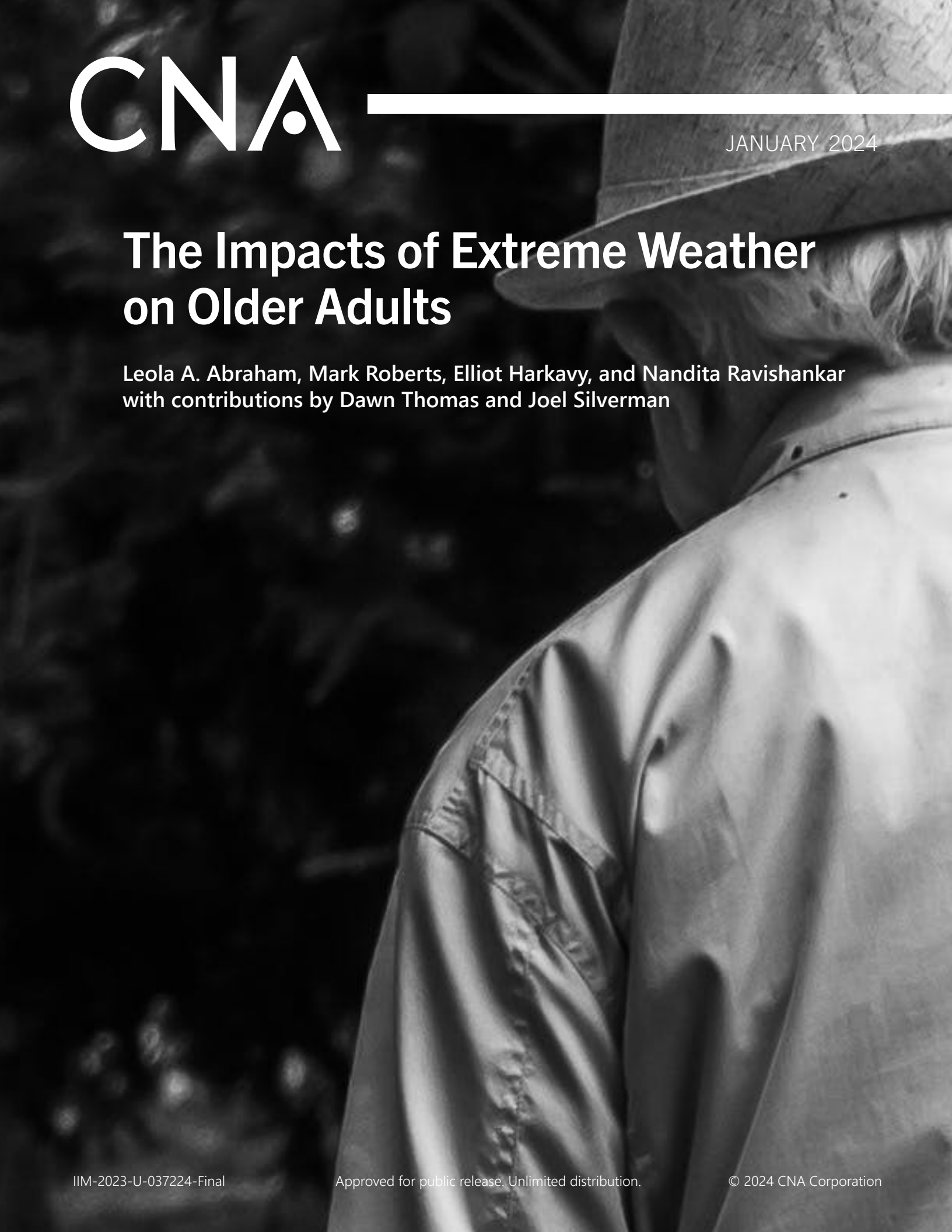


CNA

JANUARY 2024

The Impacts of Extreme Weather on Older Adults

Leola A. Abraham, Mark Roberts, Elliot Harkavy, and Nandita Ravishankar
with contributions by Dawn Thomas and Joel Silverman

IIM-2023-U-037224-Final

Abstract

A confluence of circumstances is aligning to put more adults ages 65 and older (older adults) at risk of suffering and dying from extreme weather. Climate-related extreme weather events are increasing in frequency and severity just as the older adult population—a group more vulnerable to extreme weather because of aging immune systems and health conditions—is expanding rapidly. This will likely increase the number of individuals at risk during extreme weather events and heighten demands on emergency management services, especially because older adults tend to concentrate in the regions most susceptible to extreme weather. This report studies how climate-related extreme weather events affect the health, housing, and economic security of older adults in the US, examining emergency planning, response, and recovery, as well as how existing federal and state policies and programs affect older adults during and after an extreme weather event. Although neither a systematic review nor longitudinal study, it outlines the issues and creates a repeatable and adaptable framework that can be applied to research climate effects on at-risk, underserved, or marginalized populations.

Recommended citation:

Abraham, L. A., et al. *The Impacts of Extreme Weather on Older Adults*. Arlington, VA: CNA Institute for Public Research, Center for Vulnerable Population Protection, 2024.

Cover image: Sue Mercer. Photograph courtesy of Canva.

This project and report were supported by a grant from the CNA Corporation Independent Research Council.

PROJECT PREFACE

The Impacts of Extreme Weather on Older Adults project is funded by the CNA Corporation Independent Research Council to examine how climate-related extreme weather events affect the health, housing, and economic security of adults age 65 and older in the United States.

The project considers the experiences of older adults before, during, and after natural disasters. It examines whether existing federal, state, and local government emergency management agency (EMA) policies, plans, and programs include strategies and initiatives for addressing the needs of older adults. It explores how those policies, plans, and programs affect older adults during and after a federally declared disaster.[1] Given changing conditions, it considers events such as extreme heat and drought that do not currently have eligibility for federal assistance.

Specifically, the research examines how climate-related extreme weather events affect the health, housing, and economic security of older adults in the US by pursuing the following objectives:

- Determining the effects of climate-related extreme weather events on older adult populations in jurisdictions with high frequency or severity of natural disasters.
- Determining whether federal, state, and local EMA policies, plans (mitigation, preparedness, response, and recovery), and programs include strategies and initiatives for addressing the needs of older adults before, during, and after natural disasters.
- Identifying gaps in federal, state, and local EMA policies, plans, and programs and detecting themes, best practices, and opportunities for more effective response and recovery plans to support older adults during a natural disaster.

The report follows a CNA report for the National Council on Disability (NCD), *The Impacts of Extreme Weather Events on People with Disabilities,* the statutorily required annual report to the White House published on May 4, 2023. The NCD report examines how extreme weather events and environmental hazards have adversely and disproportionately affected people with disabilities in the US and its territories over the past 20 years. However, this report takes a shorter view, focusing on the past decade (2013–2023), and only examines data from US states (excluding tribal lands and US territories). We hope that readers will uncover insights to help drive organizational policies, plans, and programs, and we welcome feedback as you review our insights, findings, and recommendations.

We thank the federal, state, and county government agencies, nongovernmental organizations, universities, and individuals who provided input through stakeholder interview sessions. This report begins with a brief description of the project evolution and the methodology used to conduct the project, including the literature review and data collection, risk mapping, stakeholder engagement, and data analysis. The report then provides findings and recommendations for ongoing consideration by our topic areas: health, housing, and economic security. It is authored by Leola A. Abraham, Dr. Mark Roberts, Elliot Harkavy, and Nandita Ravishankar with support from advisory members Dawn Thomas and Joel Silverman.

EXECUTIVE SUMMARY

As older adults account for a larger share of our population, EMAs will have to consider these additional at-risk individuals during disaster planning, response, and recovery.

Communities are facing "polycrises" from the COVID-19 pandemic to unpredictable economies, where rising inflation and interest rates are affecting prices from the gas pump to the dinner table. People are facing food and energy scarcity, political instability, multiple wars, and other external disruptions that create uncertainty.

Meanwhile, climate-related extreme weather events are increasing in frequency, severity, and cost. Billion-dollar natural disasters are becoming the new normal. Concurrent weather events challenge federal, state, local, tribal, and territorial emergency management agency (EMA) resources and community resilience.

As older adults account for a larger share of our population, EMAs will have to consider these additional at-risk individuals during disaster planning, response, and recovery. An increase in older adults will likely result in a greater number of individuals at risk during a natural disaster. The growing older adult population will increase demand on resources and strain critical sectors (e.g., health care, housing, emergency services) and support services. Understanding their distinct needs and expectations is critical to ensuring their safety and will help them to rebuild following a natural disaster.

In this report, CNA's Center for Vulnerable Population Protection examines how climate-related extreme weather events affected the health, housing, and economic security of older adults over the past 10 years. This report defines extreme weather by the type of hazard (e.g., drought, heat wave, flooding, severe storm, wildfire, winter weather, tropical cyclone (hurricane)) and level of risk (at the county level). CNA examined counties in four states—Arizona, California, Florida, and Missouri—focusing on health, housing, and economic effects and how governments (including emergency management) supported older adults during the planning for, response to, and recovery from natural disasters.

Because of the increasing frequency, severity, and cost of weather events; the increasing number of older adults in the US; and the enhanced vulnerability of older adults during severe weather, this report explores the effects of climate-related extreme weather events on older adults and the current state of federal, state, and local emergency management agencies' planning, response, and recovery efforts to include and assist this population.

Key assumptions

- A growing older adult population will increase demand on resources and strain critical sectors (e.g., health care, housing, emergency services) and support services.
- Polycrises and concurrent disasters challenge federal, state, and local EMAs and communities.
- Continued social polarization, social unrest, political instability, and upcoming 2024 national elections will affect climate policy and continue to delay urgent climate mitigation strategies needed to protect communities.
- At-risk communities will continue to face climate-related health, housing, and economic effects without prioritized and rapid federal, state, and local government intervention.

Key insights

Climate-related extreme weather events

- Natural disasters and extreme weather events rank as the top two most severe global risks to the world in the upcoming two-year period.
- Climate-related extreme weather events are increasing in frequency, severity, and cost. Extremely high disaster activity and billion-dollar natural disasters are becoming the new normal.
- State and local governments may be more vulnerable and less prepared for extreme weather events.

Growing aging population

- As older Americans account for a larger share of the population, more people will likely face vulnerabilities and increased risk during natural disasters.
- A growing older adult population, increasing extreme weather events, and a gap in the health care workforce will increase demand on resources.
- More targeted research on the effects of extreme weather events on older adults is needed to help EMAs and communities better plan for emergencies and disasters.

Health

- Due to aging immune systems and chronic and underlying conditions, older adults face vulnerabilities and increased risk of injury and mortality during extreme weather.
- Older adults with disabilities face higher risks of injury and mortality during extreme weather events.
- Older adults are especially vulnerable to climate-driven decreases in air quality.
- Extreme heat is the greatest climate risk to the older adult population.
- Climate change may increase exposure to pathogens in older adult populations.
- More people will likely be affected by acute mental health effects as a result of increasing natural disasters and extreme weather events.
- Existing shortages of health care workers exacerbate risks to individuals who require immediate care during disasters.

Housing and location

- Older adults are particularly vulnerable to climate change–related health effects based on the characteristics of their homes, such as the age, quality of construction, and amenities.
- Multiple factors disincentivize older adults from making home improvements to prepare for extreme weather.
- Geographic location is a factor in how extreme weather events affect older adults.
- Social isolation increases risk during natural disasters, since the population living alone increases with advanced age.

Economic effect

- The increase in extreme weather events is resulting in significant social and economic costs to older adults.
- Insurance costs have increased, but in some states, insurance options have decreased, putting older adults at risk of being uninsured.

Emergency management

- A lack of inclusive disaster mitigation and preparedness planning can have devastating effects on older adults during extreme weather events.
- Despite the dangers of extreme heat on older adults, it is not listed as a qualifying event in the statutory definition of major disasters.
- State laws do not provide specific guidance on how counties should plan for and include older adults and individuals with access and functional needs in evacuation plans.
- Older adults have distinct medical needs that make them less likely to evacuate in disasters.
- Households with older adults are likely to be tied to their communities and their homes and are less likely to evacuate.
- Many households with older adults have limited resources, a lack of transportation, and other barriers to evacuation.
- Early warning systems are not always designed for older adults.
- Disaster communications may not reach older adults, causing gaps in information-sharing and trust.
- Older adults who shelter in place are susceptible to cascading effects of disaster impacts, such as physical damage and loss of access and power.
- Evacuation shelters may not fully accommodate the needs of older adults.

Key recommendations

Federal recommendations

- Congress should update the Stafford Act and introduce legislation to add extreme heat to the list of disasters for which states can request an emergency or disaster declaration, making them eligible for assistance from the Federal Emergency Management Agency's (FEMA's) individual assistance and public assistance programs and other federal government support.
- Congress should pass legislation to improve the inclusion of older adults and individuals with disabilities in the mitigation, preparation, response, and recovery phases of natural disasters.

- Congress should update the Stafford Act to help states better prepare for multiple disasters.
- Congress should issue a review of early warning systems to standardize the systems and embed accountability.
- Congress should appropriate funds to FEMA for the express purpose of ensuring that evacuation shelters provide accommodations to ensure the safety of older adults.
- The President should sign an executive order charging federal agencies to develop or update emergency management plans to allow for an increase in concurrent extreme weather events.

Federal agency recommendations

- FEMA should bolster its Building Resilient Infrastructure and Communities program to help communities increase resilience to heat waves, droughts, wildfires, floods, hurricanes, and other hazards by preparing before disaster strikes.
- Federal agencies should review, consolidate, and enhance existing guidance for effective communications before, during, and after disasters. A comprehensive guide should be regularly updated and distributed across all response agencies and nongovernmental organizations to foster consistency in communication.
- The Centers for Medicare and Medicaid Services Quality, Safety & Oversight Group should review and update the Emergency Preparedness Requirements for Medicare and Medicaid Participating Providers and Suppliers Final Rule to ensure it adequately addresses the risk of compound, consecutive extreme weather events.

Federal, state, and local government recommendations

- Federal, state, and local EMAs must clearly identify and better understand the distinct needs of the growing older adult population; adopt evidence-informed, uniform, and collaborative emergency preparedness interventions for all older adults, particularly for those who live alone and use medical equipment requiring electricity; and ensure programs tailored to older adults are adequately resourced and available before, during, and after disasters.
- Federal, state, and local EMA emergency management plans should include tailored interventions to support older adults, particularly those with economic barriers to evacuating or relocating.
- Federal, state, and local EMAs must ensure transportation and sheltering resources are available, plentiful, and free for evacuees to encourage evacuation compliance. The evacuation needs of older adults and other at-risk groups must also be identified and met.
- Federal, state, and local EMAs should fund and coordinate with community organizations, including faith-based organizations, to build trust and reach older adults during and after a disaster.
- Emergency management plans should include tailored interventions to support older adults, particularly those who live alone and are electricity dependent.
- Federal, state, and local governments should conduct scenario planning and other mitigation tools to better understand the key drivers of polycrises and to develop a framework to better prepare for polycrises.

State recommendations

- State and local governments should collaborate and exchange climate data and best practices with other state and local entities with higher hazard risk, including extreme heat, and/or vulnerable populations.
- State laws should require detail in evacuation plans concerning older adults and individuals with access and functional needs and specify funding amounts to be dedicated to inclusive planning for this growing population.

TABLE OF CONTENTS

METHODOLOGY

This report examines emergency planning, response, and recovery, and how existing federal law and regulations and federal and state policies and programs affect older adults in regard to health, housing, and quality of life during and after an extreme weather event.

This report is organized into five chapters that examine how climate-related extreme weather events affect the health, housing, and economic security of adults ages 65 and older (older adults) in the United States. It examines emergency planning, response, and recovery, and how existing federal law and regulations and federal and state policies and programs affect older adults in regard to health, housing, and quality of life during and after an extreme weather event. The report looks at how the future of extreme weather will affect this population. This is not a systematic review or longitudinal study; however, it outlines the issues to create a repeatable and adaptable framework and methodology that can be applied to future research on climate effects on at-risk, underserved, or marginalized populations.

Literature review and data collection

To develop the report, CNA conducted a literature review on aging population trends, climate change, extreme weather events, and environmental hazards. The literature review focused on the US from 2013–2023 (10 years). The review was not intended to be comprehensive, but rather to explore the issues of health, housing, and economic influence on older adults, as well as relevant future areas of research.

First, CNA defined the research problem, which framed the project purpose, goals, and objectives. We developed 21 research questions and the data collection criteria that informed which issues we would include in or exclude from the data collection. In addition, we developed key words for the search criteria and defined our terminology.

Second, CNA conducted a literature review and examined a selection of relevant academic research papers and government documents and reports on how climate-related extreme weather events affect older adults in the US. Although we focused on issues relevant to the US, we drew on broader international literature including the United Nations Framework Convention on Climate Change, the Intergovernmental Panel on Climate Change (IPCC), and the World Economic Forum (WEF) Global Risks reports. Although these reports take global views on the effects of a changing climate, they address the interdependency of local and global action (or inaction). We organized the results into five chapters focused on health, housing, economic effect, emergency management, and futures.

Geographic location selection

Third, CNA conducted risk mapping and a multistep geospatial analysis to spatially demonstrate where climate-related extreme weather events are occurring in the US, the communities that are affected, and where older adults are concentrated.

CNA applied a hot spot analysis using ArcPro (3.0) to identify county clusters that have a statistically significant higher number of adults over 65 compared

to the US average and a statistically significant higher proportion (percentage) of adults over 65 compared to the US average.

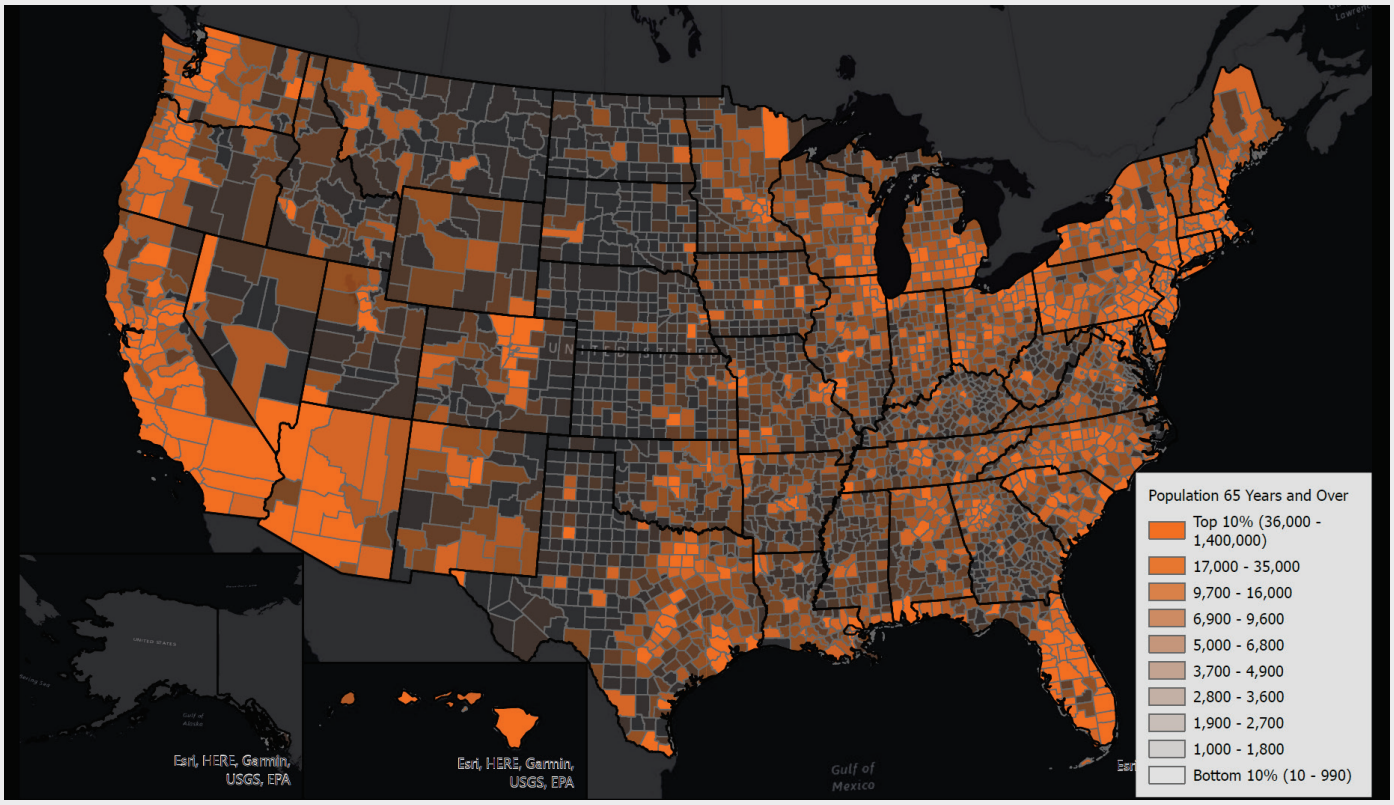
Concentration of older adults in the United States

To show where significant concentrations of adults age 65 and older reside, CNA used the US Census Bureau's American Community Survey (ACS) (2017–2021) 5-year estimates, Table(s) B01001.[2] CNA examined the following:

- The population distribution of adults 65 years and over by county (Figure 1).
- The population distribution of the percent of adults 65 years and over by county (Figure 2).
- The bivariate distribution of the population 65 years and over and the percent of population that is 65 years and over by county (Figure 3).

CNA also considered rural and remote communities that may have low population totals but high percentages of older adults. See Appendix E (Figures 12–31) for additional maps.

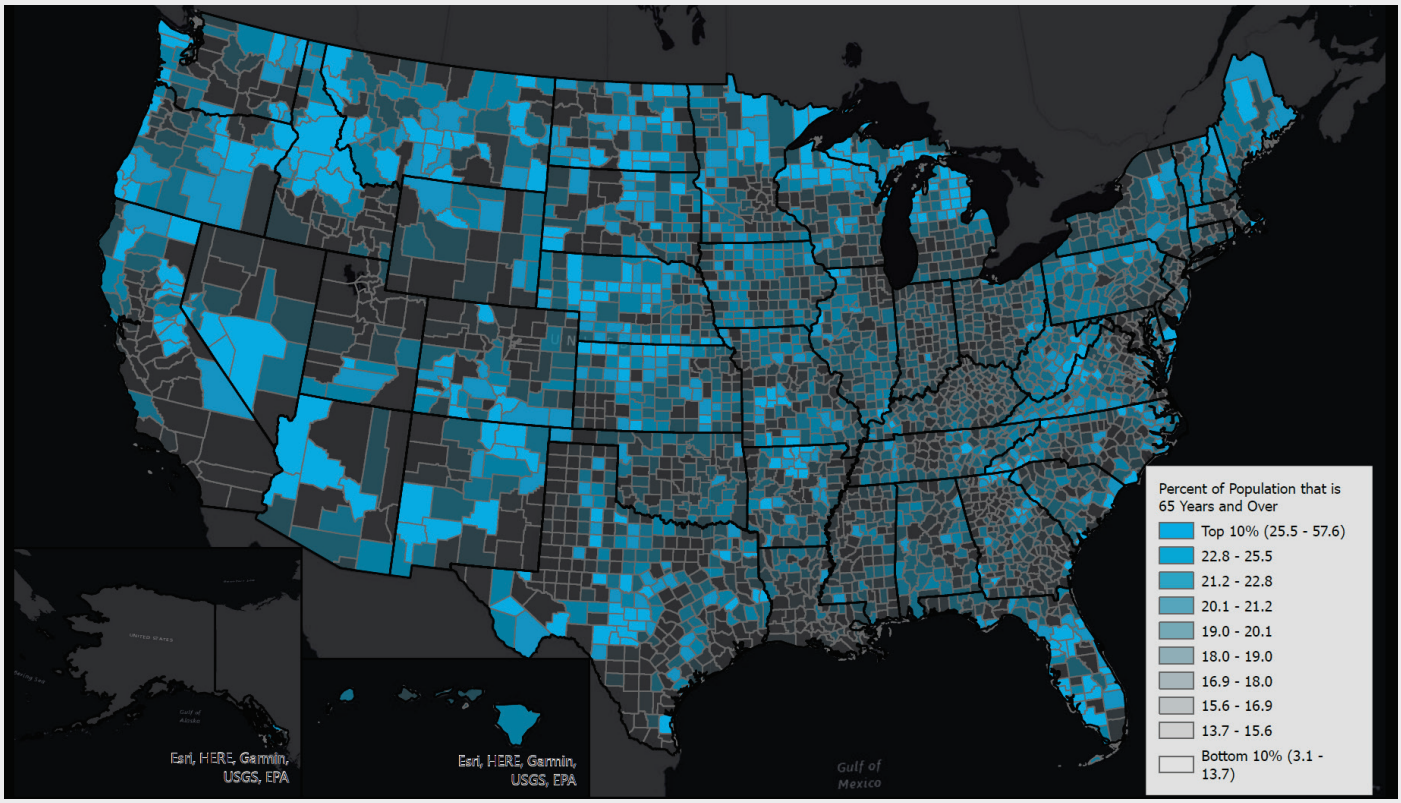
Figure 1. US population 65 years and over, by county



Source: United States Census Bureau, "American Community Survey 2017–2021 5-Year Estimates," Nov. 30, 2022, https://www.census.gov/programs-surveys/acs/technical-documentation/table-and-geography-changes/2021/5-year.html.

Note: Population is shaded by decile with the highest population in orange.

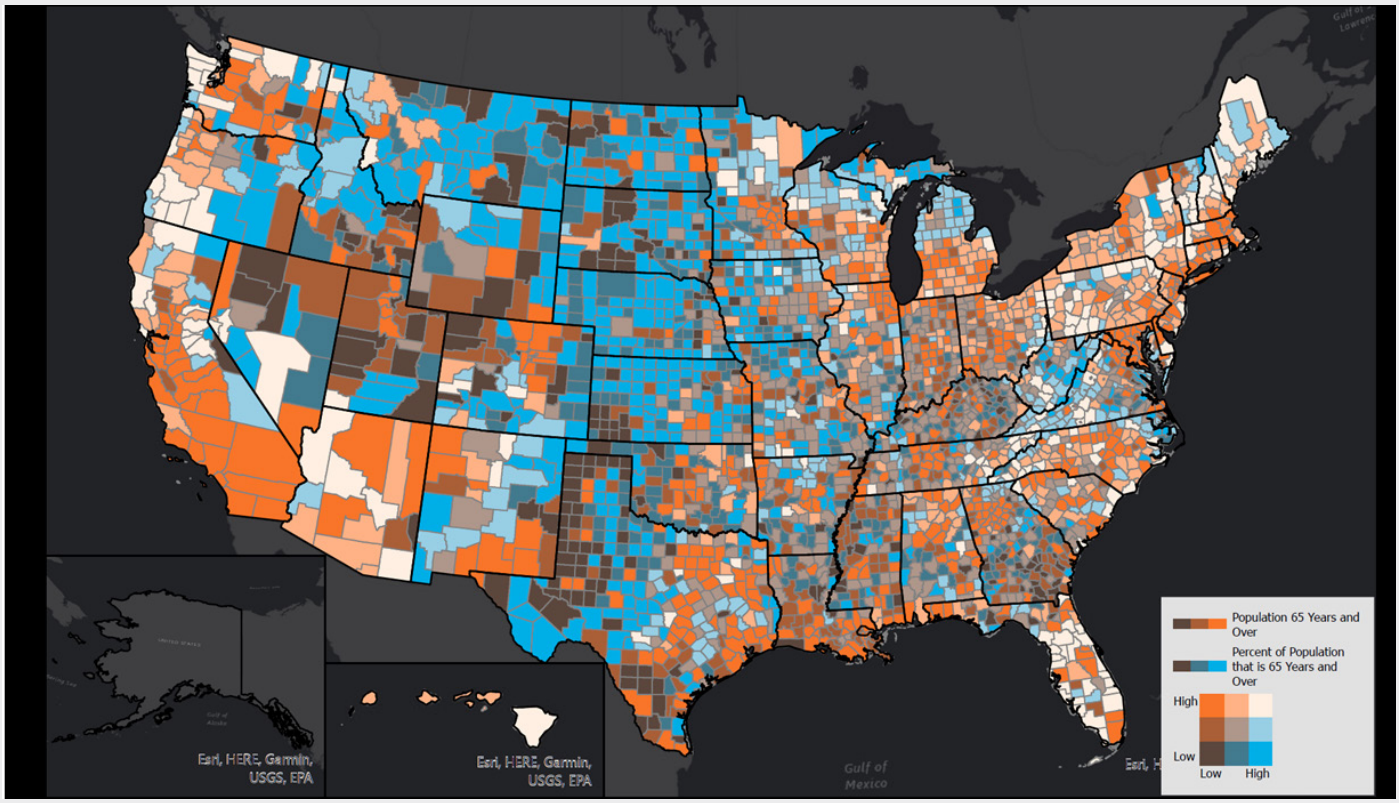
Figure 2. Percent of us population 65 years and over, by county



Source: United States Census Bureau, "American Community Survey 2017–2021 5-Year Estimates," Nov. 30, 2022, https://www.census.gov/programs-surveys/acs/technical-documentation/table-and-geography-changes/2021/5-year.html.

Note: Population percent is shaded by decile with the highest population in blue.

Figure 3. Bivariate distribution of US population 65 years and over and percent of population 65 years and over, by county



Source: United States Census Bureau, "American Community Survey 2017–2021 5-Year Estimates," Nov. 30, 2022, https://www.census.gov/programs-surveys/acs/technical-documentation/table-and-geography-changes/2021/5-year.html.

