassessment of disaster management strategies.

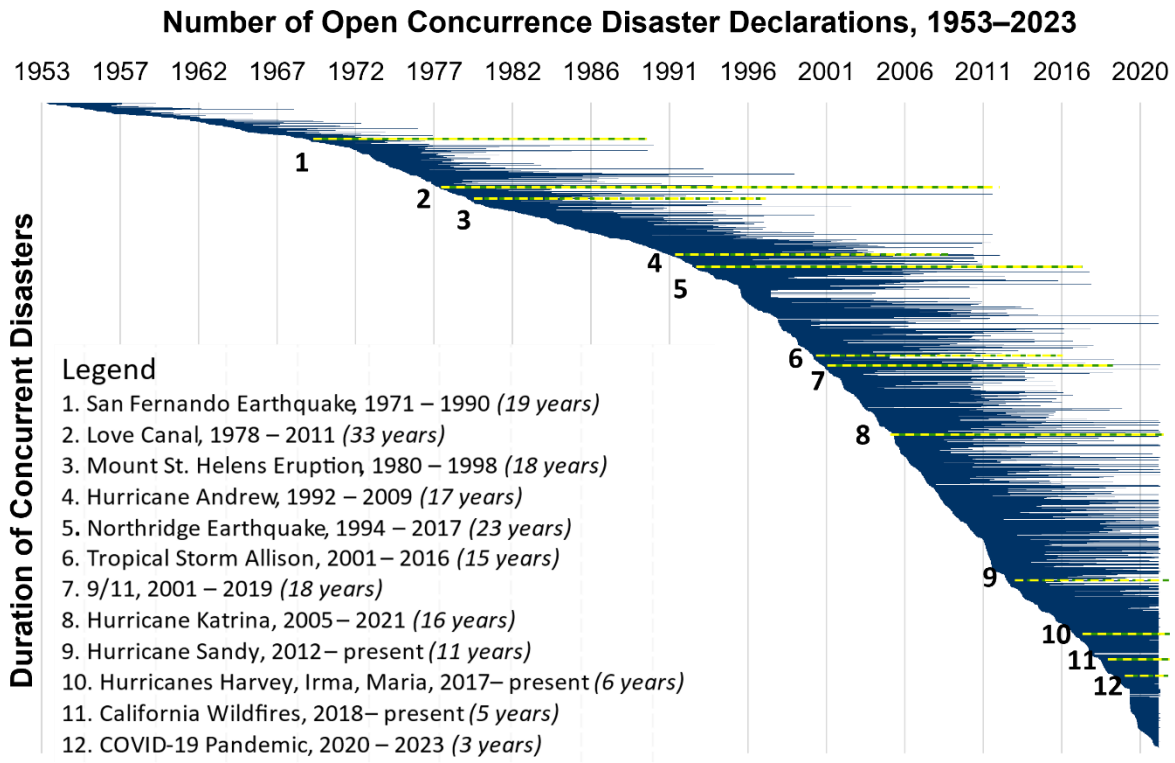


Figure 2: Declared Disaster Durations between 1953-2023.

FEMA uses data from the THIRA/SPR process to better understand complex challenges communities face before, during, and after disasters, and their capability to manage these challenges. By examining threats and hazards—from man-made acts of terrorism to weather-related incidents like extreme heat—communities use the THIRA/SPR process to identify and assess their specific vulnerabilities and preparedness levels. FEMA also collaborates with the U.S. Census Bureau to leverage population and socioeconomic data to analyze how risk, vulnerability, and community capability interact, resulting in vastly different outcomes across the country, even for the same types of disasters. [15] The following sections explore key findings related to risk based on the THIRA/SPR data, which is used by communities to analyze a wide range of threats, from man-made incidents such as acts of terrorism, to weather-related disasters like hurricanes.

4. Most Challenging Threats and Hazards

Key Terms

- **Threat:** Indication of potential harm to life, information, operations, the environment, and/or property.[5]
- **Hazard:** A source or cause of harm or difficulty and may be natural, technological, or human-caused.[5]
- **Core Capability:** The distinct critical elements necessary to achieve the National Preparedness Goal. There are 32 core capabilities organized under five mission areas.[5]
- **Core Capability Target:** A goal to manage the impact of a threat or hazard in a desired amount of time that is associated with each core capability. Communities create core capability targets using standardized target language.[5] "Core capability targets" are used interchangeably with "capability goals" and "targets" throughout this report.[5]
- **Level of Capability:** The estimated extent to which communities have the capability to achieve specific targets. This report also uses the terms "high-achievement capabilities" and "low-achievement capabilities" to indicate whether communities are closer to or further away from achieving specific targets.[5, 15]
- **Risk:** The potential for an adverse outcome assessed as a function of the hazard/threat and its likelihood, assets and their vulnerabilities, and consequences.[15]
- **High-Risk Community:** A community that is more vulnerable to, and less prepared for, the impacts of disasters, as assessed through FEMA's NRI. Conversely, a low-risk community is less vulnerable and more prepared.[13, 15]
- **Resilience**: The ability to prepare for threats and hazards, adapt to changing conditions, and withstand and recover rapidly from adverse conditions and disruptions.

The threat and hazard landscape is increasingly complex and unpredictable. Our interconnected critical infrastructure leaves individuals vulnerable to cascading failures during disasters. Incidents like cyberattacks and pandemics are threat multipliers that disrupt critical functions of adjacent systems. These evolving threats and hazards not only pose significant challenges for planning but can impact our ability to respond effectively to concurrent incidents, such as simultaneous natural disasters.

The THIRA and SPR are tools FEMA and local jurisdictions use to collect and analyze preparedness data and support strategic planning and grant management. Communities use the THIRA to identify their most challenging threats and hazards and determine the level of capability they need to address those threats and hazards. SPR is used to estimate current capabilities, identify preparedness gaps, and indicate intended approaches for addressing gaps. Communities also report threats and hazards that stress their capabilities.

In their THIRA/SPR submissions from 2019 to 2023, communities reported cyberattacks, pandemics, floods, earthquakes, and active shooter incidents as threats and hazards most likely to occur.[3] Cyberattacks were consistently the top threat since 2019.[3] Since 2020, communities reported pandemics as a likely hazard more frequently than flooding and earthquakes.[3, 16, 9, 17] In 2023, communities chose earthquakes and hurricanes/typhoons as the most stressing hazard to their capabilities.[3] Some THIRA/SPR submissions also mentioned stressors like extreme temperatures and drought, but a lack of standardized data on these events highlights the need for further data collection to conduct comprehensive historical analyses.

Despite regional differences in reported natural hazards—such as earthquakes and wildfires in the West, hurricanes/typhoons in the Northeast and South, and tornadoes in the Midwest—cyberattacks and pandemics continue to present as the most challenging threats and hazards for states. From 2020 to 2022, communities identified cyberattacks as the most stressing threat or hazard.[3] 2023 marks the first year since 2019 that cyberattacks are not a top two most stressing threat or hazard identified by communities.[3]

Increasing frequency and severity of prolonged climate impacts, such as extreme heat, underscores the importance of understanding how disasters affect vulnerable populations. The following section examines risk based not on threat severity, but on the intersection of threat and vulnerability.

5. Risk and Vulnerability Intersections

Vulnerabilities are characteristics of design, location, security posture, process, or operation that make an asset, system, or network susceptible to destruction, incapacitation, or exploitation. Risk is defined as a function of the nature and magnitude of a threat, vulnerabilities to that threat, and potential consequences. A widely used logical framework defines risk as **Risk = Threat x Vulnerability x Consequence**.

Communities often assess risk and vulnerability through simple methods, such as designating areas or specific populations as 'low risk' or 'high risk', based on their lived experiences. This approach helps communities identify gaps and strategies to address them. However, emergency managers also rely on detailed federal analyses and tools (including CEJST, the 5th National Climate Assessment, and FEMA tools like the NRI, CDRZ platform, CRCI, HAZUS 6.1, and BCAT) for developing risk assessments.[18] Integrating detailed analyses with community-based assessments is essential for creating targeted strategies that enhance resilience and preparedness.

Demographic shifts and the state of repair of housing and infrastructure are crucial in determining a community's disaster vulnerability. Shifting demographic trends since 2000 have led to changes in risk in different parts of the U.S. Since 2000, the U.S. population has grown by 18 percent, becoming more ethnically diverse and older on average.[19] The 65-and-older age group has been the fastest-growing segment since 2000.[20] Furthermore, the over-64 age group increased across all states since 2000. According to CEJST and the Centers for Disease Control and Prevention and Agency for Toxic Substances and Disease Registry (CDC/ATSDR) Social Vulnerability Index, communities that tend to be more vulnerable and disadvantaged encompass older populations, populations with a higher prevalence of disabilities/health issues, rural populations, and larger non-White populations.[21,22] Using this index, FEMA can identify and continue supporting higher risk communities through targeted programs, training, and tools to improve resilience.[3] For example, a Ready.gov campaign is focused on older populations and their caregivers, recommending they identify risks specific to their area, know their needs during emergencies, develop a comprehensive emergency plan and assemble an emergency preparedness kit, and build a strong support network included in their emergency planning.[23] As the population continues to grow, challenges surrounding older populations will become more prevalent and the demand for resources will continue to increase.

Climate-related risks present unique preparedness and recovery challenges, particularly for rural communities, which are often more vulnerable due to their aging populations, limited resources, and socioeconomic conditions. These challenges are increasingly affecting regions like the Midwest, where rural areas are predominate (see **Figure 3**). Specific vulnerabilities in these areas are reflected in FEMA's CDRZ designations for Midwest communities. In the Midwest, CDRZs have a rural population rate of 59.8 percent, whereas nationally, the rural population rate is 26.1 percent.[7]

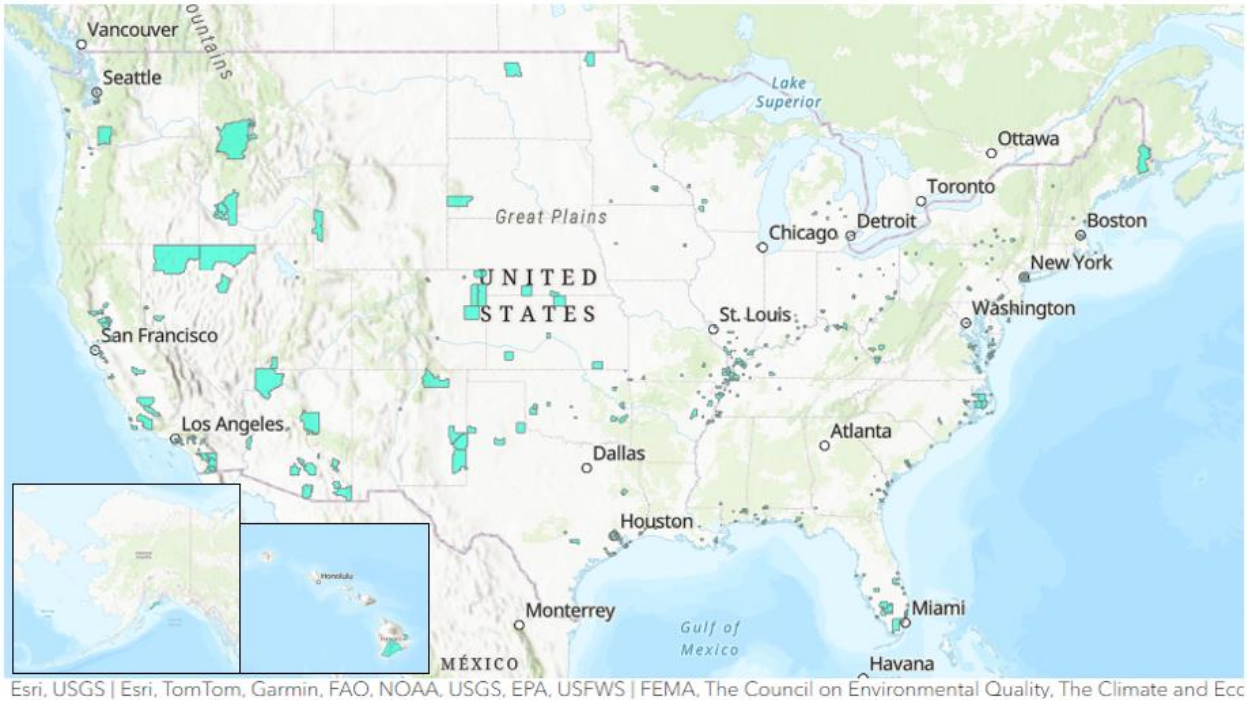


Figure 3: Vulnerable Areas Identified as Community Disaster Resilience Zones (CDRZs).

