Economic Research Service
U.S. DEPARTMENT OF AGRICULTURE

Economic Research Service

Economic Information Bulletin Number 284

February 2025

Aging and Wildfire Risk to Communities

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Economic Research Service
U.S. DEPARTMENT OF AGRICULTURE

Economic Research Service
www.ers.usda.gov

Recommended citation format for this publication:

Winkler, R. L., & Mockrin, M. H. (2025). *Aging and wildfire risk to communities* (Report No. EIB-284). U.S. Department of Agriculture, Economic Research Service.

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Abstract

The population of the United States is aging as the Baby Boom generation grows older. In 2020, 23 percent of the U.S. population had reached age 60 (older ages). The share of the population at older ages is forecast to increase to 26 percent in 2030 and 29 percent in 2050. Wildfire risks are also increasing, and older populations are especially vulnerable. This report found that most (87 percent) of the recent population growth in places with moderate-to-high wildfire risk has been among people over the age of 60. Already, the proportion of older people living in places with more wildfire risk is higher than in the population at large. In rural areas with the greatest wildfire risk, 35 percent of people living in those areas are over the age of 60. The number of older people exposed to wildfire risk is expected to increase as populations grow older and as wildfire increases in frequency and intensity.

Keywords: Aging, wildfire, rural population, social vulnerability, Wildland-Urban Interface

Acknowledgments

The authors thank Greg Dillon and Eva Karau of the USDA, Forest Service, Rocky Mountain Research Station, for assistance with Wildfire Risk to Communities data and review; David Arnold with USDA, Economic Research Service (ERS) for geographic information system support; Cody Evers at Portland State University for feedback and information on firesheds; Ella Brodowski, Michael West, Alicia Ulwelling, Sharon Butterfield, Jenn Prunty, Firesafe Flathead, and participants in the July 2023 "Community Meeting on Population Change, Aging, and Vulnerability to Wildfire in Flathead County" for their input on wildfire vulnerabilities experienced by an aging population, which informed our research questions; and Kelly Pohl and Patty Hernandez at Headwaters Economics for feedback on the research. The authors would also like to thank Casey Keel, Grant Wall, and Christopher Whitney (USDA, ERS) for their editorial support, Opeyemi Zubair (USDA, ERS) for map design support, and Chris Sanguinett (USDA, ERS) for layout and design.

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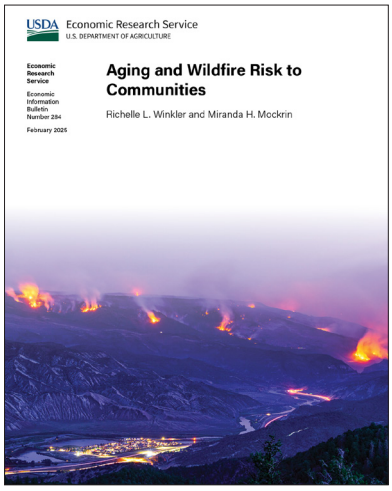

What Is the Issue?

Climate change, expanding housing development into wildlands, as well as legacies of fire suppression and forest management policies have led to increasing wildfire risks to communities. At the same time, the average age of the population in the United States has been increasing as the older population has grown while the proportion of younger people has contracted (i.e., population aging). These shifts may be felt especially in rural areas, where out-migration of young adults, in-migration of older people, and aging in place work together to change the population composition. Older people face a greater relative risk of dying in a fire than younger people, and older people need different kinds of resources and programs tailored to their unique needs to mitigate the risk from wildfire. Information about the combination of aging and wildfire risk across U.S. States, counties, and fire management areas might help in designing wildfire risk reduction programs to address populations at a higher risk or to incorporate fire preparedness into aging services. Older people in rural areas may be particularly vulnerable due to limited emergency response infrastructures and social and geographic isolation.

What Did the Study Find?

This report examined the extent to which (and where) older people live in locations that are at higher risk of wildfire impacting their homes.

- In 2020, about 36 million people in the United States lived in census blocks with moderate-to-high wildfire risk or 11 percent of the population.
- Nearly all (87 percent) of the population growth in higher wildfire risk locations between 2010 and 2020 was among people over the age of 60, many of whom had been living in higher risk places for years and are growing older (i.e., aging in place).
- Compared with their share of the total population, older people disproportionately live in higher wildfire risk areas. Among those living in moderate-to-high risk locations in 2020, 9.8 million (27 percent) were over the age of 60 compared with 23 percent of the total U.S. population. For the population living in the highest risk places, 32 percent were over the age of 60.
- Over the next 20 years, increasing numbers of older people are expected to live in higher wildfire risk places as the population continues to age.

- Larger numbers of older people exposed to wildfire risk lived in rural areas, retirement destinations, and wildland-urban interface areas compared with urban areas. For instance, 30–35 percent of residents in high-risk and highest risk rural locations were over the age of 60 in 2020 (1.5 million people).
- U.S. States with the highest number of older people living in moderate-to-high risk locations include California (1.4 million), Florida (1.3 million), and Texas (1.1 million).
- U.S. counties and firesheds (forest management units used by the United States Forest Service) with greater numbers of older people living in moderate-to-high risk locations are found across much of the West and the coastal Southeast, as well as in parts of Oklahoma, New Jersey, Arkansas, Missouri, Kentucky, Tennessee, North Carolina, Virginia, and West Virginia.

How Was the Study Conducted?

This study was based on matching data on age from the decennial Census 2010 and Census 2020 with data on wildfire risks to homes from the Wildfire Risk to Communities dataset (Scott et al., 2024). This report used census blocks as the unit of analysis. Blocks are the smallest unit for which census data are available, and using this small geographic size made it possible to identify where population aging and wildfire risk coincide with the most geographic specificity possible. Data on wildfire risk for 30-meter-by-30-meter units were averaged within census blocks using a geographic information system, classified as low, moderate, high, or highest wildfire risk based on that average risk score, and then overlapped with census data on age. Most (84 percent) of blocks were classified as low risk. Each block was defined as rural, urban and/or part of the wildland-urban interface, which made it possible to summarize results by rurality. Finally, block level data were aggregated to examine the concurrence of risk and age by State, county, and fireshed (Winkler et al., 2025).

Aging and Wildfire Risk to Communities

Introduction

Across the United States, wildfire severity and losses have increased over the past 30 years (Ostoja et al., 2023; Thompson et al., 2023; Iglesias et al., 2022; Hagmann et al., 2021). Since the 1990s, the annual burned area in the United States has doubled (Hoover & Hanson, 2023). Federal suppression costs have nearly tripled, reaching $4.4 billion in 2021, primarily paid by the U.S. Department of Agriculture (USDA) Forest Service (FS) (National Interagency Fire Center, 2023). Wildfire losses reached $29.3 billion in 2018 (National Oceanic and Atmospheric Administration (NOAA), 2023). At the same time, the number of older people (aged 60 and over) in the United States has been increasing, and this has been especially true in places with greater risk of wildfire. This means that a growing number of older people are living in places with elevated wildfire risk. This population has unique vulnerabilities to wildfire effects and special needs and interests when it comes to wildfire mitigation and adaptation programs.

Wildfires are increasing as the result of interacting social and ecological factors, including climate change (Iglesias et al., 2022; Haskett & Riddle, 2023), legacies of fire suppression and forest management (Keeley & Syphard, 2019, Hagmann et al., 2021), and expanding housing development in proximity to wildlands (i.e., the wildland-urban interface (WUI)) (Radeloff et al., 2023). Efforts to live with fire in ways that minimize risk to human lives and properties are now a central goal of wildfire policy in the United States at all levels of government. The USDA, Forest Service's Wildfire Crisis Strategy (introduced in 2022) aimed to increase the pace and scale of hazardous fuels reduction projects in the highest priority landscapes, promote community readiness for fire, and support postfire ecological recovery and restoration (USDA, Forest Service (FS), 2023).

Across the Federal Government, calls and directives have increasingly recognized differential vulnerabilities (e.g., age) to the effects of climate change, natural hazards, and environmental problems. For example, Executive Order 14008 (January 27, 2021) on Tackling the Climate Crisis at Home and Abroad directed the Secretary of Health and Human Services to "establish an Interagency Working Group to Decrease Risk of Climate Change to Children, the Elderly, People with Disabilities, and the Vulnerable." In response, the 2023 USDA, Forest Service's Wildfire Crisis Strategy report on Expanding Efforts To Deliver on the Wildfire Crisis Strategy recognized that "[a]t-risk communities may experience unique barriers in preparing for, responding to, and recovering from wildfires," noting age as one of the social and demographic variables that was important to consider, and it stated that "[h]ow we consider, communicate with, outreach to, and support at-risk communities are critical components to successful implementation of the Wildfire Crisis Strategy" (USDA, FS, 2023, p. 8).

This report focused on understanding one key driver of wildfire vulnerability by documenting population aging in areas with high wildfire risk.[1] Population aging refers to the increase in both the number and percentage of older people in the population, while the percentage of young people declines. It is a compositional change where the median age of the population increases. This report focused on older individuals because this population is increasing quickly in areas with greater wildfire risk, such as in more rural and fire prone areas of the West and Southeast regions of the United States. In addition, older people face some unique vulnerabilities regarding wildfire preparation, response, and recovery, and there is potential to tailor programs seeking to mitigate wildfire risk or help older people adapt to living with fire.

This report documented the number and share of people over the age of 60 living in high wildfire risk areas and highlighted how the aging population combined with wildfire risk has increased the number of older people exposed to wildfire risk since 2010. Our research objectives included: (1) describing the extent to which older adults live in places that are at higher risk of wildfire impacting their homes; (2) depicting how this risk is changing with population aging; (3) reporting on the confluence of both aging and wildfire risk in rural places and retirement destinations; and (4) illustrating where the most older people are exposed to wildfire risk by U.S. State, county, and fireshed (i.e., a wildfire management unit developed by USDA, FS).[2] In doing so, we addressed the following research questions:

- To what extent do older adults live in places that are at higher risk of wildfire?
- How has this risk changed over time with population aging?
- Where (geographically) are there more older people living in higher risk locations by rurality, State, county, retirement destinations, and fireshed?

Age and Wildfire Risk

People of all ages can be vulnerable to wildfire, which can continue to affect people throughout their life course. Still, age is a key consideration when thinking about what makes someone vulnerable to wildfire (Masri et al., 2021; Melton et al., 2023). Older people tend to face physical limitations that can restrict their ability to prepare for wildfire events, respond or evacuate during wildfire events, and recover mental and physical health after fire. Research has found that older people experienced heightened challenges in maintaining necessary health routines as well as health and social connections during evacuations and wildfire recovery (Willey & Mijal, 2023; Asfaw et al., 2020). Older people were more likely to live with underlying chronic diseases and were especially susceptible to short-term and long-term health effects of wildfire smoke (Melton et al., 2023). Moreover, studies have shown that older people were more likely to be socially isolated and to have less access to internet communications—especially in rural areas—which are critical for monitoring fire conditions, preparedness, and evacuation (Melton et al., 2023; Lee et al., 2021; Courtin & Knapp, 2017).