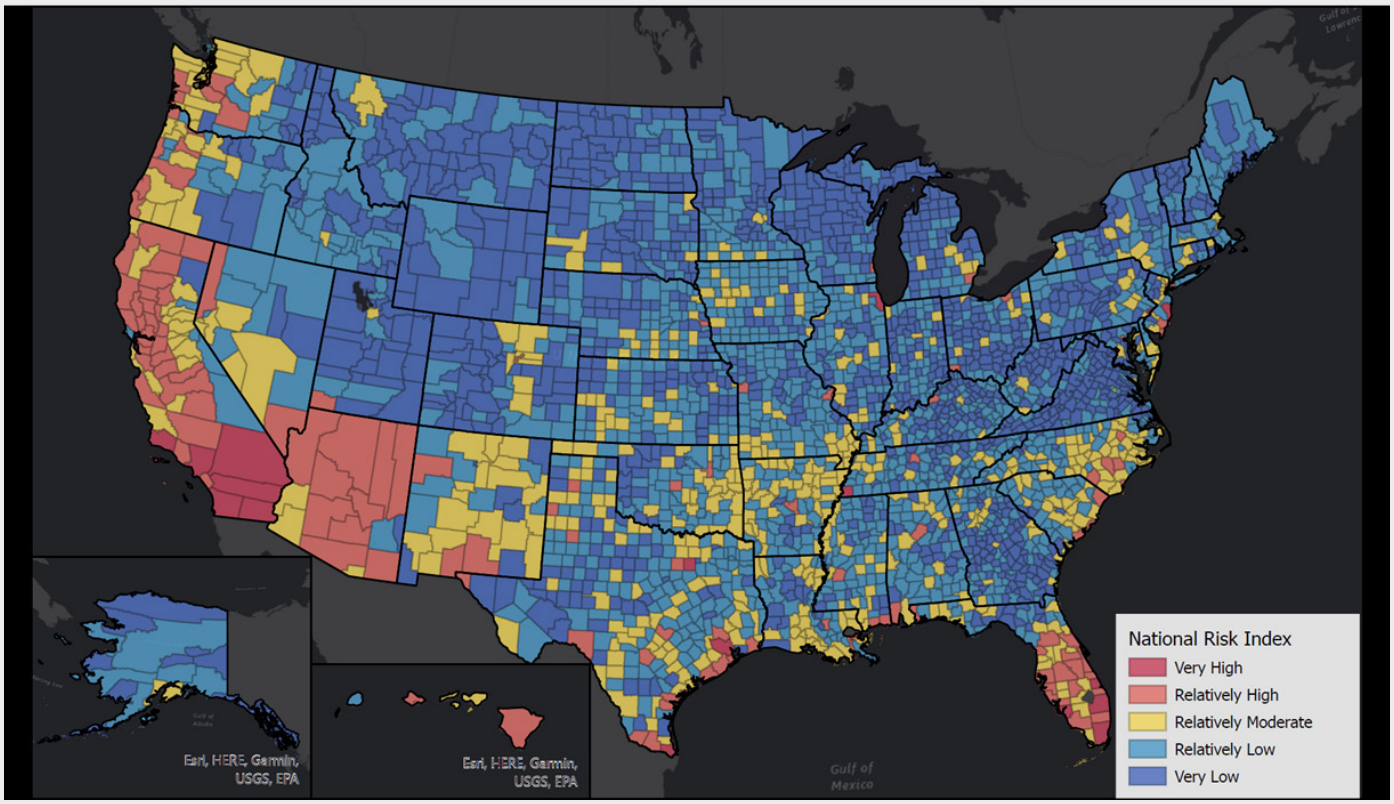
Note: Counties in white are of most concern, having both high populations 65 years and over and high percentages of population that is 65 years and over. Counties in orange have high populations 65 years and over but low percentages of population that are 65 years and over. Counties in blue have low populations 65 years and over but high percentages of population that are 65 years and over. Light orange counties have high population and medium percent population. Light blue counties have medium population and high percent population.

Climate-related extreme weather events in the United States

To show climate-related extreme weather events in the US by county, CNA used FEMA National Risk Index (NRI) 2021 Update and the US Census Bureau's ACS (2017–2021) 5-year estimates, Table(s) B01001 (Figure 4).[3]

CNA mapped the extreme disaster risk for each county including hurricane, heat wave, drought, landslide, riverine flooding, tornado, strong wind (severe storm), and wildfire. Counties range from very high risk to very low risk. We combined the data from the counties that have high risks of natural hazards with the data of counties that have high total counts and high percentages of older adults. This layering of the data enabled CNA to select the counties to conduct research where aging populations face risks from extreme weather events.

Figure 4. Composite risk index of hurricanes in US, by county



Source: FEMA, "National Risk Index for Natural Hazards," Aug. 30, 2023, https://www.fema.gov/flood-maps/products-tools/national-risk-index.

State selection

After reviewing the datasets, CNA selected four states and six extreme weather types. The four states are Arizona, California, Florida, and Missouri. We examined several counties in each state based on the level of risk. The six extreme weather types are flooding, heat wave, hurricane, ice storm, wildfire, and winter weather. CNA also studied consequence events such as flooding and power outages.

The data showed states like Georgia, New Jersey, Virginia, Arizona, Washington, Massachusetts, Tennessee, Indiana, Missouri, and Wisconsin "each had more than 1 million people age 65 and older in 2019. The four states with the highest percentage of their populations age 65 and older in 2019 were Maine (21 percent), Florida (21 percent), West Virginia (20 percent), and Vermont (20 percent). In three states, the age 65 and older population increased by 57 percent or more between 2009 and 2019: Alaska (72 percent), Colorado (58 percent), and Nevada (57 percent)."[4]

The fastest growing US metropolitan area between 2010 and 2020 was The Villages, Florida. This metro area's population grew from 93,420 in 2010 to 129,752 in 2020 (38.9 percent), and 143.2 percent between 2000 and 2020. Home to an age-restricted retirement community, the metro area "had the oldest median age in 2020 of any metro area in the nation (68.5 years)."[5] California, Florida, Arizona, and Missouri also have a high population and high percentage of older adults, as shown in Table 1.

Table 1. US state population data

State	Number of Persons 65 and Older	Persons Age 65 and Older as a Percentage of Total Population, 2020	Increase in Population Age 65 and Older, 2010 to 2020	Percent Below Poverty, 2020
California	5,976,166	15.2%	39.8%	10.7%
Florida	4,638,094	21.3%	41.5%	10.6%
Arizona	1,373,975	18.5%	54.5%	7.3%
Missouri	1,089,714	17.7%	29.5%	5.7%

Source: CNA. Population data are from the US Census Bureau, Population Estimates. Poverty data for the states are from the Current Population Survey, Annual Social and Economic Supplement.

Economic effects of extreme weather events in the United States

To demonstrate the economic effects of extreme weather events, CNA referenced the National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI) US Billion-Dollar Weather and Climate Disasters data (2023).[6]

The risk mapping analysis enabled CNA to identify key US locations that were appropriate for reviewing extreme weather events and their effects on older adults. The mapping analysis also informed key locations to convene stakeholder focus groups to provide the most informed input.

Stakeholder engagement

Fourth, CNA conducted stakeholder engagement through virtual stakeholder convenings using a mixed mode of participant engagement. After reviewing emergency management or all-hazard emergency operations plans in relevant states,[7] CNA developed interview questions that covered three important areas: health and well-being, housing, and economic security. The questions also touched on federal, state, and local emergency management agency policies and plans, as well as futures—additional research is needed to better understand the scope of the problem; other at-risk, underserved, or marginalized populations; and government policies and plans that require review or improvements to ameliorate the effects of climate-related extreme weather events on older adults and protect populations. CNA conducted outreach to and engaged federal, state, and local government representatives and nongovernmental agency (NGO) representatives, as well as other experts.

Data analysis and coding

CNA used NVivo (released March 2020), a statistical and qualitative data analysis software, to code academic articles, government reports, and stakeholder interview responses. This software allowed for uniform tagging, collating, and management of information from the wide range of sources. Because of the volume of data analyzed, the uniform application of coding minimized erroneous linking of themes to data points.

CNA developed two codebooks (one for the stakeholder responses and a thematic codebook for the academic articles, reports, and stakeholder responses) to distinguish the findings. The codebooks were used to compare data that linked specific coded documents or stakeholder comments to topic areas. Two important benefits of this linkage were to define the body of evidence and identify gaps in the information we collected for each finding.

The thematic codebook was used to identify common themes, intersectionality between affected areas and risks, correlations, and more. Using the data from both codebooks, CNA generated a word cloud to create a snapshot of the key words and themes in the research (Figure 5).

Figure 5. Climate-related effects on older adults

Source: CNA-generated word cloud, 2023.

BACKGROUND

Older adults are more vulnerable to climate-related extreme weather events because of aging immune systems and chronic and underlying conditions.

Climate-related extreme weather events are increasing in frequency, severity, and cost,[8] and extreme weather is the new normal. Meanwhile, the older adult population is growing and accounting for a larger share of the population, which will increase demand for resources and strain critical systems and support services. Older adults are more vulnerable to climate-related extreme weather events because of aging immune systems and chronic and underlying conditions. A larger older adult population will likely increase the number of individuals at risk during extreme weather events and place increased demands on emergency management services.

To prepare for the new climate reality, federal, state, and local emergency management agencies (EMAs) should expand their approach to readiness. To reduce risks to older adults, federal, state, and local EMAs should better identify the distinct needs and expectations of older adults and engage and involve them in disaster planning. They should apply the lessons they learn to mitigation strategies and emergency management plans as they strive to improve community resilience.

Natural disasters and extreme weather events rank as the top two most severe global risks to the world in the upcoming two-year period

According to WEF's *The Global Risks Report (2022)*, the planet's health dominates concerns about the next 10 years. "Environmental risks are perceived to be the five most critical long-term threats to the world as well as the most potentially damaging to people and the planet, with 'climate action failure,' 'extreme weather,' and 'biodiversity loss' ranking as the top three most severe risks."[9]

In WEF's *The Global Risks Report (2023)*, natural disasters and extreme weather events rank second, after cost-of-living crisis, in terms of the mounting consequences of current crises (i.e., global risks that are already unfolding) on the most severe global risks that many expect to play out over the short term (2 years), and third in terms of risks that are likely to be most severe in the long term (10 years).[10]

Some US regions have already experienced costly effects—"in terms of both lives lost and economic damages—from observed changes in the frequency, intensity, or duration of certain extreme events. Climate change projections show that there will be continuing increases in the occurrence and severity of some extreme events by the end of the century"; for other extremes, "the links to climate change are more uncertain."[11]

Climate-related extreme weather events are increasing in frequency, severity, and cost; extremely high disaster activity and billion-dollar natural disasters are becoming the new normal

As shown in Figure 6 and Figure 7 a significant increase in weather-related events has occurred in recent years. "These events include record-breaking heat waves, hurricanes, floods, wildfires, droughts, and increasingly severe storms."[12]

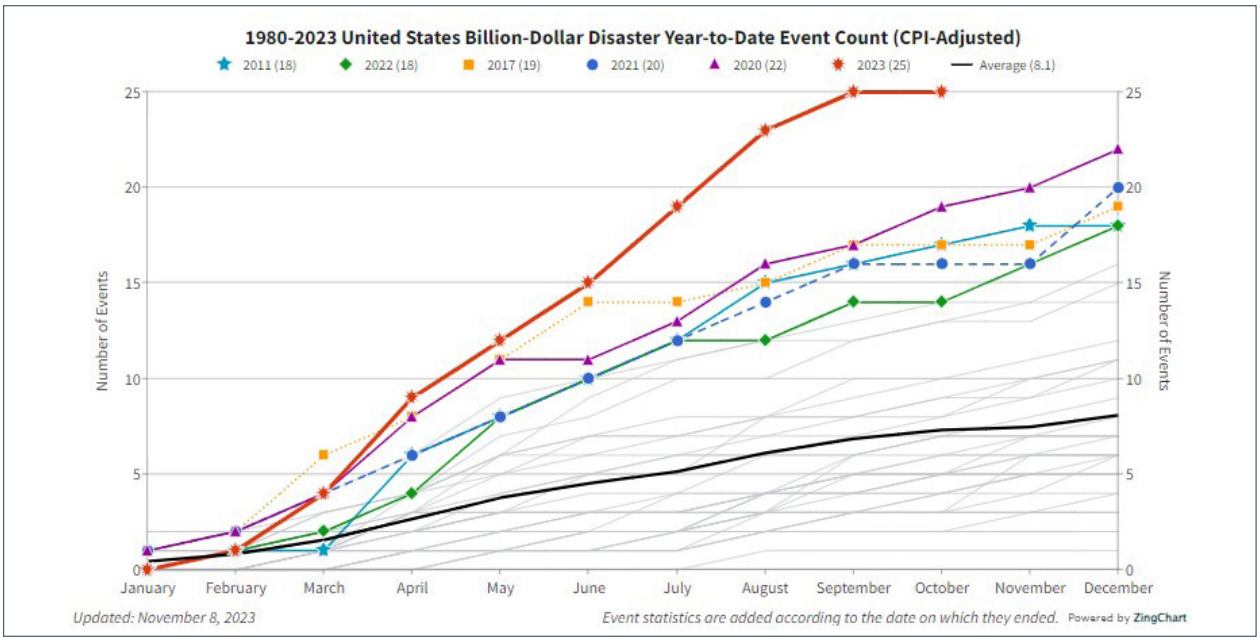
These extreme weather events are increasing in frequency, severity, and cost.[13] According to NOAA, "the US has sustained 373 weather and climate disasters since 1980 where overall damages and costs reached or exceeded $1 billion (including Consumer Price Index (CPI) adjustment to 2023). The total cost of these 373 events exceeds $2.645 trillion" (as of November 8, 2023).[14]

2022 marked the eighth consecutive year (2015–2022) in which 10 or more separate billion-dollar disaster events have affected the US. This included "18 separate weather and climate disasters costing at least $1 billion. That number puts 2022 into a three-way tie with 2017 and 2011 for the third-highest number of billion-dollar disasters in a calendar year, behind the 22 events in 2020 and 20 events in 2021."[15]

"Damages from the 2022 disasters totaled $165.1 billion. The costliest 2022 events were Hurricane Ian ($112.9 billion) and the Western and Central drought/heat wave ($22.1 billion)."[16] In 2022, Hurricane Ian was followed by Hurricane Nicole, the first hurricane to hit the US (Florida's eastern shore) during November in nearly 40 years.[17]

2022 was also "an above-average tornado year," where March 2022 had triple the average number of tornadoes reported (293) and the most tornadoes reported for any March in the 1950–2022 record.[18] The "US tornado count for 2022 was approximately 9 percent above the 1991–2020 average across the contiguous US, with 1,331 tornadoes reported."[19] In all, the 2022 disasters were associated with at least 474 deaths[20] and had significant economic effects on the areas impacted. The money spent on disaster recovery efforts can mean a loss to productive investments and gross domestic product (GDP). "Consequently, real disaster costs are growing faster than" the US GDP.[21]

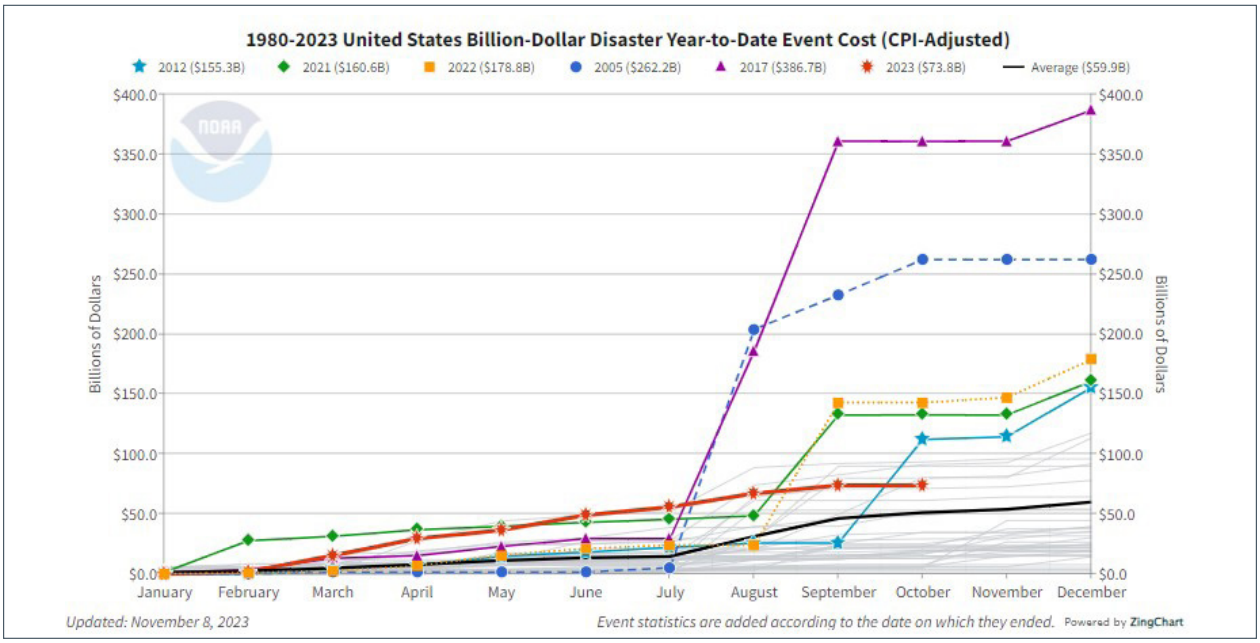
Figure 6. Month-by-month accumulation of billion-dollar disasters in the US (CPI-adjusted)



Source: NOAA image by NCEI.

Note: The colored lines represent the top six years for most billion-dollar disasters. All other years are colored light gray. Updated November 8, 2023.

Figure 7. Billion-dollar disaster event costs in the US (CPI-adjusted)



Source: NOAA image by NCEI.

Note: Updated November 8, 2023.

HURRICANE IAN (SEPTEMBER 2022):

$112.9 BILLION, 152 DEATHS

Hurricane Ian made landfall near Cayo Costa, Florida, as a Category 4 hurricane with sustained winds of 150 mph. Significant parts of coastal communities, including those along the barrier islands of Captiva, Sanibel, Pine, and Fort Myers Beach, were swept away by the high winds and storm surge. Ian slowly crossed Florida, causing significant inland flooding across central and eastern portions of the state from widespread rainfall totals of 10–20 inches.

The counties of Volusia, Orange, Seminole, and Brevard reported more than 20 inches of rainfall. "Ian re-emerged over the Atlantic as a tropical storm, increased into a Category 1 hurricane on September 30, and made landfall near Georgetown, South Carolina, with sustained winds of 85 mph causing more coastal flood damage and destroying several large piers near Myrtle Beach, South Carolina." Hurricane Ian's effect is "the first to exceed $100 billion in insured and uninsured losses in Florida."[22]

Hurricane Ian's sustained winds resulted in major flooding, damage, and loss of life. According to analyses of state fatality data, of the deaths confirmed by state authorities (November 2022), "two-thirds were people 65 years of age and older."[23]

In addition, in 2022, the US experienced an active wildfire season in which Alaska saw 1 million acres burned by June 18, 2022—"the earliest such occurrence in a calendar year" in the past 32 years. "By July 1, 1.85 million acres had been consumed—the second-highest June total on record and the seventh-highest acreage burned for any calendar month on record for Alaska."[24]

In 2023, there were 25 confirmed weather and climate disaster events, each with losses exceeding $1 billion. The disasters consisted of 19 severe storm events, 2 flooding events, 1 tropical cyclone, 1 winter storm, 1 wildfire, and 1 drought/heat wave event.[25] The first nine months of 2023 rank highest for disaster count, ahead of those of 2017 and 2020, which both saw 17 disasters. The total cost of the 2023 events exceeds $72.6 billion, and they have resulted in 464 direct and indirect fatalities as of November 8, 2023.[26]

There were several climate anomalies in 2023, including the Maui fire. The National Fire Protection Association ranked the 2023 Maui fire "among the top 10 deadliest wildfires on record since 1871."[27] In addition, 2023 saw its ninth warmest August on record, when a heat dome brought record heat and life-threatening conditions across the Plains, the Midwest, and the South. On August 30, 2023, Hurricane Idalia at Category 3 was "the strongest hurricane to hit Florida's 'Big Bend' region in more than 125 years."[28]

2023 is another active year in which the US has experienced a high frequency, high cost, and large diversity of extreme events that affect lives and livelihoods of individuals. The destructive disasters indicate "that the extremely high activity of recent years is becoming the new normal."[29]

State and local governments may be more vulnerable and less prepared for extreme weather events

More frequent, more damaging, and more expensive events will affect state and local emergency management agencies' ability to prepare. Researchers at Johns Hopkins Bloomberg School of Public Health and Trust for America's Health[30] examined states' readiness to protect residents from the health effects of climate change in light of the risk level. The team developed a set of quantitative indicators to assess each state and the District of Columbia, drawing from three domains of inquiry: (1) vulnerability, (2) public health preparedness, and (3) climate-related adaptation. American Indian and Alaska Native tribal nations and US territories were not included in the assessment because of a lack of comparable data—a serious gap that requires research.

In a 2020 report, Johns Hopkins Bloomberg School of Public Health examined states' readiness to protect residents from the health impacts of climate change in light of the nature and level of risks that they face. Hopkins researchers found Arizona, California, Florida, and Missouri to be in the "most vulnerable" category. California has experienced record-breaking droughts and high temperatures, coupled with wildfires and mudslides. At least three-quarters of California's 20 most destructive fires—measured by the number of structures destroyed—have happened since 2015. According to California's Climate Adaptation Strategy, "2022 was a year of unprecedented extremes in California, dominated by extreme heat and drought and ending with flooding."[31] States in the Southeast have felt powerful hurricanes such as Hurricane Harvey, which resulted in four feet of rain in Houston, and Hurricane Maria, which devastated Puerto Rico in 2017.[32] In Florida, in 2022 Hurricane Ian was followed by Hurricane Nicole, the first hurricane to hit the US (Florida's eastern shore) during November in nearly 40 years.[33] Hurricanes Ian and Nicole both made landfall in Florida in the span of only four weeks. "Numerous cities and towns were beginning the disaster recovery process after Ian only to experience more damage from Nicole."[34] Florida and other coastal communities are particularly at risk. Another study found that both the number and the percentage of adults older than 65 who live in coastal communities—areas highly vulnerable to weather events—will rise to over a third of the population by 2100.[35]

As older Americans account for a larger share of the population, more people will likely face vulnerabilities and increased risk during natural disasters

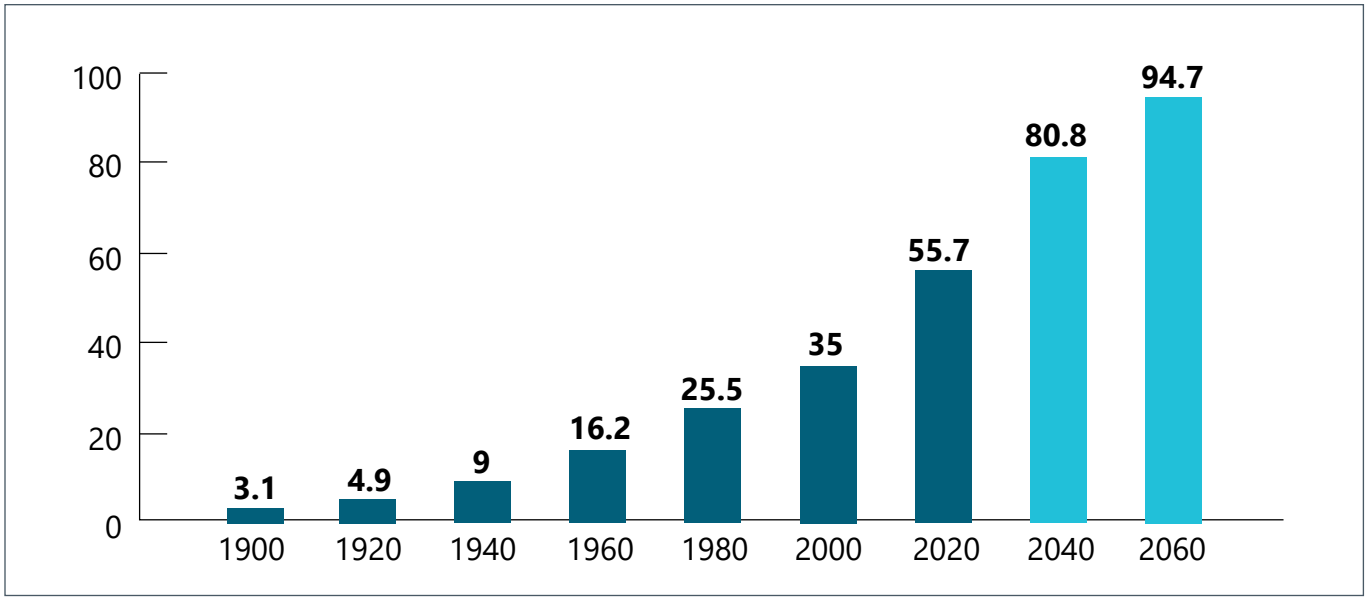
"Some types of extreme weather and climate events have increased in frequency or magnitude, but populations and assets at risk have also increased, with consequences for disaster risk."[36] As shown in Figure 8, one growing population is that of individuals 65 and older (*older adults*, as defined by the National Institutes of Health).[37]

A steadily increasing older adult population will mean a greater number of individuals at risk during natural disasters; it will mean more individuals to plan for, to evacuate, and whose lives must be rebuilt following a natural disaster. "As older Americans account for a larger share of our population, it will be increasingly important to understand their health-related needs and expectations"[38] before, during, and after a natural disaster.

"There are now more people over 65 than at any point in history,"[39] and the number of older adults in the US is projected to increase significantly in the coming decades. According to US Census data (2020), "1 in 6 people in the US are 65 and over."[40] The Administration for Community Living (ACL)'s *2021 Profile of Older Americans* reported that in 2020, there were 55.7 million Americans age 65 and older (17 percent of the population).[41]

"By the mid-2030s, the number of Americans aged 65 and older will top 77 million, and the US will have more retirement-aged adults than children."[42] By 2040, the number of US adults over age 65 is projected to reach 80.8 million (22 percent of the US population) and nearly 95 million by 2060.[43] The 85 and older population is projected to more than double from 6.7 million in 2020 to 14.4 million in 2040 (a 117 percent increase).[44] In sum, the nation's older adult population "is projected to double in size from 46 million" (2014) to between 95 and 98 million (2060).[45]

Figure 8. Number of persons 65 and older, 1900–2060 (projected)



Source: US Census Bureau. Population Estimates and Projections.

A growing older adult population, increasing extreme weather events, and a gap in the health care workforce will increase demand on resources

A growing older adult population will increase demand on resources. The health care system is facing an increased demand for accessible health care facilities, prescription medication, necessary medical equipment, assistive technologies, support services, and caregivers. The demand is creating a critical situation that will exacerbate the drivers of insecurity and the need for multiple services.

The increase in the aging population will also increase the demand for aides to assist those with the chronic health conditions and disabilities associated with an older population.[46] Critical roles such as home health aides, nursing assistants, medical and clinical lab technologists, medical and lab technicians, nurse practitioners, physicians, and surgeons will experience slow growth and staffing gaps.[47]

In 2017, the Bureau of Labor Statistics projected health care jobs will be among the fastest growing in the US through 2026, accounting for about 2.3 million new jobs.[48] In 2022, the agency forecast that health care and social assistance sectors would add about 2.6 million jobs from 2021 to 2031, the most of any sector. Within this sector, the individual and family services industry is projected to add the most employment over the projections period—approximately 850,000 jobs—and is expected to have the fastest annual employment growth of all health care and social assistance industries at 2.8 percent. Employment growth in this industry and other health care and social assistance industries is expected to be driven by the aging baby boomer population and a higher prevalence of chronic conditions.[49]

In 2018, prior to the COVID-19 pandemic, the

> shortage was of concern to maintaining health care quality; it has since contributed to increases in doctors and nurses leaving their jobs, with 8 percent of doctors closing their practices altogether in 2020—an estimated loss of 16,000 practices. The reduction in health care providers amid the pandemic only worsened the shortage. Staffing shortages also further exacerbated the vulnerabilities of congregate care facilities' residents and staff.[50]

More targeted research on the effects of extreme weather events on older adults is needed to help EMAs and communities better plan for emergencies and disasters

Insights from research can be used by federal and local governments to respond more effectively to disasters and develop new programs to help older adults affected by extreme disasters. Although there is some progress toward including older adults and at-risk communities, those researchers conducting and developing mitigation and adaptation plans and disaster preparedness guidance do not sufficiently prioritize the risks to older adults. Although a growing body of evidence reports the adverse effects of heat on the health of older adults, research gaps remain for other climate-related risks. While some organizations are prioritizing research and supporting legislation, more research and longitudinal studies on this subject are needed to better understand the distinct requirements of the growing older adult population in federal and local emergency management and disaster preparedness plans.

CHAPTER 1. HEALTH

Extreme weather events have detrimental effects on the older adult population and other at-risk, susceptible, marginalized, or underserved groups.

Due to aging immune systems and chronic and underlying conditions, older adults face vulnerabilities and increased risk of injury and mortality during extreme weather

Extreme weather events and other consequences of climate change affect everyone, but can have detrimental effects on the older adult population and other at-risk, susceptible, marginalized, or underserved groups. "Older adults (i.e., individuals ≥ 65 years of age) are identified as a population that is especially vulnerable to" climate-related extreme weather events.[51] "Physiological, psychological, and socioeconomic factors contribute to this vulnerability," including the higher prevalence of preexisting medical conditions and access and functional needs; "their higher sensitivity to extreme heat; their increased social isolation"; and their fixed financial status.[52]

Extreme weather events disproportionately affect the health of older adults due to aging immune systems. Older adults with chronic conditions—particularly those suffering from respiratory disorders, congestive heart failure, and diabetes—are at elevated risk. The *Lancet Countdown on Health and Climate Change: Responding to Converging Crisis (2020)* report described older adults as a vulnerable population experiencing "excess morbidity and mortality" associated with extreme weather, such as heat waves, wildfires, and hurricanes,[53] and there is increased risk of hospital admissions due to injuries and an increased risk of death.

For example, most of the victims who lost their lives to the 2018 California Camp Fire were older adults (60). Two-thirds of "North Carolinians who died in Hurricane Florence were older adults (60+), and almost half were 70 years or older," according to FEMA and AARP.[54]

The consequences of climate change affect the physical and mental health of older adults in different ways:

- According to the IPCC, older adults have several physiological and social risk factors that impair compensatory responses to sustained high temperatures and "decreased ability to thermoregulate (i.e., maintain temperature within the narrow optimal physiologic range)."[55]
- According to the *Journal of Nurse Practitioners*, "older adults are more vulnerable to extreme weather events" due to a "propensity for dehydration because of their decreased sense of thirst and lower body fluid content."[56] The tendency to have suppressed thirst impulse results in "dehydration and increased risk of heat-related illness. In addition, multiple diseases and/or drug treatments increase the risk of dehydration."[57]

- Natural disasters can result in respiratory and cardiovascular harm. "Heat, temperature variability, and air pollution increase mortality risks in older people, especially from cardiovascular and respiratory diseases."[58] "Extreme heat and cold weather events disproportionately" affect "the cardiovascular and respiratory mortality of older adults."[59] These events can lead to injury, illness, or death, and are linked with "psychological harm in older adults who experience the highest morbidity and mortality during heat waves."[60]
- "Older adults with chronic health conditions" are especially at risk and face exacerbating or increasing chronic health conditions during extreme weather events.[61] Older adults with chronic health conditions such as cardiovascular disease, hypertension, obesity, type 2 diabetes, and chronic kidney disease are especially at risk for disease exacerbations during times of temperature extremes, high stress, and limited resources. Those with dementias (e.g., Alzheimer's disease or vascular dementias) "are at high risk during high temperatures for exacerbation of cognitive decline and hospitalizations."[62]
- Natural disasters have long-term adverse effects on the mental health of older adults. "Severe and repeated weather-related disasters contribute to anxiety, depression, and other mental health issues."[63] "Floods are linked with increasing incidence of post-traumatic stress disorder, depression, and anxiety."[64]

Older adults with disabilities face higher risks of injury and mortality during extreme weather events

This report defines an individual with a disability using the Americans with Disabilities Act of 1990 (ADA) definition—"a person who has a physical or mental impairment that substantially limits one or more major life activities, a person who has a history or record of such an impairment, or a person who is perceived by others as having such an impairment."[65] People with disabilities includes "people with hearing, vision, cognitive, walking, self-care, or independent living difficulties."[66]

According to a Pew Research Center survey (2023) and US Census Bureau 2021 ACS data, about 42.5 million Americans are living with a disability.[67] As people grow older, the probability of living with disabilities increases. As people grow older, the probability of living with disabilities increases. According to Centers for Disease Control and Prevention (CDC) data (2020), one in four adults age 65 and older have disabilities.[68] In other words, "older Americans are significantly more likely than younger adults to have a disability. Some 46 percent of Americans ages 75 and older and 24 percent of those ages 65 to 74 report having a disability. This compares with 12 percent of adults ages 35 to 64 and 8 percent of adults under 35."[69]

According to a 2021 ACL survey, in 2020, "18 percent of adults age 65 and older reported they could not function at all or had a lot of difficulty with at least one of six functioning" areas (see Figure 9).