Building resilience in rural communities is challenging due to factors like limited access to health care, the needs of aging populations, as well as the age and quality of housing. More than one in five older Americans (age 65 years and above) live in rural areas—17.5 percent of the rural population is 65 years and older compared to 13.8 percent in urban areas.[24] Older populations are especially vulnerable during and after disasters, as standard disaster response often fails to provide adequate assistance.[25] Moreover, climate-related risks may exacerbate chronic conditions or the need for assisted healthcare devices, increasing health concerns. Finally, these areas also tend to have higher rates of smoking, obesity, and poverty, which combined with reduced access to healthcare creates unique challenges.[26, 27, 28] These challenges, combined with factors such as limited resources and an aging population, underscore the urgent need for tailored resilience efforts in these areas.

Compounding these challenges is the frequency of rural hospital closures over the last decade. Consequently, some individuals in rural areas travel upwards of 20 miles further for basic services like inpatient care, and 40 miles further for specialized services such as treatment for alcohol or drug misuse.[29] Between 2013 and 2020, over 100 rural hospitals (approximately 4 percent) shut down.[29] After peaking at 18 closures in 2020 alone, a combined 16 hospitals closed in 2021 through 2023,

and nearly 700 rural hospitals are at risk of closure due to serious financial issues.[30, 31] These closures limit access to medical services for surrounding communities during disasters.

Rural residents also face higher rates of healthcare coverage disparities compared to their urban counterparts, making healthcare more difficult to access and increasing the risk of poor health outcomes.[29] In places where local in-patient care is unavailable, many rural residents may look to telehealth services, but as of 2019, at least 17 percent of people living in rural areas lacked broadband internet access, compared to one percent of people in urban areas.[29] The intersection of these challenges highlights the need for more inclusive planning efforts to address rural communities' difficulties in building resilience and preparing for disasters.

Allocation trends are complicated by population shifts and internal migration patterns.[4] Currently, 21.8 million properties in the contiguous U.S. are exposed to flooding, a number expected to rise to 23.5 million by the middle of the century. As the frequency of intense precipitation incidents rises in some parts of the country due to climate change, so does the risk of recurrent inland and urban flooding, and financial losses.[32] These factors could increase migration patterns and accelerate the decline of some communities in flood-prone areas.[33] While migration away from flood-prone areas is a positive step toward resilience from flooding, it puts those who are unable to leave in a worse position as resources exit the area along with people. Proactive resilience measures and strategic resource allocation are essential for national preparedness by addressing potential population displacement due to climate change.

Outdated or weakened building codes create vulnerabilities in areas at risk of natural hazards, including housing and infrastructure. For example, many SLTTs in the New Madrid Seismic Zone (NMSZ)—an area at risk of significant earthquakes—have weakened seismic provisions in their model building codes (see **Figure 4**). Other jurisdictions at risk of earthquakes with outdated or weakened codes are also vulnerable to damage when an earthquake strikes. Similar challenges arise in areas at risk of tornadoes that weaken building codes by removing requirements for safe rooms in new schools and high-occupancy buildings, or in flood-prone areas that remove freeboard requirements from model building codes. **Figure 4** shows which states have adopted updated building codes for new construction, making them more resistant to different natural hazards than previous, outdated codes. The “higher, moderate, and lower resistance” key indicates the level of natural hazard resistance for building codes in each state and territory on the map.

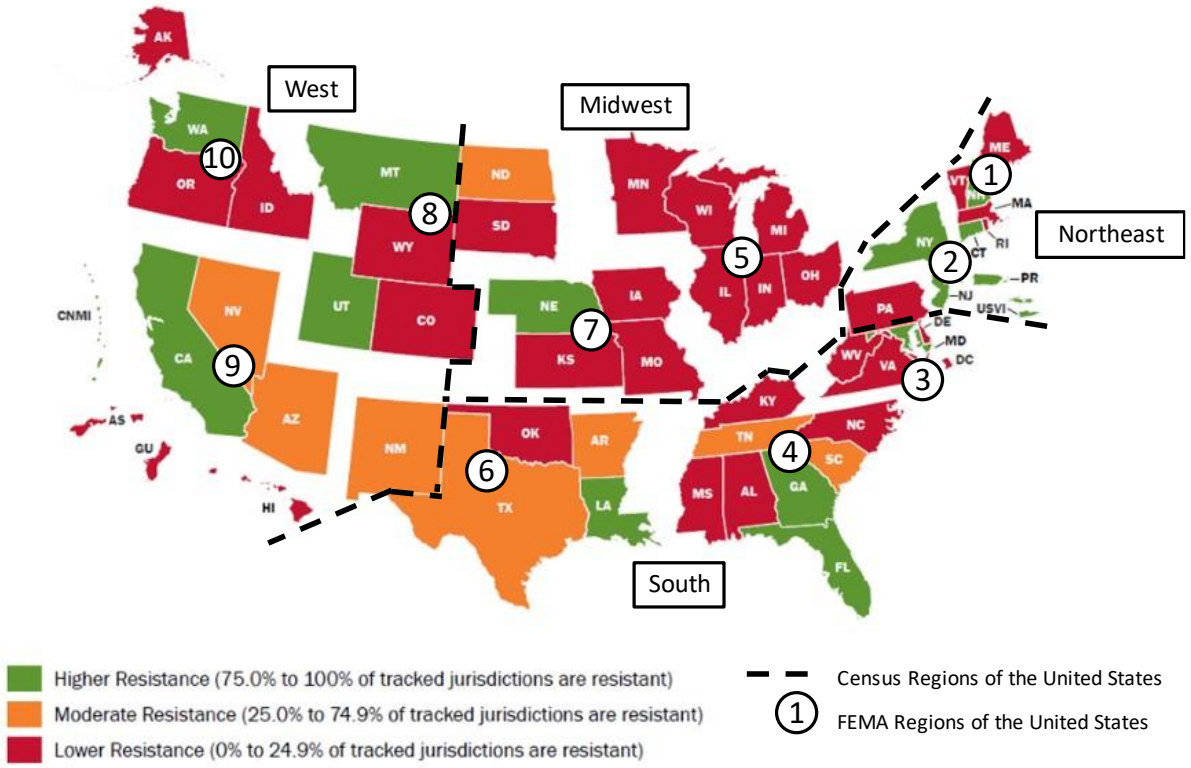


Figure 4: Current State Building Code Adoption Status, by FEMA Region.[34]

Over the past several decades, the U.S. population has increasingly moved from rural and Midwestern areas to higher-risk coastal counties. This shift exacerbates the vulnerability of these regions to the impacts of climate change and shifting land use patterns as urban and coastal populations grow. Simultaneously, many rural areas are experiencing population declines and a rise in elderly residents, making them less able to recover from disasters. To enhance resilience, it is crucial to balance investments across all communities, tailoring them to demographic and geographical profiles while enforcing local building codes that address regional hazards.

This is particularly critical as natural hazards such as tornadoes deviate from their traditional locales. Previously confined to "Tornado Alley", tornado-prone areas are now expanding eastward into states like Missouri, Arkansas, Tennessee, Kentucky, Mississippi, and Alabama—regions that often lack up-to-date building codes and adequate tornado protection infrastructure.[5, 35] Unlike traditional tornado-affected areas where tornado shelters are standard, these newly vulnerable regions are less prepared for such shifts in disaster patterns. The South's dense population and prevalence of mobile homes compound these risks, especially with the increased likelihood of nocturnal tornadoes. Tornadoes occurring at night often damage or destroy homes and property while individuals are sleeping, making them less able to respond than during the day.

Addressing these challenges requires concerted efforts to update building codes and enhance infrastructure resilience in both new and traditional risk areas. The following section explores

strategies that individuals, communities, and national entities can implement to better prepare for these evolving disaster scenarios.

The 2023 THIRA/SPR identified Long-Term Housing, Resource Restoration, and Reopening Businesses as the capabilities with the lowest target achievement across the U.S., highlighting critical areas where resilience efforts must be enhanced. Additionally, these capabilities were reported with the lowest confidence rating when assessing capabilities across the U.S., indicating communities are showing low confidence for increasing target achievement. Building code review had the second lowest target priority ranking across all U.S. communities.

Communities, especially those in rural and newly at-risk regions, face mounting challenges from climate-related risks, aging infrastructure, and demographic shifts. To address these vulnerabilities, it is essential to integrate community-based risk assessments with detailed federal analyses, ensuring that strategies are both locally informed and scientifically backed. Proactive resilience measures, such as updating building codes, improving healthcare access, and preparing for demographic changes, are crucial. Additionally, tailored support and targeted programs for the most vulnerable populations are essential for enhancing national preparedness, reducing the impact of disasters, and fostering resilient communities capable of withstanding future challenges.



Capabilities

National preparedness is not possible without preparedness of communities, and Community Preparedness is driven at individual and household levels. To better understand our capabilities as a Nation, it is essential to gauge perceptions across all levels of governance. The Capabilities section of the 2024 NPR describes some tools and resources that the emergency management community uses to assess capability across the nation, outlining individual, community, and national preparedness trends.

6. Community Preparedness

Community preparedness is essential for SLTT partners to enhance disaster resilience. It involves an ability to prepare for anticipated hazards, adapt to changing conditions, and withstand disruptions. Effective community preparedness requires engagement and coordination between emergency management officials, jurisdictions' councils for building code compliance and zoning actions, healthcare organizations (both private and community-based), mental and behavioral health providers, community and faith-based partners, and state, local, territorial, tribal, and federal agencies. **Figure 5** illustrates the distribution of FEMA (non-disaster) preparedness grants by core capability in 2023. It is presented alongside the average level of core capability achievement across 2023 THIRA/SPR submissions, aiming to establish connections between funding allocations and capability achievement implications.

The highest preparedness grant investments (by total invested amount) are in Cross-Cutting mission area core capabilities. The highest-achievement core capabilities include Situational Assessment, Risk and Disaster Resilience Assessment, and Operational Communications. The lowest preparedness grant investments are in the Recovery Mission Area. The three lowest-achievement capabilities overall include Housing, Natural and Cultural Resources, and Mass Care Services. As the frequency and severity of disasters increase, understanding how preparedness grants are allocated is essential to addressing a lack of investment in recovery.