For many of these reasons, older adults may not evacuate in time during wildfires and have increased hospitalization and death rates related to cardiovascular and respiratory issues during or following wildfires (Melton et

[1] A broad and growing body of research investigates various social vulnerabilities to environmental conditions, natural hazards, and climate change. The U.S. Department of Health and Human Services's Centers for Disease Control and Prevention (CDC) published a commonly used, county-level and multidimensional metric (i.e., Social Vulnerability Index) that is widely used (Centers for Disease Control and Prevention (CDC), 2022) and the U.S. Department of Commerce, Bureau of the Census published the Community Resilience Estimates at the county and census tract levels that also capture multidimensional vulnerability (U.S. Department of Commerce, Bureau of the Census, 2024). Older age is a part of each of these metrics. This report is different in that it centers on older ages, uses decennial census data rather than a sample, and matches the age data with wildfire risk data at a small spatial scale.

[2] Firesheds are geographic units constructed by researchers at USDA, Forest Service to facilitate planning, decision making, and resource distribution for wildfire mitigation and adaptation programs.

al., 2023). Ultimately, people over the age of 65 were found to be at a 2.6 times higher relative risk of dying in a fire (U.S. Fire Administration, 2023), and many wildfire fatalities have been among older people (Willey & Mijal, 2023). For example, the average age of death among the 85 people who died in the 2018 Camp Fire was 72 years old (Bénichou et al., 2020), and of the 96 people with identified ages who died in the 2023 Lahaina fire in Hawaii, 72 of them (or 75 percent) were over the age of 60 (Maui Police Department, 2024).

A person's age could be combined with other vulnerabilities and structural challenges, such as health limitations, economic constraints, or social isolation. For example, Asfaw et al. (2020) found that Indigenous Elders in Canada experienced isolation from Tribal services and community support with wildfire evacuation or displacement (Asfaw et al., 2020). The risks faced by older people may also be felt more broadly throughout communities. Among cultures that especially depend on intergenerational knowledge transmission and oral history, the risk to elders could challenge broader cultural continuity. Successful aging frameworks recognize the importance of individual and household characteristics like economic well-being and social networks. The frameworks also recognize macrosocial influences such as access to high-quality affordable health care, public transportation, urban design, and community emergency response planning that can facilitate or impede healthy aging and reduce risks that older people face (Rowe & Kahn, 2015).

Documenting where older people reside in places with greater wildfire risk might inform decisions about wildfire risk mitigation and healthy aging in the short and long term. Adapting wildfire mitigation services to meet older peoples' needs could be part of a successful aging strategy and/or help support healthy aging in place. For example, the USDA Section 504 Home Repair program makes grants to low-income older homeowners to remove health and safety hazards, but they do not currently explicitly consider home repairs aimed at reducing wildfire risk, such as using firesafe materials or landscape changes. Emergency response plans and wildfire risk reduction programs might be designed to meet the unique needs of an older population, or emergency and fire management personnel might coordinate with local organizations that focus on caring for older people or supporting aging in place. This might include integrating wildfire adaptation programs into aging services programs; services that could help older people with mitigation work (e.g., cleaning gutters, clearing brush around the home, etc.); or developing emergency response plans that recognize potential physical, communications, and transportation limitations that older people may face in an evacuation. Such efforts can be designed to draw on contributions and participation from older adults in planning and mitigation efforts (Melton et al., 2023).

Aging and the Wildland-Urban Interface

The number of older people living with wildlife risk in 2020 reflected prior decades of development along the outskirts of urban places and extending into forests and grasslands, often referred to as the wildland-urban interface. The wildland-urban interface (WUI) is the area where houses are intermingled with or adjacent to wildland vegetation and is a focal area for wildfire management and risk reduction. Driven by housing development, the WUI has expanded over time (Radeloff et al., 2018; Radeloff et al., 2023). From 1990 to 2020, the WUI footprint grew by 179,000 square kilometers (an area equivalent to Washington State), and the number of homes in the WUI increased by 47 percent. By 2020, 9.4 percent of the land area of the contiguous United States was in WUI areas, and that land area was home to more than 44 million homes or 32 percent of all housing nationwide and 33 percent of all people (Radeloff et al., 2018; Radeloff et al., 2023).

Much of the WUI growth was fueled by Baby Boomers' migration to suburban and natural-amenity-rich rural locations. The Baby Boom generation (born 1946–65) was much larger than any prior generation, and in 2022, made up about 21 percent of the U.S. population (69 million people) (Statistica, 2024). The Baby Boom generation reached ages 55–74 in 2020. Throughout their lifetimes, "Baby Boomers have shown an increased preference for rural and small-town destinations, compared with older and younger cohorts"

(Cromartie & Nelson, 2009, p. 8). In the 1990s alone, the net migration of Baby Boomers increased the number of people living in nonmetropolitan areas by 1.1 million (Cromartie & Nelson, 2009). Today, many older rural and WUI residents are Baby Boomers who have lived in their same homes for decades and are currently aging in place.

Population aging is compounded when young adults leave and older people remain or move into an area (Smith et al., 2016). Rural and WUI areas can be attractive places to move for those who are retired, living on fixed incomes, and want to live among natural amenities or in rural retirement destinations (Beale, 2005; Cromartie, 2018; Davis et al., 2022). Today, more than one in four residents in WUI areas are over the age of 60.

The combination of housing development and wildland vegetation in these WUI settings leads to wildfire losses because (1) people cause most wildfire ignitions; (2) when ignitions occur in WUI spaces, there is ample vegetation that can serve as fuel for a fire; and (3) houses are present in WUI spaces (Downing et al., 2022; Kramer et al., 2018; Balch et al., 2017). Housing can also be lost in more rural settings, but given lower housing densities, the number of houses lost has tended to be smaller (Caggiano et al., 2020; Kramer et al., 2018).

Climate change is expected to increase conditions conducive to wildfire into the future (Abatzoglou et al., 2021). At the same time, the number and proportion of older adults in the U.S. population will continue to increase in the coming years (U.S. Department of Commerce, Bureau of the Census, 2023a). More than 23 percent of the U.S. population had reached the age of 60 by the Census 2020, driven by the aging of the Baby Boom generation. By 2030, the last of the Baby Boomers will reach age 65, a pending transition that is fundamentally changing the age structure of the population. The share of the U.S. population over age 60 is projected to be 26 percent in 2030, 29 percent in 2050, and 33 percent in 2070 (U.S. Department of Commerce, Bureau of the Census, 2023a).

Data and Methods

We used 2020 census blocks as the unit of analysis (U.S. Department of Commerce, Bureau of the Census, 2021a). We aggregated small geography pixel data that measure the biophysical risk of wildfire to homes (from the U.S. Forest Service's Wildfire Risk to Communities dataset; Scott et al., 2024) to their averages within census blocks and joined them with population age data from Census 2020. We identified blocks with low, moderate, high, and highest wildfire hazard risk and summarized the age structure of the population according to those risk classifications. We classified each block as rural, urban, and/or falling within the wildland urban interface to examine the interaction of rurality, aging, and wildfire hazard. Finally, we aggregated the block-level data to national, State, county, and fireshed totals for reporting results. Altogether, 5,769,942 populated blocks covering the entire United States were included in the study. Blocks without population were excluded.

Data on age come from the decennial Census 2020, Demographic and Housing Characteristics (DHC) file (U.S. Department of Commerce, Bureau of the Census, 2023b). Although blocks are the smallest unit for which census data are available, their size varies. In more urban areas, census blocks are generally the size of a city block but can be much larger in rural areas. The median size of populated blocks in this study was just under 10 acres.[3] Using this small geographic size allowed for analyzing where people aged 60 and older live with respect to wildfire risk with the most geographic specificity possible.

[3] Block boundaries are formed by roads, railroads, parks, political boundaries, and cultural and physical geographic features, including streams and other bodies of water (U.S. Department of Commerce, Bureau of the Census, 2021b). The boundaries are often rectangular in shape, but patterns and sizes vary by topography, rurality, and development.

Data on rurality come from the U.S. Department of Commerce, Bureau of the Census (Census Bureau). After the Census 2020, the Census Bureau classified blocks as rural or urban (U.S. Department of Commerce, Bureau of the Census, 2023c). Following the Census Bureau's definition, urban areas constitute densely developed blocks that, grouped together with densely settled neighbors, have a population of at least 5,000 or at least 2,000 housing units. Rural blocks are all those outside urban areas.

To further consider rurality, we also examined the wildland-urban interface (WUI). We used a WUI dataset based on census blocks, which combined data on vegetation and housing density minimums on private land to define blocks as WUI (i.e., either an intermix WUI block, where housing is intermingled with vegetation, or an interface WUI block, where housing is in proximity to vegetation) (Radeloff et al., 2023). We chose this definition of WUI because the definition has been based on census blocks and so matches with census data on age, and because it is a long-established dataset that has consistently followed Federal Register definitions (Federal Register, 2001).[4] For this study, we combined interface and intermix designations and referred to both types of blocks as WUI. Blocks that were not classified as WUI may be left out either because the blocks did not have enough wildland vegetation (within the block or nearby) or because the housing density was too low (less than 1 housing unit per 40 acres). In practice, the WUI dataset captures those places where development pushes into wildland areas. Blocks classified as WUI fall somewhere between the most urban and the most rural geographies.

Ultimately, we classified each block into one of four categories, including (1) Urban (not WUI), defined as urban by the Census Bureau but not classified as WUI (42 percent of blocks, 60 percent of the U.S. population, 3 percent of U.S. area); (2) Urban WUI, defined as urban by the Census Bureau and classified as WUI (17 percent of blocks, 23 percent of the U.S. population, 2 percent of U.S. area); (3) Rural WUI, defined as rural by the Census Bureau and classified as WUI (17 percent of blocks, 10 percent of the U.S. population, 37 percent of U.S. area); and (4) Rural (not WUI), defined as rural by the Census Bureau but not classified as WUI (23 percent of blocks, 8 percent of the U.S. population, 58 percent of U.S. area). Because WUI data were not available for Alaska and Hawaii, blocks in these States are classified as either rural or urban, based only on the Census Bureau definition.

We then aggregated block level results to produce national summaries and summaries for U.S. States, counties, and firesheds. The aggregated data are publicly available for download from the USDA, Forest Service's research data archive (Winkler et al., 2025). We also specifically examined data for retirement destination counties. USDA, Economic Research Service's (ERS) County Typology Codes data product defined 442 counties across the United States as Retirement Destinations, including those counties where the number of residents aged 60 and older grew by 15 percent or more due to migration between 2000 and 2010 (Beale, 2005; USDA, Economic Research Service (ERS), 2015). Examining retirement destinations allowed us to consider the potential for elevated risk in these counties and to explore how the in-migration of older adults to specific counties may be increasing the number of older people at risk of being affected by wildfires.