> Specifically, 21 percent reported trouble seeing (even if wearing glasses), 29 percent reported difficulty hearing (even if wearing hearing aids), 39 percent reported trouble with mobility

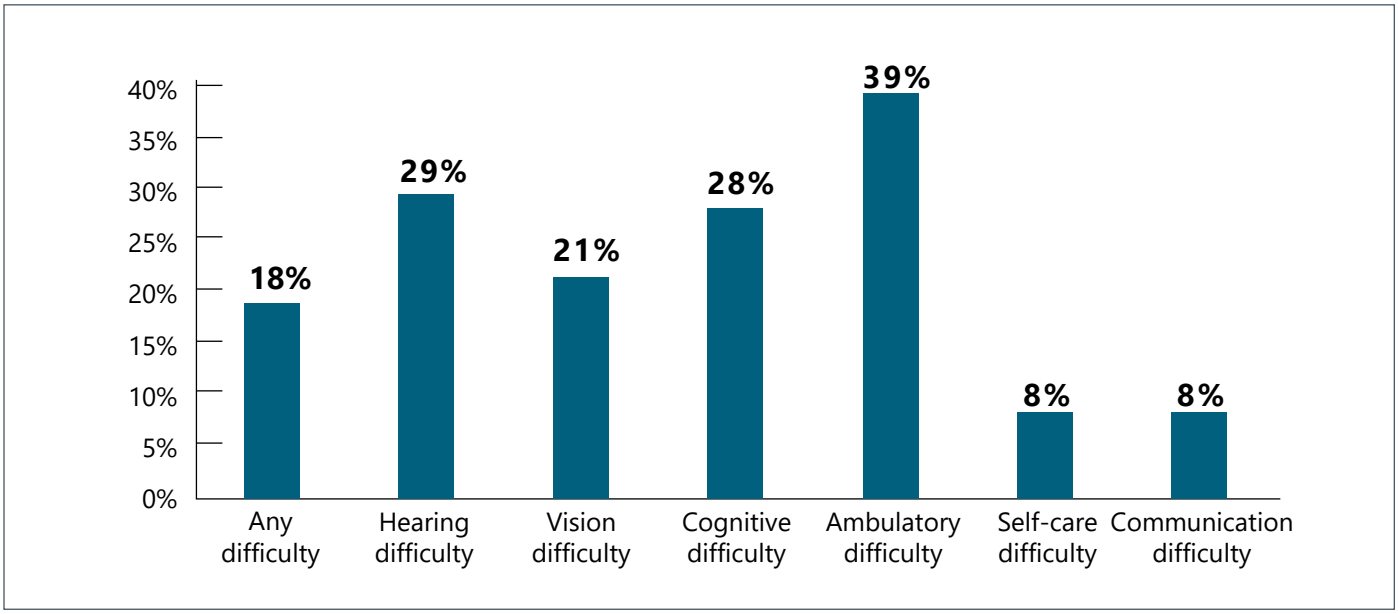
(walking or climbing stairs), 8 percent reported difficulty with communication (understanding or being understood by others), 28 percent reported trouble with cognition (remembering or concentrating), and 8 percent reported difficulty with self-care (such as washing all over or dressing).[70]

The most common types of disability in the US involve difficulties with walking and cognition.

Due to limited access and functional needs, people with disabilities are at a higher risk than most[71] when a wildfire, hurricane, tornado, severe storm, or other extreme event occurs in their community. For example, loss of power, whether short or prolonged and whether due to a wildfire, severe storm, or other disaster, significantly affects individuals whose survival depends on electronic equipment during a shelter-in-place response, such as a power outage.[72]

The global mortality rate of people with disabilities in natural disasters is up to four times higher than that of people without disabilities due to a scarcity of inclusive planning, accessible information, early warning systems, and transportation, and discriminatory attitudes within institutions and among individuals. Disasters also disrupt access to health care services, medications, oxygen, hemodialysis, personal care assistance, and medical devices.

Figure 9. Difficulty in functioning among people 65 and older, 2020



Source: US Department of Health and Human Services, The Administration for Community Living, 2021 Profile of Older Americans.

Older adults are especially vulnerable to climate-driven decreases in air quality

"Climate-driven changes are contributing to decreased air quality, increased ground level ozone and particulate matter (PM)," "prolonged pollen and allergy seasons, and increased mold growth and persistence due to increased temperatures and precipitation."[73] "Air pollution can exacerbate asthma and chronic obstructive pulmonary disease (COPD)" "and increase the risk of heart attack" in older adults, especially those who have diabetes or are obese.[74]

One major cause of air pollution is wildfires. "Wildfire smoke consists of both particles and gases, depending on what is burned, and includes carbon monoxide, carbon dioxide, hydrocarbons, ozone, water vapor, and PM." PM deeply penetrates the lungs, causing inflammation and destruction of the lung parenchyma; older adults with lung diseases are especially at risk. Wildfire ash, which contains hydrocarbons and heavy metals, can pollute the water and land after wildfires.[75] Additionally, large forest fires contribute to an increase in ozone concentrations and PM at ground level and contribute to global heating.[76]

The health effects of air pollutants produced by wildfires are significant. Short-term exposure (days or weeks) and wildfire smoke have been strongly linked to increasing severity of asthma; other respiratory diseases, such as COPD; inflammation or infections, including bronchitis and pneumonia; emergency department visits; and hospital admissions. Long-term exposure is linked to human health effects, "such as respiratory and heart-related illnesses and hospitalizations, adverse brain effects, depression, memory loss," and premature death.[77]

BUTTE COUNTY, CALIFORNIA—PARADISE FIRE/CAMP FIRE (2018)

The California Camp Fire (FM-5278-CA)[78] was declared on November 8, 2018, in Butte County, California, including the town of Paradise (population: 207,303). In Butte County, 18.5 percent of the population was 65 years of age and older.[79]

The 2018 Camp Fire was one of the deadliest and most destructive wildfires in California's history.[80] Of the 84 known fatalities, 78 were more than 50 years old.[81] The catastrophic wildfire destroyed nearly 19,000 buildings and most of the town of Paradise. The wildfires burned structures and produced a range of harmful and toxic substances. Analysis by the California Air Resources Board detected elevated levels of lead, zinc, calcium, iron, and manganese. Some of these metals traveled more than 150 miles and were detected in the air as far away as San Jose and Modesto.

Wildfires lead to smoke inhalation and many older adults are too frail to escape. "The US Fire Administration estimates that older adults are more than twice as likely than the general population to die in fires." Of the 69 bodies positively identified in Paradise, 53 (77 percent) were over the age of 65. "A quarter of Paradise residents lived with a disability, which is more than double the statewide rate." Research confirms that the physical limitations of advanced age make it "more difficult to escape disaster, but so do the social isolation and stubbornness that experts say are common among the elderly." Poverty was also a factor that compounded the risk of death.[82]

According to fire officials, Ridgewood Mobile Home Park and other mobile homes—particularly those built before tougher building regulations were enacted in 1976—burned faster as a result of the materials they were made from, like aluminum and particle board. Because of financial or physical limitations, or other priorities, property owners found it difficult to retrofit homes with fire-resistant materials and create defensible space around the property.

Extreme heat is the greatest climate risk to the older adult population

"Extreme heat is the number one weather-related cause of death in the US," and it kills more people than hurricanes, floods, and tornadoes combined. According to the Environmental Protection Agency, approximately 1,300 people die in the US every year from exposure to extreme heat. "Heat risks to human health are not often prioritized in climate mitigation and adaptation plans."[83]

Heat waves cause more deaths in the US than any other natural disaster. Averaged over 30 years (1991–2020), 138 people die in the US from heat annually, compared to 85 from floods, 69 from tornadoes, and 46 from hurricanes.

"Extreme heat is a prevalent public health concern throughout the temperate regions of the world." "As with other types of hazards, extreme heat can have disastrous consequences, particularly for the most vulnerable populations."[84] Extreme heat is the greatest climate risk to the older adult population. Older adults exposed to extreme heat can experience multiple adverse effects.[85]

Older adults who have higher incidence of cardiovascular and respiratory disorders or those with chronic conditions are at high risk. Increases in summer temperatures may expand "the risk of death in older people with chronic conditions, particularly those suffering from congestive heart failure and diabetes. The percentage of older adults with diabetes, which puts individuals at higher risk for heat-related illness and death, has increased."[86]

The CDC Climate and Health Program's Heat and Health Tracker[87] reports that "hot weather is associated with an increase in heat-related illnesses, including cardiovascular and respiratory complications, renal failure, electrolyte imbalance, kidney stones, negative effects on fetal health, and preterm birth. Specifically, death rates are noted to rise during and after heat waves."[88]

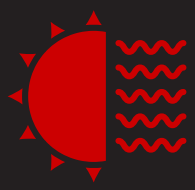
In other words, increases in temperature may increase the risk of death. Older adults "experience

Vehicle dashboard showing a temperature of 127 degrees inside a vehicle during a heat wave in Phoenix, Arizona, in 2023. *Photograph by Leola A. Abraham (CNA).*

EXTREME HEAT IS THE NUMBER ONE WEATHER-RELATED CAUSE OF DEATH IN THE US, AND IT KILLS MORE PEOPLE MOST YEARS THAN HURRICANES, FLOODS, AND TORNADOES COMBINED.

the highest morbidity and mortality during heat waves."[89] Climate-driven changes are contributing to "heat-related illnesses (e.g., heat exhaustion or heat stroke) and death."[90] During the past 20 years, heat-related mortality in people older than 65 years has increased 53.7 percent, "reaching a total of 296,000 deaths in 2018."[91] A 2023 report published in the *Lancet Countdown* found that adults older than 65 years, for whom extreme heat can be particularly life-threatening, are now exposed to twice as many heat wave days as they would have experienced in 1986–2005. The report found that heat-related deaths of people older than 65 years increased by 85 percent compared with 1990–2000, based on changing temperatures and demographics.[92]

In the coming decades, extreme heat events are projected to become more frequent, more intense, and longer lasting. "Extreme heat events are increasingly far outside the historical record because of climate change."[93] Heat not only endangers health but also contributes to droughts and wildfires.



ARIZONA HEAT WAVE (2023)

In July 2023, the record-breaking heat affected more than 20 states and up to 120 million people, according to the National Weather Service.[94] Phoenix, Arizona broke extreme heat records with temperatures of 100 degrees or above for 31 days in a row. The city of Tucson had temperatures of 100 degrees or above for 45 days straight, reportedly the longest streak on record.[95]

According to the Maricopa County Department of Public Health Epidemiology and Informatics, 579 heat-associated deaths were confirmed, with 56 under investigation as of November 4, 2023, compared to 386 deaths in 2022. Moreover, 61 percent of the deaths were individuals at or over the age of 50. For heat-associated indoor deaths, 85 percent were associated with nonfunctioning air conditioners.[96]

To address populations who spend time outdoors, many of whom are older adults, Maricopa County, where Phoenix is located, coordinated a regional response with partners and set up cooling and hydration stations. Cooling centers are located in community centers, churches, and other community-based organizations that provide water and a safe indoor place during the day for refuge from the heat.[97] The city is also planning tree planting and other heat mitigation initiatives for fall 2023.

Most heat-related morbidity and mortality should be preventable with improved mitigation, preparedness, and avoidance of exposure. Communities experiencing extreme heat can implement measures such as cooling centers and programs to purchase or replace air conditioners to prevent heat-related deaths. In FY 2023, Congress reauthorized the Low Income Home Energy Assistance Program (LIHEAP)[98] to help families with their household energy costs, and to promote the use of efficient air conditioning equipment, support community cooling centers, and more. LIHEAP is tailored to households with low incomes, particularly those that have a high home energy burden (percentage of income that goes to heating and cooling bills) and/or have members who are elderly, disabled, and/or a young child.

Climate change may increase exposures to pathogens in older adult populations

Climate-driven changes are contributing not only to heat-related illnesses (e.g., heat exhaustion, heat stroke) but also vector-borne diseases.[99] The changes in the distribution of disease vectors like ticks and mosquitoes that are expected to result from climate change may increase exposures to pathogens in older adult populations.

Some vector-borne diseases, notably mosquito-borne West Nile and St. Louis encephalitis viruses, pose a greater health risk to sensitive older adults with already compromised immune systems. Climate change is also expected to increase exposure risk to waterborne pathogens in sources of drinking water and recreational water. "Older adults have a higher risk of contracting gastrointestinal illnesses from contaminated drinking and recreational water and suffering severe health outcomes and death."[100]

Additionally, flooding and extreme precipitation can affect the health and well-being of older adults. Flooding effects include the spread of infectious disease and overgrowth of indoor and outdoor molds and fungi in buildings, which can exacerbate allergies in older adults with asthma, emphysema, or COPD and result in increased emergency services and hospitalizations.

More people will likely be affected by acute mental health effects as a result of increasing natural disasters and extreme weather events

Extreme heat, wildfires, "hurricanes, and other severe weather events lead to physical, mental, or emotional trauma before, during, and after the event."[101] It is likely that more people will be affected by acute mental health issues due to increasing natural disasters and extreme weather events.[102]

Rising temperatures, precipitation extremes, extreme weather events, and sea level rise have led to increases in exposures to extreme heat events, poor air quality, reduced food and water quality, changes in infectious agents, and population displacement. These effects have "led to an increase in heat-related and cardiopulmonary illnesses," vector-borne diseases, and mental health issues.[103]

> Trauma and shock can lead to anxiety, depression, phobic and somatic impairment, and substance use disorders. Without intervention, people may begin to experience post-traumatic stress disorder (PTSD) symptoms and increase in suicidality. PTSD is more likely to occur in people who have lost loved ones, property, or things of personal value.[104]

Although the physical health consequences of climate change are researched, the mental health effects of climate-related extreme weather events are often overlooked.[105] "Correlating climate change and mental health is challenging for several reasons, including local and global stigma and under-reporting, differences in health systems, and variations in cultural understandings of well-being. Partly due to this difficulty, the literature has focused on extremes of heat, with investigations reporting correlations between higher temperatures and heat waves and the risk of violence or suicide."[106] More research is needed to determine the impacts to mental health.

Existing shortages of health care workers exacerbate risks to individuals who require immediate care during disasters

A growing older adult population, increasing extreme weather events, and a shortage of health care workers, including nurses, can increase risk to older adults during an extreme weather event where emergency services are stretched. The US health care system is experiencing a high demand for emergency care and a decrease in its workforce. This gap will increase risk and exacerbate poor outcomes for older adults "and people with disabilities during disasters when demand for acute emergency care is heightened."[107]

A 2018 Mercer report[108] revealed potentially severe shortages of nurses could develop in the next five years as a result of high turnover. Mercer projects that by 2025, demand for health care workers will outpace supply. In its US health workforce analysis, Mercer estimated that there will be "a shortage of 446,000" home health aides, nearly 100,000 medical and laboratory technicians, 95,000 nursing assistants, and 30,000 nurse practitioners.[109]

Research has shown that several groups play key roles in supporting older adults during natural disasters.

> Nurses and advanced practice providers play key roles in ensuring timely screening for climate-related mental health effects in vulnerable populations and in implementing effective interventions to limit the long-term effects caused by the acute psychological trauma and chronic psychological trauma associated with the consequences of climate change.[110]

The health staffing shortage is placing pressure on an already overwhelmed US health care system by reducing access to providers, including direct service providers (DSPs). People with chronic health conditions and individuals who rely on DSPs for day-to-day support are often more vulnerable to health complications and disproportionately affected by health care and DSP shortages. Without support, individuals can experience a decline in health status, face unnecessary hospitalizations as a result of compromised care, or have increased need for emergency services. "Existing shortages in health care workers exacerbate risks to individuals who require immediate care during disasters and are not able to obtain the assistance they require," leaving those individuals and their caregivers with reduced support during and after disasters.[111]

Shortages of health care specialists, direct care workers, lifesaving medical supplies, and accessible, affordable housing all exacerbate risks for older adults who often require specialized care before, during, and after natural emergencies and disasters. Federal, state, and local EMAs need to

better understand how the changing climate and extreme weather events are affecting the health and well-being of older adults. They need to determine what this growing population needs, what actions to take, and what policies and programs to implement to mitigate risks and prepare for, respond to, and help older adults recover from disasters.

Recommendations

Federal recommendations

1. Congress should require federal, state, and local EMAs to clearly identify the distinct needs of older adults and their barriers to evacuation and integrate those needs into disaster preparedness planning to minimize risks to older adults during natural disasters.
2. Congress should continue to fund LIHEAP to help families with their household energy costs, including summer cooling, and to promote the use of efficient air conditioning equipment and community cooling centers.[112]
3. Congress should pass legislation to address the shortage of primary care doctors and other health care providers. The legislation should address shortfalls in the nation's supply of health care providers and incorporate inclusive recruitment for a diverse health care workforce, loan forgiveness that encourages health care providers to work with underserved populations, and other innovative targeted incentive measures.

State recommendations

4. State and local governments should plan for extreme heat by setting up cooling centers that provide water and a safe indoor refuge from the heat in community centers, churches, and other community-based organizations.
5. State and local governments should continue to develop education programs and train first responders to identify acute psychological stress and the potential for chronic mental health effects on older adults following a natural disaster.
6. State and local governments should encourage and develop training for public health professionals on emergency preparedness and increase the involvement of health care providers in preparedness and mitigation efforts to improve health outcomes.

CHAPTER 2. HOUSING AND LOCATION

Older adults tend to have resided in their homes longer and therefore have older homes, which may require maintenance and may lack modern climate-related features, such as fire-resistant siding or other climate-responsive design elements.

Older adults are particularly vulnerable to climate change–related health effects based on the characteristics of their homes, such as the age, quality of construction, and amenities

Many US buildings and homes were not designed for future conditions or even current climate change–related extreme weather, and growing flood and fire activity is forcing residential and commercial insurers to leave coastal states like California, Florida, and Louisiana. Older homes were not built with the climate in mind, lack climate-change adaptive features, and may not meet modern building codes, placing older adults at increased risk during natural disasters.

In 2019, for homeowners age 75 and older, "the median home construction year was 1972, compared to 1979 for all homeowners."[113] According to the Joint Center for Housing Studies at Harvard University, "older adults tend to have resided in their homes longer and therefore have older homes," which may require "maintenance and may lack modern climate-related features, such as fire-resistant siding or other climate-responsive design" elements.[114] "Among the homes owned by people age 75 and older, 3 percent had moderate to severe problems with plumbing, heating, electric, wiring, and/or upkeep."[115]

"Housing can protect against or exacerbate the effects of extreme heat through mechanisms, such as insulation, thermal mass, ventilation, shading of the home, high ceilings, and having cooler rooms" (e.g., basements or rooms with air conditioning or fans). Air conditioning has been widely adopted as the main adaptation strategy to mitigate extreme heat exposure indoors and is extremely important in reducing the incidence of poor health outcomes during extreme heat. Central air conditioning is more effective in overcoming internal thermal loads during extreme heat and cooling indoor environments compared to portable or window units.[116]

"In the US, there are disparities in home air conditioning by race and by age of the home (with older homes less likely to have air conditioning)."[117] Individuals who are most vulnerable to the health effects of extreme heat are less likely to have access to or utilize air conditioners. "Even in cities with widespread air conditioner use, nearly 40 percent of heat-related deaths happen indoors as a result of a variety of factors, including nonfunctioning air conditioning units, lack of electricity, and disabling air conditioning units to avoid high financial costs."[118] "In buildings without adequate cooling systems, people may be exposed to elevated indoor temperatures, thus increasing the risk of heat-related health effects."[119]

Despite the dependence on air conditioning for cooling during extreme heat, one of the many protective factors often studied with

regard to heat stress is the role of buildings. Depending on the building architecture, design, orientation, materials, and ventilation, extreme temperatures may be exacerbated indoors, as compared to outdoor temperatures during extreme heat events due to internal heat loads and the building's thermal mass.

The change in climate means states that did not previously need amenities such as air conditioners may now require them. Older residential structures in traditionally milder climates that were designed to retain heat in cold months may face difficulties as average temperatures increase. A greater vulnerability to extreme heat can exist "among older adults living in homes built before 1940 and in cities with lower rates of residential air conditioning use."[120] One notable example is the June 2021 Excessive Heat Event in the Pacific Northwest, where at least 83 people lost their lives to hyperthermia or elevated body temperature; most lived alone in homes with no working air conditioning or fans. According to the State of Oregon's Initial After-Action Review of the June 2021 Excessive Heat Event, unlike other hazards, excessive heat (and the magnitude of the June event) is not a hazard Oregon had a history of experiencing.[121] Since older adults generally spend most of their time inside their homes, federal, state, and local officials developing preparedness plans should note these issues.

Multiple factors disincentivize older adults from making home improvements to prepare for extreme weather

Although older adults may own their homes, they also tend to live on fixed incomes from savings, pensions, or Social Security. As the cost of living and inflation skyrocket, limited income, taxes, and medical costs may prohibit older adults from making home improvements to meet modern standards and prepare for extreme weather events.

According to the US Census Bureau, "the homeownership rate (the percentage of all occupied housing units that are owner-occupied) is the highest among people ages 65 to 74 (79 percent)."[122] According to the US Bureau of Labor Statistics (2016), "housing was the greatest expense in dollar" amount and as a share of total expenditures for older households (55 and older).[123] "In 2019, the median value of homes owned by older persons was $200,000 (with a median purchase price of $75,000). In comparison, the median home value of all homeowners was $230,000 (with a median purchase price of $150,000)."[124]

For older adults still renting, they must contend with rising rental prices. The US Census Bureau ACS (2017–2021) reported that "over 19 million US renter households spent more than 30 percent of their income on housing costs in 2021."[125] Paying more than 30 percent of income on rent is considered a cost burden. Nearly half of the counties where renters had the highest median housing cost ratios were in the South. Florida was among the "states with the largest number of counties where renters' median housing costs exceeded 30 percent of their income."[126]

In addition to cost concerns, older adults may be reluctant to adapt their homes to modern standards because of a lack of trust or fear of fraud when engaging with contractors. During interviews, stakeholders noted that older individuals are often unsure of where to turn for trusted contractors; this deficit was especially pronounced during the height of the COVID-19 pandemic, when the costs of contractors were high, trust was low, and availability was scarce because of slowed supply chains.

Finally, some older adults view climate change as a "young person's problem" and think that they will not have to worry about climate-related extreme weather events directly affecting their health, homes, and livelihoods. Older people who believe that climate change will not have significant impacts in their lifetimes are less inclined to update their houses to mitigate climate impacts. Others dismiss that climate change is causing storms and other weather events to become more extreme.[127]

Geographic location is a factor in how extreme weather events affect older adults

More than half of older adults in the US live in areas that disproportionally experience the effects of heat waves, forest fires, hurricanes, and coastal flooding. More than half of the older US adult population "is concentrated in 170 counties" (5 percent of all 3,143 US counties), and about 20 percent of older Americans live in counties "in which a hurricane or tropical storm made landfall over the last decade."[128]

California and Florida are among the top five states where older adults are concentrated. "Florida is a traditional retirement destination with an older adult population accounting for 16.8 percent of the total in 2010, nearly 4 percentage points higher than the national average."[129] The increasing severity of tropical storms may pose particular risks for older adults in coastal zones. At least 10 percent of the US population lives in 500-year floodplains, according to New York University Furman Center, which now flood much more frequently than historically predicted. Yet developers continue to build in locations known for flooding and natural disasters.

"Other geographic risk factors common to older adults are the urban heat island effect, urban sprawl (which affects mobility), characteristics of the built environment, and perceptions of neighborhood safety."[130] Increased urbanization (more people concentrated in fewer counties) and an increasingly aging population may lead to increased heat-related health issues.[131]

"According to the United Nations Population Division, 68 percent of the planet's population will live in urban areas by 2050, up from 55 percent in 2018."[132] Extreme heat is a danger to all segments of society, but people in dense urban environments suffer the most. Urban centers tend to have a high density of buildings, paved roads, and parking lots—all of which absorb and retain heat. The connection between urbanization and heat risks will become urgent as people move to urban areas.

In large metropolitan areas, disease incidence among older adults is expected to increase even in regions with relatively modest temperature changes. Heat waves combined with urban heat islands can result in large death tolls, with older adults, the unwell, the socially isolated, and outdoor workers being especially vulnerable, although acclimatization and heat health-warning systems can substantially reduce excess deaths. Heat waves pose a challenge for major cities. In urban areas, heat waves also have negative effects on air quality and the number of days with high pollutants, ground level ozone, and suspended particle concentrations. Urban expansion into flood-prone areas increases flood risk, since more people live in those areas. Flooding can also affect mental health when individuals face the destruction of their homes and livelihoods.

Social isolation increases risk during natural disasters since the population living alone increases with advanced age

Social isolation is a well-documented issue among older adults. About 27 percent (14.7 million) of all older adults living in a community (noninstitutionalized) in 2020 lived alone (5 million men, 9.7 million women). They represented 20 percent of older men and 33 percent of older women. The proportion living alone increases with advanced age for both men and women. "A relatively small number of people (1.2 million) age 65 and older lived in nursing homes in 2019. The percentage increases with age, ranging from 1 percent for ages 65–74, 2 percent for ages 75–84, and 8 percent for" those 85 plus.[133]

Social isolation enhances risk during natural disasters, since the population living alone increases with advanced age.

> Older adults who live in rural areas may be isolated, have limited social networks or family supports, and/or have fewer economic resources than those living in more urban areas. Rural-residing older adults are often exposed to a greater level of danger during disasters, have greater risk of experiencing life-threatening challenges when trying to evacuate or relocate, and are less likely to receive disaster warnings.[134]

EMAs and organizations such as the American Red Cross recommend that older adults living alone create a contact list of people who can help during an emergency.[135] Older adults living alone should list family, friends, and neighbors, as well as out-of-town contacts, and carry the contact list in their wallet. In addition, older adults should identify which television and radio stations broadcast on the Emergency Alert System and determine which special radios and other communication apps provide early warnings of emergencies. While providing disaster preparation guidance is important, state and local EMAs should use technology to better identify individuals living in isolation; better communicate response and evacuation plans, routes, and meeting places; and provide transportation for those who do not own a vehicle or drive.

Recommendations

Federal recommendations

1. Congress should pass legislation to provide incentives to older adults for home improvements, such as air conditioning, in preparation for extreme weather to protect the growing older adult population who face inflation and increasing costs of living.

State recommendations

2. States that have not previously prepared for extreme weather, such as extreme heat, should prepare for all unforeseen climate change–related scenarios. State and local EMAs should conduct scenario planning and exercises to better prepare.

3. State and local EMAs should plan for extreme heat by determining whether health-warning systems can substantially reduce excess deaths.

4. State and local EMAs should continue to leverage technology and data, such as ArcGIS mapping tools and NOAA's National Centers for Environmental Information Climate Data Online, to better understand where individuals living in isolation are located and how best to provide access in a disaster.

CHAPTER 3. ECONOMIC EFFECT

Older adults experience more difficulty recovering fro.m a disaster than younger persons, particularly if they have limited individual, social, and financial resources.

The increase in extreme weather events is resulting in significant social and economic costs to older adults

As the cost of living increases, including the cost of food, housing, and medical out-of-pocket costs, older adults who live on fixed incomes will be less likely to afford health care, medicine, and home upgrades to prepare for a disaster or rebuild or relocate following a disaster. They are also facing poverty and working past retirement age.

Older adults often live off fixed income from savings, pensions, or Social Security. In a US Census Bureau report (2018), Social Security (90 percent) was the most common type of household income received among the population 65 and older.[136] The median income of older persons was $27,398, and family households headed by persons age 65 and older reported a median income of $70,254.

The costs of living and health care are increasing. In 2019, older adults (65 and above) "averaged out-of-pocket health care expenditures of $6,833," up 41 percent from 2009. In addition, about "1.1 million people age 60-plus were responsible for the basic needs of at least one grandchild under age 18 living with them."[137]

As the costs of electricity and utilities increase,[138] older adults may face tough choices about whether they can afford to heat or cool their homes. There are several benefit programs to help older adults with disabilities pay for energy and utilities. Programs such as LIHEAP, Weatherization Assistance Program, and other forms of emergency assistance are available to older adults,[139] and these programs should continue to be funded.