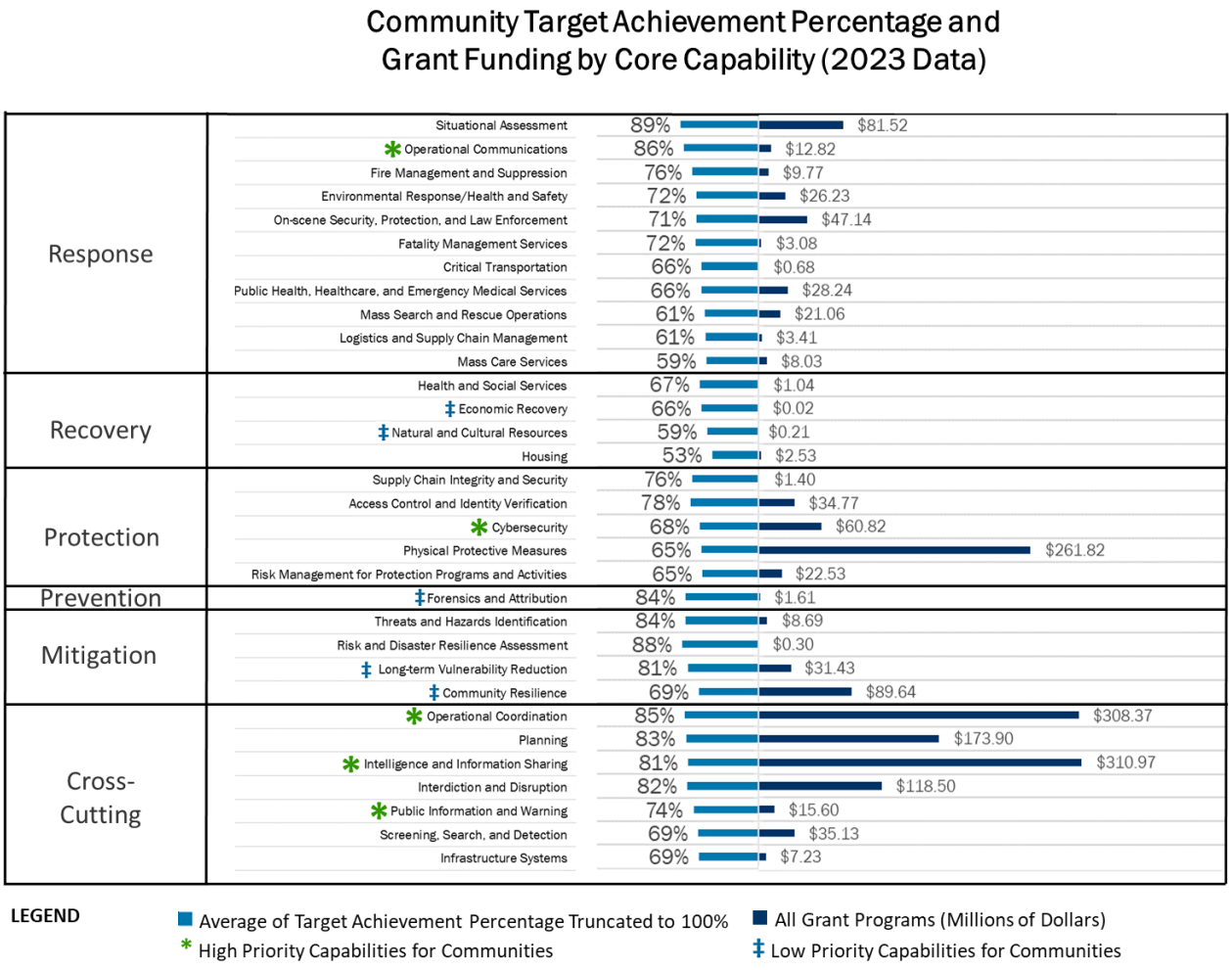


Figure 5: The relationship between grant program investments and average THIRA/SPR capability target achievement in 2023, organized by core capabilities and mission area.[6]

For many communities, ongoing grant investments in resilience are crucial for maintaining and enhancing safety during disaster events. For example, the Emergency Management Performance Grant provides state and local emergency management agencies with resources to implement the National Preparedness System, contributing to a secure and resilient nation.[38] Additionally, hazard mitigation projects benefiting designated CDRZs are eligible for an increase in the federal Building Resilient Infrastructure and Communities (BRIC) Program cost share from the normal 75 percent to up to 90 percent.[39] As referenced in the previous section on Risk and Vulnerability Intersections, federal cost share particularly aids disadvantaged communities in developing and strengthening their disaster resilience and preparedness.[39] Other FEMA grants, such as the National Earthquake Hazards Reduction Program's State Assistance Program, Regional Catastrophic Preparedness Grant Program, and State and Local Cybersecurity Grant Program (SLCGP), also play vital roles in enhancing community safety, reducing financial burdens, and strengthening disaster resilience and preparedness nationwide.[38] Using grant funds to help adopt updated building codes and considering hazards (such as flooding) when zoning for land use are not only ways to build resilience, but are

specified in Mitigation core capabilities such as Long-Term Vulnerability Reduction and Community Resilience.

As disasters become more frequent and severe, it is essential to understand whether grant investments help prepare communities for disaster response and reduce risk. While specific data on direct impacts of preparedness and mitigation grants on disaster risk reduction is limited, studies show positive outcomes. Four studies found Hazard Mitigation Grant Program funding and participation in FEMA's Community Rating System led to reduced property damage from natural hazards.[40, 41] The National Institute of Building Sciences' 2020 Mitigation Saves report states that public-sector investment in mitigation since 1995, costing $27 billion, will ultimately save $160 billion—an average of $6 saved for every $1 invested in disaster losses.[42]

While applying for FEMA grants is one way communities can receive investments, FEMA is also working with federal partners to proactively identify communities at higher risk and strategically direct federal investments to these areas.[43] Programs like the Climate Smart Communities Initiative, a public-private partnership established by NOAA, are pivotal in reinforcing disaster resilience through targeted investment.[44, 45] NOAA's initiative directs funding to jurisdictions that identify gaps in their disaster preparedness, facilitating a targeted and effective approach to enhancing overall resilience in the face of natural hazards.[46]

7. Individual and Household Preparedness

Preparedness is a shared responsibility involving all levels of government, the private and nonprofit sectors, and individual citizens. Individuals and households are central to our nation's preparedness. A community's ability to respond to and recover from a disaster depends on the preparedness of each member.[47] The U.S. experienced 28 separate billion-dollar weather and climate disasters in 2023, surpassing the previous record of 22 events in 2020 since the metric was introduced in 1980.[48] The sheer number, cost, and size of disasters heighten risk awareness and encourage disaster preparedness among individuals.

According to the National Household Survey by FEMA, 89 percent of individuals encountered information on disaster preparedness, and those with such awareness were five times more likely to take at least three preparedness actions compared to those who did not receive information.[49] These results underscore the crucial role of communicating emergency information through various channels in helping individuals and communities anticipate disaster severity, assess their risk, and take steps to prepare.[49]

FEMA's 2023 National Household Survey also found that 51 percent of adults believed they were prepared for a disaster. This is down from a high of 59 percent in 2019 (**Figure 6**); however, the overall trend is increasing for both perception of individual disaster preparedness (over the past seven years) and for the percentage of survey respondents taking preparedness actions (over the past year). [49, 7] These findings highlight the evolving nature of disaster preparedness and the need for continued focus on improving individual and community resilience.

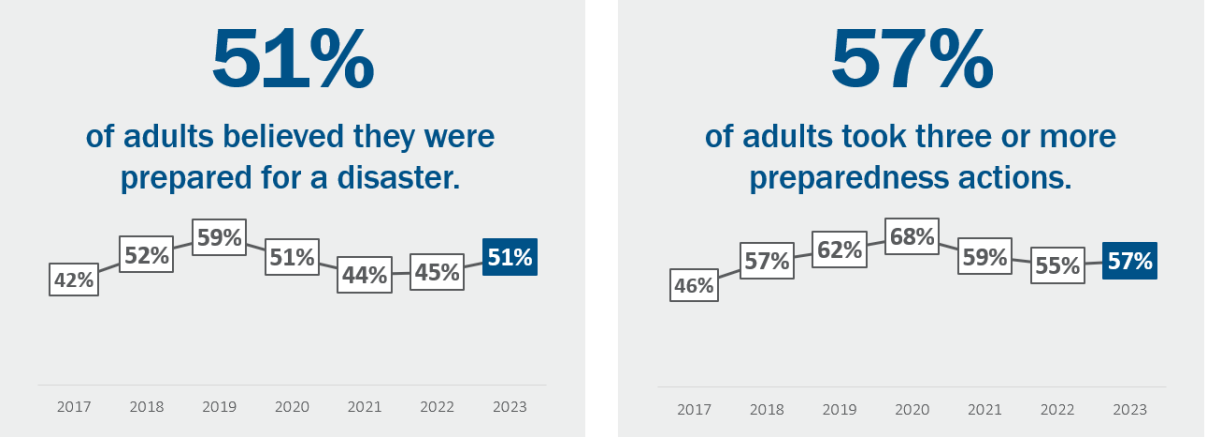


Figure 6: Findings from the 2023 National Household Survey on perceived preparedness (left) and actions taken to prepare (right). All responses are self-reported.

Although accessibility of information may contribute to the public's increasing awareness of disasters, it does not necessarily indicate a greater perception of preparedness for disasters. According to the 2023 National Household Survey, 77 percent of both urban and rural respondents stated they believed they would likely be impacted by disasters in the coming year (**Figure 7**).[49] Only half of 2023 National Household Survey respondents, however, believed that taking disaster preparedness actions would get them through a disaster scenario and were confident in their ability to prepare.[49] An even smaller percentage of respondents—14 percent—got involved with their communities to take preparedness actions. These results indicate that although many people believe they will individually or collectively be impacted by disasters and some have taken actual steps to prepare, taking preparedness actions may not be the only factor contributing to their perceived preparedness (or lack thereof) for those disasters.

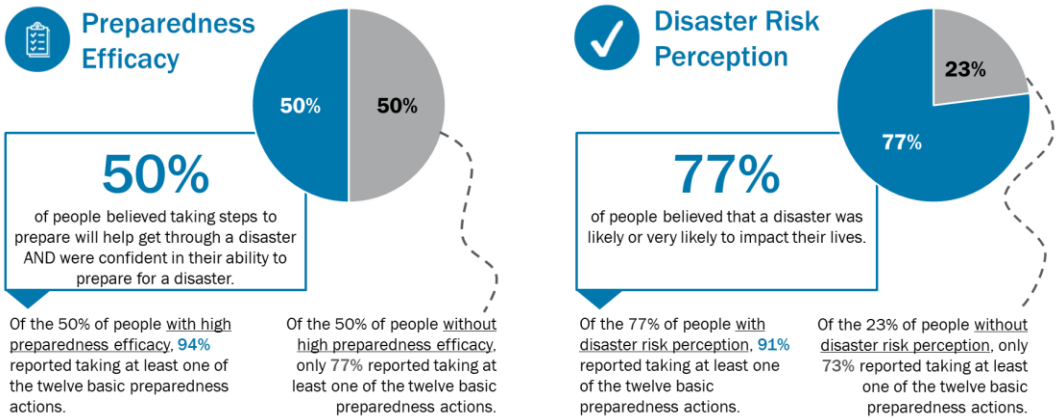


Figure 7: Factors that Influence Preparedness Actions, preparedness efficacy (left) and disaster risk perception (right).

Emergency savings are critical for individual and household disaster preparedness. Emergency savings can aid in evacuation, purchasing disaster protection materials, and keeping emergency supplies on hand. Evacuation expenses often include vehicle fuel, food, and lodging. The 2023

National Household Survey found that 48 percent of respondents assembled or updated emergency supplies, 32 percent "saved for a rainy day," and 30 percent documented or insured private property.[49] However, these actions require individuals and families to have extra funding available beyond their normal living expenses.[49] Two-thirds of respondents expressed high levels of concern about lacking necessities in a disaster, highlighting gaps in financial preparedness and risk literacy.[49] Addressing liquid asset poverty is essential for bolstering emergency savings and resilience.

Focus Areas



FEMA selected focus areas based on leadership priorities, community capabilities impacted by disasters in 2023, and perennial challenges that FEMA can assess over time to explore progress in closing capability gaps. The Focus Areas section of the 2024 NPR includes information on four core capabilities: Mass Care Services, Public Information and Warning, Infrastructure Systems, and Cybersecurity.

8. Mass Care Services

Mass Care Services involves providing "life-sustaining and human services to the affected population, to include hydration, feeding, sheltering, temporary housing, evacuee support, reunification, and distribution of emergency supplies."[50]

8.1. Risk

When storms and other disruptive incidents occur, communities must be ready to respond. Still, 2023 THIRA/SPR submissions indicated an average target achievement of just 59 percent for reporting jurisdictions' Mass Care Services capabilities.[3] Communities in FEMA Regions 3 and 10 reported the largest decreases in capability for sheltering and relocation assistance from the beginning of 2023 to the end of the year.[8] Region 10 communities reported a 31 and 30 percent decrease, respectively, in their capability to provide people with temporary, non-congregate housing, as well as their capability to provide accessible, temporary, non-congregate housing for people with AFN.[3] Communities in Region 3 similarly reported an 18 percent decrease in their capability to provide people with temporary, non-congregate housing.[3] These low achievement estimates demonstrate a need for focused planning and funding.