Firesheds are a geographic unit used by USDA's Forest Service for land management decision making and resource allocation for wildfire mitigation and adaptation programs, including the Wildfire Crisis Strategy Implementation Plan (Evers et al., 2023; USDA, Forest Service (FS), 2022). There were 7,479 populated firesheds in 2020, each about 250,000 acres in size. Census blocks are designed to geographically fit within counties and States, but the blocks do not perfectly nest within firesheds. So, we associated blocks with the fireshed where the center of the block is located, using the spatial join tool in ArcGIS Pro.

[4] Wildland-urban interface datasets vary based on definition (Federal Register (2001) or Healthy Forest Restoration Act (2003)), input datasets, and goals (i.e., delineating vegetation around development for fuel treatment versus mapping development in close proximity to vegetation) (Taccaliti et al., 2023).

We described changes between Census 2010 and Census 2020 in age structure. Because we seek to hold biophysical conditions and geographic area constant and examine only changes to the population age, we used a geographic crosswalk file provided by the National Historical Geographic Information System NHGIS) and related data (Manson et al., 2023). The crosswalk interpolated 2010 block data into 2020 census block geographies using the process described by NHGIS (2023). Then, we followed the same steps described above to process the 2010 age data and to compare it with the 2020 results.

This report is different from other studies and datasets that have combined biophysical data with data on aging in its scale of analysis and the improved data precision. For example, the U.S. Department of Health and Human Services, Centers for Disease Control and Prevention (CDC) Social Vulnerability Index has considered data on age that can be combined with environmental data on wildfire risk. Also, Headwaters Economics provided a helpful tool combining sociodemographic data with Wildfire Risk to Communities data. However, these and other existing datasets provided age data at the county or census tract level using sample data from the American Community Survey. Particularly in rural areas and in western States, where the risk of wildfire disasters is greatest, counties and tracts are often large geographic units with a great deal of variation in both population ages and wildfire risk within them. Both wildfire risk and household characteristics vary at much smaller spatial scales (Paveglio et al., 2018; Coughlin et al., 2019). The problem with data at larger scales is they potentially combine age data from one area within the county or tract with wildfire risk from another area of the county or tract. In other words, the part of the county where older people live may not be the same part as where wildfire risk is greater. This report has furthered past analyses by working with age data at the smallest geographic unit possible, the census block, from decennial census data that aim for a complete population count (rather than a sample) and matching population data with data on wildfire risk aggregated to the same census block geographies. This approach offered a much more precise analysis of where population aging and wildfire risk coincide.

Measuring and Mapping Wildfire Risk

There are several ways to measure wildfire risk that combine the likelihood and intensity of wildfire with the potential people and houses exposed. The USDA, Forest Service produced a set of measures on Wildfire Risk to Communities and made the measures available via an interactive website with that name and through USDA, Forest Service's Research Data Archive (Scott et al., 2024; USDA, FS 2024). These measures integrated information related to both the likelihood that a wildfire will occur in a place and the likely intensity of a fire there if the fire were to occur, which together measure the wildfire hazard (USDA, FS, 2023b). The data were modeled based on simulations of fire behavior across different types of fire seasons and included information on weather, topography, and vegetation. For this study, we were interested in the risk to residential structures, so we used the Risk to Potential Structures (RPS) dataset (sometimes referred to as Risk to Homes), 4th edition, which was released in 2024 and approximated conditions in 2020 (Scott et al., 2024). This measure was designed to answer the question "What would be the relative risk to a house if one existed here?" (USDA, FS, 2023b). It was provided as a 30-meter-by-30-meter raster dataset (i.e., image file) for the entire United States (Scott et al., 2024).[1]

[1] The Risk to Potential Structures dataset relied upon nationally consistent simulations of wildfire risk that necessarily made some assumptions about wildfire spread and vulnerabilities (Scott et al., 2024). This approach extended wildfire risk into developed areas based on land cover and assumed any potential structures were equally susceptible to wildfire damage. Comparing simulation estimates of exposure with empirical data on wildfire occurrence and losses remains an active area of research (Ager et al., 2021). Results may be different with different risk measures. The Wildfire Risk to Communities website includes multiple measures of wildfire risk and population vulnerability. We used only the Risk to Potential Structures data. The website integrates data on population vulnerability taken from the American Community Survey samples at the county or census tract level, which is different than the block level data from decennial censuses that we used here.

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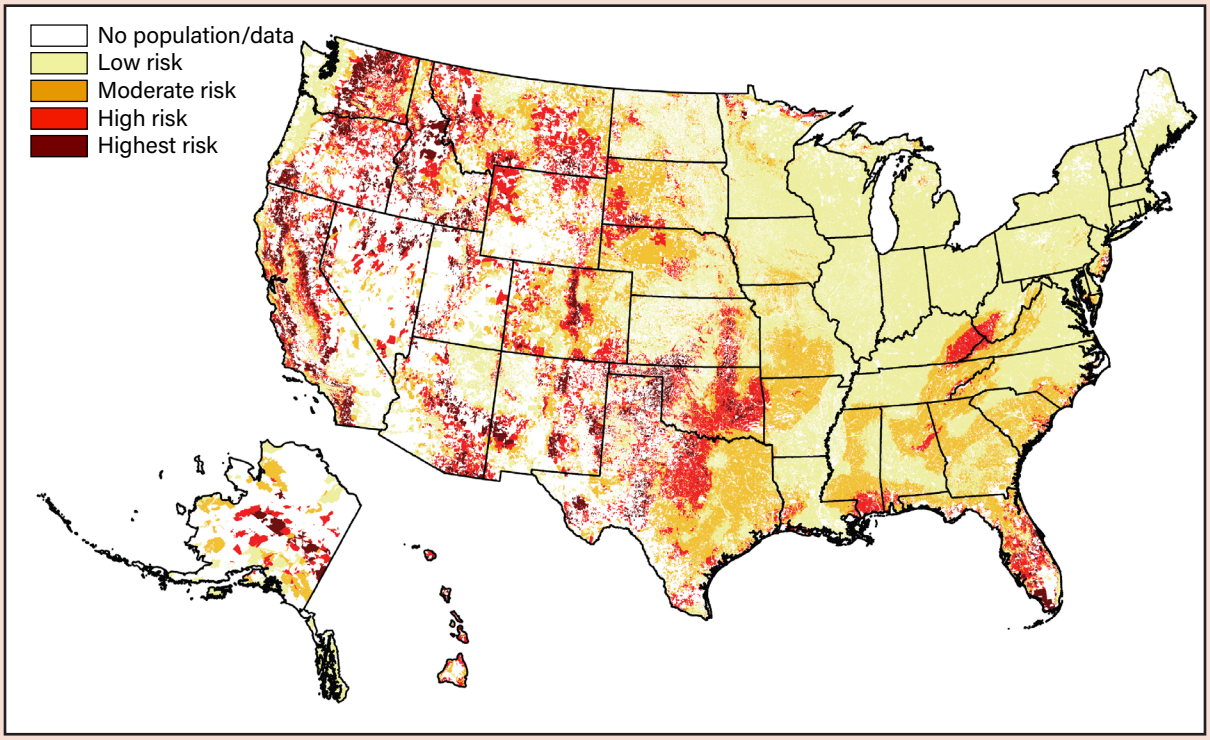
We used the zonal statistics tool in ArcGIS Pro to calculate the average RPS value of pixels within census blocks. We classified blocks according to their relative risk, following guidance from the RPS authors (Dillon, personal communication, 2023). We referred to blocks with pixel values below the 40th percentile as low risk, blocks with pixel values in the 40–70th percentiles as moderate risk, pixel values in the 70–90th percentile as high risk, and pixel values in the 90–100th percentile as the highest risk.[2] The resulting map of wildfire risk shows that the risk is widespread across the United States, in both forested and grassland systems (box figure 1).

Box figure 1
Wildfire risk by census block



Note: Average values of Wildfire Risk to Potential Structures data were aggregated to census blocks. Blocks with average pixel values below the 40th percentile are classified as low risk, blocks with average pixel values in the 40–70th percentiles are moderate risk, average pixel values in the 70–90th percentile are high risk, and average pixel values in the 90–100th percentile are highest risk.

Source: USDA, Economic Research Service using data from U.S. Department of Agriculture, Forest Service, Wildfire Risk to Communities; and U.S. Department of Commerce, Bureau of the Census Topologically Integrated Geographic Encoding and Referencing (TIGER)/Line shapefiles.

To validate this classification, we reviewed data on the geographic extent of wildfires that occurred between 1984 and 2022 (Monitoring Trends in Burn Severity (MTBS), 2023)[3] and matched those fire boundaries with our block data. We found that only 0.19 percent of the 4.86 million populated census blocks that we

[2] After completing this processing, 1,698 census blocks were missing data on wildfire risk level. These blocks were dropped from further analysis. The risk threshold breaks were relative. We decided to avoid a normal distribution and instead classify most blocks as low risk and only a small share of blocks in the high and highest risk classes to best match the data on the geography of recent large wildfires.

[3] Monitoring Trends in Burn Severity (MTBS) maps the burn severity and extent of large fires across all lands of the United States from 1984 to the present. MTBS includes all fires 1,000 acres or greater in the Western United States and 500 acres or greater in the Eastern United States (MTBS, 2023).

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classified as low risk had experienced a wildfire in MTBS since 1984. Among the 687,798 census blocks classified as moderate risk, 5 percent (*n*= 32,714) experienced at least one fire in the 1984–2022 period (number of blocks (*n)*= 9,411). Of the 212,099 blocks classified as high risk, 22 percent (*n*=46,685) had at least one fire, and 41 percent of the 55,168 highest risk blocks (*n*=22,730) experienced at least one fire (box table 1).