The cost of living crisis, inflation, and energy prices can be linked to increased poverty.[140] "In 2019, nearly 1 in 10 people age 65 and older (8.9 percent or 4.9 million) lived below the poverty level." "Another 2.6 million or 4.4 percent of older adults were classified as 'near poor' (income between the poverty level and 125 percent of this level). A higher percentage of older persons living alone were poor (16.1 percent) compared to older persons living with families (5.3 percent)."[141]

Further, older adults continue to work past retirement age. In 2018, "around 30 percent of males and 22 percent of females ages 65 to 74 were in the labor force."[142] However, during the COVID-19 pandemic, between March and April 2020, the unemployment rate for adults age 65 plus more than quadrupled.[143] Although "the percentage of people in poverty was lower for the population age 65 and older than for the total population, a higher percentage of older women (about 11 percent) than older men (about 7 percent) were in poverty."[144]

"In general, older adults may experience more difficulty recovering from a disaster than younger persons, particularly if they have limited individual, social, and financial resources."[145] Older adults are "more likely to suffer significant financial losses after a disaster than younger groups and frequently

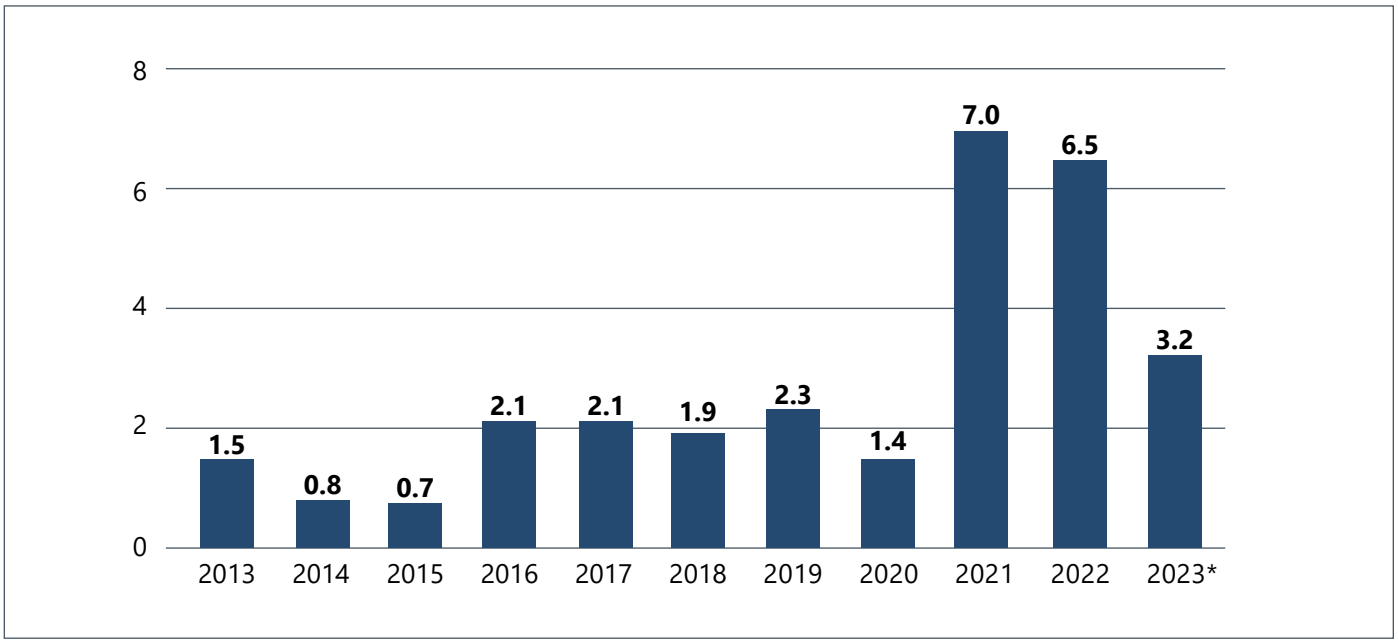
cannot absorb disaster-related expenses because of preexisting financial constraints, shorter time horizons, and an inability to recoup losses."[146]

The longer term economic effect of storms can also fall more heavily on older residents. Only a fifth of renters and a third of homeowners in the AARP survey said they were "very confident" that they could rebound financially from a natural disaster. "Low-income renters without insurance to cover their losses are among the most at risk; for homeowners, rebuilding can take years" and provide "opportunities for scammers that target the elderly."[147]

Older adults who may need to purchase new homes after a natural disaster will be affected by higher interest rates. According to the *WEF Global Risks Report 2023*,[148] global mortgage rates have reached their highest levels in more than a decade. Some estimates suggest that the increase in rates amounts to a 35 percent increase in mortgage payments for homeowners. Rent inflation also increased before easing, disproportionately affecting lower socioeconomic groups who are more likely to rent but least able to afford rental price hikes. "Retirees will also be affected as pensions fail to keep pace with higher inflation."[149] Higher costs can result in trade-offs in spending choices and worsen health and well-being for communities (see Figure 10).

Extreme weather events also affect communities. The health risks associated with climate change—

Figure 10. United States annual inflation rates, 2013–2023



Source: US Inflation Calculator, "Current US Inflation Rates: 2000–2023."

death, illness, disruptions to care from disasters, and lost workdays—carry a steep economic cost. The Natural Resource Defense Council and the University of California, San Francisco recently teamed up to quantify that cost. The costs of just 10 climate events in 2012, including wildfires in California, Lyme disease in Michigan, and algal blooms in Florida, among others, totals about $10 billion in health costs across the US. About 65 percent of the illness costs were paid for by Medicare and Medicaid, pointing to the outsized harm of climate change to older adults and low-income people.

Insurance costs have increased, but in some states insurance options have decreased, putting older adults at risk of being uninsured

Extreme weather is threatening older adults' abilities to protect their homes and property. The cost of insurance in states most affected by disasters is increasing for homeowners and for landlords who rent to older adults. Data show that millions of low-income seniors who rent are cost burdened, meaning they pay more than 30 percent of monthly income on rent and utilities[150] (see Figure 11). In general, seniors may forgo insurance due to the cost and may leave their property uninsured and in disrepair following a disaster such as flooding. This could lead to foreclosure, health issues such as mold, or other concerns.

As insurance companies are identifying risk exposure to extreme weather, such as stronger, more intense hurricanes and wildfires and the high costs associated with them, insurance companies are leaving states such as Florida, California, and Louisiana, affecting thousands of people. Florida has among the highest homeowner's insurance premiums in the US. Insurance rates in Florida almost doubled in the past five years. The average annual cost of a "Florida homeowner's insurance policy increased to $4,231 in 2022, nearly three times more than the US annual average of $1,544, according to an Insurance Information Institute analysis."[151]

Although individuals continue to live in high-risk areas such as floodplains, most homeowner's insurance neglects to cover flood damage. The National Flood Insurance Program (NFIP), managed by FEMA, offers flood insurance to property owners, renters, and businesses.[152] According to the Association of State Floodplain Managers, the NFIP minimum standards, the basis of flood codes across the country, have not been updated in 45 years, making it difficult to design resilient buildings, and the US lacks consistent flood design standards for infrastructure. Although FEMA is updating its flood maps, evolving its flood hazard data, and "working on a new rating methodology for flood insurance," state and local governments must still adopt them into laws that inspectors can use to measure the safety of buildings.[153]

Some states are developing hazard mitigation plans to support insurance. The Missouri State Hazard Mitigation Plan 2023, Goal 3.4, supports the NFIP, Community Rating System (CRS), earthquake insurance, and other programs that reduce the effects of property disasters. Other mitigation measures—buyouts, floodproofing, insurance awareness, implementation of higher regulatory standards, adoption of building codes, participation in the CRS Program, and pre-staging of emergency response resources to reduces losses—would mostly benefit at-risk counties in Missouri.[154]

The American Rescue Plan includes provisions to

make comprehensive coverage more affordable and accessible, particularly for many older people. Its premium tax credits provide enormous benefits to older people, who otherwise face premiums three times higher than younger people. The Rescue Plan also includes a new financial incentive for additional states to expand Medicaid. Future legislation can further the goal of achieving universal coverage by making the American Rescue Plan's "premium tax credit improvements permanent, further lowering premiums and cost sharing and providing a federal health care plan to uninsured people caught in the 'coverage gap' in states that have not expanded Medicaid. Such changes are acutely needed to improve access to coverage and lower costs for older people but would also help people at every age."[155]

Figure 11. Millions of low-income senior renters are cost burdened

Source: Center on Budget and Policy Priorities.

Recommendations

Federal recommendations

1. Congress should pass legislation to further the goal of achieving universal coverage by making the American Rescue Plan's premium tax credit improvements permanent, further lowering premiums and cost sharing, and providing a federal health care plan to uninsured people caught in the "coverage gap" in states that have not expanded Medicaid. Recovery legislation should build on the Affordable Care Act's improvements in coverage for adults over 55.

2. To ease the pressure on older adults and other at-risk populations, the federal government should continue to fund energy/emergency assistance programs or offer fuel rebates or other assistance to adults over 65.

3. Congress should continue to fund the LIHEAP to help families with their household energy costs, including summer cooling, and to promote the availability of efficient air conditioning equipment and community cooling centers.[156]

State recommendations

4. States should develop hazard mitigation plans to support insurance, including the NFIP, CRS, earthquake insurance, and other programs that serve to reduce the effects of disasters on properties.

CHAPTER 4. EMERGENCY MANAGEMENT

The global mortality rate of people with disabilities in natural disasters is up to four times higher than that of people without disabilities because of a scarcity of accessible information, early warning systems, and transportation, and discriminatory attitudes.

PREPAREDNESS

A lack of inclusive disaster mitigation and preparedness planning can have devastating effects on older adults during extreme weather events

The research evidence suggests that "older adults, particularly those who are living with chronic health conditions, are low-income, have low literacy skills, and/or tend to disproportionately experience greater adverse outcomes during disasters and emergencies."[157] This disproportionate effect is also the result of a lack of inclusive planning.[158]

At-risk populations, such as older adults, are not consistently engaged in disaster planning. However, this population has distinct needs that should be considered during disaster planning. Their needs are related to advanced age and preexisting health conditions that increase risk during natural disasters. During disasters, older adults and individuals with disabilities may need accommodations such as "wheelchair-accessible vehicles and shelters, medication," or sign language services.[159] "The global mortality rate of people with disabilities in natural disasters is up to four times higher than that of people without disabilities" because of a scarcity of accessible information, early warning systems, and transportation, as well as "discriminatory attitudes within institutions and among individuals."[160]

The National Preparedness System is built around a whole-community approach to planning and implementing preparedness efforts. Effective whole-community planning requires federal and local emergency management agencies to involve all people, including older adults and individuals with disabilities, throughout the planning process.[161] The system can help public officials better understand a community's needs and capabilities and plan accordingly so that each group knows its roles and responsibilities for effective stakeholder collaboration. Some examples include the following:

- The Missouri State Hazard Mitigation Plan 2023 recommends including members of communities at greatest risk—and compensating them "for their involvement, when appropriate—in planning and decision-making."[162]
- An evaluation of the Hazard Mitigation Plan for Butte County, California, where the Camp Fire (2018) took place, found that social vulnerability was not mentioned in the planning. Specific Social Vulnerability Index variables should include high concentrations of elderly residents and people with disabilities and lack of access to quality housing and transportation options.[163]

- Arizona has created an Office of Heat Response and Mitigation. Phoenix, Arizona; Miami, Florida; and Los Angeles, California, have hired "chief heat officers" to raise the public's awareness about the dangers of extreme heat, to respond to heat emergencies, and to conduct more deliberate planning for heat-related incidents in the future.

A lack of inclusive disaster planning will have devastating consequences on community resilience in general, especially during extreme natural disasters.[164] On June 10, 2019, H.R.1744, the Real Emergency Access for Aging and Disability Inclusion for Disasters Act,[165] was introduced to increase investment in disaster research and technical assistance, review FEMA spending, and review accessibility compliance. The bill would allocate funding to focus on gaps in response efforts for the aging and disabled communities. Moreover, it creates coalitions of "people with disabilities and older adults to inform recommendations on best practices."[166] The bill failed to pass in 2019; although the bill was reintroduced on March 29, 2023, in both the Senate (S. 1049) and the House (H.R. 2371), it still has not passed.[167]

Despite the dangers of extreme heat on older adults, it is not listed as a qualifying event in the statutory definition of major disasters

While heat waves kill large numbers of people (and livestock, crops, and wildlife), infrastructure damage caused by them (such as melted pavement and wires) is relatively minor. Despite the dangers of extreme heat on individuals, especially older adults, it is not listed as a qualifying event in the statutory definition of major disasters. In other words, extreme heat is not on the list of disasters for which communities would be eligible for federal government assistance,[168] although it is included in the list of hazards in the Stafford Act (Section 205): "A participating entity may use funds in the entity loan fund to provide financial assistance for projects or activities that mitigate the impacts of natural hazards including—(A) drought and prolonged episodes of intense heat."[169]

FEMA is accustomed to dealing with the tremendous physical damage that major storms can cause to the built environment. The agency devotes considerable resources to deal with floods, tornadoes, and hurricanes, but little for heat. FEMA primarily focuses on declaring disasters and emergencies, but no such declarations have occurred for heat events other than droughts.

FEMA traditionally uses individual assistance (IA) and public assistance (PA) programs to address structural damage, whereas heat mainly affects individuals. However, FEMA now has new, largely untested authority to address heat waves. Under the agency's Individuals and Households Program Assistance and Other Needs Assistance, it may provide funding to individuals and households to purchase new air conditioning units and/or electric fans in areas affected by extreme heat.

State laws do not provide specific guidance on how counties should plan for and include older adults and individuals with access and functional needs in evacuation plans

> The need to evacuate an area can pose increased health and safety risks for older adults, especially those who are poor or reside in nursing or assisted-living facilities. Moving patients to sheltering facilities is complicated, costly, and time-consuming and requires concurrent transfer of medical records, medications, and medical equipment.[170]

The increased risk is also the result of the difficulty individuals have evacuating without assistance, accessing lifesaving medical equipment, and receiving accurate information, assistive technologies, and effective emergency services.[171]

In California, to give one example, although a state law passed in 2016 requires each county to consider access and functional needs in its evacuation plan, the law does not specify how in-depth those efforts should be or how much money should be spent on them.[172]

Recommendations

Federal recommendations

1. Congress should update the Stafford Act and introduce legislation to add extreme heat to the list of disasters for which states can request an emergency or disaster declaration making them eligible for assistance from FEMA's IA and PA programs and other federal government support.

2. Congress should pass legislation to improve the inclusion of older adults and individuals with disabilities in the mitigation, preparation, response, and recovery phases of natural disasters.

3. FEMA should bolster its Building Resilient Infrastructure and Communities (BRIC) program to help communities increase resilience to heat waves, droughts, wildfires, flood, hurricanes, and other hazards by preparing before disaster strikes.

State recommendations

4. State and local governments should collaborate and exchange climate data and best practices with other state and local entities with higher hazard risk, including extreme heat and/or vulnerable populations.

5. State laws should require detail in evacuation plans concerning older adults and individuals with access and functional needs and specify funding amounts to be dedicated to inclusive planning for this growing population.

RESPONSE

Older adults have distinct medical needs that make them less likely to evacuate in disasters

There are documented reasons why older adults choose to remain in their homes rather than evacuate during emergencies or natural disasters. Older adults have distinct and complex needs and face many more obstacles during emergencies than most people. These include medical needs, limited mobility, isolation, and distrust of authority. These medical needs, in particular, may discourage this group from evacuating.

Medical needs of older adults may be related to advanced age and can include chronic health issues. "It is not unusual for older persons to face chronic health conditions compounded by sensory deficits (e.g., limited vision or hearing), reduced mobility, cognitive decline, or mental health conditions such as depression or anxiety."[173] During a disaster, older individuals may have difficulty evacuating without assistance or access to lifesaving medical equipment, assistive technologies, and effective emergency services.[174]

Older adults using assistive technology may have functional limitations which, due to physical or mental impairment, require the individual to use special services or accommodations not typically made for other individuals. These limitations may include mobility limitations, sensory limitations, or intermittent chronic conditions that require them to use assistive devices such as canes, walkers, or wheelchairs for ambulation, balance, or general mobility; vision or hearing aids; medical equipment such as oxygen concentrators or nebulizers; or a personal emergency response system that alerts a 24-hour call center in a health emergency. Still others with developmental or intellectual disabilities may have aged in the community or in a residential care facility and require use of special devices and equipment.[175]

Households with older adults are likely to be tied to their communities and their homes and are less likely to evacuate

During extreme weather events, older adults prefer to remain in the comfort of their homes and within their communities following a disaster.[176] "From 2019 to 2020, only 4 percent of older persons moved, as opposed to 10 percent of the population below age 65. Most older movers (55 percent) stayed in the same county. The other older movers either remained in the same state (26 percent) or moved out of state or abroad (19 percent)."[177]

In general, older adults prefer to remain near their families, friends, homes, and communities, and may not want to leave their pet(s) behind. Older adults who have experienced multiple disasters and lack trust in local authorities or federal disaster responders may choose to remain home rather than evacuate to a shelter. Older adults who live in rural areas also may not evacuate because they do not want to leave behind their livestock, which they rely on for income. In other instances, some older adults may feel cultural or spiritual ties to the land where their families have lived for generations and may choose not to evacuate or relocate. During Hurricane Ian in 2022, "several residents said they had defiantly ridden out the storm in the homes they had poured their savings into, partly to ensure they could easily begin cleaning up the damage."[178]

Many households with older adults have limited resources, a lack of transportation, and other barriers to evacuation

Older adults are less likely to evacuate than other individuals for a number of reasons. Older adults who are aging in place or live alone, who care for loved ones, or who have limited English proficiency are especially at risk. "These individuals may lack the awareness and resources to evacuate."[179] Rural-residing older adults are also at greater risk; they are "less likely to receive disaster warnings,"[180] may be isolated, have limited social networks or family supports, and/or have fewer economic resources than those living in more urban areas.

Economic barriers are a key factor that may dissuade older adults from evacuating. Older adults who live on fixed incomes or below the poverty line or are residents of low-income communities are at a disadvantage during disasters such as wildfires because of their limited resources when needing to evacuate and relocate to new housing.[181] Older adults with low incomes are less likely to evacuate because of the costs associated with evacuating, including transportation, food, water, bedding, medicine, and the loss of access to health care.

One study found that during Hurricane Irma (Florida, 2017), which prompted one of the largest evacuations in US history of over six million people, "older adults were less likely to shelter with family than with friends, which suggests that social connections may be important. Older adults were also less likely to evacuate to a hotel or motel." This may be the result of the

> costs of hotels or motels or the barriers that older adults face during the evacuation process. Respondents with pets were less likely to stay at a hotel or motel or at a public shelter. Often, hotels, motels, and public shelters do not allow pets, which decreases the likelihood that individuals would choose these sheltering options.[182]

Some older adults may not have access to a credit card to pay for a hotel room. In addition, during Hurricane Irma, some non-evacuees (34.7 percent) reported that they stayed because they wanted to protect their properties.[183]

During a disaster with a mandatory evacuation, access to public transit for older adults is critical. Some older adults may not have access to a vehicle, may not drive, or may not have reliable mass transportation in their community. "Jurisdictions face transportation resource gaps for emergency evacuations. The need for accessible transportation during disaster response and evacuation often surpasses the resources of the local community, forcing jurisdictions to be creative"; communities frequently become dependent on volunteers for transportation during disasters.[184] To evacuate, older adults may require transit and paratransit transportation options and shelters that are accessible and ADA-compliant.

Early warning systems are not always designed for older adults

Chronic health conditions and other health conditions can delay older adults from receiving emergency alerts during disasters or reduce their ability to respond to evacuation orders.[185] Older adults may have difficulty if they do not understand the early warning system and the need to evacuate. If the early warning system is not sounded because of poor maintenance or a lack of trained staff, this increases risks to the community and decreases trust.

In 2023, the fires in Maui raised attention to the

failure of early warning systems and cell phone alerts. According to AARP (August 2023), the county received the blame for failing to issue sufficient warnings. "Maui's official warning system—80 outdoor sirens—never sounded as the fires raced toward the town at a mile per minute. Cell phone alerts to evacuate were issued, according to Hawaii officials, but many locals report they never received them."[186]

Disaster communications may not reach older adults, causing gaps in information-sharing and trust

During interviews, stakeholders noted that communication remains a key factor to reaching older populations, especially in rural areas. However, federal, state, and local EMAs are not always able to reach this demographic, creating information gaps and deepening community mistrust.

Older adults may have difficulty receiving accurate information. Evacuation information, including orders, is not uniformly communicated in ways and via media that are accessible to older adults or those with access and functional needs. Such information is often communicated in ways that lack use of American Sign Language, captions, and plain language on websites, instructional materials, and television and radio announcements.

Those who live remotely, who do not have access to mass media or social media, or who have limited English proficiency may not understand the communications messaging and therefore the level of risk associated with a particular emergency or disaster.

Federal, state, and local responders continue to have a trust gap in communities where communications, outreach, and engagement is not sufficient. Older adults in some communities may have strong relationships with local community-based organizations, including NGOs and faith-based organizations.

Recommendations

Federal recommendations

1. Congress should issue a review of early warning systems to standardize the systems and embed accountability.

2. Federal agencies should review, consolidate, and enhance existing guidance for effective communications before, during, and after disasters. A comprehensive guide should be regularly updated and distributed across all response agencies and NGOs to foster consistency in communication.

Federal and state recommendations

3. Federal, state, and local EMAs must clearly identify and better understand the distinct needs of the growing older adult population; adopt evidence-informed, uniform, and collaborative emergency preparedness interventions for all older adults, particularly for those who live alone and use medical equipment requiring electricity; and ensure that programs tailored to older adults are adequately resourced and available before, during, and after disasters.

4. Federal, state, and local EMA emergency management plans should include tailored interventions to support older adults, particularly those who have economic barriers to evacuating or relocating.

5. Federal, state, and local EMAs must ensure transportation and sheltering resources are available, plentiful, and free for evacuees

to encourage evacuation compliance. The evacuation needs of older adults and other at-risk groups must also be identified and met.

6. Federal, state, and local EMAs should fund and coordinate with community organizations, including faith-based organizations, to build trust and reach older adults during and after a disaster.

RECOVERY

Older adults who shelter in place are susceptible to cascading effects of disaster impacts, such as physical damage and loss of access and power

When a community is affected by a disaster, the regular health care services that the community has access to are also affected. If sheltering during a disaster, an older person's access to medications and pharmacy refills, health care, and other supports are disrupted. "Disasters also disrupt access to health care services, oxygen, hemodialysis, personal care assistance, and medical devices."[187]

Loss of power also impacts older adults after disasters. Without power, electrically powered assistive technology (e.g., ventilators and oxygen)[188] may not function properly, or it may be lost or damaged, "and backup batteries may not always be at hand."[189] Additionally, the "refrigeration needed for some types of medications may also be" disrupted.[190] When Hurricane Ian made landfall in Southwest Florida in 2022,[191] older people with limited mobility and those with chronic health conditions requiring the use of electrically powered medical devices were especially vulnerable.

Evacuation shelters may not accommodate the needs of older adults

It is widely reported that evacuation shelters do not provide equivalent provisions to older individuals with access and functional needs. Evacuation shelters may not be equipped for older adults and may not have accommodations, often forcing older adults to be segregated, sometimes apart from their families and natural supports during disasters. They are then placed in separate locations or settings from the general population.

Older adults must bring their own medications and equipment to shelters, and many have limited access to support staff, putting them at risk. Accessing prescriptions in a disaster or emergency can be challenging, from finding an in-network pharmacy to replacing damaged or lost drugs. In general, insurance providers do not allow individuals to "stockpile" medication. In cases when stockpiling is allowed, the guidance on how much can be stored is unclear.

Older adults who require personal attendant services (PAS) may not have access to them in an evacuation shelter. Historically, shelter operators fail to plan and meet the need for PAS, attendant care services, and personal care services in shelters. Although PAS is required by federal law, this gap has persisted, leading to "denial of full and equal services."[192] Finally, disaster shelters and services do not routinely have sign language interpreters nor procedures written or presented in plain language.

Recommendations

Federal and state recommendations

1. Congress should appropriate funds to FEMA for the express purpose of ensuring that evacuation shelters provide accommodations to ensure the safety of older adults.

2. Emergency management plans should include tailored interventions to support older adults, particularly those who live alone and are electricity dependent.

CHAPTER 5. PLANNING FOR THE FUTURE NOW

Consecutive disasters can strain critical infrastructure and support services and stretch resources such as equipment and supplies as well as human resources.

Federal, state, and local emergency management agencies must rethink disaster mitigation, preparedness, emergency response, and recovery as extreme disasters and polycrises become the new norm

Although a central aim of the Paris Agreement is to limit global temperature rise to 1.5 degrees Celsius by the end of this century[193] to avoid the worst effects of climate change, climate-related extreme weather events are occurring now. Risks related to extreme weather will continue to accelerate during the next two to ten years (2033) rather than by 2100.

Today, climate-related extreme weather events are the new normal. In the past, natural disasters would occur one at a time, and communities would have time to recover and rebuild. Now disasters do not occur as isolated events but seem to compound or contribute to concurrent crises.

Local governments are already experiencing compounding disasters, where two or more extreme events occur simultaneously, often with different causes. Chronic deteriorating conditions can compound acute events, for example, when an extreme and prolonged drought is followed by wildfires or an intense rain storm leads to landslides and flooding. Extreme heat is linked to other risks such as drought, wildfires, and power outages. "Most notably, the rise in vulnerability to drought is lengthening wildfire seasons in the western states."[194] Droughts can be intensified by unusually warm temperatures, and dry, hot conditions can increase the "potential for extreme wildfires to spread rapidly and burn with more severity," therefore costing more to suppress.[195]

In 2021, "the most intense 22-year drought in the western US" was compounded by hot, dry conditions that contributed to extreme wildfires.[196] California experienced drought-enhanced wildfire seasons that produced wildfires and mountainside burn scars, followed by atmospheric rivers of heavy rainfall that enhanced landslides and flooding. In 2022, the California Fire Incident Archive reported that California experienced 7,477 wildfires and 554,342 total emergency responses, with 331,360 acres burned, 876 structures destroyed, and 9 fatalities.[197]

Consecutive disasters (e.g., in 2022, Florida was affected by Hurricanes Ian and Nicole in the span of several weeks) can strain critical infrastructure and support services and stretch resources such as equipment and supplies as well as human resources.

Federal, state, and local EMAs and communities are also facing polycrises—clusters of related global risks with compounding effects, such that the overall effect exceeds the sum of each part.[198] Examples of polycrises include the COVID-19 pandemic and the 2020 California wildfires, where parts of Sonoma, Lake, and Napa counties experienced COVID-19, a heat wave, wildfires,

and rolling power outages; and Hurricane Hilary and the Ventura County, California, earthquake, or "Hurriquake" in 2023. These extreme disasters strain resources, leading to fatigue, and challenge the ability of communities to recover and build resilience. Increasing extreme weather events can deplete federal emergency funds.

In 2023, Hawaii wildfires and dozens of other natural disasters forced FEMA to withhold funds, thus forcing states and localities to pay for recovery projects themselves and wait for FEMA reimbursement or delay the start of the projects. "The Continuing Resolution signed September 30, 2023, enabled FEMA to resume funding for more than 2,400 projects across the country."[199]

The future of disaster recovery "requires more than getting back to normal, especially when 'normal' may be a major contributor to a community's vulnerability to compounding and cascading disasters."[200] Recovery requires acknowledging the reality of a changing climate and the possibility that the way communities designed and built their infrastructures, created their building codes, and implemented land use regulations contributes to or even amplifies the effects disasters have on those communities.

Federal, state, and local EMAs urgently need to disrupt the status quo and recalibrate how the US thinks about disaster mitigation, preparedness and emergency response, and recovery actions in the face of compounding and cascading events becoming more common. As communities grow older and expectations for equity in disaster increases, federal, state, and local EMAs will require a significant shift in the disaster management framework, one that takes a holistic view of communities to meet demand, save lives, and strengthen community resilience.

APPENDIX A: INSIGHTS AND RECOMMENDATIONS

	Insights	Recommendations
	CLIMATE-RELATED EXTREME WEATHER EVENTS	
1	Natural disasters and extreme weather events rank as the top two most severe global risks to the world in the upcoming two-year period.	The US must keep its commitment to the Paris Agreement and take a government-wide approach to climate as identified in the executive order (EO) on Tackling the Climate Crisis at Home and Abroad.
2	Climate-related extreme weather events are increasing in frequency, severity, and cost. Extremely high disaster activity and billion-dollar natural disasters are becoming the new normal.	Congress should replenish the disaster fund by approving either an FY 2024 budget or special funding for FEMA to ensure that FEMA's immediate needs funding continues.
3	State and local governments may be more vulnerable and less prepared for extreme weather events.	State and local emergency management agencies (EMAs), and state health departments should conduct reviews and update emergency management plans and guidance to prepare for an increase in extreme weather events and older adults population.
	GROWING AGING POPULATION	
4	As older Americans account for a larger share of the population, more people will likely face vulnerabilities and increased risk during natural disasters.	Federal, state, and local governments should include older adults in their Emergency Management planning. They should increase disaster preparedness education for older adults and prepare additional tailored resources to meet their needs.
5	A growing older adult population, increasing extreme weather events, and a gap in the health care workforce will increase demand on resources.	Congress should pass the Real Emergency Access for Aging and Disability Inclusion for Disasters Act (REAADI) to help ensure the diverse voices of disabled people and older adults are included in disaster preparation, response, recovery, and mitigation. States should review spending to ensure compliance with the ADA and a review of the extent to which disabled people's civil rights have been upheld during and after disasters.

	Insights	Recommendations
	GROWING AGING POPULATION (CONT'D)	
6	More targeted research on the effects of extreme weather events on older adults is needed to help EMAs and communities better plan for emergencies and disasters.	Federal government agencies and NGOs should fund additional research to better understand the distinct needs of the growing older adult population in relation to planning for and recovering from extreme weather events.
	HEALTH	
7	Due to aging immune systems and chronic and underlying conditions, older adults face vulnerabilities and increased risk of injury and mortality during extreme weather.	Congress should require federal, state, and local EMAs to clearly identify the distinct needs of older adults and their barriers to evacuation, and integrate those needs into disaster preparedness planning to minimize risks to older adults during natural disasters.
8	Older adults with disabilities face higher risks of injury and mortality during extreme weather events.	Congress should continue to fund the LIHEAP to help families with their household energy costs, including summer cooling, and to promote the use impacts on older adults following a natural disaster of efficient air conditioning equipment and community cooling centers.
9	Older adults are especially vulnerable to climate-driven decreases in air quality.	See Recommendation 7.
10	Extreme heat is the greatest climate risk to the older adult population.	State and local governments should plan for extreme heat by setting up cooling centers that provide water and a safe indoor refuge from the heat in community centers, churches, and other community-based organizations.
11	Climate change may increase exposure to pathogens in older adult populations.	See Recommendation 7.

	Insights	Recommendations
	HEALTH (CONT'D)	
12	More people will likely experience acute mental health effects as a result of increasing natural disasters and extreme weather events.	State and local governments should continue to develop education programs and train first responders to identify acute psychological stress and the potential for chronic mental health effects on older adults following a natural disaster. State and local governments should encourage and develop training for public health professionals on emergency preparedness and increase the involvement of health care providers in preparedness and mitigation efforts to improve health outcomes.
13	Existing shortages of health care workers exacerbate risks to individuals who require immediate care during disasters.	Congress should pass legislation to address the shortage of primary care doctors and other health care providers. The legislation should address shortfalls in the nation's supply of health care providers and include inclusive recruitment for a diverse health care workforce, increases in pay to keep up with inflation, loan forgiveness that encourages health care providers to work with underserved populations, and other innovative targeted incentive measures.
	HOUSING AND LOCATION	
14	Older adults are particularly vulnerable to climate change–related health effects based on the characteristics of their homes, such as age, quality of construction, and amenities.	States that have not previously prepared for extreme weather, such as extreme heat, should prepare for all unforeseen climate-change related scenarios. State and local EMAs should conduct scenario planning and exercises to better prepare.
15	Multiple factors disincentivize older adults from making home improvements to prepare for extreme weather.	Congress should pass legislation to provide incentives to older adults for home improvements, such as air conditioning, in preparation for extreme weather to protect the growing older adult population who face inflation and increasing costs of living.
16	Geographic location is a factor in how extreme weather events affect older adults.	State and local EMAs should plan for extreme heat by determining whether health-warning systems can substantially reduce excess deaths.

	Insights	Recommendations
	HOUSING AND LOCATION (CONT'D)	
17	Social isolation increases risk during natural disasters because the population living alone increases with advanced age.	State and local EMAs should continue to leverage technology and data, such as ArcGIS mapping tools and NOAA's National Centers for Environmental Information Climate Data Online, to better understand where individuals living in isolation are located and how best to provide access in a disaster.
	ECONOMIC EFFECT	
18	The increase in extreme weather events is resulting in significant social and economic costs to older adults.	To ease the pressure on older adults and other at-risk populations, the federal government should place caps on electricity bills and offer fuel rebates. See Recommendation 8.
19	Insurance costs have increased, but in some states insurance options have decreased, putting older adults at risk of being uninsured.	States should develop hazard mitigation plans to support insurance, including the NFIP, Community Rating System (CRS), earthquake insurance, and other programs that serve to reduce the impacts of disasters on properties. Congress should pass legislation to further the goal of achieving universal coverage by making the American Rescue Plan's premium tax credit improvements permanent, further lowering premiums and cost sharing, and providing a federal health care plan to uninsured people caught in the "coverage gap" in states that have not expanded Medicaid. Recovery legislation should build on the Affordable Care Act's improvements in coverage for adults over 55.