Increasingly severe weather events requiring Mass Care Services present challenges to vulnerable populations. According to the Congressional Research Service, mass care sheltering gaps include coordination and communication issues with stakeholders and partners, lack of resources and planning before, during, and after disasters, gaps in knowledge and expertise about affected population subsets, staffing shortfalls at sheltering facilities, and overcrowded or poorly constructed

buildings due to rapid population growth and urbanization.[51, 52] These challenges can make disaster response more stressful for vulnerable populations requiring these services.

Every year, tropical cyclones, including hurricanes and tropical storms, devastate communities across the U.S.[53] Since 1980, 103 hurricanes made landfall in the top 10 hurricane-prone states, with 15 occurring in 2020-2022 alone.[53] In their 2023 THIRA/SPR submissions, communities reported that natural hazards posed the greatest challenge to their Mass Care Services capabilities. Extreme precipitation also challenges Mass Care Services capabilities.[i] In the US, heavy precipitation has increased since the 1980s, with 16 out of the top 20 incidents occurring since 1990.[55] Heavy precipitation leads to crop damage, soil erosion, flood risks, water quality impairment, damage to infrastructure and housing, and can impact evacuation and sheltering, which can lead to fatalities.[54, 55]

Individuals and families with lower socioeconomic status face significant barriers during disasters, including high costs for travel or lack of access to reliable transportation.[56] Fewer than 40 percent of participants in the National Household Survey reported having savings set aside for disasters, and about 1 in 4 respondents said they would rely on public transportation during an evacuation.[49] Rural populations face additional challenges, such as unreliable access to medical care during disasters. Over 600 rural hospitals are at risk of closing, and without adequate healthcare infrastructure, these communities face higher health risks and poorer outcomes.[57]

Housing supply challenges exacerbate difficult living conditions for vulnerable individuals, and disasters worsen these challenges. The ability of emergency response systems at all levels of government to address specific needs of people experiencing homelessness is critical to ensuring effective crisis management. Emergency shelters should be equipped to accommodate unhoused populations to reduce resource strain for impacted communities.[58] In particular, resources may be strained when shelters lack trained personnel and support services to assist individuals with mental and other disabilities.

Frequent and severe disasters significantly impact the economic foundations of affected communities, compounding mass care challenges. The relocation of survivors out of impacted areas can hinder their ability to return to normal life and thrive economically.[59] Individuals who maintain strong ties with their local communities—through regular communication with neighbors, participation in religious or social groups, and engagement with coworkers—are more likely to be informed about available resources and services during a natural disaster. A 2022 academic study on the impact of Hurricane Katrina found that displaced evacuees who did not return to New Orleans experienced poorer short-term labor market outcomes compared to those who returned.[60] The shortage of affordable housing in the U.S. makes post-disaster relocation efforts and overall disaster recovery more challenging.[61]

[i] Extreme precipitation occurs when the volume of rain or snow significantly surpasses typical amounts (relative to location and time of year).[54]

8.2. Capabilities and Gaps

Communities need to develop plans for temporary housing when sheltering facilities are limited.[3] Coordination with Voluntary Organizations Active in Disaster (VOAD) and other non-governmental organizations is also necessary to ensure clearly defined roles and expectations before disasters strike.[3] Over 60 percent of communities reported gaps in each of the other four POETE areas—organization, equipment, training, and exercises—for both the Relocation Assistance and Community Sheltering targets.[3] Contributing factors to these gaps include limited available temporary housing, equipment challenges, lack of evacuation transportation, and a need for sheltering supplies such as trailers, cots, and supplies for pets.[3] Many communities also need to exercise their sheltering plans, citing both staff turnover and a lack of in-person training as impacting this capability.[3]

Limited inventory and escalating costs of housing challenge displaced survivors.[59] In 2022, disasters displaced an estimated 3,369,516 people in the U.S., with another 2,491,795 displaced in 2023.[62, 63] **Figure 8** shows the number of displaced people by FEMA region for both years.

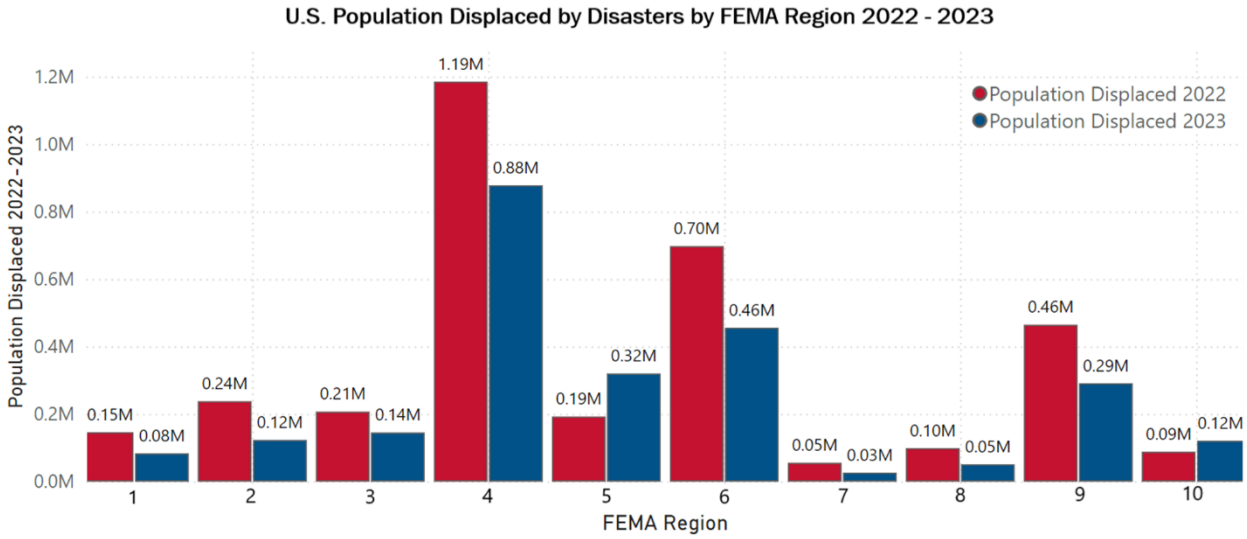


Figure 8: The U.S. population displacement numbers from natural disasters by FEMA region in 2022 and 2023.

8.3. Management Opportunities

Table 1 summarizes the opportunities that federal, state, local, tribal, and territorial governments; NGOs, VOADs, the private sector, and individuals/households can leverage to manage risk, build Mass Care Services capability, and address capacity gaps to increase their overall resilience.

Table 1: Mass Care Services – Management Opportunities

Stakeholder Group	Management Opportunities
Federal Government	• Build and sustain regional capability to rapidly deploy individual assistance staff to disaster-impacted sites. • Leverage resources and support policies that provide temporary non-congregate sheltering to survivors. • Analyze and adjust plans and procedures to ensure they include considerations for individuals experiencing homelessness, older adults, people with low incomes, individuals with disabilities, people who are limited English proficient, and others who may have access and functional needs potentially impacted by an incident or disaster.
State, Local, Tribal, and Territorial Governments	• Explore opportunities to increase post-disaster protections for renters, including eviction moratoriums, emergency rental assistance, just cause eviction laws, and landlord mortgage payment deferments to improve housing accessibility in the context of mass care.[49] • Promote evacuation strategies and tools available to state and local emergency managers, including the use of HURREVAC as a hurricane decision support tool. • Create a disability coordinator position within all emergency management departments and agencies to facilitate more inclusive response and recovery efforts.[64]
NGOs, VOADs, and the Private Sector	• Ensure NGO facilities can provide essential services and facilities to evacuees, including individuals experiencing homelessness, elderly people, and individuals with AFN.[65,66]
Individuals and Households	• Ensure that all household members know and understand emergency and disaster plans. Include offices, schools, and other relevant locations in emergency plans.[66]

9. Public Information and Warning

Public Information and Warning involves delivering "coordinated, prompt, reliable, and actionable information to the whole community through the use of clear, consistent, accessible, and culturally and linguistically appropriate methods to effectively relay information regarding any threat or hazard, as well as the actions being taken and the assistance being made available, as appropriate."[1]

9.1. Risk

Effective communication and proactive awareness campaigns before and during disasters are essential for reducing loss of life and property. Public alerting systems act as lifelines during crises, providing timely and accurate information, enabling informed decision-making, and promoting swift,

coordinated responses. While public education and training can provide knowledge about preparation, they don't always lead to protective actions. Therefore, public safety communicators must innovate and leverage technology to best inform their communities' decision-making and actions.

Seven of the ten most frequently reported capability-stressing threats and hazards in the 2023 THIRA/SPR submissions were no-notice incidents, including cyberattacks and earthquakes.[9] Some incidents, such as earthquakes causing tsunamis, can escalate rapidly, emphasizing the need for a strategic approach at federal, state, local, tribal, and territorial levels to enhance Public Information and Warning Systems. These incidents highlight the critical need for collaboration among all levels of government to improve early warning systems, safeguarding communities during emergencies.[71]

The tsunami warning model has proven to be highly effective and serves as an example of a well-functioning system that should be considered when developing warning systems and public information dissemination for no-notice hazards. Given enough warning of tsunamis, at-risk populations can take protective actions. Approximately 40 percent of the U.S. population resides in coastal communities vulnerable to tsunamis, high-tide flooding, and storm surge. Public alert and warning systems rely on seismometers to detect undersea earthquakes, volcanoes, or landslides that could trigger tsunamis.[72] Regional and national monitoring centers receive seismic data, which is relayed to warning centers like the Pacific Tsunami Warning Center to assess the tsunami's size and potential impacts.[73] Alerts are then disseminated through various channels, including radio, TV, smartphone apps, and sirens, providing information on expected arrival times and potential impacts. Robust public alert systems and strategic dissemination of warnings are vital in empowering coastal populations to take lifesaving actions.

In December 2021, Western Washington University's Resilience Institute estimated that up to 28 percent of people on Oregon's and Washington's coast would be unable to reach higher ground in time to escape a tsunami, with 18 percent (up to 60,000 people) at risk of being swept out to sea.[74] These estimates underscore the critical importance of enhancing tsunami preparedness and communication capabilities to prevent loss of life in vulnerable coastal regions. Additionally, tsunamis can disable cellular communication structures, creating a dangerous information bottleneck for individuals. The tsunami.gov website was created to broadcast information and alerts to high visitor volumes seeking information about potential risks during conditions that could produce tsunamis.[73] Since 2021, NOAA has been working on unifying the two existing Tsunami Warning Center communication systems to create a more flexible and robust communications infrastructure.

Communication breakdowns during disasters are not limited to tsunamis; they can occur during various incidents, including wildfires, hurricanes, and flooding. For example, climate change is leading to more intense and faster-moving wildfires, reducing the window of time for emergency management officials to issue effective warnings. These disasters can also damage telecommunications grids, disrupting cell phone service and impeding the flow of vital information.