Box table 1

Wildfire risk classification by census block

Risk classification	Percentile (of pixel values)	Populated blocks (number)	Blocks with recent fire (number)	Blocks with recent fire (percent)
Low risk	< 40	4.86 million	9,411	0.2
Moderate risk	40–70	687,798	32,714	5
High risk	70–90	212,099	46,685	22
Highest risk	90–100	56,168	22,730	41

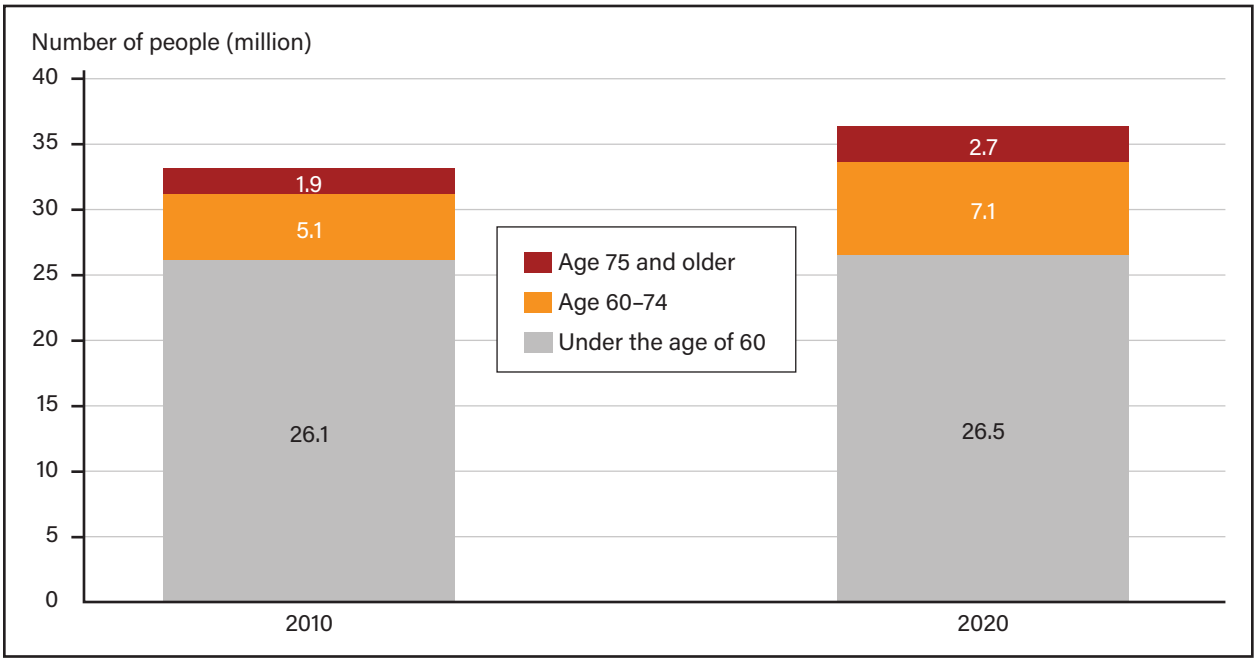
Note: Average values of Wildfire Risk to Potential Structures data aggregated to census blocks and then geographically matched with data on the geographic extent of large wildfires that occurred between 1984 and 2022 to examine the distribution of blocks within each risk classification by recent fire experience.

Source: USDA, Economic Research Service using data from USDA, Forest Service, Wildfire Risk to Communities; U.S. Department of Commerce, Bureau of the Census Topologically Integrated Geographic Encoding and Referencing system (TIGER)/Line shapefiles; and Monitoring Trends in Burn Severity.

Population Growth in Places With Greater Wildfire Risk Is Mostly Among Older People

In 2020, 36 million people lived in places with moderate-to-high wildfire risk. Of those, 9.8 million (27 percent) were over the age of 60, compared with 23 percent of the total U.S. population that was over the age of 60. Between 2010 and 2020, the population living in moderate-to-high wildfire risk blocks grew by 3.2 million. Almost all that growth (87 percent) was due to growth among people over the age of 60 (figure 1). In these riskier places, the number of people under the age of 60 increased by 406,743 in the last decade. At the same time, the population aged 60–74 increased by more than 2 million, and the population aged 75 and over increased by 812,643. The increase in the older population has been due to a combination of aging in place and migration.

Figure 1
Population living in moderate-to-high wildfire risk blocks by age group, 2010–20

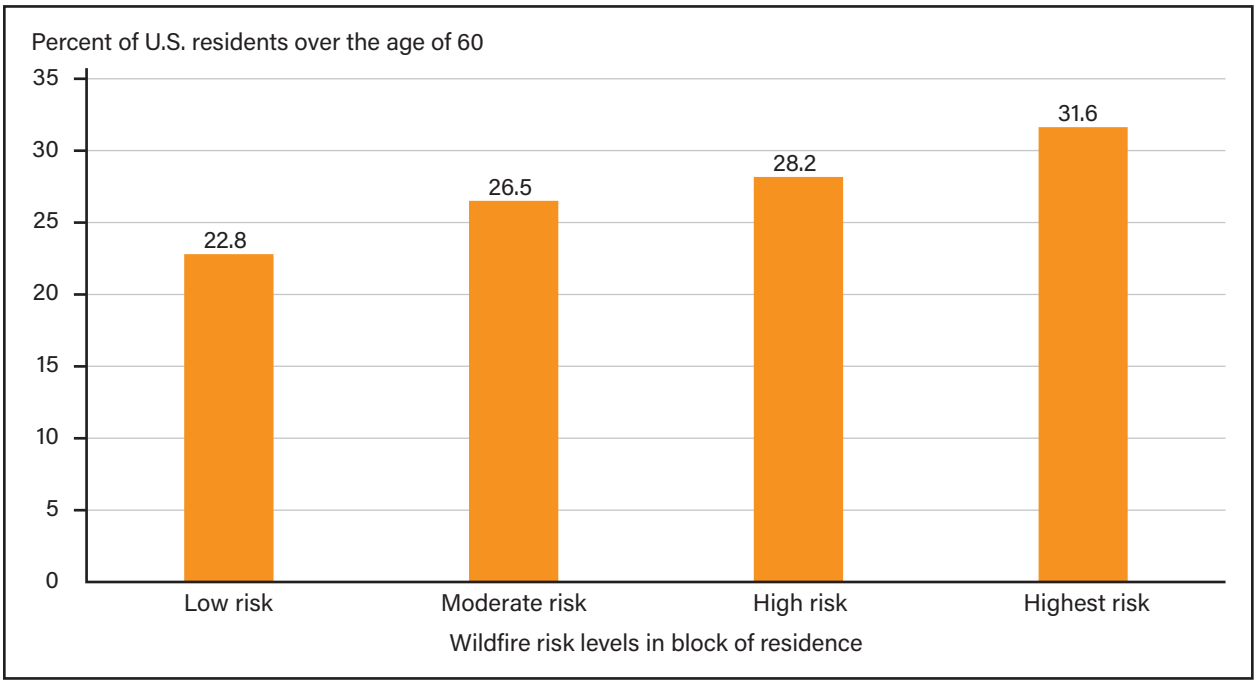


Source: USDA, Economic Research Service using data from U.S. Department of Commerce, Bureau of the Census 2010 and 2020; and USDA, Forest Service, Wildfire Risk to Potential Structures.

Populations Are Older in Areas With Greater Wildfire Risk

The higher the wildfire risk, the older the population living in those blocks has tended to be (figure 2). Focusing on the subset of 8.3 million people living in high-risk locations in 2020 (labeled "High risk" and "Highest risk" in the chart below), 2.4 million (29 percent) were over the age of 60. In the highest risk locations, 32 percent of people were over the age of 60.

Figure 2
Percent of the population over the age of 60 by wildfire risk, 2020

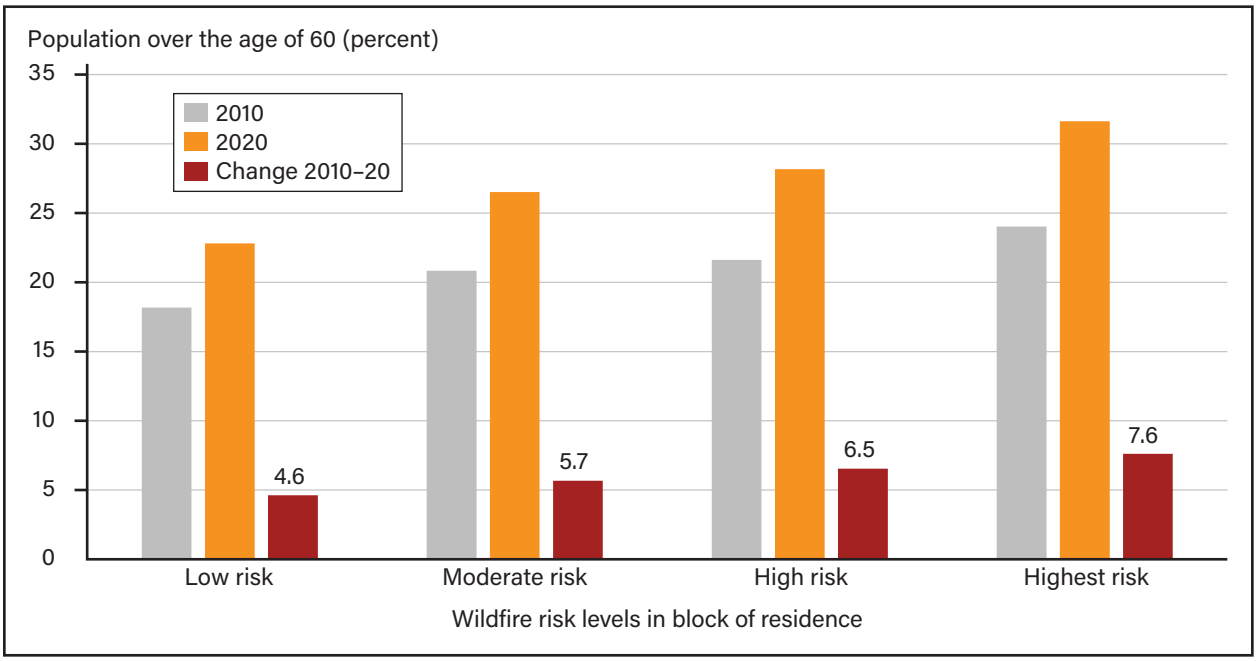


Note: These values represent population-weighted averages, calculated by summing the number of residents over the age of 60 across all blocks within each risk category and dividing by the summed total population within each category. Confidence intervals for each category are low (0.02, 0.06, 0.11, and 0.25, from low to highest risk, respectively), so the confidence intervals are not represented in the chart.

Source: USDA, Economic Research Service using data from U.S. Department of Commerce, Bureau of the Census 2020; and USDA, Forest Service, Wildfire Risk to Potential Structures.

Population aging refers to increases in the share of the population at older ages compared with younger ages. In recent years, population aging has occurred more rapidly in higher wildfire risk areas (figure 3). Between 2010 and 2020, the share of the population over age 60 increased by 4.6 percentage points in low-risk census blocks. The share increased more in moderate, high, and highest risk census blocks by 5.7, 6.5, and 7.6 percentage points, respectively (figure 3).