	Insights	Recommendations
	EMERGENCY MANAGEMENT—PREPAREDNESS	
20	A lack of inclusive disaster mitigation and preparedness planning can have devastating effects on older adults during extreme weather events.	Congress should pass legislation to improve the inclusion of older adults and individuals with disabilities in the mitigation, preparation, response, and recovery phases of natural disasters. FEMA should bolster its BRIC program to help communities increase resilience to heat waves, droughts, wildfires, flood, hurricanes, and other hazards by preparing before disaster strikes.
21	Despite its dangers on older adults, extreme heat is not listed as a qualifying event in the statutory definition of major disasters.	Congress should update the Stafford Act and introduce legislation to add extreme heat to the list of disasters for which states can request an emergency or disaster declaration, making them eligible for assistance from FEMA's Individual Assistance (IA) and Public Assistance (PA) programs and other federal government support. State and local governments should collaborate and exchange climate data and best practices with other state and local entities with higher hazard risk, including extreme heat and vulnerable populations.
22	State laws do not provide specific guidance on how counties should plan for and include older adults and individuals with access and functional needs in evacuation plans.	State laws should require detail in evacuation plans concerning older adults and individuals with access and functional needs and specify funding amounts to be dedicated to inclusive planning for this growing population.

	Insights	Recommendations
	EMERGENCY MANAGEMENT—RESPONSE	
23	Older adults have distinct medical needs that make them less likely to evacuate in disasters.	Federal, state, and local EMAs must clearly identify and better understand the distinct needs of the growing older adult population; adopt evidence-informed, uniform, and collaborative emergency preparedness interventions for all older adults, particularly for those who live alone and use medical equipment requiring electricity; and ensure that programs tailored to older adults are adequately resourced and available before, during, and after disasters.
24	Households with older adults are likely to be tied to their communities and their homes and are less likely to evacuate.	Federal, state, and local EMA emergency management plans should include tailored interventions to support older adults, particularly those who have economic barriers to evacuating or relocating.
25	Many households with older adults have limited resources, a lack of transportation, and other barriers to evacuation.	Federal, state, and local EMAs must ensure transportation and sheltering resources are available, plentiful, and free for evacuees to encourage evacuation compliance. The evacuation needs of older adults and other at-risk groups must also be identified and met.
26	Early warning systems are not always designed for older adults.	Congress should issue a review of early warning systems to standardize the systems and embed accountability.
27	Disaster communications may not reach older adults, causing gaps in information-sharing and trust.	Federal agencies should review, consolidate, and enhance existing guidance for effective communications before, during, and after disasters. A comprehensive guide should be regularly updated and distributed across all response agencies and NGOs to foster consistency in communication. Federal, state, and local EMAs should fund and coordinate with community organizations, including faith-based organizations, to build trust and reach older adults during and after a disaster.

	Insights	Recommendations
	EMERGENCY MANAGEMENT—RECOVERY	
28	Older adults who shelter in place are susceptible to cascading effects of disaster impacts, such as physical damage and loss of access and power.	See Recommendation 24.
29	Evacuation shelters may not fully accommodate the needs of older adults.	Congress should appropriate funds to FEMA for the express purpose of ensuring that evacuation shelters provide accommodations to ensure the safety of older adults.
	FUTURES	
30	Federal, state, and local EMAs must rethink disaster mitigation, preparedness, emergency response, and recovery as extreme disasters and polycrises become the new norm.	Congress should update the Stafford Act to help states better prepare for multiple disasters. Congress should consider how the Disaster Relief Fund and related preexisting appropriations requiring continuing resolutions can be continued to match the needs of increasing disasters and not be put at risk. The President should sign an executive order (EO) charging federal agencies with developing or updating emergency management plans to allow for an increase in compound, consecutive extreme weather events. The Centers for Medicare and Medicaid Services (CMS) Quality, Safety & Oversight Group should review and update the Emergency Preparedness Requirements for Medicare and Medicaid Participating Providers and Suppliers Final Rule to ensure it adequately addresses the risk of compound, consecutive extreme weather events. Federal, state, and local EMAs should conduct scenario planning and use other mitigation tools to better understand the key drivers of polycrises and to develop a framework to better prepare for polycrises.

APPENDIX B: DEFINITIONS AND TERMINOLOGY

Access/accessible

- "The suitability or adaptability of programs, services, activities, goods, facilities, privileges, advantages, or accommodations provided by a public or private (for-profit or not-for-profit) entity, or by any entity with which it contracts, for all members of the population, including individuals with disabilities."[201]

Access and functional needs

- "Persons who may have additional needs before, during, and after an incident in functional areas, including but not limited to maintaining independence, communication, transportation, supervision, and medical care. Individuals in need of additional response assistance may include those who have disabilities, live in institutionalized settings, are seniors, are children, are from diverse cultures, have limited English proficiency or are non-English speaking, or are transportation disadvantaged."[202]

Assistive technology

- Any item, piece of equipment, software program, or product system that is used to increase, maintain, or improve the functional capabilities of persons with disabilities.
- Assistive technology helps people who have difficulty speaking, typing, writing, remembering, pointing, seeing, hearing, learning, walking, and many other things. Different disabilities require different assistive technologies.

At risk population

- "Person(s) who could fall into one or more of the following categories: low-income family, large family (requiring three or more bedrooms), dysfunctional person(s), or person(s) exhibiting substance abuse or mental health problems."[203]

Cascading event

- A primary event, such as heavy rainfall, seismic activity, or rapid snowmelt, followed by a chain of consequences that may range from modest to severe and whose damage and losses may be more severe than if they had occurred separately. A classic example is the tsunami triggered by the major earthquake that struck Japan in 2011, with one consequence being the Fukushima nuclear reactor failure. The war in Ukraine occurring during the COVID-19 pandemic highlighted the importance of supply chain problems, which are by nature cascading, as they represent the ripple effects of an initial bottleneck across sectors and regions over time.

Compound event

- When (1) "two or more extreme events occur simultaneously" or successively, (2) combinations of extreme events with underlying conditions amplify the impact of the events, or (3) combinations of events that are not themselves extreme lead to an extreme event or impact when combined.[204] Compound disasters typically result from multiple causes, can generate multiplicative damage and losses, and are increasing in likelihood as the Earth's climate changes. Examples are concurrent heat waves and droughts, compound flooding when a storm surge combines with extreme rainfall and river flow, and any disaster taking place during a long-term pandemic, such as COVID-19.

Compounded poverty

- "A series of circumstances and challenges" working together to create or exacerbate barriers to economic stability.[205]

Concurrent events

- Events happening at the same time but at different locations, yet possibly affecting similar sectors in different regions.

Disability/people with disabilities

- "The Americans with Disabilities Act (ADA) defines a person with a disability as a person who has a physical or mental impairment that substantially limits one or more major life activities. This includes people who have a record of such an impairment, even if they do not currently have a disability. It also includes individuals who do not have a disability but are regarded as having a disability. The ADA also makes it unlawful to discriminate against a person based on that person's association with a person with a disability."[206]
- "To be protected by the ADA, one must have a disability or have a relationship or association with an individual with a disability." "The ADA does not specifically name all of the impairments that are covered."[207]

Disproportionate effects

- "Term used in Executive Order 12898 to describe situations of concern with significantly higher and more adverse health and environmental effects on minority populations, low-income populations, or indigenous peoples."[208]

Equity

- The FEMA definition, which is aligned to EO 13985, is "the consistent and systematic fair, just, and impartial treatment of all individuals." FEMA's overarching equity principle, aligned to the agency's mission statement, is "ensuring all people are helped before, during, and after disasters."[209]
- "The core definition of equity is to provide the greatest support to those with greatest need to achieve a certain minimum outcome. It is separate from equality, which is providing the same resources to everyone regardless of need. One of the core tenets of emergency management is to work to stabilize and heal communities from the disruption caused by disaster. As such, it is important to recognize the role that equity plays in communities' ability to mitigate, prepare, respond, and recover from a disaster, and by extension, FEMA's role in supporting that effort."[210]

Equality

- "The nation's proper goals regarding individuals with disabilities are to assure equality of opportunity, full participation, independent living, and economic self-sufficiency for such individuals."[211]

Extreme weather event

- "A time and place in which weather, climate, or environmental conditions—such as temperature, precipitation, drought, or flooding—rank above a threshold value near the upper or lower ends of the range of historical measurements. Though the threshold is subjective, some scientists define extreme events as those that occur in the highest or lowest 5 percent or 10 percent of historical measurements. They often describe events by how far they are from the mean or by their recurrence interval or probability."[212]
- "Extreme events are occurrences of unusually severe weather or climate conditions that can cause devastating impacts on communities and agricultural and natural ecosystems. Weather-related extreme events are often short-lived and include heat waves, freezes, heavy downpours, tornadoes, tropical cyclones, and floods. Climate-related extreme events either persist longer than weather events or emerge from the accumulation of weather or climate events that persist over a longer period of time. Examples include drought resulting from long periods of below-normal precipitation or wildfire outbreaks when a prolonged dry, warm period follows an abnormally wet and productive growing season."[213]

Fair treatment

- The idea that no group of people "should bear a disproportionate share of the negative environmental consequences" resulting from industrial, governmental, and commercial operations or policies.[214]

Low income

- "A reference to populations characterized by limited economic resources. The US Office of Management and Budget has designated the Census Bureau's annual poverty measure as the official metric for program planning and analysis, although other definitions exist."[215]

Marginalized

- "Individuals, groups and communities that have experienced disparities or disadvantages in obtaining assistance or services."[216]

Minority populations

- "According to the US Census Bureau, populations of people who are not single-race white and not Hispanic, including members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic."[217]

Older adults

- Individuals 65 and older. The National Institute on Aging's guidance considers 65 and older an older adult, but understandings and definitions about this age range vary by source.[218]

Polycrisis

- "A cluster of related global risks with compounding effects, such that the overall effect exceeds the sum of each part."[219] Examples of catastrophic events occurring simultaneously include the COVID-19 pandemic and the 2020 California wildfires, during which parts of Sonoma, Lake, and Napa counties experienced COVID-19, a heat wave, wildfires, and rolling power outages simultaneously; another example is the combination of Hurricane Hilary and the Ventura County, California, earthquake, or "Hurriquake," in 2023.

Underserved communities

- "Populations sharing a particular characteristic, as well as geographic communities that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life."[220]

Vulnerable and at-risk populations

- "Those who are relatively (or absolutely) incapable of protecting their own interests. More formally, they may have insufficient power, intelligence, education, resources, strength, or other needed attributes to protect their own interests."[221]
- Those "unnoticed and ignored by public health officials" and "people pushed to the back of the treatment line."[222]

Whole of community

- An inclusive approach to emergency preparedness and management through the inclusion of individuals and families—including those with access and functional needs, businesses, faith-based and community organizations, nonprofit groups, schools and academia, media outlets, and all levels of government, including state, local, tribal, territorial, and federal partners.

APPENDIX C: POLICIES AND LAWS

This section provides an overview of select relevant legislation.

Achieving a Better Life Experience Act (ABLE Act)

The ABLE Act, which was signed into law on December 19, 2014, is designed to improve the financial stability of persons with disabilities by authorizing tax-advantaged savings accounts, known as ABLE accounts, for youth and adults with disabilities. The law recognizes that many individuals and their families depend on a wide variety of means-tested public benefits for income, health care, and food and housing assistance. Eligibility for many of these benefits requires applicants to have few assets. Thus, to remain eligible for these programs, an individual must remain poor.

ABLE account funds and distributions for qualified disability-related expenses are not taken into consideration when determining eligibility for federally funded means-tested benefits, including supplemental security income (SSI) and Medicaid. According to language in the ABLE Act, an ABLE account will, with private savings, "secure funding for disability-related expenses on behalf of designated beneficiaries with disabilities that will supplement, but not supplant, benefits provided through private insurance, Medicaid, SSI, the beneficiary's employment, and other sources."

These accounts are similar in construction to college savings accounts; both are included in Section 529 of the IRS Code. Assets in ABLE accounts can be used to cover any "qualified disability expense" including housing, transportation, support services, and any other expense reasonably related to a disability.

An ABLE account may not receive annual contributions exceeding the annual gift-tax exemption ($14,000 in 2015). A state must also ensure that aggregate contributions to an ABLE account do not exceed the state-based limits for 529 accounts.

Affordable Housing Act

Officially passed as the Cranston-Gonzalez National Affordable Housing Act of 1990, this law established programs focused on housing and economic development, the Section 811 Supportive Housing for Persons with Disabilities program, and programs that promoted homeownership opportunities for low-income individuals and people with disabilities. (Public Law 101-625)

Americans with Disabilities Act (ADA)

"The ADA, enacted in 1990 and amended in 2008, prohibits discrimination on the basis of disability in employment, state and local government programs, services and activities, public accommodations, and commercial facilities. The goal of the ADA is to ensure full participation in society for people with disabilities by facilitating equal opportunity, independent living, and economic self-sufficiency."[223]

Title I: Employment

Title I of the ADA prohibits discrimination against people with disabilities in employment both before and after they are hired. Access to employment is one of the most important issues affecting people with disabilities. Although the ADA has led to increases in accessibility and accommodations in employment and public awareness about the capabilities of people with disabilities, there has been little change in available employment opportunities for people with disabilities. Reasonable accommodations are required for job applicants and employees with disabilities among employers with more than 15 employees. However, attitudes and stereotypes about the cost of reasonable accommodations and the abilities of people with disabilities persist.

Title II: State and Local Governments

Title II of the ADA requires that state and local governments give people with disabilities an equal opportunity to benefit from all state programs, services, and activities (e.g., public education, employment, transportation, health care, and social services) in compliance with regulations determined by the Department of Justice (DOJ). Title II also prohibits discrimination against people with disabilities for public transportation services. Under Title II, state and local governments must provide accessible buses, subways, or commuter rails and also provide paratransit services in all areas where they operate fixed-route bus or rail systems.

Olmstead v. L.C. (1999) was the landmark case that determined that "unjustified isolation" of a person with a disability is a form of discrimination under Title II of the ADA. Under the decision, if a state treatment professional determines that community placement is appropriate, then a person with a disability should be placed in the community, if the person with a disability chooses. This case had a significant impact on the opportunities for people with disabilities to live and fully participate in their communities.

Title III: Public Accommodations and Commercial Facilities

Title III of the ADA requires places of public accommodation and commercial facilities to meet accessibility standards. All new construction as well as existing structures must conform to the ADA Accessibility Guidelines. Existing structures must remove architectural barriers if doing so can be accomplished easily and without significant expense. Places of public accommodation include restaurants, hotels, shopping centers, doctor's offices, and day care centers.

Although the applicability of web accessibility is not explicitly addressed in the ADA, recent lawsuits (since approximately 2016) and DOJ actions have made this question an increasing concern over the past few years. The DOJ recently issued new web accessibility guidelines for entities covered by Titles II and III (see https://www.justice.gov/opa/pr/justice-department-issues-web-accessibility-guidance-under-americans-disabilities-act).[224]

Architectural Barriers Act of 1968

"The Architectural Barriers Act (ABA) of 1968, as amended, stipulates that all buildings which are (1) financed with federal funds, and (2) intended for use by the public, or which may result in employment or residence therein of physically handicapped persons, be designed and constructed in accordance with standards prescribed by the ABA to ensure that such buildings are fully accessible to and usable by handicapped individuals. The Act is enforced by the Architectural and Transportation Barriers Compliance Board (ATBCB), a federal agency created by Section 502 of the Rehabilitation Act of 1973, as amended. On May 9, 1983, the Secretary of Labor and the Executive Director of the ATBCB entered into a memorandum of agreement (MOA) whereby the Department agreed to implement a DOL-wide accessibility compliance system. This system, which must meet certain minimum criteria set forth by the Board, is intended to ensure full compliance with applicable GSA accessibility standards issued pursuant to the ABA. In return, the Board has agreed to refrain from initiating enforcement proceedings against DOL for noncompliance with accessibility standards if its Executive Director has approved a detailed plan for removal of barriers in covered buildings or facilities."[225] Additionally, the Americans with Disabilities Act of 1990 builds upon the ABA and refers to the ATBCB and assigns it with the authority to define the standards for the architectural and communication barriers that are structural in nature.[226]

Assistive Technology (AT) Act of 1998

Initially passed in 1998, and reauthorized in 2004 and 2022, the Act establishes a grant program to provide federal funds to support state programs that address the assistive technology needs of individuals with disabilities. With funds from this program, every state and territory in the United States established a Tech Act project (there are currently 54). These projects have developed individualized plans to meet state assistive technology needs in specific areas, including financing, technical assistance, education, training and other leadership activities, device reutilization, device loan, device demonstration, and device referral services.[227] In the past, FEMA has had a memorandum of understanding with the AT Act Projects to access their AT Reuse Programs in an emergency as a means of replacing/restoring lost durable medical equipment and AT during a disaster. Many local governments have similarly established partnerships for smaller scale weather-related emergency responses with these projects.

Fair Housing Amendments Act of 1988 [228]

Title VIII of the Civil Rights Act of 1968, known as the Fair Housing Act, prohibited discrimination concerning the sale, rental, and financing of housing based on race, religion, national origin, and sex. The Fair Housing Amendments Act of 1988 (PL 100-430) expanded this to include disability and family status.[229]

Housing Act

"The National Housing Act of 1934 was passed to relieve unemployment and stimulate the release of private credit in the hands of banks and lending institutions for home repairs and construction. This law also created the Federal Housing Administration (FHA), the main federal agency handling mortgage insurance."[230]

Medicaid Buy-In

Created by the Ticket to Work Act, the Medicaid Buy-In program offers Medicaid coverage to people with disabilities whose income is higher than the allowable substantial gainful activity levels. The purpose of the Medicaid Buy-In program is to allow people with disabilities to purchase Medicaid coverage while still being able to work. The eligibility requirements and benefits for this optional Medicaid program vary across states. Most states review employment status, disability status, income, and resources to determine Medicaid Buy-In eligibility. Some states require people who are eligible for the Medicaid Buy-In to pay a monthly premium or other cost-sharing charges, which are typically set on a sliding fee scale based on income. Many buy-in programs charge a state-specific premium and have copayments that are higher than traditional Medicaid.

Medicare Durable Medical Equipment, Prosthetics/Orthotics & Supplies Rules

The Centers for Medicare and Medicaid Services (CMS) sets the fee services and rules that govern durable medical equipment, prosthetics/orthotics, and supplies (DMEPOS).[231]

Patient Protection and Affordable Care Act (ACA)

The ACA, which was signed into law in 2010, requires hospitals and primary care physicians to shift their focus to better health outcomes and lower costs and enhance the distribution and accessibility of their professional practices. Among the provisions in ACA is the creation of essential health benefits required as part of private insurance coverage. ACA Sections 1302(b)(4)(B) and (C) define essential health benefits and indicate that providers shall "not make coverage decisions or design benefits in ways that discriminate against matching dollars with no waiting list or caps." In *National Federation of Independent Business (NFIB) v. Sebelius,* the Supreme Court decided that states were not mandated to expand Medicaid coverage.

Rehabilitation Act of 1973

"Section 501 of the Rehabilitation Act prohibits federal executive branch agencies, including the US Postal Service and the Postal Rate Commission, from discriminating against qualified individuals with disabilities.

It requires executive branch agencies to take affirmative action in the hiring, placing and advancing of individuals with disabilities."[232]

Section 503 of the Rehabilitation Act of 1973 prohibits federal contractors and subcontractors from discriminating in employment against individuals with disabilities and requires employers take affirmative action to recruit, hire, promote, and retain these individuals.[233]

Section 504 prohibits discrimination on the basis of disability by any program or activity receiving federal financial assistance. It requires compliance with specific standards for design and construction of new facilities and ensures the accessibility of programs as a whole.[234] Section 504 has also been used to require accommodations and access to public education for people with disabilities who may not require special education and related services under IDEA.

Section 508 requires federal agencies to develop, procure, maintain, or use information and communications technology (ICT) that is accessible to people with disabilities. ICT is any equipment used to create, convert, duplicate, or access information and data, including, without limitation, telephones, mobile devices, televisions, DVD players, video productions, web content, electronic documents, online trainings, webinars, teleconferences, software, hardware, lab equipment, and computers. Most states have their own version of section 508 (see https://www.section508.gov/manage/laws-and-policies/state/).

Stafford Act of 1988

"Executive Order 13347 sets forth the role of the federal government in effectively addressing the issue of Individuals with Disabilities in Emergency Preparedness."[235] "Sec. 308. Nondiscrimination in Disaster Assistance (42 U.S.C. 5151) (a) Regulations for Equitable and Impartial Relief Operations—The President shall issue, and may alter and amend, such regulations as may be necessary for the guidance of personnel carrying out federal assistance functions at the site of a major disaster or emergency. Such regulations shall include provisions for insuring that the distribution of supplies, the processing of applications, and other relief and assistance activities shall be accomplished in an equitable and impartial manner, without discrimination on the grounds of race, color, religion, nationality, sex, age, disability, English proficiency, or economic status."[236]

Supplemental Security Income (SSI)

SSI is a federal supplemental income program funded by general tax revenues (not Social Security taxes). SSI includes a number of work incentives designed to help beneficiaries go to work by minimizing the risk of losing their SSI or Medicaid benefits. Under some of these incentives, SSA will exclude some income or resources when calculating the benefit amount (such as the earned income exclusion, the student earned income exclusion, impairment-related work expenses, and the Plan for Achieving Self Support). Other incentives provide continued Medicaid coverage even when the beneficiary is not receiving cash benefits (such as the Medicaid Buy-In and section 1619(b) of the Social Security Act).

Social Security Disability Insurance (SSDI)

SSDI is funded by payroll tax contributions from workers and employers. In order to qualify for benefits, applicants must reach insured status for Social Security by working enough during the years before filing to have contributed a specific amount to the Social Security system through FICA taxes. The level of benefits is based on earnings prior to the onset of the disability; SSDI does not consider assets or other household income. SSDI benefits are subject to a five-month waiting period, which means that SSDI applicants must wait five months after the onset of their disability to receive cash benefits. Most SSDI beneficiaries are eligible for Medicare after a two-year waiting period. Like SSI, disability is defined as the inability to engage in "substantial gainful activity" because of "one or more severe physical or mental impairments that are expected to last at least a year or result in death."

Telecommunications Act of 1996

"A comprehensive law overhauling regulation of the telecommunications industry, revolutionized access to telecommunications for people with disabilities through Section 255 of the Act, which requires telecommunications products and services to be accessible to people with disabilities, to the extent readily achievable." Covered products included wired and wireless telecommunication devices, pagers, and fax machines, other products that have telecommunications capabilities, and equipment that carriers use to provide services. "Manufacturers must ensure that products are 'designed, developed, and fabricated to be accessible to and usable by individuals with disabilities' when it is readily achievable to do so. The Access Board was given the job of developing guidelines that describe what makes telecommunications products accessible, and the Federal Communications Commission is responsible for rules and policies to enforce the law."[237]

21st Century Communications and Video Accessibility Act of 2010

Requires advanced communications services and products to be accessible by people with disabilities.

APPENDIX D: KEY WORDS

Document Types:

- Academic research papers, reports, government reports, policies, guidance, case studies, laws/statues, and regulations
- Review research within the last 10 years
- In the US only (not territories or international)

Focus Areas:

- Older adults 65 and above
- Climate change
- Climate impacts and effects
- Health, housing and economic security

Hazards/Risks:

Hurricanes, heat waves, drought, wildfires, severe storms, tornadoes, flooding, landslides

Focus Areas—States and Counties and Specific Disasters:

Arizona (Mid and Southern) Counties: Maricopa, Pima, and Pinal Risks: Heat waves, drought	**California (Northern)** Counties: Butte, Plumas, and Shasta Risks: Wildfires
Florida (Southern) Counties: Broward, Collier, Lee, Miami-Dade, and Palm Beach Risks: Hurricanes	**Missouri** Counties: Taney, Stone, Douglas, Greene, Ozark and Howell Risks: Severe storms, tornadoes, flooding, landslides

We developed three sets of search terms:

The first set describes the older adult population: aging, activity, daily living, assisted living, older adult, elder, old age, baby boomer, senior citizen, retirement community, nursing home, older population.

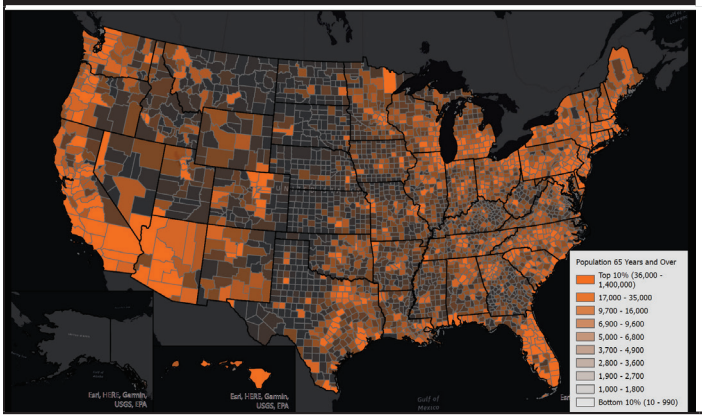
The second set describes impacts, events, and potentially vulnerable areas: air quality, ambient pollution, coastal zone, coastal flood, drought, extreme event, extreme heat, extreme weather, flood, forest fire, global change, global environmental change, global warming, greenhouse gas, climate change, heat wave, heavy precipitation, high wind, hurricane, natural disaster, ozone, particulate matter, sea level rise, storm surge, torrential rain, tropical storm, urban heat, wildfire.

The third set describes effects on health and well-being: asthma, cardiovascular, chronic obstructive pulmonary disease, chronic illness, cognitive disorder, cold sensitivity, mental deficit, disability, disabled, displaced, displacement, evacuate, evacuee, heat sensitivity, heat stress, heat stroke, indoor mold, insect disease, cough, mental illness, post-traumatic stress disorder, PTSD, relocate, respiratory. Other search terms, if not covered above, included the following:

- Older adults 65 and above
- Climate change
- Climate impacts
- Health
  - Access to healthcare
  - Assistive technologies
  - Health and well-being
  - Medicare, Medicaid
  - Mental health
  - Mobility
- Housing
  - Congregate Care Facilities
  - Rebuilding and relocating
- Economic security
  - Capacity to adapt
  - Fixed income
  - Poverty
  - Social Security
- Federal government programs
- State government programs
- Planning, preparedness, mitigation, response, recovery, adaptation
- Emergency
- Equity/inequity
- Extreme weather conditions
- Natural disaster
- Readiness
- Remote area
- Threat multipliers
- Air pollution
- Drought
- Flooding
- Flooding: coastal flooding and riverine
- Heat waves
- Hurricane
- Ice storm
- Power outages
- Wildfire
- Winter weather

APPENDIX E: MAPS

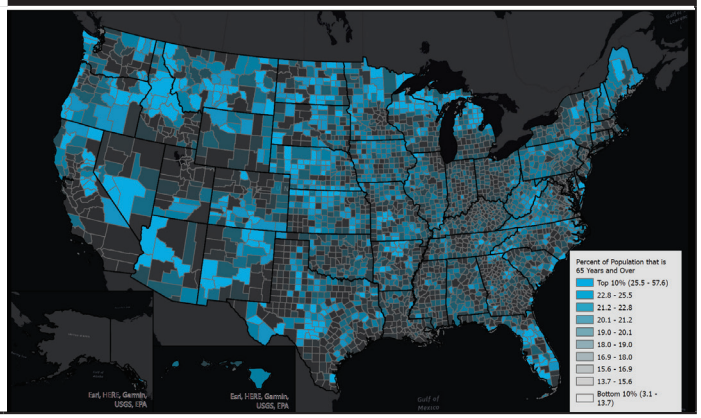
FIGURE 12. MAP OF THE CONTIGUOUS UNITED STATES SHOWING THE POPULATION 65 YEARS AND OVER BY COUNTY



Source: CNA based on data from US Census Bureau's American Community Survey (ACS) 2017–2021 5-year estimates, Table(s) B01001.

Note: Alaska (left inset) and Hawaii (right inset). Population is shaded by decile with the highest population in orange.

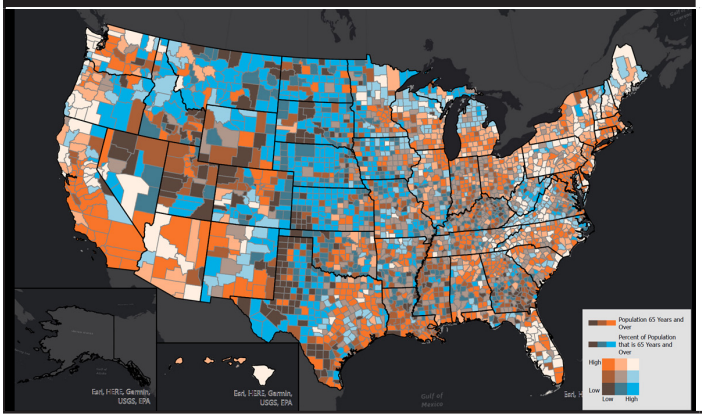
FIGURE 13. MAP OF THE CONTIGUOUS UNITED STATES SHOWING THE PERCENT OF THE POPULATION 65 YEARS AND OVER BY COUNTY



Source: CNA based on data from US Census Bureau's American Community Survey (ACS) 2017–2021 5-year estimates, Table(s) B01001.

Note: Alaska (left inset) and Hawaii (right inset). Population percent is shaded by decile with the highest population in blue.

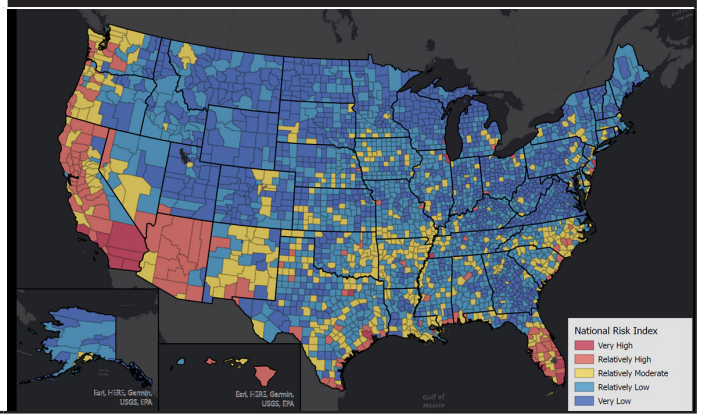
FIGURE 14. MAP OF THE CONTIGUOUS UNITED STATES SHOWING THE BIVARIATE DISTRIBUTION OF POPULATION 65 YEARS AND OVER AND THE PERCENT OF POPULATION THAT IS 65 YEARS AND OVER BY COUNTY



Source: CNA based on data from US Census Bureau's American Community Survey (ACS) 2017–2021 5-year estimates, Table(s) B01001.