2023 Maui Wildfires

In August 2023, wildfires devastated parts of Maui, burning approximately 2,170 acres of land and 2,207 structures, of which 86 percent were residential. During the wildfires, the National Weather Service (NWS) communicated these warnings through Wireless Emergency Alerts (WEAs).[93] The Maui Emergency Management Agency declared red flag warnings to indicate imminent fire conditions. Emergency sirens in Lahaina are primarily used for tsunami warnings and indicate that the public should move to higher ground; Maui's Emergency Management Agency did not sound sirens out of concern that doing so would have caused the public to move towards the wildfire.[93]

Enhancing grid resilience to diverse disasters, mapping vulnerable locations, and using alternative communication tools like sirens, radio, and social media are valuable strategies for improving emergency communications. In 2023, the Federal Communications Commission (FCC) issued new rules requiring wireless providers to offer roaming during network outages, establish mutual aid agreements between providers, enhance municipal preparedness, increase consumer readiness, and improve public awareness and stakeholder communications regarding restoration times.[75] Additionally, the Disaster Connectivity Map visualizes cell phone coverage and internet speeds, helping identify connectivity outages and facilitating faster and more targeted resource allocation to repair communication networks.[76] As climate change continues to intensify risks, the whole community should focus on building resilient grid infrastructure, adaptable tools, and community networks to address evolving threats effectively.

9.2. Capabilities and Gaps

FEMA's Integrated Public Alert & Warning System (IPAWS) is the cornerstone of the U.S's national public warning system.[77] This robust platform facilitates the dissemination of authenticated emergency information through diverse channels, including Wireless Emergency Alerts (WEA), emergency alert services on radio and television, and NOAA's Weather Radio.[77] Federal, state, local, tribal, and territorial authorities can use FEMA IPAWS to send alerts, warnings, and notifications for different threats and hazards, providing essential emergency guidance to the public.

Early warning systems (EWS) that effectively reduce disaster risk are grounded in sound science and reliable technology with flexibility to address multiple threats and hazards. Additionally, EWS should be people-centered and accessible to all, including individuals with disabilities, e.g., deaf and hard of hearing individuals, people who are limited English proficient, and other marginalized and vulnerable groups. The United Nations Office for Disaster Risk Reduction, Climate Risk and Early Warning Systems Pacific initiative exemplifies this approach using a comprehensive checklist and implementation guide to ensure that EWS are not only scientifically robust but also gender-responsive and disability-inclusive.[78, 10] This effort contributes to the broader UN Executive Action Plan 2023–2027 for the Early Warning for All initiative, which aims to tailor early warning systems to the specific needs of diverse populations.[80]

As the U.S. continues to strengthen its public warning capabilities through FEMA IPAWS, understanding these international best practices and frameworks can help ensure warnings effectively reach all

segments of society, thereby enhancing preparedness and response capabilities across the nation. FEMA IPAWS regularly collaborates with members and representatives of the Access and Functional Needs community to ensure SLTT Alerting Authorities (AAs) send equitable alerts and warnings that are understood by all. The IPAWS system uses technical standards that can disseminate alert messages in languages other than English. However, the effectiveness of the IPAWS system to deliver messages in multiple languages and accessible formats is limited by the capabilities of private sector system providers that interface with IPAWS to distribute emergency messages and by the resources available to AAs responsible for writing and sending these alerts.

To address these challenges, the FEMA IPAWS office has sponsored proposals with DHS Science & Technology Independent Research and Development to conduct research and explore technology solutions to expand messaging capabilities to ensure emergency messages reach people with Limited English Proficiency and Access and Functional Needs. A report on this ongoing research is due in October 2024. The FEMA IPAWS office continues to engage with federal and industry partners to increase support from participating private sector systems to deliver multilingual and accessible alerts. For example, FEMA IPAWS supported the FCC's adoption of the rules (88 FR 86824, 12/15/2023) that require participating wireless providers to make specified WEAs available in the thirteen most spoken languages, excluding English, in the United States (according to the 2020 Census) and American Sign Language (ASL). In addition, the FCC has proposed the use of the Emergency Alert System (EAS) to send multilingual alerts over television, radio, and other media. The FCC has targeted the implementation of multiple language templates within 24 to 36 months from the adoption of the rule in October 2023.

The U.S. Fire Administration (USFA) is seeking new ways to enhance warning systems and address the evolving challenges associated with wildfires. An important element of this progression is the USFA's ability to collect, analyze, and report actionable information in a timely manner.[81] Working with the DHS Science and Technology Directorate, USFA is developing a new, modern cloud-based data and analytics platform, known as the National Emergency Response Information System (NERIS).[81] NERIS aims to empower local fire and emergency services by providing near real-time information and analytic tools to support data-informed decision-making, enhancing preparedness and response to all hazards.[81] Additionally, USFA is developing an updated and streamlined core fire data standard that serves as the foundation for interoperability and data exchange with the new NERIS platform.[81] The NERIS platform will replace the legacy National Fire Incident Reporting System.

Another important aspect of public information and warning is ensuring meaningful access to information for individuals who are limited English proficient (LEP) and effective communication access for individuals with disabilities, e.g., people who are deaf or hard of hearing. Individuals who are LEP and individuals with disabilities must receive access to FEMA-conducted and assisted services that directly impact their ability to prepare and respond to disaster or emergency-related public information and warnings. Language barriers of any kind make it difficult to receive warnings, orders, and assistance in response to both disasters and catastrophic incidents. According to U.S. Census data, over 26 million people in the U.S. reported are LEP, but currently most emergency alerts are provided in English only.

Advancements and Gaps in Alert and Warning Systems

Emergency managers must have plans in place to warn the public to all threats and hazards. Likewise, the public should understand how these AWN systems work and what information they disseminate. NWS extreme weather alerts are presently fully automated to prevent delays in communicating related lifesaving information. NWS does not presently provide automated AWNs for wildfires, however. This could be problematic because the speed at which fires travel generally don't afford emergency managers enough time to identify the fire hazard and manually alert their communities, as exemplified by the Maui, HI wildfire.[91]

NOAA NWS, Oklahoma Forestry Services, and Texas A&M Forest Service recently tested a fire detection and notification system that identifies wildfire hotspots via satellites, and communicates this information across a multi-agency AWN system.[92] During the test, local officials assessed this information and requested a community wildfire/evacuation notification.[92] Using satellites to detect wildfire heat can cut down response times for local emergency management officials, as well as the time it takes to disseminate WEAs to community members.[92]

FEMA and NWS may consider engaging to enhance automation of wildfire-related WEAs. When NWS identifies an active wildfire through their satellites' hotspot detection system, particularly when an NWS red flag warning is in place, an automated WEA could be disseminated to surrounding communities alerting them to the presence of the wildfire, advising them to stay vigilant, and evacuate if necessary. Such a change has the potential to save many lives that could otherwise be lost due to alerting delays.

Beyond federal initiatives, several states started implementing forecasting and warning initiatives. In 2023, Washington State took a significant step forward with 2SHB 1578, a legislative initiative aimed at strengthening wildfire forecasting.[83] Led by the Department of Natural Resources, the state collaborated with various agencies to deploy mobile air quality monitoring equipment, conduct simulation modeling, and provide real-time data.[83] This comprehensive effort works to enhance community resilience and address the health impacts of wildfire smoke. Similarly, Kansas and Hawaii established task forces dedicated to wildfire prevention.[84, 85] The Kansas task force recommended adopting an index based on the National Fire Danger Rating System and suggested legislative funding for operating an early warning network.[85] These initiatives represent a tangible commitment by states to fortify their communities against wildfires, demonstrating a proactive stance in disaster risk reduction and public safety enhancement.

Parallel to these federal and state initiatives, the academic and private sector scientific community significantly contributes to forecasting advancements. The application of artificial intelligence (AI) in public-facing forecasting and warning systems is a technological advancement emerging as a cost-effective solution to enhance accuracy in weather forecasting, and is critical to cultivating an ever-prepared nation.[86] AI driven weather models present innovative possibilities to the inherent challenges in predicting hazards. Federal and state governments are recognizing AI's potential and are introducing new legislation and plans to improve warning systems using AI.

As communication systems and technologies evolve, robust individual and community preparedness is crucial for resilience against all hazards. Resources like FEMA's Ready.gov and the CDC offer comprehensive guidance for various emergencies, including extreme heat. Ready.gov provides tips and information sheets in multiple languages, while the CDC offers targeted advice for vulnerable populations. For example, in earthquake-prone areas such as California, Oregon, and Washington, the Earthquake Early Warning system delivers timely information through various platforms. These combined efforts at federal, state, and individual levels enhance the nation's overall preparedness and response capabilities for all types of hazards.

According to the 2023 National Household Survey, only 36 percent of respondents reported signing up for alerts and warnings as part of their disaster preparedness efforts in the last year.[49] However, a majority of respondents (98 percent) expect to receive alerts and warnings in real-time from several sources. These sources include news outlets, personal networks, and commercial entities such as utility companies or service providers. Similarly, 95 percent of the respondents expect such alerts from their personal network and 97 percent expect them from commercial entities.[49] Additionally, approximately nine out of 10 individuals anticipated receiving real-time alerts from the government during an incident.[49]

9.3. Management Opportunities

Table 2 summarizes opportunities federal, state, local, tribal, and territorial governments, NGOs, VOADs, the private sector, and individuals/households can leverage to manage risk, build Public Information and Warning capability, and address capacity gaps to increase their overall resilience.

Table 2: Public Information and Warning – Management Opportunities

Stakeholder Group	Management Opportunities
Federal Government	• Follow the guidance of the Cybersecurity and Infrastructure Security Agency (CISA) and emergency response researchers about components of effective disaster public warnings. Important components to consider are the source and frequency of the warning, as well as the consistency, credibility, accuracy, and understandability of messages.[87, 88, 89, 90] • Incorporate communications within exercises, focusing on how to support information collection and coordination between entities. Include private sector counterparts in all phases of these exercises. • Provide guidance on how jurisdictions can require both physical and logical infrastructure diagrams when acquiring communications equipment (e.g., 911, land mobile radio, and alerts, warnings, and notifications) to enhance understanding of emergency communications system interdependencies. • Collaborate with other federal agencies or private sector organizations that specialize in messaging accessibility and invest in research and development of new technologies that can enhance the effectiveness and reach of emergency messaging (e.g., the DHS Science and Technology Directorate's [S&T] 2023 partnership to integrate flood and wildfire sensors with IPAWS-OPEN, enabling emergency alerts on mobile devices and vehicle infotainment systems).[91]

Stakeholder Group	Management Opportunities
	• Ensure public information and warnings are accessible to individuals with disabilities and individuals who are limited English proficient.
State, Local, Tribal, and Territorial Governments	• Conduct exercises and training to test and validate practices developed in the 2023 IPAWS Best Practices document on guidance and techniques for sending successful AWNs. Also, refer to the Ten Keys to Improving Emergency Alerts, Warnings, and Notifications document for AWN guidance. • Enhance all-hazards preparedness, evaluate responses to disasters, and expand focus on regional environmental hazards to ensure effective communications with at-risk communities and vulnerable populations.[92] • Utilize the latest federally-funded communication systems and technologies available (such as the Public Safety Innovation Accelerator Program through the National Institute of Standards and Technology) to reduce the likelihood of communications outages during wildfires.[93, 94] • Work with partners to ensure that recommendations included in the Wildfire Mitigation and Management Commission report are fully considered in addressing wildland fire management policies at the state and local level.[95] • Address interoperability gaps by consulting the NIMS Basic Guidance for Public Information Officers, which outlines the integration of communication systems and technologies to achieve a seamless flow of information during emergencies. Public Information Officers should be adept in risk communication, media relations, and communication equipment and resources that support interoperability.[96] • As recipients of federal financial assistance, ensure public information and warnings are accessible to individuals with disabilities and individuals who are limited English proficient.
NGOs, VOADs, and the Private Sector	• Evaluate sector's current AWN management practices and align them with the 2023 IPAWS Best Practices for a seamless integration.[77] • Coordinate with FEMA to increase involvement with planning and issuing recommended techniques for FEMAs AWN systems. • Explore investment in research and development initiatives to improve warning systems, monitoring capabilities, and disaster prediction.
Individuals and Households	• Explore the Ready.gov outlines for individuals and households to prepare for all hazards.[97] • Become aware of the risks associated with regional environmental conditions.[98] • Sign up for local emergency alerts and FEMA alerts through FEMA's app and follow the instructions from local authorities. They will provide the latest recommendations based on the threat to your community and appropriate safety measures.[99] • Send text messages or use social media to reach out to family and friends during disasters. Phone systems are often busy following a disaster. Make calls only in emergencies. • Follow FEMA's protective actions guidance for individuals. This guidance (for all major hazards) provides best practices to prepare for, stay safe during, and safely recover from disasters and emergencies. • Ensure public information and warnings are accessible to individuals with disabilities and individuals who are limited English proficient.