Figure 3
Percent of population over age 60 by wildfire risk, 2010–20

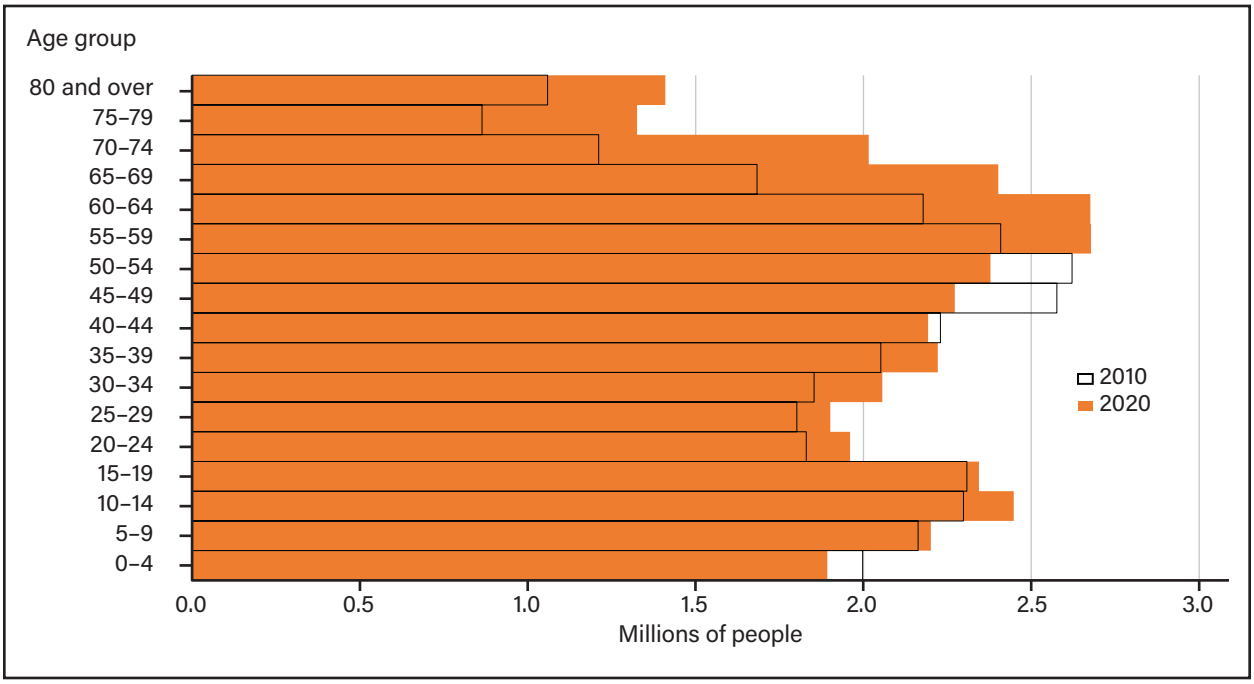


Source: USDA, Economic Research Service using data from U.S. Department of Commerce, Bureau of the Census 2010 and 2020; and USDA, Forest Service, Wildfire Risk to Potential Structures.

Aging in Place has Contributed to Older Populations in Riskier Places

Charts showing the population by 5-year age groups indicate where there are larger and smaller age cohorts and offer a sense of how the age structure is shifting older over time (figures 4 and 5). Focusing on those people living in moderate-to-high-risk blocks, the population grew markedly between 2010 and 2020 for each age group over 55 and decreased or showed little change for younger ages, illustrating a clear pattern of population aging (figure 4).

Figure 4
Number of people living in moderate-to-high risk blocks by 5-year age group, 2010 and 2020



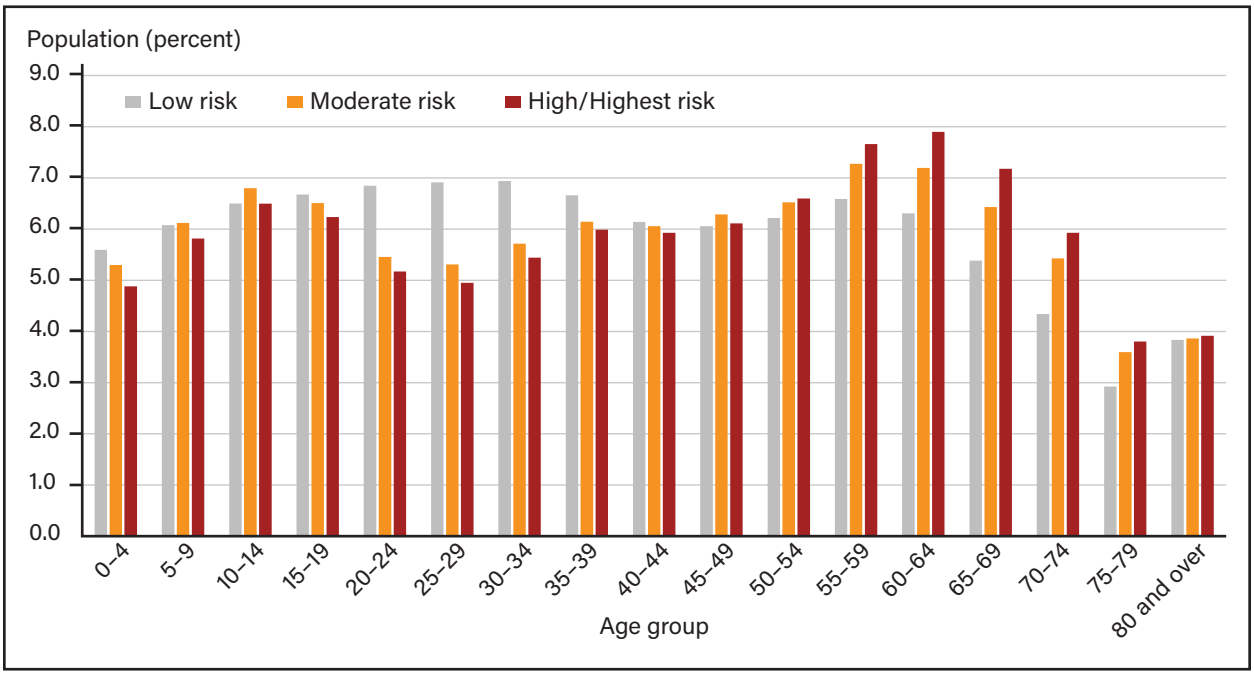
Source: USDA, Economic Research Service using data from U.S. Department of Commerce, Bureau of the Census 2010 and 2020; and USDA, Forest Service, Wildfire Risk to Potential Structures.

Considering how age patterns have changed over time suggests much of the aging in higher risk locations is associated with aging in place instead of in migration of older people to risky areas. The relatively large number of people who were aged 55–64 in 2020 was only slightly greater than the same group of people who were aged 45–54 in 2010. This finding suggests that, although death would have removed some people from these cohorts, the net result of in-migration to riskier wildfire places and out-migration added a relatively small number of people to the 55–64-year age cohorts living in moderate-to-high wildfire risk blocks in 2020. Similarly, the number of people in cohorts who were aged 55–59 in 2010 and aged to 65–69 in 2020, those 60–64 in 2010 and 70–74 in 2020, and those 65–69 in 2010 and 75–79 in 2020 generally were reduced in size as they aged—especially for the oldest group. Some cohort members were inevitably lost to death. The overall loss of population for these cohorts demonstrated that the net result of migration processes for people at older ages was not enough to replace those who died. Still, we cannot determine the exact extent to which migration (in comparison to deaths) has been driving these population shifts, particularly in specific locations. There is likely spatial variation in whether aging is fueled by migration or aging in place—especially in places that are known to attract many retirees.

By 2020, the older population was disproportionately concentrated in higher wildfire risk areas. In low risk census blocks, the population was largest for ages 20–34 in 2020 (figure 5). In moderate risk and high risk

blocks, the largest age groups were older (55–64). The percent of the population at older ages was greatest for the high risk and highest risk blocks. Reviewing this recent change in age structure allows for imagining how the population will continue to age into the future as the larger cohorts, already at older ages, get older each year.

Figure 5
Relative age distribution of the U.S. population by wildfire risk, 2020

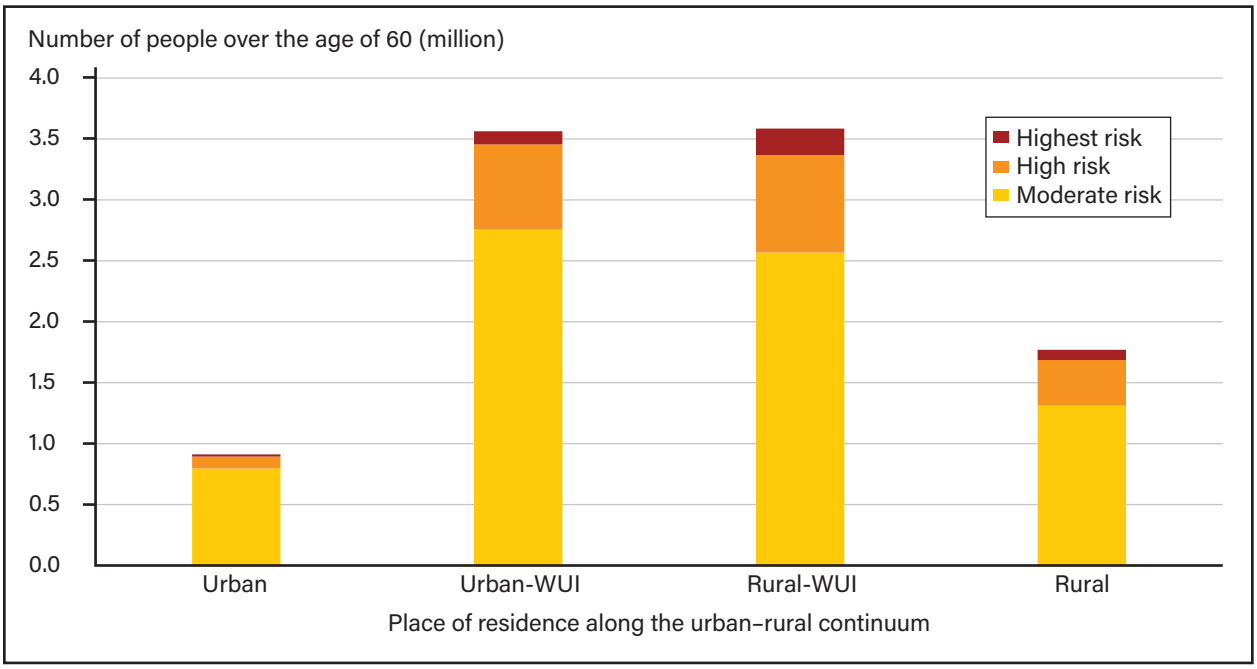


Source: USDA, Economic Research Service using data from U.S. Department of Commerce, Bureau of the Census 2020; and USDA, Forest Service, Wildfire Risk to Potential Structures.

Rural and Wildland-Urban Interface Areas Are Home to Larger Numbers and Greater Shares of Older People at Risk

Nearly 10 million people over the age of 60 lived in census blocks with moderate-to-high risk of wildfire in 2020. Of those, fewer than 1 million were in urban areas. Examining the distribution of the older population (aged 60 and older) by wildfire risk and rurality showed that the coincidence of wildfire risk and older people is predominately a rural and, especially, a WUI issue (figure 6). Rural areas that are not WUI (i.e., areas that lack enough housing density to be considered WUI) were home to 1.7 million older people exposed to moderate-to-high wildfire risk. WUI areas included more than 7 million older people exposed to moderate-to-high risk, who were nearly evenly divided between urban-WUI and rural-WUI.