Note: Alaska (left inset) and Hawaii (right inset). Counties in white have high populations 65 years and over as well as high percentages of population that are 65 years and over. Counties in orange have high populations 65 years and over but low percentages of population that are 65 years and over. Counties in blue have low populations 65 years and over but high percentages of population that are 65 years and over. Light orange counties have high population and medium percent population. Light blue counties have medium population and high percent population.

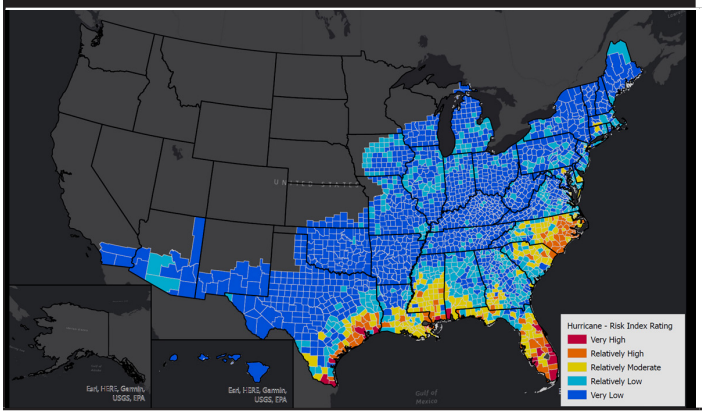
FIGURE 15. MAP OF THE CONTIGUOUS UNITED STATES SHOWING THE COMPOSITE RISK INDEX OF EACH COUNTY



Source: CNA based on data from Federal Emergency Management Agency, National Risk Index (NRI) 2021 Update.

Note: Alaska (left inset) and Hawaii (right inset). Counties range from very high risk to very low risk.

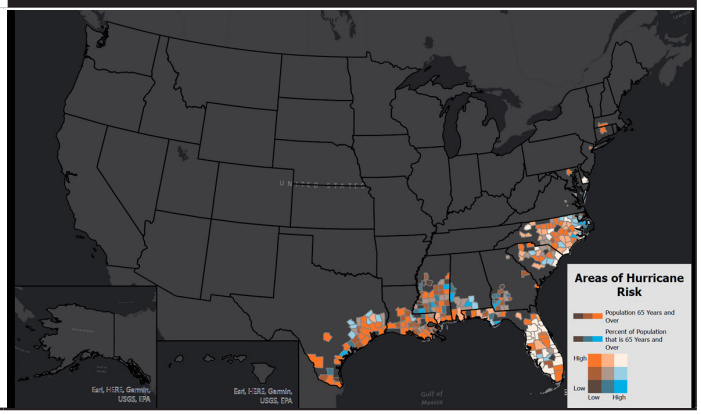
FIGURE 16. MAP OF THE CONTIGUOUS UNITED STATES SHOWING THE HURRICANE RISK INDEX OF EACH COUNTY



Source: CNA based on data from Federal Emergency Management Agency, National Risk Index (NRI) 2021 Update.

Note: Alaska (left inset) and Hawaii (right inset). Counties range from very high risk to very low risk. Counties along the Gulf Coast and southern Atlantic Coast are at most risk. Southern Florida has no counties below relatively moderate risk.

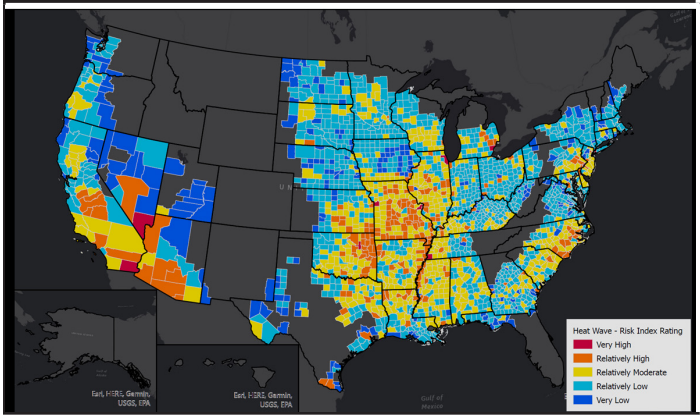
FIGURE 17. MAP OF THE CONTIGUOUS UNITED STATES SHOWING THE POPULATION PROFILE OF COUNTIES AT RELATIVELY MODERATE, RELATIVELY HIGH, OR VERY HIGH HURRICANE RISK



Source: CNA based on data from Federal Emergency Management Agency, National Risk Index (NRI) 2021 Update and US Census Bureau's American Community Survey (ACS) 2017–2021 5-year estimates, Table(s) B01001.

Note: Alaska (left inset) and Hawaii (right inset). Counties in white have at least moderate risk, have high population 65 years and over, and have high percent of population that is 65 years and over.

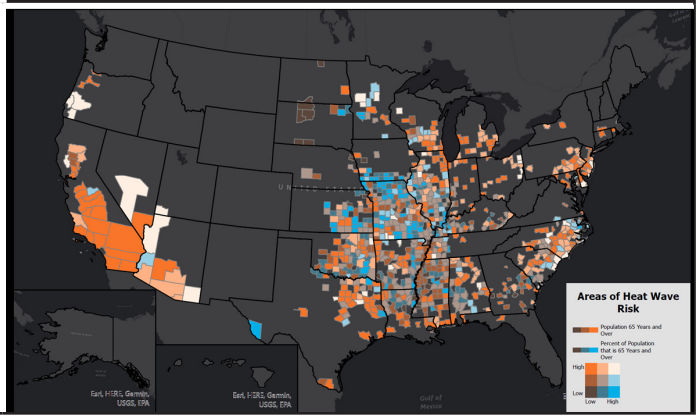
FIGURE 18. MAP OF THE CONTIGUOUS UNITED STATES SHOWING THE HEAT WAVE RISK INDEX OF EACH COUNTY



Source: CNA based on data from Federal Emergency Management Agency, National Risk Index (NRI) 2021 Update.

Note: Alaska (left inset) and Hawaii (right inset). Counties range from very high risk to very low risk. Counties in the Southwest in California, Nevada, and Arizona as well as in Oklahoma, Missouri, and along the Mississippi River have high heat wave risk.

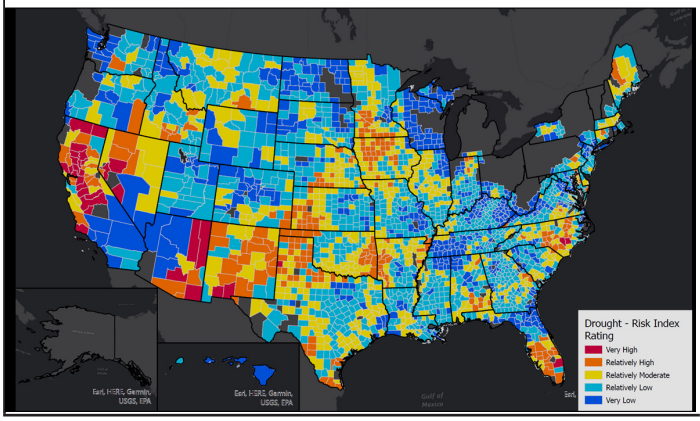
FIGURE 19. MAP OF THE CONTIGUOUS UNITED STATES SHOWING THE POPULATION PROFILE OF COUNTIES AT RELATIVELY MODERATE, RELATIVELY HIGH, OR VERY HIGH HEAT WAVE RISK



Source: CNA based on data from Federal Emergency Management Agency, National Risk Index (NRI) 2021 Update and US Census Bureau's American Community Survey (ACS) 2017–2021 5-year estimates, Table(s) B01001.

Note: Alaska (left inset) and Hawaii (right inset). Counties in white have at least moderate risk, have high population 65 years and over, and have high percent of population that is 65 years and over.

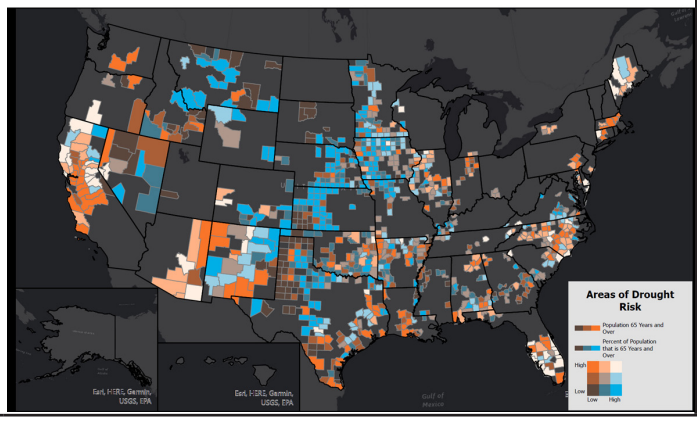
FIGURE 20. MAP OF THE CONTIGUOUS UNITED STATES SHOWING THE DROUGHT RISK INDEX OF EACH COUNTY



Source: CNA based on data from Federal Emergency Management Agency, National Risk Index (NRI) 2021 Update.

Note: Alaska (left inset) and Hawaii (right inset). Counties range from very high risk to very low risk.

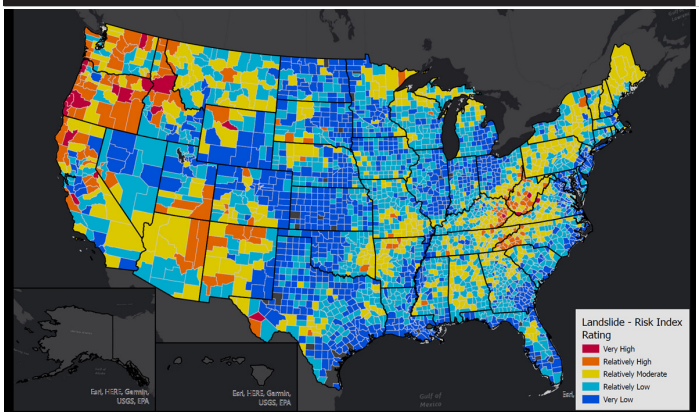
FIGURE 21. MAP OF THE CONTIGUOUS UNITED STATES SHOWING THE POPULATION PROFILE OF COUNTIES AT RELATIVELY MODERATE, RELATIVELY HIGH, OR VERY HIGH DROUGHT RISK



Source: CNA based on data from Federal Emergency Management Agency, National Risk Index (NRI) 2021 Update; US Census Bureau's American Community Survey (ACS) 2017–2021 5-year estimates, Table(s) B01001.

Note: Alaska (left inset) and Hawaii (right inset). Counties in white have at least moderate risk, have high population 65 years and over, and have high percent of population that is 65 years and over.

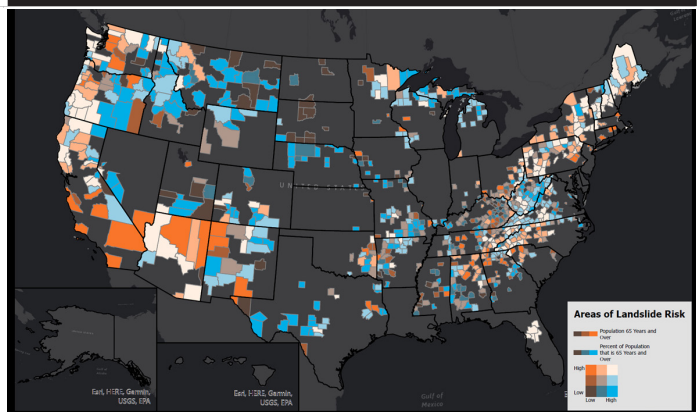
FIGURE 22. MAP OF THE CONTIGUOUS UNITED STATES SHOWING THE LANDSLIDE RISK INDEX OF EACH COUNTY



Source: Federal Emergency Management Agency, National Risk Index (NRI) 2021 Update.

Note: Alaska (left inset) and Hawaii (right inset). Counties range from very high risk to very low risk.

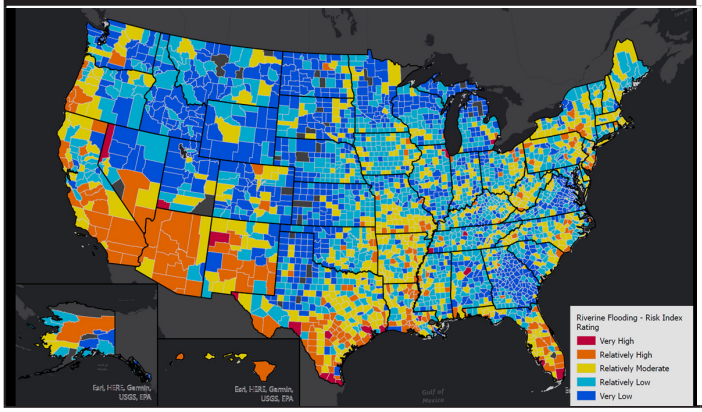
FIGURE 23. MAP OF THE CONTIGUOUS UNITED STATES SHOWING THE POPULATION PROFILE OF COUNTIES AT RELATIVELY MODERATE, RELATIVELY HIGH, OR VERY HIGH LANDSLIDE RISK



Source: CNA using Federal Emergency Management Agency, National Risk Index (NRI) 2021 Update. Source: US Census Bureau's American Community Survey (ACS) 2017–2021 5-year estimates, Table(s) B01001.

Note: Alaska (left inset) and Hawaii (right inset). Counties in white have at least moderate risk, have high population 65 years and over, and have high percent of population that is 65 years and over.

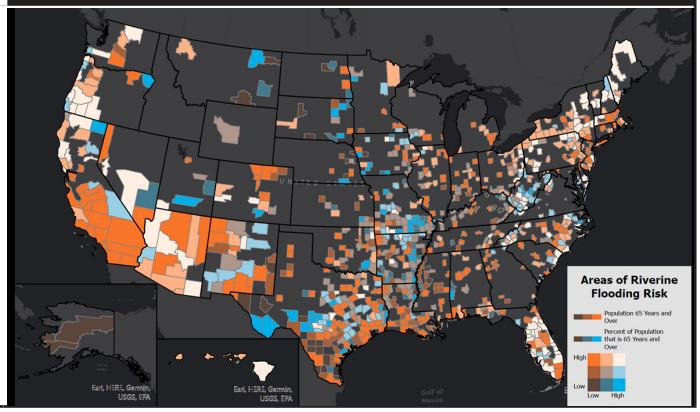
FIGURE 24. MAP OF THE CONTIGUOUS UNITED STATES SHOWING THE RIVERINE FLOODING RISK INDEX OF EACH COUNTY



Source: Federal Emergency Management Agency, National Risk Index (NRI) 2021 Update.

Note: Alaska (left inset) and Hawaii (right inset). Counties range from very high risk to very low risk.

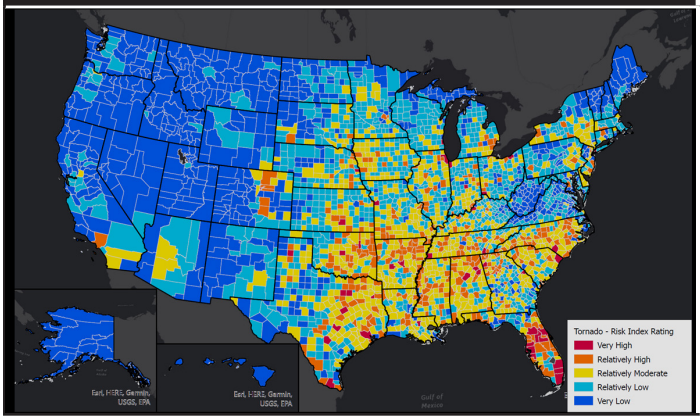
FIGURE 25. MAP OF THE CONTIGUOUS UNITED STATES SHOWING THE POPULATION PROFILE OF COUNTIES AT RELATIVELY MODERATE, RELATIVELY HIGH, OR VERY HIGH RIVERINE FLOODING RISK



Source: CNA using Federal Emergency Management Agency, National Risk Index (NRI) 2021 Update. Source: US Census Bureau's American Community Survey (ACS) 2017–2021 5-year estimates, Table(s) B01001.

Note: Alaska (left inset) and Hawaii (right inset). Counties in white have at least moderate risk, have high population 65 years and over, and have high percent of population that is 65 years and over.

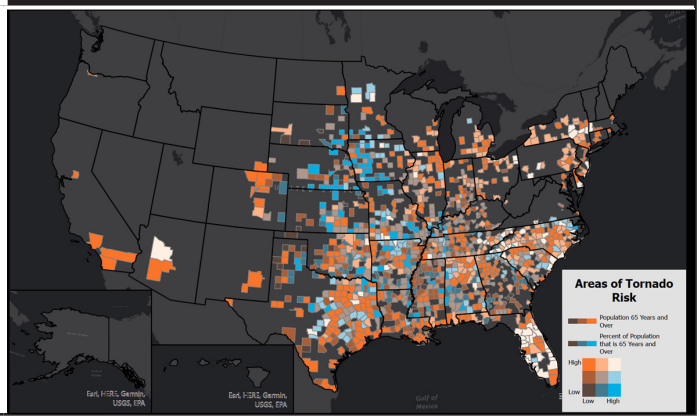
FIGURE 26. MAP OF THE CONTIGUOUS UNITED STATES SHOWING THE TORNADO RISK INDEX OF EACH COUNTY



Source: Federal Emergency Management Agency, National Risk Index (NRI) 2021 Update.

Note: Alaska (left inset) and Hawaii (right inset). Counties range from very high risk to very low risk.

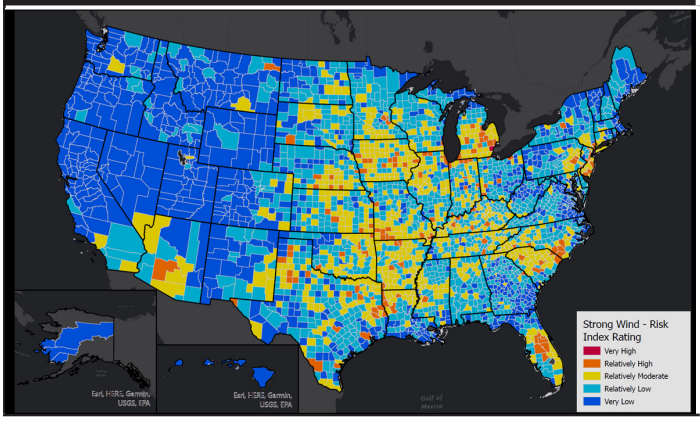
FIGURE 27. MAP OF THE CONTIGUOUS UNITED STATES SHOWING THE POPULATION PROFILE OF COUNTIES AT RELATIVELY MODERATE, RELATIVELY HIGH, OR VERY HIGH TORNADO RISK



Source: CNA using Federal Emergency Management Agency, National Risk Index (NRI) 2021 Update. Source: US Census Bureau's American Community Survey (ACS) 2017–2021 5-year estimates, Table(s) B01001.

Note: Alaska (left inset) and Hawaii (right inset). Counties in white have at least moderate risk, have high population 65 years and over, and have high percent of population that is 65 years and over.

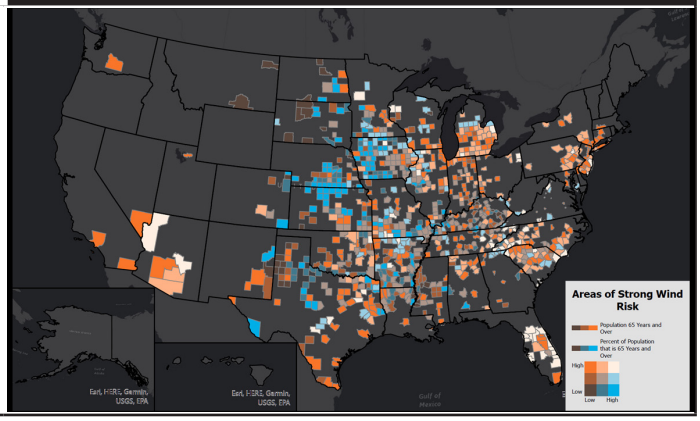
FIGURE 28. MAP OF THE CONTIGUOUS UNITED STATES SHOWING THE STRONG WIND RISK INDEX OF EACH COUNTY



Source: Federal Emergency Management Agency, National Risk Index (NRI) 2021 Update.

Note: Alaska (left inset) and Hawaii (right inset). Counties range from very high risk to very low risk.

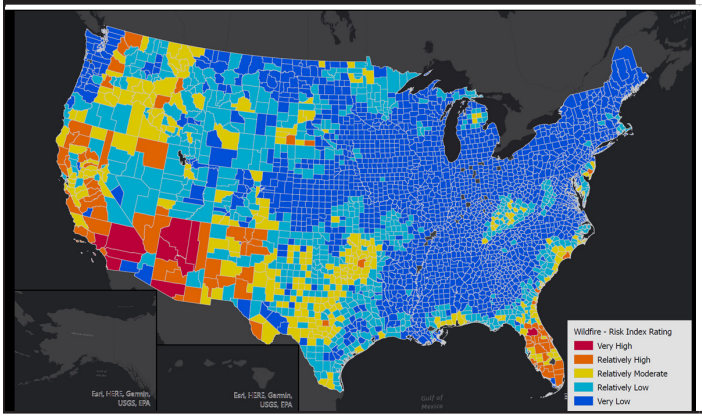
FIGURE 29. MAP OF THE CONTIGUOUS UNITED STATES SHOWING THE POPULATION PROFILE OF COUNTIES AT RELATIVELY MODERATE, RELATIVELY HIGH, OR VERY HIGH STRONG WIND RISK



Source: CNA using Federal Emergency Management Agency, National Risk Index (NRI) 2021 Update. Source: US Census Bureau's American Community Survey (ACS) 2017–2021 5-year estimates, Table(s) B01001.

Note: Alaska (left inset) and Hawaii (right inset). Counties in white have at least moderate risk, have high population 65 years and over, and have high percent of population that is 65 years and over.

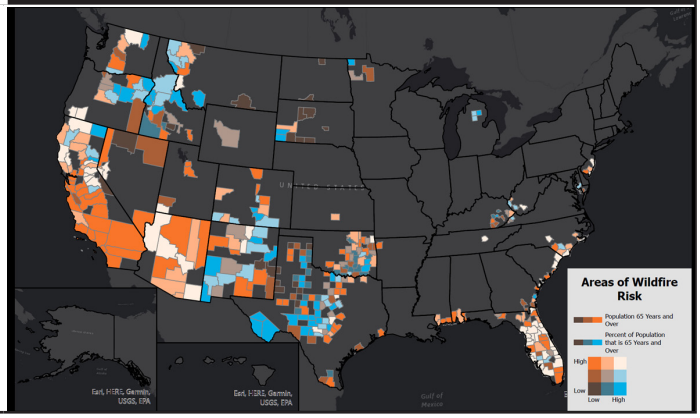
FIGURE 30. MAP OF THE CONTIGUOUS UNITED STATES SHOWING THE WILDFIRE RISK INDEX OF EACH COUNTY



Source: Federal Emergency Management Agency, National Risk Index (NRI) 2021 Update.

Note: Alaska (left inset) and Hawaii (right inset). Counties range from very high risk to very low risk.

FIGURE 31. MAP OF THE CONTIGUOUS UNITED STATES SHOWING THE POPULATION PROFILE OF COUNTIES AT RELATIVELY MODERATE, RELATIVELY HIGH, OR VERY HIGH WILDFIRE RISK



Source: CNA using Federal Emergency Management Agency, National Risk Index (NRI) 2021 Update. Source: US Census Bureau's American Community Survey (ACS) 2017–2021 5-year estimates, Table(s) B01001.

Note: Alaska (left inset) and Hawaii (right inset). Counties in white have at least moderate risk, have high population 65 years and over, and have high percent of population that is 65 years and over.

FIGURES AND TABLES

Figures

Tables

ABBREVIATIONS

AARP	American Association of Retired Persons (formerly)
ABA	Architectural Barriers Act
ADA	Americans with Disabilities Act of 1990
ACL	Administration for Community Living
ACA	Affordable Care Act
ACS	American Community Survey
AT	assistive technology
BRIC	Building Resilient Infrastructure and Communities
CDC	Centers for Disease Control and Prevention
CMS	Centers for Medicare and Medicaid Services
COPD	chronic obstructive pulmonary disease
CRS	Community Rating System
CPI	Consumer Price Index
DMEPOS	durable medical equipment, prosthetics/orthotics, and supplies
DOJ	US Department of Justice
DOL	US Department of Labor
DSPs	direct service providers
EMAs	emergency management agencies
EO	executive order
FEMA	Federal Emergency Management Agency
GDP	gross domestic product
IA	individual assistance
ICT	information and communications technology
IPCC	Intergovernmental Panel on Climate Change
LIHEAP	Low Income Home Energy Assistance Program
NCEI	National Centers for Environmental Information
NCD	National Council on Disability
NFIP	National Flood Insurance Program
NGO	nongovernmental organizations
NOAA	National Oceanic and Atmospheric Administration
NRI	National Risk Index
PA	public assistance

Abbreviations (cont'd)

PAS	personal assistance/attendant services
PM	particulate matter
PTSD	post-traumatic stress disorder
REAADI	Real Emergency Access for Aging and Disability Inclusion for Disasters Act
SSI	supplemental security income
SSDI	Social Security Disability Insurance
WEF	World Economic Forum

ENDNOTES

1. Federal Emergency Management Agency (FEMA), "How a Disaster Gets Declared," Apr. 25, 2023, https://www.fema.gov/disaster/how-declared.
2. United States Census Bureau, "American Community Survey 2017–2021 5-Year Data Release," Dec. 8, 2022, https://www.census.gov/newsroom/press-kits/2022/acs-5-year.html.
3. United States Census Bureau, "American Community Survey 2017–2021 5-Year Estimates."
4. Administration for Community Living (ACL), *2020 Profile of Older Americans*, May 2021, https://acl.gov/sites/default/files/Aging%20and%20Disability%20in%20America/2020ProfileOlderAmericans.Final_.pdf.
5. Laura Blakeslee et al., "Age Profiles of Smaller Geographies Don't Always Mirror the National Trend," US Census Bureau, May 25, 2023, https://www.census.gov/library/stories/2023/05/aging-united-states-population-fewer-children-in-2020.html.
6. National Oceanic and Atmospheric Administration (NOAA) and National Centers for Environmental Information (NCEI), "US Billion-Dollar Weather and Climate Disasters," 2023, https://www.ncei.noaa.gov/access/billions/, DOI: 10.25921/stkw-7w73.
7. Arizona Climate and Health Adaptation Plan (2017); Central Arizona Project Climate Adaptation Plan (2018); Safeguarding California Plan, California's Climate Adaptation Strategy (2018 Update); California Climate Adaptation Strategy, Implementation Report (2022); Florida Hazard Mitigation Plan (2018); and Missouri State Hazard Mitigation Plan 2023.
8. National Council on Disability, *The Impacts of Extreme Weather Events on People with Disabilities*, May 4, 2023, https://ncd.gov/publications/2023/impacts-extreme-weather-events-people-disabilities.
9. World Economic Forum (WEF), *The Global Risks Report 2022: 17th Edition*, 2022, https://www3.weforum.org/docs/WEF_The_Global_Risks_Report_2022.pdf.
10. WEF, *The Global Risks Report 2023: 18th Edition*, Jan. 2023, https://www3.weforum.org/docs/WEF_Global_Risks_Report_2023.pdf.
11. "Climate and Health Assessment," *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment*, United States Global Change Research Program, 2016, https://health2016.globalchange.gov/extreme-events.
12. US Department of Health and Human Services (HHS), *2021 Climate Action Plan*, Sept. 28, 2021, https://www.hhs.gov/sites/default/files/hhs-climate-action-plan-9-28-2021.pdf.
13. National Council on Disability, *The Impacts of Extreme Weather Events on People with Disabilities*.
14. NOAA and NCEI, "Billion-Dollar Weather and Climate Disasters," 2023, Billion-Dollar Weather and Climate Disasters | National Centers for Environmental Information (NCEI) (noaa.gov).
15. Adam B. Smith, *US Billion-Dollar Weather and Climate Disasters in Historical Context*, NOAA and NCEI, Jan. 10, 2023, https://www.climate.gov/news-features/blogs/beyond-data/2022-us-billion-dollar-weather-and-climate-disasters-historical.
16. Smith, *US Billion-Dollar Weather and Climate Disasters in Historical Context*.
17. NOAA, "Record Drought Gripped Much of the US in 2022," Jan. 10, 2023, https://www.noaa.gov/news/record-drought-gripped-much-of-us-in-2022.
18. NOAA National Centers for Environmental Information, *March 2022 Tornadoes Report*, Apr. 2022, https://www.ncei.noaa.gov/access/monitoring/monthly-report/tornadoes/202203.

19. NOAA, "Record Drought Gripped Much of the US in 2022."

20. "18 Extreme Weather Events Caused $165 Billion in Damage Last Year; NOAA Says," CBS News and Associated Press, Jan. 10, 2022, https://www.cbsnews.com/news/noaa-billion-dollar-weather-disasters-2022-hurricane-ian-drought/.

21. Tatyana Deryugina, "The Fiscal Cost of Hurricanes: Disaster Aid Versus Social Insurance," National Bureau of Economic Research, May 2016, https://www.nber.org/papers/w22272.

22. Smith, *US Billion-Dollar Weather and Climate Disasters in Historical Context.*

23. Kathryn Varn, "A Vast Majority of Hurricane Ian Deaths Were Elderly Floridians. What Happened?," *Tallahassee Democrat*, Nov. 21, 2021, https://www.tallahassee.com/story/news/hurricane/2022/11/21/hurricane-ian-deadly-florida-seniors-storm-deaths/8316755001/.

24. NOAA, "Record Drought Gripped Much of the US in 2022."

25. NOAA and NCEI, "Billion-Dollar Weather and Climate Disasters," Nov. 8, 2023, https://www.ncei.noaa.gov/access/billions/.

26. NOAA and NCEI, "US Billion-Dollar Weather and Climate Disasters 1980-2023," Factsheet, Nov. 8, 2023, https://www.ncei.noaa.gov/access/billions/.

27. Lorraine Carli, "Maui Wildfire One of the Deadliest in US History," *NFPA Today (NFPA blog)*, Aug. 12, 2023, https://www.nfpa.org/News-and-Research/Publications-and-media/Blogs-Landing-Page/NFPA-Today/Blog-Posts/2023/08/12/Maui-wildfire-one-of-deadliest-in-US-history.

28. NOAA, "US saw its 9th-Warmest August on Record," Sept. 11, 2023, https://www.noaa.gov/news/us-saw-its-9th-warmest-august-on-record#:~:text=by%20the%20numbers,August%202023,saw%20its%20second%2Dhottest%20August.

29. Smith, *US Billion-Dollar Weather and Climate Disasters in Historical Context.*

30. Johns Hopkins, Bloomberg School of Public Health, *Is This the United Fate of America? Climate Change & Health: Assessing State Preparedness*, https://climateandhealthreport.org/.

31. California Climate Adaptation Strategy, 2022 Implementation Report, https://www.climateresilience.ca.gov/overview/docs/20240405-Climate_Adpatation_Strategy_Report_2023.pdf.