11. Infrastructure Systems

Infrastructure Systems involves "stabilizing critical infrastructure functions, minimizing health and safety threats, and efficiently restoring and revitalizing systems and services."[50]

11.1. Risk

Communities reported in their 2023 annual THIRA/SPR submissions that Infrastructure Systems remain a top area of concern, given their susceptibility to damage from a wide variety of threats and hazards.[3] Communities reported that power and communications systems capability gaps were their top priorities.[3] The state of the nation's infrastructure—combined with climate change impacts—leaves infrastructure vulnerable to disruptions or failure. Much of the nation's existing infrastructure is expected to remain in use for decades, despite the fact ASCE graded U.S. critical infrastructure systems a C- across all categories in their annualized reporting system.[100, 5, 11] Emergency managers and infrastructure engineers alike consistently reiterate that the characteristics of the built environment significantly influence impacts of disasters, whether triggered by earthquakes, hurricanes, floods, or fires. Resilient infrastructure that can withstand natural disasters significantly lowers human and economic cost after a disaster.

The increased frequency of billion-dollar natural disasters hit a record high in 2023, with the federal government spending $92.9 billion for damages.[2] Major 2023 disasters included Vermont flooding in July, Maui wildfires in August, and tornado outbreaks from Ohio to Texas in March and April.[48] Additionally, a United States Geological Survey report estimated through the HAZUS modeling tool that earthquakes could cost the nation approximately $14.7 billion annually in building damage, with California, Washington, and Oregon contributing 78 percent of this total estimate.[101] To mitigate future damage and economic loss, resilient infrastructure in sectors like transportation, energy, water, communications, and agriculture remains crucial. Over 14 percent of communities cited natural hazards as their biggest infrastructure challenge, while 10 percent pointed to human-caused incidents like cyberattacks.[3]

Climate change has a cascading effect on all critical infrastructure. This can cause more extreme and variable weather compared to historic averages. Climate variability can strain energy infrastructure, causing increased demand for cooling and heating, leading to overloaded power transmission lines and grid systems. Ice storms can weigh down tree branches and power transmission lines, resulting in a loss of power and communication. In February 2023, a large winter storm across the northern U.S. left 820,000 homes without power and caused extreme damage, downing more than 2,000 power lines.[102] The 2023 National Household Survey reflected concerns about energy availability and highlighted that 63 percent of people expressed they were 'very' or 'extremely' concerned about energy-related challenges during an emergency or disaster.[49] Improvements in energy infrastructure will help ease concerns found in the National Household Survey and improve the functionality of the nation through this investment.

Drought and extreme heat scenarios can be just as detrimental to critical infrastructure systems. These scenarios can fuel wildfire spread and make containment more challenging, hindering transportation routes and driver visibility.[103] Extreme heat can also result in an increased demand for air conditioning usage, potentially overloading grid infrastructure capacity. Over the last five years, major electrical grid failures in the U.S. increased by more than 60 percent. In July of 2023, the Governor of California declared a state of emergency and urged residents to conserve electricity because of stress put on the electrical grid during extreme heat situations.

Food and agriculture sectors are also vulnerable to drought and extreme heat. A lack of precipitation, extreme winds, and extreme heat caused 22.6 percent of the U.S. to face drought in the summer of 2023. Crop and rangeland damages from natural disasters totaled $21.9 billion, or 23 percent of NOAA's total economic impact figure.[104] Drought and wildfires alone accounted for $16.5 billion in crop damage. Food and agriculture sectors are also heavily reliant on other critical infrastructure sectors' resilience to disasters. Disruptions to transportation, energy, water, or chemical sectors have cascading impacts on food and agriculture operations, making this sector highly vulnerable to both direct and indirect disruptions.

Extreme weather incidents surpassed historical benchmarks in terms of disruption and destruction, and their anticipated trajectory indicates a steady worsening as climate change continues to progress.[105] This trend towards more damaging events on a national scale impacts all 16 critical infrastructure sectors.[105] The federal government, state and local governments, and the private sector must work together with increased urgency to build critical infrastructure resilience in order to reduce long-term maintenance and repair costs, and to prevent loss of life and property from potential infrastructure failures.

11.2. Capabilities and Gaps

At the federal level, the National Earthquake Hazards Reduction Program (NEHRP) recently released its first strategic plan in 15 years.[106, 107] The new strategic plan aims to enhance the nation's capabilities to withstand, respond to, and recover from earthquakes and outlines four coordinated goals and eight focus areas that cover steps to be taken before, during, and after a seismic incident.[106, 107] The plan emphasizes post-earthquake re-occupancy, reducing potential downtime of community-prioritized structures, and basic services provided by the lifeline infrastructure on which a community relies. NEHRP's strategic goals and focus areas aim to boost scientific understanding of seismic incidents and their consequences, enhance the means for protecting against those consequences, better promote strategies for dealing with earthquakes, and foster learning from seismic incidents to improve overall community resilience.

Complementing NEHRP's recovery initiatives are academic and scientific research in the field of forecasting.[59] For example, there is a significant increase in the number and diversity of earthquake catalogs, which provide a wealth of information on the seismic cycle. However, challenges exist in translating this information into improved warning products. One tool that aims to bridge this gap is the Earthquake Early Warning system, which is available in California, Oregon, and Washington state. The system uses ground motion sensors across the West Coast to detect earthquakes before they are

perceptible to people. The public can receive early warnings about earthquakes via the free MyShake App, Android Earthquake Alerts, or WEAs, enabling them to take critical protective actions before an earthquake hits. Another example of recent advances in forecasting is a deep-learning, scalable model called the Recurrent Earthquake Forecast (RECAST).[108] RECAST enables increased access to large earthquake observation data sets, and its performance improves as more data is added. By fostering the implementation of earthquake safety, mitigation, and resilience activities at the state and local level, continued academic and scientific research on forecasting models continues to play a pivotal role in building long-term preparedness and resilience.[109]

In addition to advancements in forecasting tools, recent legislation like the 2021 Bipartisan Infrastructure Law (BIL) allocates funding to improve critical infrastructure. The BIL provides $550 billion in investments in a wide variety of infrastructure such as roads, bridges, rail, transit, water, broadband, energy, and the environment from 2022 to 2027.[110] Key provisions within the law include initiatives to ensure clean water by eradicating lead service lines, the allocation of $65 billion to achieve universal high-speed internet access, modernization of the power grid, and upgrades to infrastructure supporting clean energy technologies.[110] Through the BIL, over $8 billion are available for resilient transportation infrastructure investments, and over $5 billion are available to advance the resilience of the food and agriculture industry, including crop and livestock loss grants, climate smart farming, and other rural infrastructure.[111] Investments like these would significantly enhance communities' ability to prepare for and mitigate the impacts of disasters. Federal grant programs that fund infrastructure repairs and disaster resilience efforts expanded significantly due to new funding sources stemming from the BIL. All 50 states, the District of Columbia, and five U.S. territories receive BIL funding. Through the BIL, the federal government provided $6.8 billion for mitigation projects to reduce disaster suffering and avoid future disaster costs.[43] The BIL also increased the number of qualified applicants for an increased federal cost share and appropriated funds for a revolving loan program that helps communities gain access to low-interest loans for hazard mitigation projects. Despite these increased investments, further analysis of the BIL funding distribution and NRI data reveals important insights about the correlation between disaster risk, vulnerability, and funding distribution.

Figure 9 depicts BIL funding per capita (per person) by FEMA region and the population-weighted average NRI scores across each region. Population weighting means adjusting data to reflect the size of each group (i.e., the regions), ensuring that larger groups have a proportionate impact on the overall analysis. FEMA Regions 4 and 9 possess the largest and third-largest populations (respectively) and have the two highest adjusted NRI Risk scores. Risk scores form an absolute basis for measuring risk and are used to generate risk percentiles and ratings across communities.[9] However, Region 9 receives the lowest amount of BIL funding per capita, and Region 4 receives the third lowest.[110] The correlation (R^2) between weighted NRI risk scores and amount of BIL funding per capita is 0.59, indicating that there is a moderate-to-strong relationship between funding received, disaster risk, and social vulnerability. In other words, the population-weighted risk scores are a significant predictor of how BIL funding per capita is allocated. However, the correlation between regional population and funding per capita is 0.46, which is a less moderate correlation. This analysis shows that while BIL

funding shows some alignment with population size, regional disaster risk and vulnerability may be the primary driver of funding allocation.

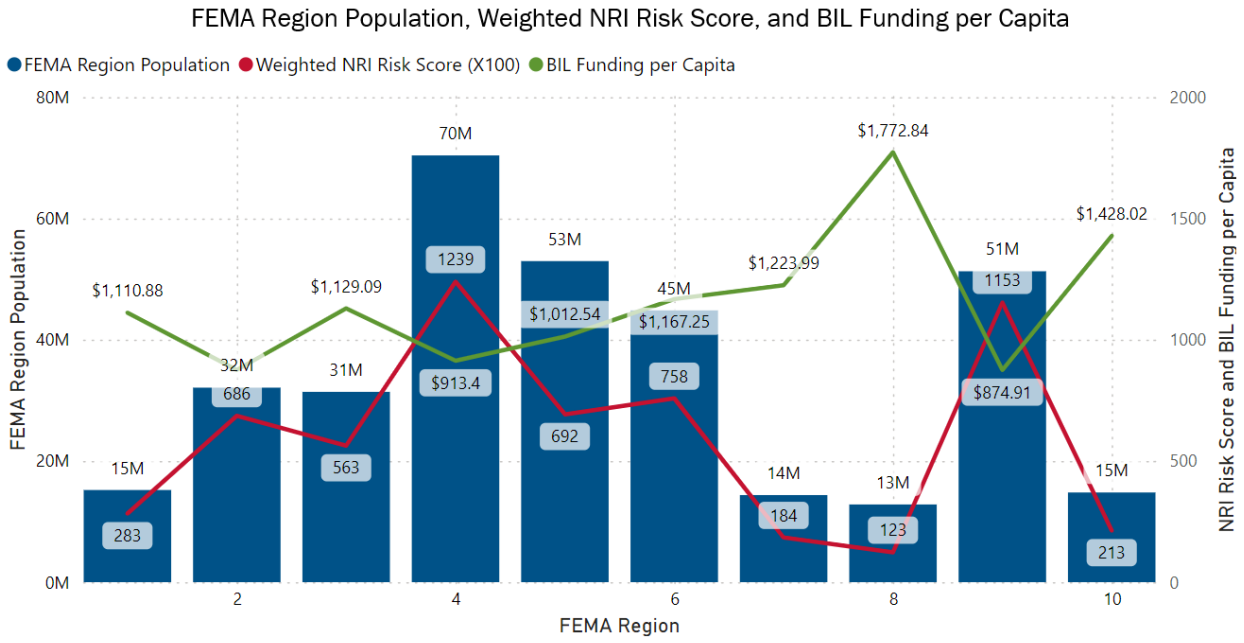


Figure 9: Total BIL Funding Distribution (as of December 2023) by FEMA regions and National Risk Rating (1-2,000).[112]

Finally, in emergencies and disasters, reliability of communications infrastructure is paramount. If a catastrophic disaster were to reoccur, such as Hurricane Maria striking Puerto Rico in 2017, all communications infrastructure in the affected area could be damaged or destroyed, hindering response and recovery. In such an event, alternative communications methods become necessary, such as amateur (otherwise known as "HAM") radio. Amateur radio can provide a viable method of communications when standard public safety and commercial telecommunications infrastructure is severely impacted, as it functions completely independently from wired and cellular phone systems, and the internet.[113] HAM radio is uniquely interoperable with various forms of communication, including digital modes, which allows operators to relay information between government entities and the public when the cellular network is disrupted.