Figure 6
Number of people over the age of 60 exposed to moderate-to-high wildfire risk by rurality, 2020



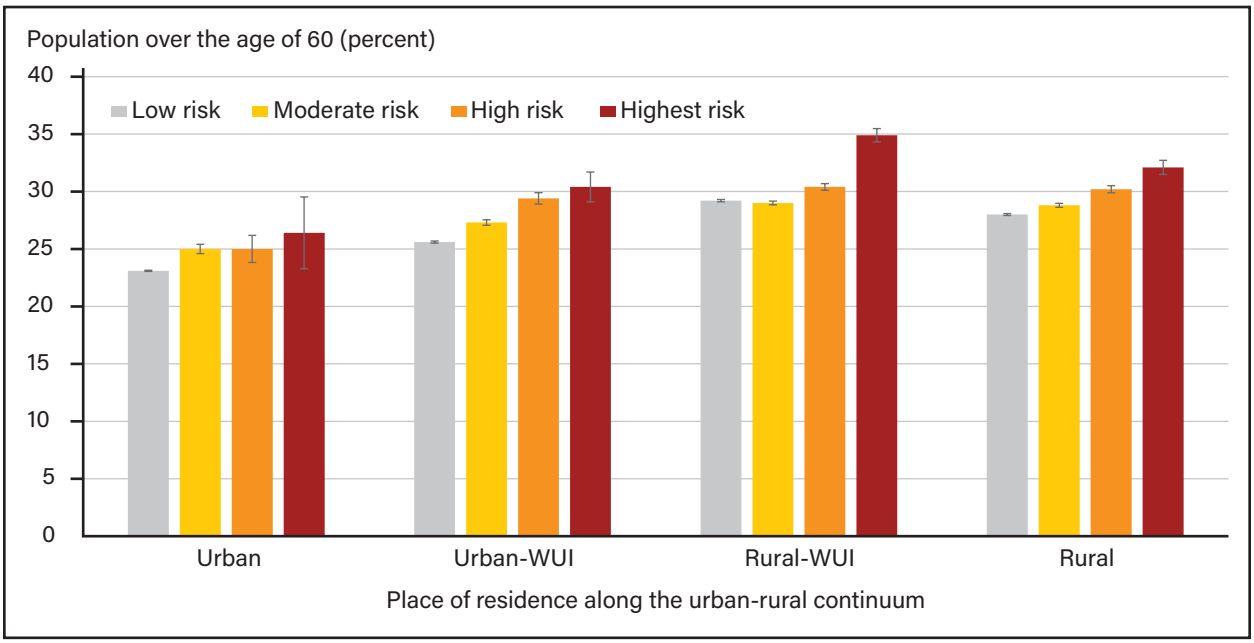
WUI=Wildland-urban interface.

Source: USDA, Economic Research Service using data from U.S. Department of Commerce, Bureau of the Census 2020; and USDA, Forest Service, Wildfire Risk to Potential Structures, and Wildland-Urban Interface.

The percentage of the population over the age of 60 increased with exposure to wildfire risk and rurality (figure 7). Within each urban, WUI, and rural group, the share of the population over the age of 60 was greater in blocks with greater wildfire risk. The older share of the population was large in high wildfire risk census blocks in rural and WUI areas, where about 30 percent or more of the population was over the age of 60. This proportion was greatest for the highest risk blocks in the rural-WUI, where 35 percent of the population was over the age of 60 in 2020.

Figure 7

Average proportion of U.S. residents over age 60 by wildfire risk and rurality, with 95-percent confidence intervals



WUI=Wildland-urban interface

Note: Shows the average (across census blocks) percent of the population over the age of 60. Includes 95-percent confidence intervals to capture the distribution of values around these means. Confidence intervals are wider for urban blocks with higher wildfire risk because there are fewer of these blocks and fewer older people living in these census blocks.

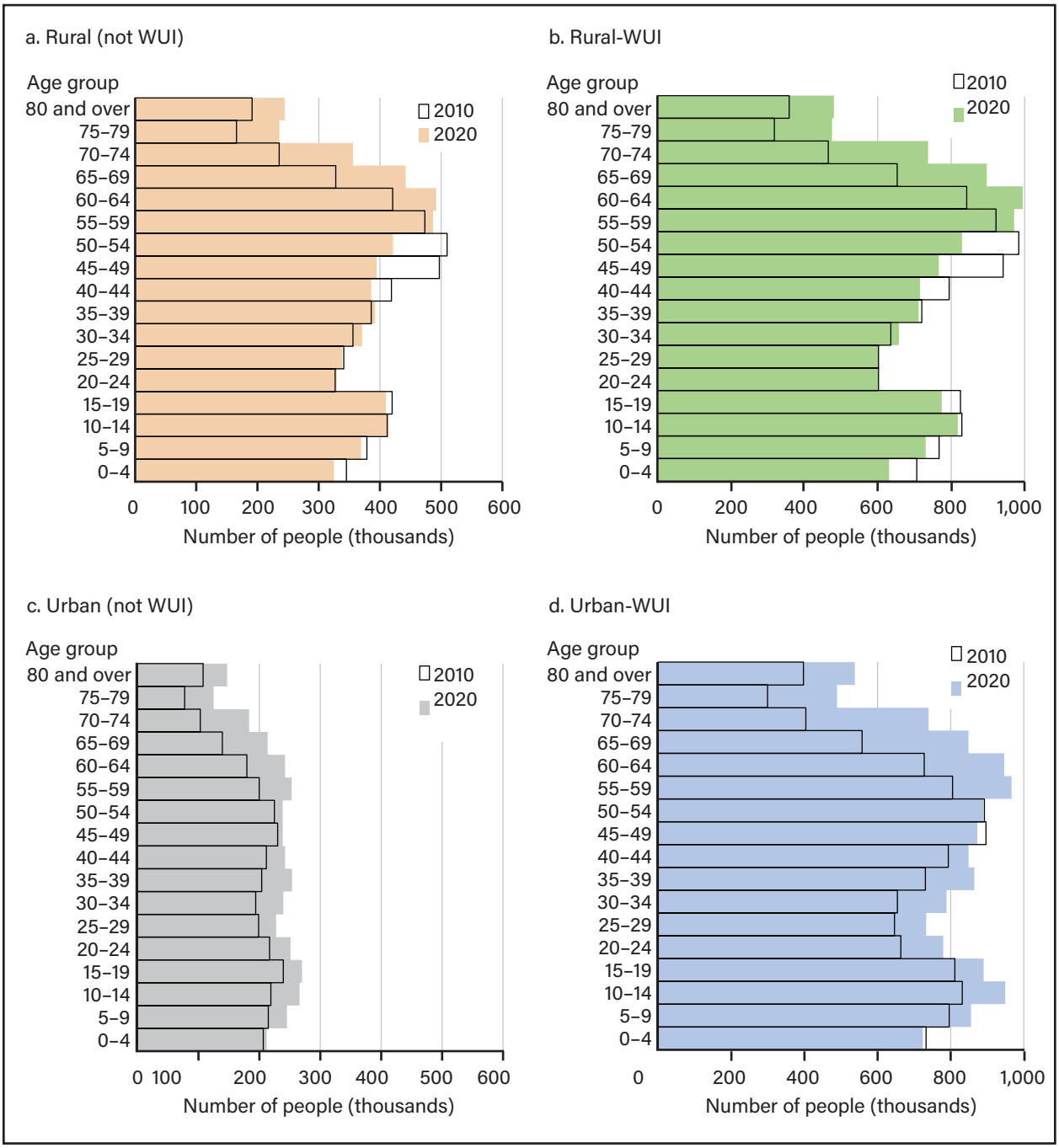
Source: USDA, Economic Research Service using data from U.S. Department of Commerce, Bureau of the Census 2020; and USDA, Forest Service, Wildfire Risk to Potential Structures, and Wildland-Urban Interface.

Looking at how the age structure of populations living in moderate-to-high wildfire risk census blocks has changed between 2010 and 2020 reveals how these trends are likely to intensify in the future (figure 8). Exposed blocks are aging across the urban-rural continuum, with hundreds of thousands more people at older ages in 2020 compared with 2010. However, the population living in moderate-to-high risk urban blocks is substantially younger and aging more slowly (figure 8c) than it is in rural and WUI areas (figure 8a, 8b, 8d). In rural and rural-WUI areas, the population over age 55 increased between 2010 and 2020, but it decreased or remained stable at younger ages. In urban and urban-WUI areas, the population generally grew across all age groups but grew more at older ages, especially in the urban-WUI. By 2030, the large Baby Boom cohorts who were aged 55–74 in 2020 will be aged 65–84 and further contribute to the concurrence of wildfire risk and aging unless large shares of people move to safer locations.

We can also examine changes to the age structure to look for clues about the relative importance of migration, compared with aging in place, for contributing to aging in higher risk places. In rural areas, it appears that aging in place is the primary mechanism. Following older rural cohorts as they age 10 years (i.e., age 50–54 in 2010 and age 60–64 in 2020; figure 8a) shows that cohorts are somewhat smaller in 2020 than in 2010, which indicates there was not enough migration among those groups to fully replace those who died. In contrast, in the rural-WUI (figure 8b) and especially in the urban-WUI (figure 8d), there is evidence that migration during the decade increased the size of some older cohorts. For example, in the urban-WUI, there were 97,918 more people aged 60–69 in 2020 than there were people aged 50–59 in 2010, and there were 11,947 more people aged 70–74 in 2020 than there were people aged 60–64 in 2010 (figure 8d).

Figure 8

Number of people living in moderate-to-high wildfire risk blocks, by 5-year age group and rurality, 2010–20



WUI=Wildland-urban interface.

Note: Shows number of people living in moderate-to-high risk blocks by 5-year age groups at Census 2010 and Census 2020. Scales range from 0 to 600,000 for the Rural (figure 8a) and Urban (figure 8c) charts and from 0 to 1,000,000 for WUI charts (figures 8b and 8d). Urban (not WUI), defined as urban by the U.S. Department of Commerce, Bureau of the Census (Census Bureau) but not classified as WUI; Urban-WUI, defined as urban by the Census Bureau and classified as WUI; Rural-WUI, defined as rural by the Census Bureau and classified as WUI; Rural (not WUI), defined as rural by the Census Bureau but not classified as WUI.