32. Johns Hopkins, *Is This the United Fate of America?*

33. NOAA, "Record Drought Gripped Much of the US in 2022."

34. Smith, *US Billion-Dollar Weather and Climate Disasters in Historical Context.*

35. Matthew E. Hauer, R. Kyle Saunders, and Daniel Shtob, "Research Note: Demographic Change on the United States Coast, 2020–2100," *Demography* 59, no. 4 (2022), pp. 1221–1232, doi: 10.1215/00703370-10127418.

36. Intergovernmental Panel on Climate Change (IPCC), *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*, 2012, https://www.ipcc.ch/site/assets/uploads/2018/03/SREX_Full_Report-1.pdf.

37. National Institutes of Health (NIH), "NIH Style Guide: Age," https://www.nih.gov/nih-style-guide/age#:~:text=Children%20(1%20year%20through%2012,adults%20(65%20and%20older)*.

38. NORC, University of Chicago, "Aging and Health," 2023, https://www.norc.org/Research/Topics/Pages/health-and-well-being/aging-and-the-life-course.aspx.

39. NORC, "Aging and Health."

40. US Census 2020, https://www.census.gov/library/stories/2023/05/2020-census-united-states-older-population-grew.html.

41. ACL, *2021 Profile of Older Americans*, Nov. 2022, https://acl.gov/sites/default/files/Profile%20of%20OA/2021%20Profile%20of%20OA/2021ProfileOlderAmericans_508.pdf.

42. NORC, University of Chicago, "National Social Life, Health, and Aging Project," 2023, https://www.norc.org/research/projects/national-social-life-health-and-aging-project.html.

43. ACL, *2021 Profile of Older Americans*.

44. ACL, *2020 Profile of Older Americans*.

45. Ann Kriebel-Gasparro, "Climate Change: Effects on the Older Adult," *Journal of Nurse Practitioners; Philadelphia* 18, no. 4. (2022), pp. 372–376, https://www.proquest.com/docview/2647162588.

46. Matthew Stevenson, "Demand for Healthcare Workers Will Outpace Supply by 2025: An Analysis of the US Healthcare Labor Market," Mercer HPA Health Provider Advisory, 2018, https://www.mercer.us/our-thinking/career/demand-for-healthcare-workers-will-outpace-supply-by-2025.html.

47. Stevenson, "Demand for Healthcare Workers Will Outpace Supply by 2025."

48. Bureau of Labor Statistics, "Employment Projections and Occupational Outlook Handbook," Oct. 2017.

49. Bureau of Labor Statistics, "Employment Projections and Occupational Outlook Handbook News Release," Sept. 9, 2022, https://www.bls.gov/news.release/ecopro.htm.

50. Alex Jokich, "Nursing Homes Facing Staffing Shortages Amid Pandemic," *KSTP Eyewitness News*, Oct. 20, 2020, https://kstp.com/news/nursing-homes-facing-staffing-shortages-amid-pandemic/5900682/.

51. Janet Gamble, "Climate Change and Older Americans: State of the Science," *Environmental Health Perspectives* 121, no. 1 (2013), pp. 15–22.

52. Gamble, "Climate Change and Older Americans."

53. Nick Watts et al., *The 2020 Report of The Lancet Countdown on Health and Climate Change: Responding to Converging Crisis Report*, *Lancet* 397, no. 10269 (2021), pp. 129–170, https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)32290-X/fulltext.

54. FEMA, *Guide to Expanding Mitigation: Making the Connection to Older Adults*, https://www.fema.gov/sites/default/files/documents/fema_mitigation-guide_older-adults.pdf.

55. Intergovernmental Panel on Climate Change (IPCC), *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation* (New York: Cambridge University Press, 2012).

56. Ann Kriebel-Gasparro, "Climate Change: Effects on the Older Adult," *Journal of Nurse Practitioners: Philadelphia* 18, no, 4 (2022), pp. 372–376, https://www.proquest.com/docview/2647162587.

57. IPCC, *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*.

58. Erwin William A. Leyva, Adam Beaman, and Patricia M. Davidson, "Health Impact of Climate Change in Older People: An Integrative Review and Implications for Nursing," *Journal of Nursing Scholarship* 4, no. 6 (2017), pp. 670–678, https://doi.org/10.1111/jnu.12346.

59. Kriebel-Gasparro, "Climate Change: Effects on the Older Adult."

60. Kriebel-Gasparro, "Climate Change: Effects on the Older Adult."

61. Kriebel-Gasparro, "Climate Change: Effects on the Older Adult."

62. US Department of Health and Human Services, *2021 Climate Action Plan*.

63. Rebecca Leppert and Katherine Schaeffer, "8 Facts About Americans with Disabilities," Pew Research Center, July 24, 2023, https://www.pewresearch.org/short-reads/2023/07/24/8-facts-about-americans-with-disabilities/.

64. Leyva, Beaman, and Davidson, "Health Impact of Climate Change in Older People."

65. Americans with Disabilities (ADA), "Guide to Disability Rights Laws," https://www.ada.gov/resources/disability-rights-guide/#:~:text=An%20individual%20with%20a%20disability%20is%20defined%20by%20the%20ADA,as%20having%20such%20an%20impairment.

66. Leppert and Schaeffer, "8 Facts About Americans with Disabilities."

67. Leppert and Schaeffer, "8 Facts About Americans with Disabilities."

68. Centers for Disease Control and Prevention (CDC), "Disability Impacts All of Us," last modified Sept. 16, 2020, https://www.cdc.gov/ncbddd/disabilityandhealth/infographic-disability-impacts-all.html.

69. Leppert and Schaeffer, "8 Facts About Americans with Disabilities."

70. Administration for Community Living (ACL), *2021 Profile of Older Americans*.

71. Greg Marshall, "How People with Disabilities Weather Natural Disasters." *Sierra*, Sept. 12, 2020, https://www.sierraclub.org/sierra/how-people-disabilities-weather-natural-disasters.

72. Marcie Roth, "A Resilient Community Is One That Includes and Protects Everyone," Bulletin of the Atomic Scientists, Mar. 4, 2018, https://thebulletin.org/2018/03/a-resilient-community-is-one-that-includes-and-protects-everyone/.

73. Rachel M. Gregg, Kathryn N. Braddock, and Jessi M. Kershner, *The State of Climate Adaptation in Public Health: An Assessment of 16 US States*, EcoAdapt, 2019, https://www.cakex.org/sites/default/files/documents/EcoAdapt_Climate%20and%20Health%20Report_June%202019_2.pdf.

74. Janet L. Gamble and John Balbus, "Populations of Concern," *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment* (Washington, DC: US Global Change Research Program, 2016), https://health2016.globalchange.gov/low/ClimateHealth2016_09_Populations_small.pdf.

75. Masri Shahir et al., "Disproportionate Impacts of Wildfires Among Elderly and Low-Income Communities in California from 2000–2020," *International Journal of Environmental Research and Public Health* 18, no. 8 (2021), pp. 3921–3921, https://doi.org/10.3390/ijerph18083921.

76. Shahir et al., "Disproportionate Impacts of Wildfires."

77. California Air Resources Board, *Camp Fire Air Quality Data Analysis*, July 2021, https://ww2.arb.ca.gov/resources/documents/camp-fire-air-quality-data-analysis.

78. FEMA, "California Camp Fire: FM-5278-CA," Dec. 20, 2022, https://www.fema.gov/disaster/5278.

79. US Census Bureau, "Butte County, California Quick Facts," https://www.census.gov/quickfacts/fact/table/buttecountycalifornia/PST045222.

80. Butte County District Attorney, *The Camp Fire Public Report, A Summary of the Camp Fire Investigation*, June 16, 2020, https://www.buttecounty.net/DocumentCenter/View/1952/June-16-2020---Camp-Fire-Public-Report-PDF?bidId=.

81. Katherine Skiba, "One Year Ago: California's Deadliest Wildfire Ravaged Town of Paradise," *AARP*, Oct. 15, 2019, https://www.aarp.org/politics-society/history/info-2019/paradise-camp-fire-anniversary.html.

82. Laura Newberry, "Must Reads: Poor, Elderly and Too Frail to Escape: Paradise Fire Killed the Most Vulnerable Residents," *Los Angeles Times*, https://www.latimes.com/local/lanow/la-me-ln-camp-fire-seniors-mobile-home-deaths-20190209-story.html.

83. Terri Adams-Fuller, "Extreme Heat Is Deadlier Than Hurricanes, Floods, and Tornadoes," *Scientific American*, July 1, 2023, https://www.scientificamerican.com/article/extreme-heat-is-deadlier-than-hurricanes-floods-and-tornadoes-combined/#:~:text=Studies%20show%20that%20outdoor%20workers,hurricanes%2C%20floods%20and%20tornadoes%20combined.

84. IPCC, *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*.

85. CDC Climate and Health Program, "Heat and Health Tracker," https://ephtracking.cdc.gov/Applications/heatTracker/.

86. Gamble and Balbus, "Populations of Concern."

87. CDC Climate and Health Program, "Heat and Health Tracker."

88. CDC Climate and Health Program, "Heat and Health Tracker."

89. Kriebel-Gasparro, "Climate Change: Effects on the Older Adult."

90. Gregg, Braddock, and Kershner, *The State of Climate Adaptation in Public Health: An Assessment of 16 US States*.

91. Watts et al., *The 2020 Report of The Lancet Countdown on Health and Climate Change*.

92. Lampard, P, Scamman, D et al. "The Imperative for a Health-Centered Response in a World Facing Irreversible Harms, The 2023 Report of the *Lancet* Countdown on Health And Climate Change," Nov. 14, 2023. https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(23)01859-7/fulltext.

93. NOAA, "Climate Attribution Tools Critical for Understanding Extreme Events. New Research Examines Climate Influence on Extreme Events in 2021 and 2022," Jan. 9, 2023, https://www.noaa.gov/news-release/climate-attribution-tools-critical-for-understanding-extreme-events.

94. National Weather Service, "Weather Prediction Center," Aug. 23, 2023, https://origin.wpc.ncep.noaa.gov/discussions/hpcdiscussions.php?disc=pmdspd.

95. Jorge Torres, "July 2023 Sets Multiple New Heat Records Across Arizona," Arizona 15 News, July 31, 2023, https://www.abc15.com/weather/impact-earth/july-2023-sets-multiple-new-heat-records-across-arizona.

96. Maricopa County Department of Public Health Epidemiology and Informatics, *2023 Weekly Heat Report*, Nov. 4, 2023, https://www.maricopa.gov/ArchiveCenter/ViewFile/Item/5734.

97. Maricopa County, "Staying Safe in the Extreme Heat," https://www.maricopa.gov/1871/Extreme-Heat.

98. USDHHS, Office of Community Services, LIHEAP Fact Sheet, https://www.acf.hhs.gov/ocs/fact-sheet/liheap-fact-sheet.

99. Gregg, Braddock, and Kershner, *The State of Climate Adaptation in Public Health: An Assessment of 16 US States*.

100. Gamble and Balbus, "Populations of Concern."

101. Gamble and Balbus, "Populations of Concern."

102. Patrice K. Nicholas et al., "Mental Health Impacts of Climate Changes Perspectives for the ED Clinician," *Journal of Emergency Nursing* 46, no. 5 (2020), https://www.jenonline.org/article/S0099-1767(20)30163-X/fulltext.

103. Nicholas et al., "Mental Health Impacts of Climate Changes Perspectives for the ED Clinician."

104. Nicholas et al., "Mental Health Impacts of Climate Changes Perspectives for the ED Clinician."

105. Nicholas et al., "Mental Health Impacts of Climate Changes Perspectives for the ED Clinician."

106. Watts et al., *The 2020 Report of The Lancet Countdown on Health and Climate Change*.

107. National Council on Disability, *The Impacts of Extreme Weather Events on People with Disabilities*.

108. Stevenson, "Demand for Healthcare Workers Will Outpace Supply by 2025."

109. Stevenson, "Demand for Healthcare Workers Will Outpace Supply by 2025."

110. Nicholas et al., "Mental Health Impacts of Climate Changes Perspectives for the ED Clinician."

111. National Council on Disability, *The Impacts of Extreme Weather Events on People with Disabilities*.

112. "LIHEAP IM-2022-06 Heat Stress Flexibilities and Resources FY 2022," July 19, 2022, https://www.acf.hhs.gov/ocs/policy-guidance/liheap-im-2022-06-heat-stress-flexibilities-and-resources-fy2022.

113. ACL, *2020 Profile of Older Americans*.

114. Jennifer Molinsky and Ann Forsyth, "Climate Change, Aging, and Well-Being: How Residential Setting Matters," *Housing Policy Debate* 33, no. 5 (2022), pp. 1029–1054, https://doi.org/10.1080/10511482.2022.2109711.

115. ACL, *2020 Profile of Older Americans*.

116. Augusta A. Williams et al., "Building Vulnerability in a Changing Climate: Indoor Temperature Exposures and Health Outcomes in Older Adults Living in Public Housing during an Extreme Heat Event in Cambridge, MA.," *International Journal of Environmental Research and Public Health* 16, no. 13 (2019), https://www.mdpi.com/1660-4601/16/13/2373.

117. Molinsky and Forsyth, "Climate Change, Aging, and Well-Being."

118. Williams et al., "Building Vulnerability in a Changing Climate."

119. Williams et al., "Building Vulnerability in a Changing Climate."

120. Molinsky and Forsyth, "Climate Change, Aging, and Well-Being."

121. Oregon Office of Emergency Management, Initial *After-Action Review (AAR) of the June 2021 Excessive Heat Event*, July 27, 2021, https://www.oregon.gov/oem/Documents/2021_June_Excessive_Heat_Event_AAR.pdf.

122. Andrew Roberts et al., "A Snapshot of the Fast-Growing US Older Population," Census.gov, Oct. 30, 2018, https://www.census.gov/library/stories/2018/10/snapshot-fast-growing-us-older-population.html.

123. Ann C. Foster, "A Closer Look at Spending Patterns of Older Americans," US Bureau of Labor Statistics, Mar. 2016, https://www.bls.gov/opub/btn/volume-5/spending-patterns-of-older-americans.htm.

124. ACL, *2020 Profile of Older Americans*.

125. Molly Cromwell, "Renters More Likely Than Homeowners to Spend More Than 30% of Income on Housing in Almost All Counties," US Census Bureau, Dec. 8, 2022, https://www.census.gov/library/stories/2022/12/housing-costs-burden.html.

126. Cromwell, "Renters More Likely Than Homeowners to Spend More Than 30% of Income on Housing in Almost All Counties."

127. Emily Paulin, "Extreme Weather Is Killing Mostly Older Adults—and Has Been for Decades. Why Aren't We More Prepared?," *AARP*, Aug. 31, 2023, https://www.aarp.org/politics-society/advocacy/info-2023/extreme-weather-older-adults.html.

128. Gamble and Balbus, "Populations of Concern."

129. Julie Strupp, "Building Codes Aren't Climate Ready, but Changes Are Coming," Construction Dive, Sept.14, 2023, https://www.constructiondive.com/news/building-codes-climate-resilience-nibs/693672/.

130. Gamble and Balbus, "Populations of Concern."

131. Gamble and Balbus, "Populations of Concern."

132. Adams-Fuller, "Extreme Heat Is Deadlier Than Hurricanes, Floods, and Tornadoes."

133. ACL, *2020 Profile of Older Americans*.

134. Allison Gibson, Mary Helen McSweeney-Feld, and Co-Conveners, "A Special Collection of Articles on Disaster Planning, Preparedness, and Post Disaster Work for Older Adults," *Journal of Gerontological Social Work* 61, no. 7 (2018), pp. 686–688, doi:10.1080/01634372.2018.1511332.

135. The Greater Rochester Chapter of the American Red Cross, "Disaster Preparedness for Seniors by Seniors," https://www.redcross.org/content/dam/redcross/atg/_s/Preparedness__Disaster_Recovery/Disaster_Preparedness/Disaster_Preparedness_for_Srs-English.revised.

136. Roberts et al., "A Snapshot of the Fast-Growing US Older Population."

137. ACL, *2020 Profile of Older Americans*.

138. National Energy Assistance Director's Association (NEADA), "Home Heating Costs Reach Highest Level in More than 10 Years Families will Pay 17.2% More for Home Heating this Winter," Sept. 12, 2022, https://neada.org/wp-content/uploads/2022/09/winter2022-23PR.pdf.

139. National Council on Aging, "Energy Assistance Benefits," https://www.ncoa.org/article/energy-assistance-benefits.

140. WEF, "The Cost-of-Living Crisis Has Pushed 71 Million People into Poverty—Here's What Needs to Happen," Aug. 19, 2022, https://www.weforum.org/agenda/2022/08/cost-of-living-crisis-poverty-un/#:~:text=The%20cost%20of%20living%20crisis%20has%20pushed%2071,says%20governments%20and%20banks%20must%20urgently%20take%20action.

141. ACL, *2020 Profile of Older Americans*.

142. Roberts et al., "A Snapshot of the Fast-Growing US Older Population."

143. ACL, *2020 Profile of Older Americans*.

144. Roberts et al., "A Snapshot of the Fast-Growing US Older Population."

145. Gibson et al., "A Special Collection of Articles on Disaster Planning, Preparedness, and Post Disaster Work for Older Adults."

146. Gibson et al., "A Special Collection of Articles on Disaster Planning, Preparedness, and Post Disaster Work for Older Adults."

147. Linda Poon, "Hurricane Ian Targeted Florida's Retirement Belt," *Bloomberg*, Sept. 30, 2002, https://www.bloomberg.com/news/articles/2022-09-30/florida-s-retiree-population-bears-brunt-of-hurricane-ian.

148. WEF, *The Global Risks Report 2023*.

149. WEF, *The Global Risks Report 2023*.

150. Center on Budget and Policy Priorities. *More Housing Vouchers Needed to Help Older Adults Afford Stable Homes in the Community*. Aug 5, 2021, https://www.cbpp.org/research/housing/more-housing-vouchers-needed-to-help-older-adults-afford-stable-homes-in-the.

151. Mark Friedlander, "Triple-I: Extreme Fraud and Litigation Causing Florida's Homeowners Insurance Market Demise," Insurance Information Institute, June 23, 2022, https://www.iii.org/press-release/triple-i-extreme-fraud-and-litigation-causing-floridas-homeowners-insurance-markets-demise-062322.

152. FEMA, "Flood Insurance Program," https://www.fema.gov/flood-insurance.

153. Strupp, "Building Codes Aren't Climate Ready, but Changes Are Coming."

154. *Missouri State Hazard Mitigation Plan 2023*, pp. v https://sema.dps.mo.gov/docs/programs/LRMF//_Hazard_Mitigation_Plan_2023-2028.pdf.

155. Tara Straw et al., "Recovery Legislation Should Build On Affordable Care Act Improvements in Coverage for Adults Over 55," Center on Budget and Policy Priorities, https://www.cbpp.org/research/health/recovery-legislation-should-build-on-affordable-care-act-improvements-in-coverage.

156. US Department of Health and Human Services, "LIHEAP IM-2022-06 Heat Stress Flexibilities and Resources FY 2022," July 19, 2022, https://www.acf.hhs.gov/ocs/policy-guidance/liheap-im-2022-06-heat-stress-flexibilities-and-resources-fy2022.

157. American Red Cross and American Academy of Nursing, *Closing the Gaps: Advancing Disaster Preparedness, Response and Recovery for Older Adults. American Red Cross. 25 Evidence-Informed Expert Recommendations to Improve Disaster Preparedness, Response and Recovery for Older Adults Across the United States*, Jan. 2020, https://www.redcross.org/content/dam/redcross/training-services/scientific-advisory-council/253901-03%20BRCR-Older%20Adults%20Whitepaper%20FINAL%201.23.2020.pdf

158. Penelope J. S. Stein and Michael A. Stein, "Climate Change and the Right to Health of People with Disabilities," *Lancet Global Health* 10, no. 1 (2022), pp. e24–e25, https://doi.org/10.1016/S2214-109X(21)00542-8.

159. Roth, "A Resilient Community Is One That Includes and Protects Everyone."

160. Stein and Stein, "Climate Change and the Right to Health of People with Disabilities." https://www.cbpp.org/research/health/recovery-legislation-should-build-on-affordable-care-act-improvements-in-coverage.

161. Stein and Stein, "Climate Change and the Right to Health of People with Disabilities."

162. Sean Calvin Conway, *An Evaluation of Human-Centered Impacts and Social Vulnerability in the Case of the Camp Fire in Butte County, California*, The University of Texas at Austin, Aug. 2021, https://repositories.lib.utexas.edu/bitstream/handle/2152/90481/CONWAY-MASTERSREPORT-2021.pdf?sequence=1.

163. Roth, "A Resilient Community Is One That Includes and Protects Everyone."

164. Roth, "A Resilient Community Is One That Includes and Protects Everyone."

165. H.R.1744—REAADI for Disasters Act, https://www.congress.gov/bill/116th-congress/house-bill/3208?q=%7B%22search%22%3A%5B%22HR+3208%22%5D%7D&s=1&r=1.

166. CAP, "Centering the Disability and Aging Communities in Federal Emergency Response Efforts," June 16, 2020, https://www.americanprogress.org/article/centering-disability-aging-communities-federal-emergency-response-efforts/.

167. REAADI for Disasters Act and DRMA, https://reaadi.com/.

168. Elizabeth M. Webster, *FEMA IHP Assistance for Extreme Heat: Considerations and Limitations, Congressional Research Service*, Aug. 15, 2022., https://crsreports.congress.gov/product/pdf/IN/IN11988/2

169. Webster, *FEMA IHP Assistance for Extreme Heat: Considerations and Limitations*.

170. Gamble and Balbus, "Populations of Concern."

171. Watts et al., *The 2020 Report of The Lancet Countdown on Health and Climate Change*.

172. *AB-2311 Emergency Services: Access and Functional Needs in Emergencies*, Chapter 520, Sept. 23, 2016, https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160AB2311.

173. Gibson et al., "A Special Collection of Articles on Disaster Planning, Preparedness, and Post Disaster Work for Older Adults."

174. Mary Helen McSweeney-Feld, "Assistive Technology and Older Adults in Disasters: Implications for Emergency Management," *Disaster Medicine and Public Health Preparedness* 11, no. 1 (2017), pp. 135–139, doi:10.1017/dmp.2016.160.

175. McSweeney-Feld, "Assistive Technology and Older Adults in Disasters."

176. Emily Cochrane and Julie Bosman,"'Our Bubble Has Been Burst': Older Storm Victims Face an Uncertain Future," *New York Times*, Oct. 10, 2022, https://www.nytimes.com/2022/10/10/us/florida-hurricane-ian-retirees.html.

177. ACL, *2020 Profile of Older Americans*.

178. Cochrane and Bosman,"'Our Bubble Has Been Burst.'"

179. Sue Anne Bell, "Commentary: Hurricane Ian: Older Adults Have Many Reasons for Not Evacuating—Here's Why It's Important to Check on Aging Neighbors," University of Michigan, Institute for Healthcare Policy and Innovation, Sept. 27, 2022, https://ihpi.umich.edu/news/commentary-hurricane-ian-older-adults-have-many-reasons-not-evacuating-heres-why-its-important.

180. Gibson et al., "A Special Collection of Articles on Disaster Planning, Preparedness, and Post Disaster Work for Older Adults."

181. Shahir et al., "Disproportionate Impacts of Wildfires."

182. Stephen Wong, Susan Shaheen, and Joan Walker, "Understanding Evacuee Behavior: A Case Study of Hurricane Irma Final Report," University of California Berkely, Transportation Sustainability Research Center, 2018, https://escholarship.org/content/qt9370z127/qt9370z127_noSplash_21eb1018e67fe6a9a6d84f49434b384f.pdf?t=pjwj00.

183. Wong, Shaheen, and Walker, "Understanding Evacuee Behavior."

184. National Council on Disability, *The Impacts of Extreme Weather Events on People with Disabilities*.

185. Stein and Stein, "Climate Change and the Right to Health of People with Disabilities."

186. Paulin, "Extreme Weather Is Killing Mostly Older Adults."

187. Stein and Stein, "Climate Change and the Right to Health of People with Disabilities."

188. McSweeney-Feld, "Assistive Technology and Older Adults in Disasters."

189. McSweeney-Feld, "Assistive Technology and Older Adults in Disasters."

190. McSweeney-Feld, "Assistive Technology and Older Adults in Disasters."

191. FEMA, "Florida Hurricane Ian, DR-4673-FL," https://www.fema.gov/disaster/4673.

192. FEMA, *Guidance on Planning for Personal Assistance Services in General Population Shelters*, https://www.fema.gov/pdf/emergency/disasterhousing/guidance_plan_ps_gpops.pdf.

193. United Nations Climate Change, "Key Aspects of the Paris Agreement," https://unfccc.int/most-requested/key-aspects-of-the-paris-agreement.

194. Adam Smith, *US Billion-Dollar Weather and Climate Disasters in Historical Context*, NOAA and NCEI, Jan. 10, 2023, https://www.climate.gov/news-features/blogs/beyond-data/2022-us-billion-dollar-weather-and-climate-disasters-historical.

195. NOAA and National Integrated Drought Information System (NIDIS), "Wildfire Management," https://www.drought.gov/sectors/wildfire-management.

196. Andrew Hoell et al., "Water Year 2021 Compound Precipitation and Temperature Extremes in California and Nevada," *Bulletin of the American Meteorological Society* 103, no. 12 (2022), pp. E2905–E2911.

197. Hoell et al., "Water Year 2021 Compound Precipitation."

198. WEF, *The Global Risks Report 2023*.

199. FEMA, "Continuing Resolution Allows FEMA to Lift Restrictions on Disaster Relief Funding," Oct. 3, 2023, https://www.fema.gov/press-release/20231003/continuing-resolution-allows-fema-lift-restrictions-disaster-relief-funding.

200. The National Academies of Sciences, Engineering, and Medicine, *Resilience for Compounding and Cascading Events* (Washington, DC: The National Academies Press, 2022).

201. FEMA, "Glossary," https://www.fema.gov/about/glossary.

202. FEMA, "Glossary."

203. Law Insider, "At-risk population Definition," https://www.lawinsider.com/dictionary/at-risk-population.

204. IPCC Sixth Assessment Report, Chapter 11: "Weather and Climate Extreme Events in a Changing Climate | Climate Change 2021: The Physical Science Basis." ipcc.ch.

205. Gillian B. White, "Poverty, Compounded," *Atlantic*, Apr. 16, 2016, https://www.theatlantic.com/business/archive/2016/04/how-poverty-compounds/478539/.

206. ADA National Network, "What Is the Definition of Disability Under the ADA?," Jan. 2022, https://adata.org/faq/what-definition-disability-under-ada.

207. NCD, "Resources," https://ncd.gov/resources; ADA, "A Guide to Disability Rights Laws," Feb. 2020, https://www.ada.gov/cguide.htm.

208. United States Environmental Protection Agency (EPA), "Environmental Justice 2020 Glossary," 2020, https://www.epa.gov/environmentaljustice/ej-2020-glossary.

209. FEMA, *National Advisory Council Report to the FEMA Administrator*, Nov. 2020, https://www.fema.gov/sites/default/files/documents/fema_nac-report_11-2020.pdf.

210. FEMA, *National Advisory Council Report to the FEMA Administrator.*

211. NCD, "Progress Report on National Disability Policy."

212. David Herring, "What Is an 'Extreme Event'? Is There Evidence That Global Warming Has Caused or Contributed to Any Particular Extreme Event?," NOAA, Oct. 29, 2020, https://www.climate.gov/news-features/climate-qa/what-extreme-event-there-evidence-global-warming-has-caused-or-contributed.

213. USDA Climate Hub, "Extreme Weather," https://www.climatehubs.usda.gov/climate-impacts/extreme-weather.

214. EPA, "Learn About Environmental Justice," https://www.epa.gov/environmentaljustice/learn-about-environmental-justice.

215. EPA, "Environmental Justice 2020 Glossary," 2020.

216. Law Insider, "Marginalized Definition," https://www.lawinsider.com/dictionary/marginalized.

217. EPA, "Environmental Justice 2020 Glossary."

218. NIH, "Style Guide on Age," https://www.nih.gov/nih-style-guide/age#:~:text=Children%20(1%20year%20through%2012,adults%20(65%20and%20older)*.

219. WEF, *The Global Risks Report 2023*.

220. White House, "Executive Order On Advancing Racial Equity and Support for Underserved Communities Through the Federal Government," Jan. 20, 2021, https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/20/executive-order-advancing-racial-equity-and-support-for-underserved-communities-through-the-federal-government/.

221. Children's Hospital of Philadelphia Research Institute, "Institution Board Review," 2022, https://irb.research.chop.edu/vulnerable-populations.

222. NCD, "National Council on Disability 2021 Progress Report: The Impact of COVID-19 on People with Disabilities."

223. P.L. 101-336, 104 Stat. 327, (and as subsequently amended) 42 U.S.C. Ch. 126 §§ 12101 et seq. (July 26, 1990).

224. Essential Accessibility, "Web Accessibility Lawsuits: What's the Current Landscape?," Apr. 20, 2021, https://www.essentialaccessibility.com/blog/web-accessibility-lawsuits.

225. Department of Labor Office of the Assistant Secretary for Administration & Management, "Architectural Barriers Act (ABA)," https://www.dol.gov/agencies/oasam/centers-offices/civil-rights-center/dlms2-0600#603.

226. Code of Federal Regulations, "§ 570.614 Architectural Barriers Act and the Americans with Disabilities Act," https://www.ecfr.gov/current/title-24/subtitle-B/chapter-V/subchapter-C/part-570/subpart-K/section-570.614.

227. Association of Assistive Technology Act Programs, "Assistive Technology Act Information," https://ataporg.org/at-act-info/.

228. National Low Income Housing Coalition, "Universal Design for Seniors and People with Disabilities," Sept. 30, 2021, https://nlihc.org/resource/universal-design-seniors-and-people-disabilities.

229. US Department of Housing and Urban Development (HUD), "Housing Discrimination Under the Fair Housing Act," https://www.hud.gov/program_offices/fair_housing_equal_opp/fair_housing_act_overview.

230. US Department of Housing and Urban Development (HUD), "Historical Timeline 1930–2010," https://www.huduser.gov/portal/hudtimeline_1930.html.

231. Centers for Medicare & Medicaid Services (CMS), "Durable Medical Equipment, Prosthetics/Orthotics & Supplies Fee Schedule," last modified Dec. 22, 2021, https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/DMEPOSFeeSched.

232. US Department of Labor (DOL), Office of Disability Employment Policy, "Employment Rights: Who Has Them and Who Enforces Them," https://www.dol.gov/agencies/odep/publications/fact-sheets/employment-rights-who-has-them-and-who-enforces-them#:~:text=Section%20501%20of%20the%20Rehabilitation,against%20qualified%20individuals%20with%20disabilities.

233. DOL, Office of Federal Contract Compliance Programs, "Section 503 Regulations Frequently Asked Questions," Feb. 14, 2014, https://www.dol.gov/agencies/ofccp/faqs/section-503.