An amateur radio station can be set up almost anywhere within less than an hour with the proper equipment (a wire antenna, a VHF/UHF dual-band radio, and a power source, such as a battery). Several organizations surrounding this alternative communication method exist. The Amateur Radio Emergency Service (ARES) is comprised of licensed and registered amateur radio operators who voluntarily provide communications support during emergencies and disasters.[113] Community Emergency Response Teams (CERT) have equipment and operators, and the Radio Amateur Civil Emergency Service (RACES), regulated by the FCC, provides tactical emergency support radio communications to federal, state, and local governments during emergencies.[114,115]

11.3. Management Opportunities

Table 3 summarizes the opportunities that federal, state, local, tribal, and territorial governments; NGOs, VOADs, and the private sector can leverage to manage risk, build Infrastructure Systems capability, and address capacity gaps to increase their overall resilience.

Table 3: Infrastructure Systems – Management Opportunities

Stakeholder Group	Management Opportunities
Federal Government	• Offer a wider range of specialized state earthquake assistance program grant workshops to equip participants with the knowledge, tools, and support to establish and sustain earthquake hazard reduction programs.[109] • Leverage federal exercises and training with regional and local partners to improve the pre-identification of staging areas that can both better handle the specific heavy equipment for temporary power and be near critical infrastructure that require such assets during a catastrophic disaster. • Leverage both regional level task forces and FEMA Integration Teams to allocate full-time staff to collecting critical data and points of contact before disasters to decrease delays in response. • Explore the costs and benefits of better stocking federally owned warehouses with inventory for water and wastewater testing to improve responding to water-related issues during disasters.
State, Local, Tribal, and Territorial Governments	• Take proactive steps to address seismic risks in Fiscal Year 2023 (e.g., FEMA's Earthquake State Assistance Grant program, which provides $2,145,416 for states and territories with a high to very high earthquake risk, along with up to $1.159 million designated for nonprofit organizations and institutions of higher education). Funds can be used to reduce risk to life and property from future earthquakes by investing in research, new tools, and post-disaster implementation strategies.[116] Investing in resilience will help advance the current tools and technology used to combat the effects that natural disasters have. • Encourage and support the integration of water and wastewater utility partners (e.g., regional utilities or Water and Wastewater Agency Response Network [WARN] members) in state emergency operation centers to overcome barriers in communication and situational awareness at the local level. • Leverage federal housing resources (e.g., HUD's 203(k) Rehab Mortgage Insurance).[117] Review Section 1206 of the Disaster Recovery Reform Act, which authorizes FEMA to reimburse communities for efforts related to building code administration and enforcement following disasters.[59] • Use the $2 million per state and territory and $25 million for tribal communities provided by the "Codes Plus Up" program to adopt or update building codes to more current editions and improve their implementation.[118]
NGOs, VOADs, and the Private Sector	• Conduct regular earthquake preparedness exercises and training sessions across private sector facilities to help identify and address weaknesses in earthquake mitigation plans, minimize the impact of earthquakes, and reduce the risk of damage and injury. • For organizations to maintain critical communications in emergency situations, they must understand communications resilience and document current network implementations. This includes identifying controlled network implementations,

Stakeholder Group	Management Opportunities
	interfacing with service providers, evaluating alternative path solutions, and staying vigilant with up-to-date technologies.[119]
Individuals and Households	• Learn protective actions to take during emergencies and disasters. For example, people can take actions to ensure they have access to redundant forms of communication to receive up-to-date alerts during disasters.[120]

12. Cybersecurity

Cybersecurity is defined as "prevention of damage to, protection of, and restoration of computers, electronic communications systems, electronic communications services, wire communication, and electronic communication, including information contained therein, to ensure its availability, integrity, authentication, confidentiality, and nonrepudiation.[121]

12.1 Risk

The U.S. faces routine domestic and international cyber threats from state sponsored actors, transnational criminal organizations, cyber criminals, and other malicious cyber actors who exploit system vulnerabilities for various motives, including financial gains and geopolitical advantages. The interconnected nature of critical infrastructure systems can lead to cascading impacts and failures if one is breached, making robust cybersecurity essential for resilience.

The U.S. has made progress toward a resilient cyber ecosystem, notably through the National Cybersecurity Strategy Implementation Plan.[122] This plan enhances coordination among Federal agencies. However, advancements in digital technologies, including AI and quantum computing, also increase cybersecurity complexity.[122] Advancements in digital communications, advanced computing, data storage and processing, and quantum information science increase the complexity of the cybersecurity protection needed.[122] According to the 2024 Homeland Threat Assessment by DHS, cyber threats will persist, targeting critical infrastructure with ransomware attacks and other malicious actions motivated by financial or geopolitical gains. The global average cost of data breaches rose by 15 percent between 2020 and 2023, reaching $4.45 million, highlighting the urgency of addressing cyber threats comprehensively.[59]

As digitization increases, infrastructure systems connected to the Internet of Things (IoT) may become more vulnerable to sophisticated malicious actions. This challenge is exacerbated by the ongoing exposure of U.S. critical infrastructure to the internet, creating vulnerable targets for easy access by malicious actors.[123] Factors like default passwords in critical infrastructure systems make them frequent targets for adversaries, and stolen or weak passwords serve as common entry points for digital theft.[124] As digitization becomes increasingly prevalent across the U.S., critical infrastructure systems are more vulnerable to cyberattacks, breakdowns, and supply chain vulnerabilities that could interrupt the free flow of information through cyberspace and delivery of services. Furthermore, the proliferation of IoT in 5G networks complicates device security.[125] Other critical infrastructure systems

such as underwater cables and industrial control systems are also at risk of foreign or domestic cyberattacks.[126] DOE developed plans to enhance grid resilience by creating the DOE Cybersecurity Strategy, which realigns responsibility to take the burden of defending cyberspace to the most capable organizations and aligns incentives to favor long term investment.[126, 127] Recognizing all previous risks when creating a resilient energy grid is important, especially with the level of complexity of adapting to these evolving cybersecurity threats.[128]

Besides the well-known risks to critical infrastructure, emerging risks include lack of transparency in software and generative AI. Software transparency allows end-users to gain a better understanding of device security they are interested in purchasing, similar to how nutrition labels allow customers to identify healthier ingredients in foods at the grocery store.[129] Transparency not only empowers end-users to understand device security but also aids producers and consumers in evaluating software inventory and estimating risks associated with licenses and vulnerabilities.[130] The emergence of threats from generative AI, specifically deepfake technology, adds a layer of complexity to the evolving cybersecurity landscape.[131] Malicious actors exploit the erosion of trust in digital media, using deepfakes for unauthorized purposes and challenging norms and capabilities in navigating digital spaces.[131] In addition, integrating personal data within AI algorithms could expose personal data leading to privacy and confidentiality concerns for companies. Finally, microtargeting—which involves the collection and analysis of personal data to tailor messages—poses multiple threats to government institutions.[132] This method enables manipulation of individuals, influences groups, disrupts systems, and distorts reality.

Many organizations, especially businesses, often obtain IT services from third-party providers to enhance their capacity to deliver cloud storage, data management, and security. Nevertheless, reliance on managed service providers (MSP) can pose security risks, potentially exposing users to cyber threats. Inadequate security measures by an MSP could result in the compromise of sensitive customer and company information.[133] Moreover, dependence on MSPs may lead to a vulnerability in case of downtime or other operational issues affecting the end user. Outsourcing to MSPs may also entail a loss of control over data, raising concerns among end users regarding privacy and data security. The National Security Agency (NSA) and CISA recommend the following actions: 1) adhere to security standards during the selection process for MSP services; 2) choose services and service levels that provide visibility into MSP actions through identity and access management (IAM) and log analytic systems (tools specifically designed to collect, parse, and analyze log data from different sources like web servers, applications, networks, and security devices); 3) evaluate configurations to ensure the integration of logs and IAM information pertaining to MSP actions into the organizational security infrastructure; and 4) regularly examine MSP accounts and privileges in IAM systems while investigating any abnormal or unforeseen alterations.[134]

12.2 Capabilities and Gaps

The federal government is increasingly focused on disrupting cybersecurity threats and mitigating cybersecurity challenges that threaten national security. In March 2023, the White House released the new U.S. National Cybersecurity Strategy.[135] Components of this strategy include defending critical infrastructure, collaborating with private sector partners, and investing in a resilient future.[135] The

strategy seeks to protect critical infrastructure from cyber threats by promoting strong cyber "hygiene" in target-rich and cyber-poor sectors, including K-12 education, healthcare and hospitals, and water and wastewater infrastructure.[131, 132] Boosting individual and household cybersecurity is imperative, as underlined by a National Cybersecurity Alliance survey.[137] Despite some familiarity with multifactor authentication (MFA), heightened awareness is needed. Additionally, trends in weak password practices—including the limited use of unique passwords and low adoption of password managers—emphasizes the urgency for increased cybersecurity awareness.[138] Implementing proactive cybersecurity measures will help educate and protect individuals from cyber threats and data leaks that may put themselves or their organizations at risk.

The rapid advancement of AI captured the attention of lawmakers and federal agencies, prompting various initiatives to address this issue. For instance, AI.gov is a platform dedicated to advancing AI-related efforts across the federal government.[139] EO 14110, signed October 2023, aims to advance AI efforts across federal agencies.[140] The EO directs the U.S. Government to harness the benefits of AI while mitigating its risks, focusing on safety, equity, innovation, security, privacy, and American leadership in AI. The federal government is also rapidly hiring talent to build and govern AI, with the goal of creating the most talented AI workforce globally.[139, 141] Federal agencies are leveraging AI to improve services for the public, including various applications across different sectors. The National AI Advisory Committee, established by Congress to advise the White House on AI-related issues, contributes to informed decision-making and ensures the U.S. leads in ethical development of AI.[142]

Additionally, the FCC took action to classify AI-generated voice calls as robocalls under the Telephone Consumer Protection Act.[143] Calls using voice cloning technologies are now generally considered illegal unless consumers expressly give consent to receive them. The FCC is also developing the Cyber Trust Mark program, a voluntary cybersecurity labeling program for IoT devices.[144] These smart devices include home office routers, digital personal assistants, home security systems, and more. The proposed label would provide information to consumers about the relative security of a smart device. Devices adhering to certain cybersecurity practices would bear this label. The FCC also ensures accessibility to printed and online information for people with disabilities, following requirements from the Americans with Disabilities Act and Web Accessibility Initiative guidance.

In 2023, the NSA launched several initiatives to enhance federal cybersecurity capabilities and respond to the dynamic threat landscape.[145] These initiatives included pilots that addressed vulnerabilities in the Defense Industrial Base and other sectors. The NSA also established the AI Security Center and the Center for Cyber Security Standards (CCSS) to develop secure AI capabilities and shape the adoption of standards for telecommunications, emphasizing the security of 5G networks and quantum-resistant cryptography.[145] These initiatives highlight the NSA's commitment to staying at the forefront of AI security and telecommunications standards, reinforcing national cybersecurity in an ever-evolving digital landscape.