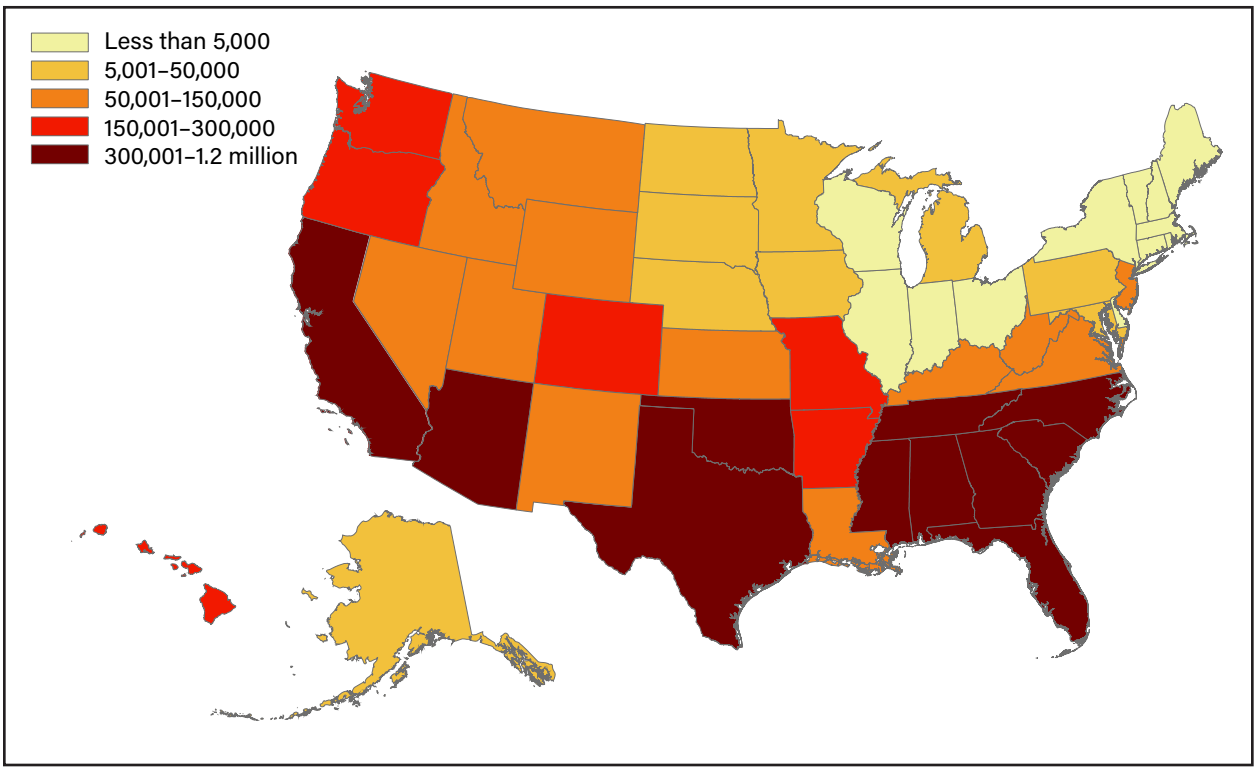
Source: USDA, Economic Research Service using data from U.S. Department of Commerce, Bureau of the Census 2010 and 2020; and USDA, Forest Service, Wildfire Risk to Potential Structures, and Wildland Urban Interface.

U.S. States With More Older People Exposed to Wildfire Risk

Understanding the number of older people (aged 60 and older) living with wildfire risk can provide information for State-level agencies and nonprofit organizations focused on natural hazard preparation and risk reduction. The number of older people facing wildfire risk varied considerably by State, reflecting biophysical aspects of wildfire risk (climate, vegetation) but also State-level population dynamics (figure 9). The greatest numbers of older people exposed to wildfire risk were found in the Southeast and Southwest regions. The top three States with the highest number of older people exposed to wildfire risk were California, Florida, and Texas, each with more than 1 million residents over the age of 60 who lived in moderate-to-high risk census blocks (table 1).

California, Florida, and Texas were the most populous three States in the United States, and they were also places with environmental conditions that led to heightened wildfire risk. Texas and California both had relatively young populations overall, with median ages among the lowest in the country (35 and 37 years of age, respectively). Yet, in higher wildfire risk areas within those States, the population was older. Florida had one of the oldest populations in the country (median age of 43 years), and the age of people there who lived in the higher wildfire risk blocks was similar to the age structure of the State as a whole.

Figure 9
Number of people aged 60 and over living in moderate-to-high wildfire risk census blocks, by State, 2020



Source: USDA, Economic Research Service using data from U.S. Department of Commerce, Bureau of the Census 2020; and USDA, Forest Service, Wildfire Risk to Potential Structures.

Table 1
Top 10 U.S. States by number of people aged 60 and older exposed to moderate-to-high wildfire risk

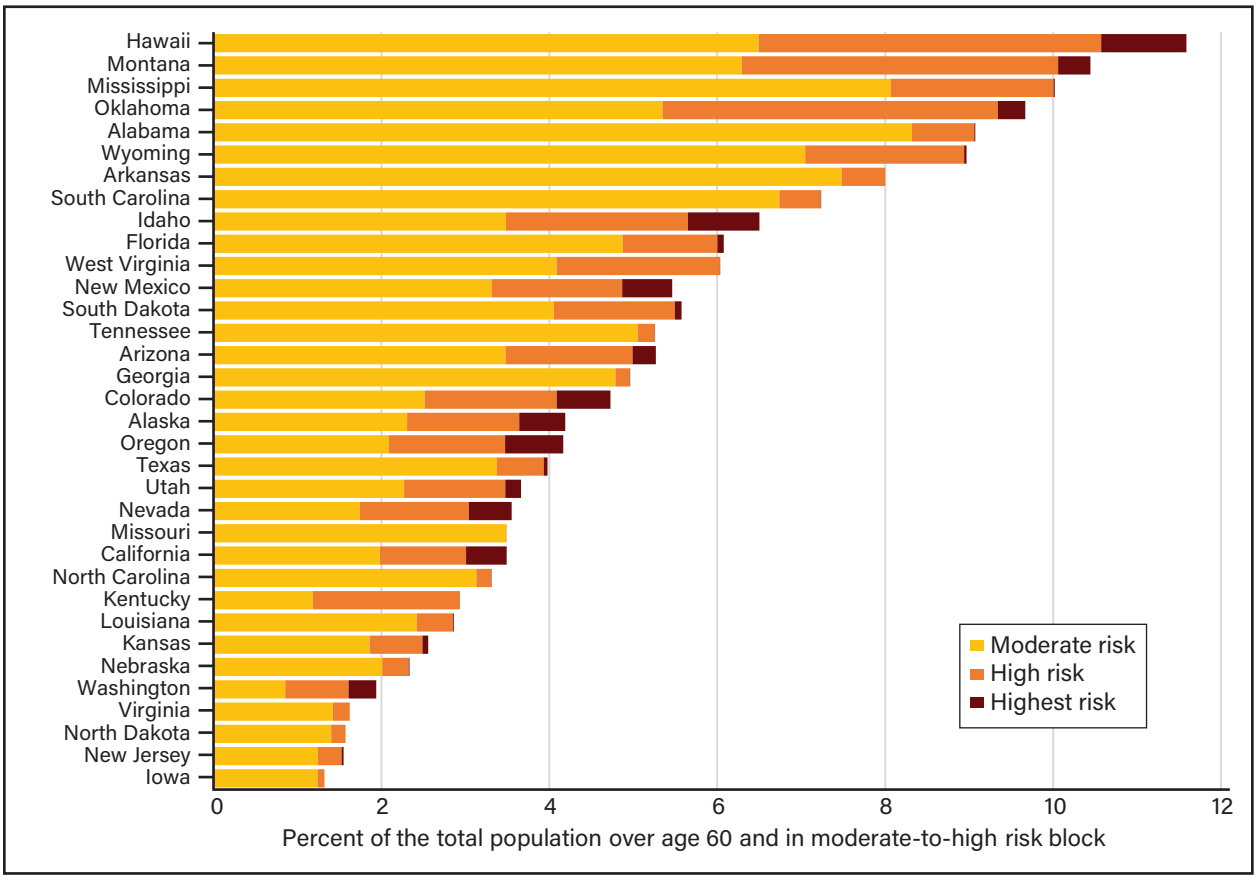
Rank (number)	State	Exposed older people (number)	Exposed older people (percent)
1	California	1,371,724	3.5
2	Florida	1,314,420	6.1
3	Texas	1,144,175	3.9
4	Georgia	534,126	5.0
5	Alabama	457,416	9.1
6	Oklahoma	387,162	9.8
7	South Carolina	374,975	7.3
8	Arizona	374,239	5.2
9	Tennessee	365,000	5.3
10	North Carolina	346,293	3.3

Note: The figure shows the number of people over age 60 who lived in moderate-to-high risk blocks (number) and the share of the total population who were both over the age of 60 and living in a moderate-to-high risk block (percent) in 2020.

Source: USDA, Economic Research Service using data from U.S. Department of Commerce, Bureau of the Census 2020; and USDA, Forest Service, Wildfire Risk to Potential Structures.

In some States with smaller populations, higher proportions of the population were older people living in blocks with moderate-to-high wildfire risk (figure 10). Hawaii was the State with the greatest share of its population who was both over the age of 60 and lived in moderate-to-high wildfire risk census blocks (11.6 percent). Hawaii had one of the older median ages in the country (40 years of age), and wildfire risk was widespread in the State. The 2023 Lahaina, Hawaii fire (where 75 percent of the people who died were over the age of 60; Maui Police Department, 2024) demonstrated that this can be a deadly combination for older communities. The proportion of total population that were both older and living with moderate-to-high wildfire risk was also high in Montana, Mississippi, Oklahoma, Alabama, and Wyoming.

Figure 10
Share of the total population who were both aged 60 and over and living in moderate-to-high wildfire risk census blocks, by U.S. State



Note: States where less than 1 percent of the population was over age 60 and living in a moderate-to-high risk block are excluded: Connecticut, Delaware, Illinois, Indiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, New Hampshire, New York, Ohio, Pennsylvania, Rhode Island, Washington, DC, Wisconsin, and Vermont.

Source: USDA, Economic Research Service using data from U.S. Department of Commerce, Bureau of the Census 2020; and USDA, Forest Service, Wildfire Risk to Potential Structures.

U.S. Counties With More Older People Exposed to Wildfire Risk

Hazard planning and the organization of local governmental services often occur at the county level. For planning and wildfire risk reduction efforts, it is helpful to know which counties have both more older people and higher proportions of older people living in areas with wildfire risk. With fewer resources and a smaller share of prime working age adults, rural counties might especially struggle to provide adequate services (e.g., first responders and emergency services, workforce available to reduce fuel loads and mitigate risk, etc.) to address wildfire risk.