234. P.L. 93-112, 87 Stat. 355, (and as subsequently amended) 29 U.S.C.A. §§ 701 et. seq.

235. Homeland Security Digital Library, "Individuals with Disabilities in Emergency Preparedness: Executive Order 13347. Annual Report July 2005," July 2005, https://www.hsdl.org/?abstract&did=455537.

236. FEMA, *Stafford Act, as Amended*, May 2021, https://www.fema.gov/sites/default/files/documents/fema_stafford_act_2021_vol1.pdf.

237. US Access Board, "Telecommunications Act of 1996 (Section 255)," https://www.access-board.gov/law/ta.html.

REFERENCES

"18 Extreme Weather Events Caused $165 Billion in Damage Last Year; NOAA Says." CBS News and Associated Press. Jan. 10, 2022. https://www.cbsnews.com/news/noaa-billion-dollar-weather-disasters-2022-hurricane-ian-drought/.

AB-2311 Emergency Services: Access and Functional Needs in Emergencies. Chapter 520. Sept. 23, 2016. https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160AB2311.

ADA.gov. "A Guide to Disability Rights Laws." Feb. 2020. https://www.ada.gov/cguide.htm.

ADA National Network. "What Is the Definition of Disability Under the ADA?" Jan. 2022. https://adata.org/faq/what-definition-disability-under-ada.

Adams-Fuller, Terri. "Extreme Heat Is Deadlier Than Hurricanes, Floods, and Tornadoes." *Scientific American*. July 1, 2023. https://www.scientificamerican.com/article/extreme-heat-is-deadlier-than-hurricanes-floods-and-tornadoes-combined/#:~:text=Studies%20show%20that%outdoor%20,hurricanes%2C%20floods%20and%20tornadoes%20combined.

Administration for Community Living (ACL). *2020 Profile of Older Americans*. May 2021. https://acl.gov/sites/default/files/Aging%20and%20Disability%20in%20America/2020ProfileOlderAmericans.Final_.pdf.

ACL. *2021 Profile of Older Americans*. Nov. 2022. https://acl.gov/sites/default/files/Profile of OA/2021 Profile of OA/2021ProfileOlder_508.pdf.

ACL. *2020 Profile of Older Americans.* May 2021. https://acl.gov/sites/default/files/Aging%20and%20Disability%20in%20America/2020ProfileOlderAmericans.Final_.pdf.

American Red Cross and American Academy of Nursing. *Closing the Gaps: Advancing Disaster Preparedness, Response and Recovery for Older Adults.* Jan. 2020. https://www.redcross.org/content/dam/redcross/training-services/scientific-advisory-council/253901-03%20BRCR-Older%20Adults%20Whitepaper%20%201.23.2020.pdf.

Americans with Disabilities Act of 1990. Public Law 101-336. 104 Stat. 327. (and as subsequently amended) 42 U.S.C. Ch. 126 §§ 12101 et seq. https://uscode.house.gov/view.xhtml?req=granuleid%3AUSC-prelim-title42-chapter126-subchapter2&edition=prelim#:~:text=%28c%29%20Unjustified%20isolation%20or%20segregation%20of-%20qualified%20individuals,service%2C%20program%2C%20or%20activity%20provided%20by%20the%20State.

Association of Assistive Technology Act Programs. "Assistive Technology Act Information." https://ataporg.org/at-act-info/.

Bell, Sue Ann. "Commentary: Hurricane Ian: Older Adults Have Many Reasons for Not Evacuating—Here's Why It's Important to Check on Aging Neighbors." University of Michigan Institute for Healthcare Policy and Innovation. Sept. 27, 2022. https://ihpi.umich.edu/news/hurricane-ian-older-adults-have-many-reasons-not-evacuating-heres-why-its-important.

Blakeslee, Laura, Megan Rabe, Zoe Caplan, and Andrew Roberts. "Age Profiles of Smaller Geographies Don't Always Mirror the National Trend." US Census Bureau. May 25, 2023. https://www.census.gov//stories/2023/05/aging-united-states-population-fewer-children-in-2020.html.

Bureau of Labor Statistics. "Employment Projections and Occupational Outlook Handbook." Oct. 2017.

Bureau of Labor Statistics. "Employment Projections and Occupational Outlook Handbook News Release." Sept. 9, 2022. https://www.bls.gov/news.release/ecopro.htm.

Butte County District Attorney. *The Camp Fire Public Report, A Summary of the Camp Fire Investigation*. June 16, 2020. https://www.buttecounty.net/DocumentCenter/View/1952/June-16-2020---Camp-Fire-Public-Report-PDF?bidId=.

California Air Resources Board. *Camp Fire Air Quality Data Analysis*. July 2021. https://ww2.arb.ca.gov/resources//camp-fire-air-quality-data-analysis.

California Climate Adaptation Strategy. 2022 Implementation Report. ://www.climateresilience.ca.gov /overview/docs/20240405 Climate_Adpatation_Strategy_Report_2023.pdf.

Caplan, Zoe. "2020 Census: 1 in 6 People in the United States Were 65 and Over." US Census Bureau. May 25, 2023. https://www.census.gov/library/stories/2023/05/2020-census-united-states-older-population-grew.html.

Carli, Lorraine. "Maui Wildfire One of the Deadliest in US History." *NFPA Today (NFPA blog)*. Aug. 12, 2023. https://www.nfpa.org/News-and-Research/Publications-and-media/Blogs-Landing-Page/NFPA-Today/Blog-Posts/2023/08/12/Maui-wildfire-one-of-deadliest-in-US-history.

Center on Budget and Policy Priorities. "More Housing Vouchers Needed to Help Older Adults Afford Stable Homes in the Community." Aug 5, 2021. More Housing Vouchers Needed to Help Older Adults Afford Stable Homes in the Community | Center on Budget and Policy Priorities (cbpp.org).

Centers for Disease Control and Prevention (CDC). "Disability Impacts All of Us." last modified Sept. 16, 2020. https://www.cdc.gov/ncbddd/disabilityandhealth/infographic-disability-impacts-all.html.

Centers for Medicare & Medicaid Services (CMS). "Durable Medical Equipment, Prosthetics/Orthotics & Supplies Fee Schedule." last modified Dec. 22, 2021. https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/DMEPOSFeeSched.

CDC Climate and Health Program. "Heat and Health Tracker." https://ephtracking.cdc.gov/Applications/heatTracker/.

Children's Hospital of Philadelphia Research Institute. "Institution Board Review." 2022. https://irb.research.chop.edu/vulnerable-populations.

"Climate and Health Assessment." *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment*. United States Global Change Research Program. 2016. https://health2016.globalchange.gov/extreme-events.

Cochrane, Emily, and Julie Bosman."'Our Bubble Has Been Burst': Older Storm Victims Face an Uncertain Future." *New York Times*. Oct. 10, 2022. https://www.nytimes.com/2022/10/10/us/hurricane-ian-retirees.html.

Code of Federal Regulations. "§ 570.614 Architectural Barriers Act and the Americans with Disabilities Act." https://www.ecfr.gov/current/title-24/subtitle-B/chapter-V/subchapter-C/part-570/subpart-K/section-570.614.

Conway, Sean Calvin. "An Evaluation of Human-Centered Impacts and Social Vulnerability in the Case of the Camp Fire in Butte County, California." The University of Texas at Austin. Aug. 2021. https://.lib.utexas.edu/bitstream/handle/2152/90481/.pdf?sequence=1.

Cromwell, Molly. "Renters More Likely Than Homeowners to Spend More Than 30% of Income on Housing in Almost All Counties." US Census Bureau. Dec. 8, 2022. https://www.census.gov/library//2022/12/housing-costs-burden.html.

Department of Labor Office of the Assistant Secretary for Administration & Management. "Architectural Barriers Act (ABA)." https://www.dol.gov/agencies/oasam/centers-offices/civil-rights- /dlms2-0600#603.

Deryugina, Tatyana. "The Fiscal Cost of Hurricanes: Disaster Aid Versus Social Insurance." National Bureau of Economic Research. May 2016. https://www.nber.org/papers/w22272.

Environmental Protection Agency (EPA). "Environmental Justice 2020 Glossary." 2020. https://www.epa.gov/environmentaljustice/ej-2020-glossary.

EPA. "Learn About Environmental Justice." https://www.epa.gov/environmentaljustice/learn-about-environmental-justice.

Essential Accessibility. "Web Accessibility Lawsuits: What's the Current Landscape?" Apr. 20, 2021. https://www.essentialaccessibility.com/blog/web-accessibility-lawsuits.

Federal Emergency Management Agency (FEMA). "California Camp Fire: FM-5278-CA." Dec. 20, 2022. https://www.fema.gov/disaster/5278.

FEMA. "Continuing Resolution Allows FEMA to Lift Restrictions on Disaster Relief Funding." Oct 3, 2023. https://www.fema.gov/press-release/20231003/continuing-resolution-allows-fema-lift-restrictions-disaster-relief-funding.

FEMA. "Glossary." https://www.fema.gov/about/glossary.

FEMA. *Guide to Expanding Mitigation: Making the Connection to Older Adults*. https://www.fema.gov/sites/default/files/documents/fema_mitigation-guide_older-adults.pdf.

FEMA. "Flood Insurance Program." https://www.fema.gov/flood-insurance.

FEMA. "Florida Hurricane Ian." https://www.fema.gov/disaster/4673.

FEMA. *Guidance on Planning for Personal Assistance Services in General Population Shelters*. https://www.fema.gov/pdf/emergency/disasterhousing/guidance_plan_ps_gpops.pdf.

FEMA. "How a Disaster Gets Declared." Apr. 25, 2023. https://www.fema.gov/disaster/how-declared.

FEMA. *National Advisory Council Report to the FEMA Administrator*. Nov. 2020. https://www.fema.gov/sites/default/files/documents/fema_nac-report_11-2020.pdf.

FEMA. *National Incident Management System (NIMS) Document*. Oct. 2017. https://www.fema./sites/default/files/2020-07/fema_nims_doctrine-2017.pdf.

FEMA. "National Risk Index for Natural Hazards." Aug. 30, 2023. https://www.fema.gov/flood-maps/products-tools/national-risk-index.

FEMA. *Stafford Act, as Amended*. May 2021. https://www.fema.gov/sites/default/files//fema_stafford_act_2021_vol1.pdf.

Foster, Ann C. "A Closer Look at Spending Patterns of Older Americans." US Bureau of Labor Statistics. Mar. 2016. https://www.bls.gov/opub/btn/volume-5/spending-patterns-of-older-americans.htm.

Friedlander, Mark. "Triple-I: Extreme Fraud and Litigation Causing Florida's Homeowners Insurance Market Demise." Insurance Information Institute. June 23, 2022. https://www.iii.org/press-release/triple-i-extreme-fraud-and-litigation-causing-floridas-homeowners-insurance-markets-demise-062322.

Gamble, Janet. "Climate Change and Older Americans: State of the Science." *Environmental Health Perspectives* 121, no. 1 (2013): 15–22.

Gamble, Janet, and John Balbus. "Populations of Concern." *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment* (Washington, DC: US Global Change Research Program. 2016.) https://health2016.globalchange.gov/low/ClimateHealth2016_09_Populations_small.pdf.

Gibson, Allison, Mary Helen McSweeney-Feld, and Co-Conveners. "A Special Collection of Articles on Disaster Planning, Preparedness, and Post Disaster Work for Older Adults." *Journal of Gerontological Social Work* 61, no. 7 (2018): 686–688. DOI:10.1080/01634372.2018.1511332.

Gregg, Rachel M., Kathryn N. Braddock, and Jessi M. Kershner. *The State of Climate Adaptation in Public Health: An Assessment of 16 US States*. EcoAdapt. 2019. https://www.cakex.org/sites//files/documents/EcoAdapt_Climate%20and%20Health%20Report_June%202019_2.pdf.

H.R.1744—REAADI for Disasters Act. https://www.congress.gov/bill/116th-congress/house-bill/3208?q=%7B%22search%22%3A%5B%22HR+3208%22%5D%7D&s=1&r=1.

Hauer, Matthew E., R. Kyle Saunders, and Daniel Shtob. "Research Note: Demographic Change on the United States Coast, 2020–2100." *Demography* 59, no. 4 (2022):1221–1232. DOI: 10.1215/00703370-10127418.

Herring, David. "What Is an 'Extreme Event'? Is There Evidence That Global Warming Has Caused or Contributed to Any Particular Extreme Event?" NOAA. Oct. 29, 2020. https://www.climate./news-features/climate-qa/what-extreme-event-there-evidence-global-warming-has-caused-or-contributed.

Hoell, Andrew, Xiao-Wei Quan, Martin Hoerling, Henry F. Diaz, Rong Fu, Cenlin He, Joel R. Lisonbee, et al. "Water Year 2021 Compound Precipitation and Temperature Extremes in California and Nevada." *Bulletin of the American Meteorological Society* 103, no. 12 (2022): E2905–E2911. DOI: https://doi.org/10.1175/BAMS-D-22-0112.1.

Homeland Security Digital Library. "Individuals with Disabilities in Emergency Preparedness: Executive Order 13347. Annual Report July 2005." July 2005. https://www.hsdl.org/?abstract&did=455537.

Intergovernmental Panel on Climate Change (IPCC). *Chapter 11: 'Weather and Climate Extreme Events in a Changing Climate.'* IPCC Sixth Assessment Report. https://www.ipcc.ch/report//wg1/chapter/chapter-11/.

Intergovernmental Panel on Climate Change (IPCC). *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*. 2012. https://www.ipcc.ch/site/assets//2018/03/SREX_Full_Report-1.pdf.

Johns Hopkins Bloomberg School of Public Health. *Is This the United Fate of America? Climate Change & Health: Assessing State Preparedness*. https://climateandhealthreport.org/.

Jokich, Alex. "Nursing Homes Facing Staffing Shortages Amid Pandemic." *KSTP Eyewitness News*. Oct. 20, 2020. https://kstp.com/news/nursing-homes-facing-staffing-shortages-amid-pandemic/5900682/.

Kriebel-Gasparro, Ann. "Climate Change: Effects on the Older Adult." *Journal of Nurse Practitioners; Philadelphia* 18, no. 4. (2022): 372–376. https://www.proquest.com/docview/2647162588.

Law Insider. "At-risk population Definition." https://www.lawinsider.com/dictionary/at-risk-population.

Law Insider. "Marginalized Definition." https://www.lawinsider.com/dictionary/marginalized.

Leppert, Rebecca and Katherine Schaeffer. "8 Facts About Americans with Disabilities." Pew Research Center. July 24, 2023. https://www.pewresearch.org/short-reads/2023/07/24/8-facts-about-americans-with-disabilities/.

Leyva, Erwin William A., Adam Beaman, and Patricia M. Davidson. "Health Impact of Climate Change in Older People: An Integrative Review and Implications for Nursing." *Journal of Nursing Scholarship* 4, no. 6 (2017): 670–678. https://doi.org/10.1111/jnu.12346.

Maricopa County. "Staying Safe in the Extreme Heat." https://www.maricopa.gov/1871/Extreme-Heat.

Maricopa County Department of Public Health and Epidemiology and Informatics. *2023 Weekly Heat Report*. Nov. 4, 2023, https://www.maricopa.gov/ArchiveCenter/ViewFile/Item/5734.

Marshall, Greg. "How People with Disabilities Weather Natural Disasters. Ensure Maximal Safety During Pandemic Disaster Season." *Sierra*. Sept. 12, 2020. https://www.sierraclub.org/sierra/how-people-disabilities-weather-natural-disasters.

Masri, Shahir, Erica Scatudo, Yufang Jin, and Jun Wu. "Disproportionate Impacts of Wildfires Among Elderly and Low-Income Communities in California from 2000–2020." *International Journal of Environmental Research and Public Health* 18, no. 8 (2021): 3921–3921. https://doi.org/10.3390/ijerph18083921.

McSweeney-Feld, Mary Helen. "Assistive Technology and Older Adults in Disasters: Implications for Emergency Management." *Disaster Medicine and Public Health Preparedness* 11, no. 1 (2017): 135–139. doi:10.1017/dmp.2016.160.

Mercer. "Healthcare Workforce Analysis." https://www.mercer.us/our-thinking/career/demand-for-healthcare-workers-will-outpace-supply-by-2025.html.

Molinsky, Jennifer, and Ann Forsyth. "Climate Change, Aging, and Well-Being: How Residential Setting Matters." *Housing Policy Debate* 33, no. 5 (2022): 1029–1054. https://doi.org/10.1080/10511482.2022.2109711.

National Council on Aging. "Energy Assistance Benefits." https://www.ncoa.org/article/energy-assistance-benefits.

National Council on Disability (NCD). "2021 Progress Report: The Impact of COVID-19 on People with Disabilities." Oct. 29, 2021. https://www.ncd.gov/progressreport/2021/2021-progress-report.

NCD. "Progress Report on National Disability Policy." July 24, 2020. https://www.ncd.gov/progressreport/2020/2020-progress-report.

NCD. "Resources." https://ncd.gov/resources.

NCD. *The Impacts of Extreme Weather Events on People with Disabilities*. May 4, 2023. https://ncd.gov/publications/2023/impacts-extreme-weather-events-disabilities.

National Energy Assistance Director's Association (NEADA). "Home Heating Costs Reach Highest Level in More than 10 Years Families will Pay 17.2% More for Home Heating this Winter." Sept. 12, 2022. https://neada.org/wp-content/uploads/2022/09/winter2022-23PR.pdf.

National Institutes of Health (NIH). "NIH Style Guide: Age." https://www.nih.gov/nih-style-guide/age#:~:text=Children%20(1%20year%20through%2012,adults%20(65%20and%20older)*.

National Low Income Housing Coalition. "Universal Design for Seniors and People with Disabilities." Sept. 30, 2021. https://nlihc.org/resource/universal-design-seniors-and-people-disabilities.

National Oceanic and Atmospheric Association (NOAA). "Climate Attribution Tools Critical for Understanding Extreme Events. New Research Examines Climate Influence on Extreme Events in 2021 and 2022." Jan. 9, 2023. https://www.noaa.gov/release/climate-attribution-tools-critical-for-understanding-extreme-events.

NOAA. "Record Drought Gripped Much of the US in 2022." Jan. 10, 2023. https://www.noaa.gov/news/drought-gripped-much-of-us-in-2022.

NOAA. "US saw its 9th-Warmest August on Record." Sept. 11, 2023. https://www.noaa.gov/news/us-saw-its-9th-warmest-august-on-record#:~:text=by%20the%20,August%202023,saw%its%20second%2Dhottest%20August.

NOAA and National Centers for Environmental Information (NCEI). "Assessing the US Climate in August 2023." Aug. 2023, https://www.ncei.noaa.gov/news/national-climate-202308.

NOAA and NCEI. *March 2022 Tornadoes Report*. Apr. 2022. https://www.ncei.noaa.gov/access//monthly-report/tornadoes/202203.

NOAA and NCEI. "US Billion-Dollar Weather and Climate Disasters." 2023. https://www.ncei.noaa.gov/access/billions/. DOI: 10.25921/stkw-7w73.NOAA and NCEI. "US Billion-Dollar Weather and Climate Disasters 1980-2023," Factsheet, Nov. 8, 2023, https://www.ncei.noaa.gov/access/billions/.

NOAA and NCEI. "US Climate Summary for September 2023." Oct. 11, 2023. https://www.climate.gov/features/understanding-climate/us-climate-summary-september-2023.

National Weather Service. "Weather Prediction Center." Aug. 23, 2023. https://origin.wpc.ncep.noaa.gov/discussions/hpcdiscussions.php?disc=pmdspd.

Newberry, Laura. "Must Reads: Poor, Elderly and Too Frail to Escape: Paradise Fire Killed the Most Vulnerable Residents." *Los Angeles Times*. https://www.latimes.com/local/lanow/la-me-ln-camp-fire-seniors-mobile-home-deaths-20190209-story.html.

Nicholas, Patrice K., Suellen Breaky, Bradley P. White, Margaret J. Brown, Jenny Fanuele, Roksolana Starodub, and Ana Viamonte Ros. "Mental Health Impacts of Climate Changes Perspectives for the ED Clinician." *Journal of Emergency Nursing* 46, no. 5 (2020): 590–599. https://www.jenonline.org/article/-1767(20)30163-X/fulltext.

NOAA and National Integrated Drought Information System (NIDIS). "Wildfire Management." https://www.drought.gov/sectors/wildfire-management.

NORC, University of Chicago. "Aging and Health." 2023. https://www.norc.org/Research/Topics//health-and-well-being/aging-and-the-life-course.aspx.

NORC, University of Chicago. "National Social Life, Health, and Aging Project." 2023. https://www.norc.org/research/projects/national-social-life-health-and-aging-project.html.

Novack, Valerie. "Centering the Disability and Aging Communities in Federal Emergency Response Efforts." Center for American Progress. June 16, 2020. https://www.americanprogress.org/article/centering-disability-aging-communities-federal-emergency-response-efforts/.

Oregon Office of Emergency Management. *Initial After-Action Review (AAR) of the June 2021 Excessive Heat Event.* July 27, 2021. https://www.oregon.gov/oem/Documents/2021_June__Heat_Event_AAR.pdf.

Paulin, Emily. "Extreme Weather Is Killing Mostly Older Adults—and Has Been for Decades. Why Aren't We More Prepared?" *AARP*. Aug. 31, 2023. https://www.aarp.org/politics-society/advocacy/info-2023/extreme-weather-older-adults.html.

Poon, Linda. "Hurricane Ian Targeted Florida's Retirement Belt." *Bloomberg*. Sept. 30, 2002. https://www.bloomberg.com/news/articles/2022-09-30/florida-s-retireebears-brunt-of-hurricane-ian.

REAADI for Disasters Act and DRMA. https://reaadi.com/.

Rehabilitation Act of 1973. Public Law 93–112. 87 Stat 355. (and as subsequently amended) 29 U.S.C.A. §§ 701 et. seq.

Roberts, Andrew, Stella Ogunwole, Laura Blakeslee, and Megan Rabe. "A Snapshot of the Fast-Growing US Older Population." US Census Bureau. Oct. 30, 2018. https://www.census.gov/library/stories/2018/10/snapshot-fast-growing-us-older-population.html.

Romanello, Maria, et al. *The Imperative for a Health-Centered Response in a World Facing Irreversible Harms, The 2023 report of the Lancet Countdown on Health and Climate Change*, Nov. 14, 2023. https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(23)01859-7/fulltext.

Roth, Marcie. "A Resilient Community Is One That Includes and Protects Everyone." Bulletin of the Atomic Scientists. Mar. 4, 2018. https://thebulletin.org/2018/03/a-resilient-community-is-one-thatand-protects-everyone/.

Skiba, Katherine. "One Year Ago: California's Deadliest Wildfire Ravaged Town of Paradise." *AARP*. Oct. 15, 2019. https://www.aarp.org/politics-society/history/info-2019/paradise-camp-fire-anniversary.html.

Smith, Adam B. *US Billion-Dollar Weather and Climate Disasters in Historical Context*. NOAA and NCEI. Jan. 10, 2023. https://www.climate.gov/news-features/blogs/beyond-data/2022-us-billion-dollar-weather-and-climate-disasters-historical.

State Emergency Management Agency. *Missouri State Hazard Mitigation Plan 2023*. Missouri Department of Public Safety. https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/_Hazard_Mitigation_Plan_2023-2028.pdf.

Stein, Penelope J. S., and Michael A. Stein. "Climate Change and the Right to Health of People with Disabilities." *Lancet Global Health* 10, no. 1 (2022): e24–e25. https://doi.org/10.1016/S2214-109X(21)00542-8.

Stevenson, Matthew. "Demand for Healthcare Workers Will Outpace Supply by 2025: An Analysis of the US Healthcare Labor Market." Mercer HPA Health Provider Advisory. 2018. https://www.mercer.us/our-thinking/career/demand-for-healthcare-workers-will-outpace-supply-by-2025.html.

Straw, Tara, Jesse Cross-Call, Gideon Lukens, and Matt Broaddus. "Recovery Legislation Should Build On Affordable Care Act Improvements in Coverage for Adults Over 55." Center on Budget and Policy Priorities. https://www.cbpp.org/research/health/recovery-legislation-should-build-on-affordable-care-act-improvements-in-coverage.

Strupp, Julie. "Building Codes Aren't Climate Ready, but Changes Are Coming." Construction Dive. Sept.14, 2023. https://www.constructiondive.com/news/building-codes-climate-resilience-nibs/693672/.

The Greater Rochester Chapter of the American Red Cross. "Disaster Preparedness for Seniors by Seniors." https://www.redcross.org/content/dam/redcross/atg/_s/Preparedness___Disaster_/Disaster_Preparedness/Disaster_Preparedness_for_Srs-English.revised.

The National Academies of Sciences, Engineering, and Medicine. *Resilience for Compounding and Cascading Events*. Washington, DC: The National Academies Press, 2022.

Torres, Jorge. "July 2023 Sets Multiple New Heat Records Across Arizona." Arizona 15 News. July 31, 2023. https://www.abc15.com/weather/impact-earth/july-2023-sets-multiple-new-heat-records-across-arizona.

United Nations Climate Change. "Key Aspects of the Paris Agreement." https://unfccc.int/most-requested/key-aspects-of-the-paris-agreement.

United States Census Bureau. "American Community Survey 2017–2021 5-Year Data Release." Dec. 8, 2022. https://www.census.gov/newsroom/press-kits/2022/acs-5-year.html.

United States Census Bureau. "American Community Survey 2017–2021 5-Year Estimates." Nov. 30, 2022. https://www.census.gov/programs-surveys/acs/technical-documentation/table-and-geography-changes/2021/5-year.html.

US Access Board. "Telecommunications Act of 1996 (Section 255)." https://www.access-board.gov/law/ta.html.

US Census Bureau. "Butte County, California Quick Facts." https://www.census.gov/quickfacts//table/buttecountycalifornia/PST045222.

US Department of Health and Human Services (HHS). *2021 Climate Action Plan*. Sept. 28, 2021. https://www.hhs.gov/sites/default/files/hhs-climate-action-plan-9-28-2021.pdf.

US Department of Housing and Urban Development (HUD). "Historical Timeline 1930–2010." https://www.huduser.gov/portal/hudtimeline_1930.html.

US Department of Housing and Urban Development (HUD). "Housing Discrimination Under the Fair Housing Act." https://www.hud.gov/program_offices/fair_housing_equal_opp/fair__act_overview.

US Department of Labor (DOL) Office of Disability Employment Policy. "Employment Rights: Who Has Them and Who Enforces Them." https://www.dol.gov/agencies/odep/publications/fact-sheets/employment-rights-who-has-them-and-who-enforces-them#:~:text=Section%20501%20%20the%20Rehabilitation,against%20qualified%20individuals%20with%20disabilities.

US DOL Office of Federal Contract Compliance Programs. "Section 503 Regulations Frequently Asked Questions." Feb. 14, 2014. https://www.dol.gov/agencies/ofccp/faqs/section-503.

USDA Climate Hub. "Extreme Weather." https://www.climatehubs.usda.gov/climate-impacts/extreme-weather.

USDHHS Office of Community Services. "LIHEAP Fact Sheet." https://www.acf.hhs.gov/ocs/fact-sheet/liheap-fact-sheet.

USDHHS Office of Community Services. "LIHEAP IM-2022-06 Heat Stress Flexibilities and Resources FY 2022," July 19, 2022, https://www.acf.hhs.gov/ocs/policy-guidance/liheap-im-2022-06-heat-stress-flexibilities-and-resources-fy2022.

US Inflation Calculator. "Current US Inflation Rates: 2000–2023." https://www.usinflationcalculator.com/inflation/current-inflation-rates/.

Varn, Kathryn. "A Vast Majority of Hurricane Ian Deaths Were Elderly Floridians. What Happened?" *Tallahassee Democrat*. Nov. 21, 2021. https://www.tallahassee.com/story/news///11/21/hurricane-ian-deadly-florida-seniors-storm-deaths/8316755001/.

Watts, Nick, Markus Amann, Nigel Arnell, Sonja Ayeb-Karlsson, Jessica Beagley, Kristine Belesova, Maxwell Boykoff et al. "The 2020 Report of The Lancet Countdown on Health and Climate Change: Responding to Converging Crisis Report." *Lancet* 397, no. 10269 (2021): 129–170. https://www.thelancet.com//lancet/article/PIIS0140-6736(20)32290-X/fulltext.

Webster, Elizabeth M. *FEMA IHP Assistance for Extreme Heat: Considerations and Limitations*. Congressional Research Service. Aug. 15, 2022. https://crsreports.congress.gov/product/pdf/IN/IN11988/2.

White, Gillian B. "Poverty, Compounded," *Atlantic*, Apr. 16, 2016, https://www.theatlantic.com/business/archive/2016/04/how-poverty-compounds/478539/.

White House. "Executive Order On Advancing Racial Equity and Support for Underserved Communities Through the Federal Government." Jan. 20, 2021. https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/20/executive-order-advancing-racial-equity-and- support-for-underserved-communities-through-the-federal-government/.

Williams, Augusta A., John D. Spengler, Paul Catalano, Joseph G. Allen, and Jose G. Cedeno-Laurent. "Building Vulnerability in a Changing Climate: Indoor Temperature Exposures and Health Outcomes in Older Adults Living in Public Housing during an Extreme Heat Event in Cambridge, MA." *International Journal of Environmental Research and Public Health* 16, no. 13 (2019). https://www.mdpi.com/1660-4601/16/13/2373.

Wong, Stephen, Susan Shaheen, and Joan Walker. "Understanding Evacuee Behavior: A Case Study of Hurricane Irma." University of California Berkely Transportation Sustainability Research Center. Dec. 2018. https://escholarship.org/content/qt9370z127/qt9370z_noSplash_21eb1018e67fe6a9a6d84f49434b384f.pdf?t=pjwj00.

World Economic Forum. "The Cost-of-Living Crisis Has Pushed 71 Million People into Poverty—Here's What Needs to Happen." Aug. 19, 2022. https://www.weforum.org//2022/08/cost-of-living-crisis-poverty-un/#:~:text=The%20cost%20of%20%20crisis%20has%20%,says%20governments%20and%20banks%20must%20urgently%20take%20action.

World Economic Forum. *The Global Risks Report 2022: 17th Edition*. 2022. https://www3.weforum.org/docs/WEF_Global_Risks_Report_2022.pdf.

World Economic Forum. *The Global Risks Report 2023: 18th Edition*. Jan. 2023. https://www3.weforum.org/docs/WEF_Global_Risks_Report_2023.pdf.

ABOUT CNA

CNA is a nonprofit research and analysis organization dedicated to the safety and security of the nation. It operates the Center for Naval Analyses—the federally funded research and development center (FFRDC) of the Department of the Navy—as well as the Institute for Public Research. CNA develops actionable solutions to complex problems of national importance. With nearly 700 scientists, analysts, and professional staff, CNA takes a real-world approach to gathering data. Its unique Field Program places analysts on aircraft carriers and military bases, in squad rooms and crisis centers, working side by side with operators and decision-makers around the world. CNA supports naval operations, fleet readiness, and strategic competition. Its non-defense research portfolio includes criminal justice, homeland security, and data management.

Dedicated to the Safety and Security of the Nation

www.cna.org

IIM-2023-U-037224-Final