The CyberSentry program partners with select critical infrastructure organizations that own and operate information and operational technology systems that support various National Critical Functions. CyberSentry enables CISA to gain insights into adversary tactics, techniques, and procedures to enable collective cyber defense through sharing of indicators of compromise,

disseminating defensive countermeasures, and continuous monitoring.[146] This collaborative approach, built around secure by design principles, is essential for effective defense against cyber threats. Additionally, the SLCGP has provided $374.9 million in grant funding to empower state and local governments to strengthen their cybersecurity capabilities. DHS established the SLCGP through the State and Local Cybersecurity Improvement Act as part of the BIL with the intent of empowering state and local governments across the nation to strengthen their cyber-informed engineering capabilities.[123, 147] The program, which is coordinated by FEMA and jointly managed by CISA, is supported through a $1 billion fund spanning four years and is now in its second year. The funding boost from $185 million in FY 2022 to the current allotment of $374.9 million in FY 2023 underscores the Administration and Congress's steadfast commitment to enhancing the cybersecurity posture of communities like Dallas, Texas and Lowell, Massachusetts—just two of the many communities facing threats of ransomware attacks and cybersecurity breaches in 2023.[148, 149, 150] Additionally, in 2023, the Tribal Cybersecurity Grant Program was introduced to provide funding to federally recognized tribes in order to address cybersecurity risks and threats to information systems owned, operated by, or on behalf of tribal governments.[151]

The concept of Threatcasting emerged as a proactive methodology for anticipating future national security scenarios and emphasizing preemptive action and recovery strategies.[132] Threatcasting is a conceptual framework and process that enables multidisciplinary groups to envision potential future threats and systematically plan against them, typically looking ten years into the future. In a recent collaborative workshop, experts from the U.S. Secret Service (USSS) and Arizona State University's Threatcasting lab delved deep into the microtargeting trends in cyber threats. Discussion revolved around cyberattacks becoming increasingly adept at targeting specific individuals or groups, highlighting the significance of this phenomenon. Additionally, they proposed actionable strategies to counter these evolving threats, shedding light on innovative approaches to preemptively tackle cybersecurity challenges.

Moreover, the workshop introduced the concept of "gatekeepers" who possess the ability to control pivotal resources relevant to cybersecurity.[132] These gatekeepers play a crucial role in safeguarding against potential threats and ensuring the resilience of digital ecosystems. By integrating these insights, the workshop aimed to equip decision-makers with a comprehensive framework for proactive planning in the face of escalating cyber complexities.[132]

The significance of enhancing individual and household cybersecurity is underscored by recent findings, notably from a National Cybersecurity Alliance survey.[138] While 57 percent of respondents reported being familiar with MFA, a substantial number remain unaware of its pivotal role as a crucial layer of protection in securing accounts.[138] This revelation underscores the need for increased awareness and education on the effectiveness of MFA in thwarting cyber threats. Furthermore, the survey highlights statistics regarding password practices. Only 33 percent of individuals create unique passwords for all their accounts, emphasizing the widespread use of potentially compromised passwords across multiple platforms.[138] Additionally, a mere 18 percent of respondents adopted password managers, a tool proven to enhance security by generating and storing robust, unique passwords for various accounts.[138] The National Cybersecurity Alliance survey reveals a need for greater awareness and education on MFA and better password practices to enhance individual and

household cybersecurity. This underscores the need for increased awareness and education on cybersecurity practices to enhance individual and household protection.

12.3 Management Opportunities

Table 4 summarizes the opportunities that federal, state, local, tribal, and territorial governments; NGOs, VOADs, the private sector, and individuals/households can leverage to manage risk, build cybersecurity capability, and address capacity gaps to increase their overall resilience.

Table 4: Cybersecurity – Management Opportunities

Stakeholder Group	Management Opportunities
Federal Government	• Continue implementing cybersecurity strategies highlighted in the 2023 National Cybersecurity Strategy Implementation Plan and strengthen federal cybersecurity measures, focusing on software supply chain security and transparent coding practices.[152, 153] • Increase information sharing with state and local governments, other federal agencies, and private industry partners to develop a shared picture of cyber threats; and develop prevention, protection, and mitigation strategies to address threats.[65] • Integrate Threatcasting principles derived from the collaborative workshop by the USSS and Arizona State University's Threatcasting lab into federal emergency management frameworks. • Work across federal agencies and with communities of interest to develop additional resources to promote adoption of the NIST Cybersecurity Framework.[154]
State, Local, Tribal, and Territorial Governments	• Leverage federal resources including FEMA and CISA's new *Planning Considerations for Cyber Incidents: Guidance for Emergency Managers* document, and CISA's *Shields Up* and *Shields Ready* campaign websites to collaboratively prepare for cyber incidents, develop cyber incident response plans, and increase organizational vigilance.[155, 156, 157] • Develop plans to harden computer systems from the effects of an electromagnetic pulse and identify the funding to implement those plans. • Explore the Cyber Incident Reporting for Critical Infrastructure Act reporting that will allow CISA to deploy resources to state and local government-hosted exercises.[158] • Establish a relationship with the local FBI Field Office and Cyber Task Force to establish cyber threat response coordination and expectations in advance of a cyber incident.
NGOs, VOADs, and the Private Sector	• Continue engaging in public-private partnerships to strengthen secure-by-design and secure-by-default principles in critical infrastructure sectors.[159] • Utilize the concept of Threatcasting as a methodology to anticipate future national security scenarios, emphasizing preemptive action and recovery. • Establish a relationship with the local FBI Field Office and Cyber Task Force to elevate cyber threat response coordination and expectations in advance of a cyber incident. • To secure IT infrastructure after a cyberattack, ensure comprehensive remediation by rebuilding affected hardware, replacing compromised files with clean versions, installing necessary patches, resetting passwords on impacted

Stakeholder Group	Management Opportunities
	accounts, and monitoring for any adversarial reactions. Before reconnecting systems to the network, develop robust response plans for potential alternative attack vectors, confirm the elimination of all cyber threat persistence mechanisms, and verify that all adversary activity is fully contained to prevent reinfection.[160]
Individuals and Households	• Explore CISA resources that promote online security safety, such as recognizing and reporting phishing, using strong passwords, turning on MFA, and updating software.[92] • Explore the FCCs "Cyber Trust Mark" program that strengthen cyber protections by labeling and certifying smart devices that meet safety standards and are less vulnerable to cyberattacks.[162] • Gain knowledge and report cybercrimes at the FBI's Internet Crime Complaint Center.[163] For cybersecurity basics, also see Ready.gov's Cybersecurity page.[164]



Conclusion

The 2024 NPR provides an overview of our nation's current disaster risk and capability landscape. Risks and capabilities inform emergency management decision-making and cannot be assessed without whole community consideration. All levels of government need to work together to ensure disaster preparedness and resilience. Governments need to work with non-governmental partners and the private sector to ensure holistic preparedness and a full understanding of both the impacts of disasters and the capabilities needed to manage them.

FEMA identified several key findings impacting emergency management today, including increased frequency, severity, and cost of disasters; the expanding role of data analysis in disaster management; ongoing cybersecurity threats across all levels of government; challenges in strengthening infrastructure systems; the disproportionate impact natural disasters have on rural and disadvantaged communities; and ongoing individual and household preparedness gaps. To help the emergency management community form a clearer picture of risks and capabilities, and provide more specific management opportunities, FEMA chose to focus discussion on a subset of four core capabilities this year including Mass Care Services, Public Information and Warning, Infrastructure Systems, and Cybersecurity. Discussions within the focus areas illustrate the interconnection of systems and the potential for stress in one area to cascade to others, especially during disasters.

The 2024 NPR identifies potential management opportunities federal government, state and local governments, NGOs, VOADs, private sector, individuals, and households can use to build capability and address capacity gaps. These management opportunities, along with FEMA's analysis of national preparedness data and capabilities, inform recommendations presented in this report, which include:

- Supporting the needs of communities through strategies aimed at creating the most benefit for the greatest number of individuals, while acknowledging place-based disparities.
- Strengthening and expanding inclusive, participatory disaster preparedness planning.[165]

Building community-wide resilience helps form the foundation for successful response and recovery efforts. By examining and approaching resilience holistically alongside partners, the emergency management community can increase disaster preparedness and take steps to decrease the impact of future incidents.

Diverse perspectives from the whole community bring fresh ideas and add to the accuracy and credibility of the NPR. Please feel welcome to email NPR@fema.dhs.gov to provide feedback on this report or make suggestions for future reports. Though FEMA will consider all comments, respondents may not receive a reply to their submitted feedback.



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[1] FEMA defines "social vulnerability" as the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood.

[2] The CDC defines "concurrent disasters" as natural disasters such as hurricanes, wildfires, and earthquakes that occur at the same time as an infectious respiratory disease pandemic. However, the term can also apply to other sets of hybrid disasters that occur at the same time, or because of one another.

[3] For individuals interested in exploring additional resources that can assist in elevating community resilience, the Resilience Analysis and Planning Tool (RAPT) is a highly recommended resource within the Resilience sector. FEMA offers online access to information regarding the tool's creation and regularly updates it to ensure enhanced efficacy. The RAPT is embedded with the Community Resilience Challenges Index (CRCI) and the Grant Equity Threshold Tool (GETT) dashboard, which are valuable tools. The CRCI draws from 22 social vulnerability indicators,

providing users with insights into the primary factors contributing to heightened resilience challenges in specific counties or census tracts. The GETT offers a comprehensive platform for comparing population statistics related to CRCI, CDRZ, and the CEJST, simplifying data analysis for users.

[4] A recent study by the U.S. Department of Agriculture shows that the population in rural areas rose slightly between 2020 and 2023 after a decade of decline, because of domestic net migration to rural counties. Parts of the Midwest and Great Plains saw increases, but not as much as in some other U.S. regions. Between 2010 and 2020, the nation's urban population increased by 6.4%, due to a combination of migration, more births than deaths, and changes to the urban criteria with the 2020 Census.

[5] Tornado Alley is a term that refers to a broad area of relatively high tornado occurrence in the central United States. "Various 'Tornado Alley' maps look different because tornado occurrence can be measured many ways: by all tornadoes, tornado county-segments, strong and violent tornadoes only, and databases with different time periods." From Severe Weather 101: Tornado Basics (noaa.gov)

[6] Preparedness grants for Natural and Cultural Resources are generally gained outside of FEMA grants and the THIRA/SPR process.[36, 37] This figure is based on an analysis of funding sources including the State Homeland Security Program (SHSP), Urban Area Security Initiative (UASI), Nonprofit Security Grant Program (NSGP), Emergency Management Performance Grant (EMPG), and Homeland Security Grant Program (HSGP). Some of the federal grant funding amounts in this graphic may appear low for several reasons. First, these grants do not necessarily focus on specific core capabilities. Second, not all grants (e.g., hazard mitigation grants) are included in this list and specific core capabilities may receive targeted funding from sources other than the grants listed above, which this graphic does not capture.

[7] The twelve preparedness actions include: Assembled or updated supplies, made a plan, made my home safer, signed up for alerts and warnings, saved for a rainy day, learned my evacuation routes, documented and insured property, safeguarded documents, tested family communication plan, practiced emergency drills or habits, got involved in my community, and planned with neighbors.

[8] The THIRA is a centralized process and may not always solicit input from all agencies involved in the emergency support function. THIRA submission does not consistently reflect the views of the lead agency performing the line of effort during a disaster.

[9] This report adopts multiple definitions of "no-notice incidents" due to the absence of a formal FEMA definition. As per the Department of Energy (DOE) (supported by an academic study), such incidents entail unpredictable disasters like earthquakes, chemical spills, or terrorist attacks, where providing advance warning to the public and formulating evacuation plans is unfeasible.[68] Similarly, CISA characterizes them as events occurring unexpectedly

or with minimal warning, potentially leading to adverse security consequences, with insufficient time for preemptive alerts.[69] Consequently, this report designates human-caused disasters, earthquakes, and wildfires as instances of no-notice events, because of their sudden onset.[70]

[10] The United Nations defines "gender-responsive" as addressing the specific needs of women and men by intentionally incorporating gender considerations into the design, implementation, and outcomes of legislation, policies, and programs.[79] "Disability-inclusive" refers to the meaningful participation of persons with disabilities, the promotion of their rights and the consideration of disability-related perspectives in compliance with the Convention on the Rights of Persons with Disabilities.[80]

[11] The study evaluated 17 categories of infrastructure, giving grades from a 'B' for Rail to a 'D-' for Transit. For the first time in 20 years, the nation's overall infrastructure received a grade in the 'C' range, indicating that it is generally in mediocre condition, with deficiencies that need attention. However, 11 of the 17 categories received grades in the 'D' range, including aviation, dams, hazardous waste, inland waterways, levees, public parks, roads, schools, stormwater, transit, and wastewater.