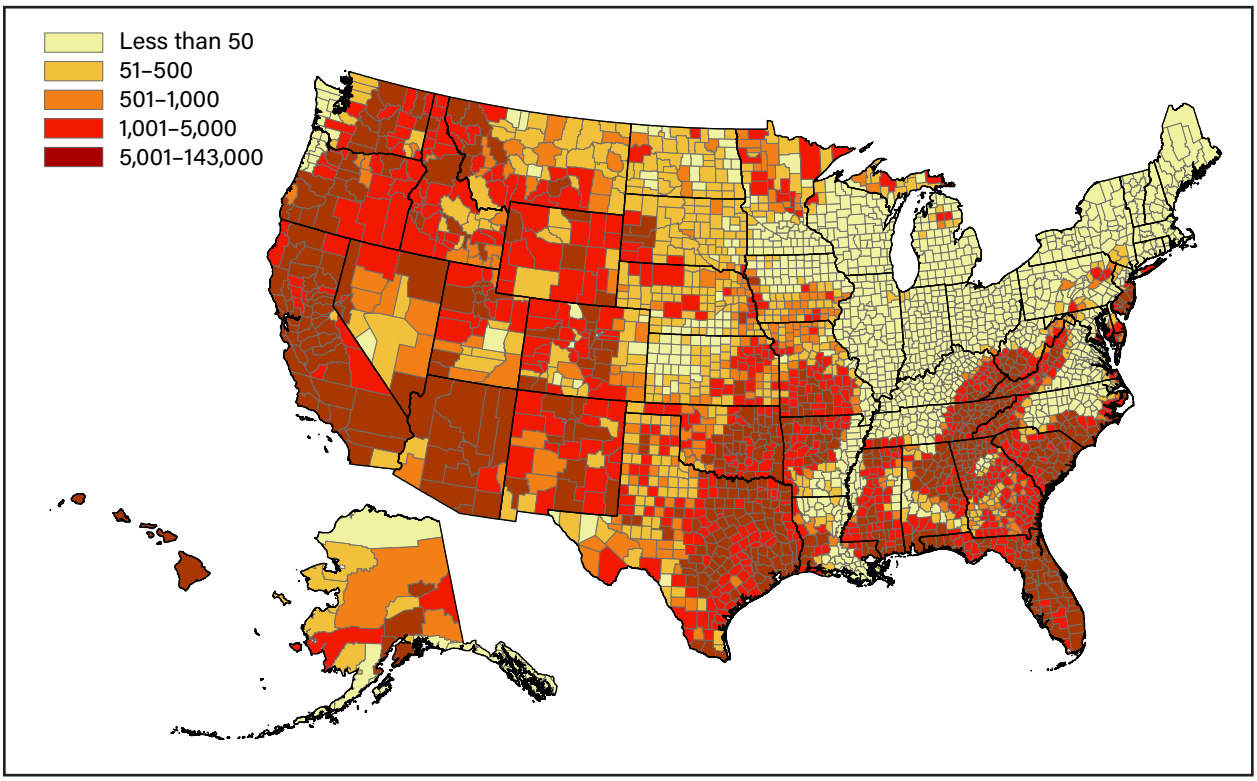
Counties with the largest numbers of older people exposed to wildfire risk have tended to be highly populated places with significant wildfire risk. This finding was true in southern California, across Florida, around Phoenix, Arizona, and in Honolulu, Hawaii (table 2, figure 11). Still, in high population counties, the older people exposed to wildfire risk often made up a relatively small proportion of the county's total population.

For example, in Los Angeles County, California, an estimated 142,532 older people lived in moderate-to-high wildfire risk blocks, but they were only 1.4 percent of the county population total.

In other counties (e.g., Catron, New Mexico), the total population was small (3,623 residents in 2020), but the share of people who were over age 60 and exposed to risk was great (48 percent) (figure 12). Similarly, in Custer County, South Dakota (just south of Mount Rushmore, among the Black Hills National Forest and home to the Crazy Horse Memorial) 3,537 older people were exposed to wildfire risk in 2020. That number amounted to 42.5 percent of the total county population. Counties with large proportions of older people at risk were found across much of southern Appalachia, the Ozarks, the Florida Panhandle, and rural areas of the Rocky Mountain West regions (figure 12).

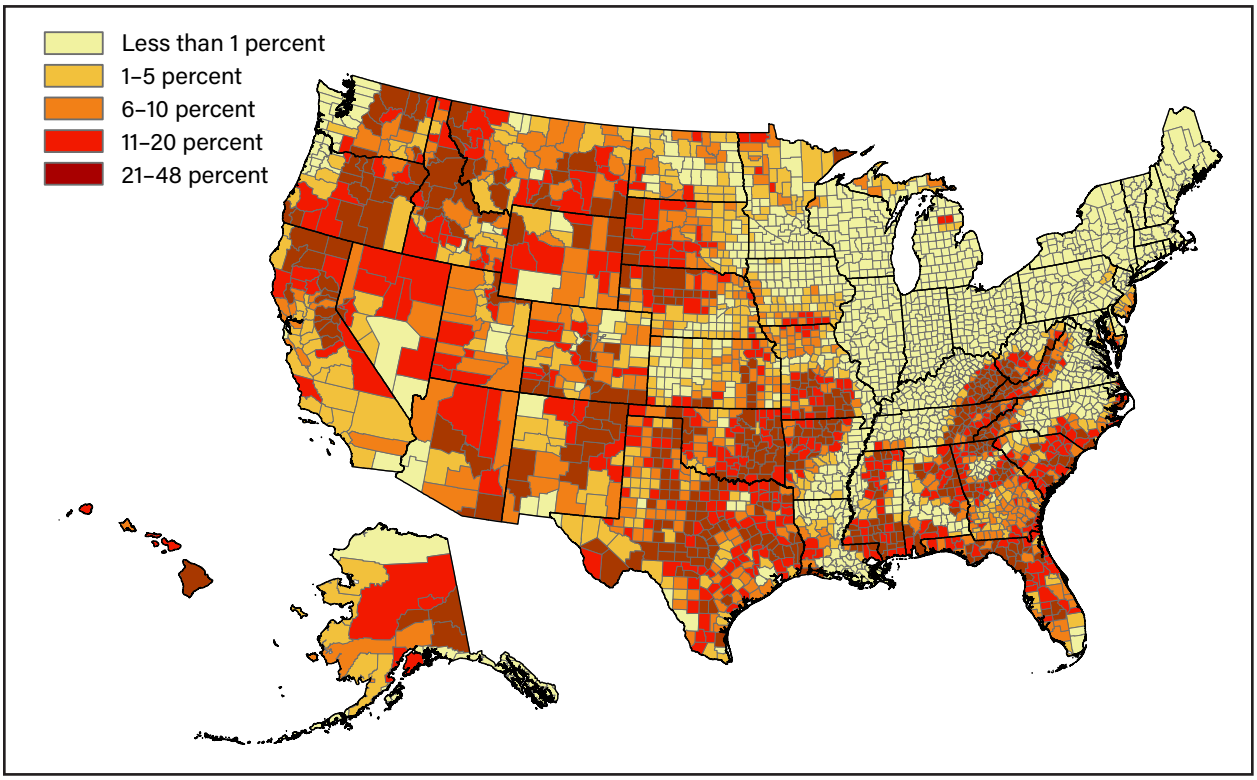
Figure 11

Number of people over age 60 living in moderate-to-high wildfire risk blocks, by U.S. county



Source: USDA, Economic Research Service using data from U.S. Department of Commerce, Bureau of the Census 2020; and USDA, Forest Service, Wildfire Risk to Potential Structures.

Figure 12
Share of population who were older people exposed to moderate-to-high wildfire risk, by U.S. county



Source: USDA, Economic Research Service using data from U.S. Department of Commerce, Bureau of the Census 2020 and Wildfire Risk to Potential Structures (2024).

We found some counties to have both a large absolute number of older people exposed to risk and higher shares of older people exposed to risk relative to the county's population. Such a combination means that both a high proportion of the county's population are potentially vulnerable to wildfires, and there are also many older people to consider in emergency responses and preparations. For example, in Yavapai County, Arizona, 68,697 older people lived in moderate-to-high wildfire risk blocks, making up 29 percent of the total population (table 2).

Table 2

Top 20 U.S. counties by number and proportion of older people exposed to wildfire risk

Ranked by number of older people living in moderate-to-high wildfire risk blocks				Ranked by share of the total population who are older people living in moderate-to-high wildfire risk blocks			
Rank (number)	County	Exposed older people (number)	Exposed older people (percent)	Rank (per-cent)	County	Exposed older people (number)	Exposed older people (percent)
1	Los Angeles, CA	142,532	1.4	1	Catron, NM	1,702	47.6
2	Riverside, CA	137,537	5.7	2	Harding, NM	307	46.7
3	San Diego, CA	114,269	3.5	3	Jeff Davis, TX	929	46.5
4	Polk, FL	96,449	13.3	4	Wheeler, OR	624	43.0
5	Honolulu, HI	92,513	9.1	5	Custer, SD	3,537	42.5
6	San Bernardino, CA	81,948	3.8	6	Clay, NC	4,613	41.6
7	Maricopa, AZ	75,079	1.7	7	Adams, ID	1,801	41.1
8	Pima, AZ	74,507	7.1	8	Storey, NV	1,669	40.8
9	Lee, FL	74,377	9.8	9	Union, GA	9,963	40.4
10	Contra Costa, CA	70,185	6.0	10	Sierra, CA	1,304	40.3
11	Yavapai, AZ	68,697	29.1	11	Mora, NM	1,647	39.4
12	Hillsborough, FL	68,613	4.7	12	Hickory, MO	3,253	39.3
13	Pasco, FL	66,666	11.9	13	Petroleum, MT	194	39.1
14	Mobile, AL	65,671	15.8	14	Ferry, WA	2,792	38.9
15	Volusia, FL	59,159	10.7	15	Grant, OR	2,797	38.7
16	Ocean, NJ	53,732	8.4	16	Kent, TX	291	38.6
17	Baldwin, AL	51,711	22.3	17	Cherokee, NC	11,056	38.4
18	Lake, FL	51,463	13.4	18	Mineral, MT	1,732	38.2
19	Brevard, FL	50,898	8.4	19	Mariposa, CA	6,540	38.2
20	Marion, FL	49,522	13.2	20	Boise, ID	2,905	38.2

CA = California. NM = New Mexico. TX = Texas. FL = Florida. OR = Oregon. HI = Hawaii. SD = South Dakota. NC = North Carolina. AZ = Arizona. ID = Idaho. NV = Nevada. GA = Georgia. MO = Missouri. MT = Montana. AL = Alabama. WA = Washington. NJ = New Jersey.

Note: The proportion of exposed older people are the percent of the total population who are aged 60 and over and live in moderate-to-high risk wildfire blocks. Blue shading indicates that county is a Retirement Destination County, as defined by the USDA, Economic Research Service (ERS) County Typology Codes.

Source: USDA, Economic Research Service using data from U.S. Department of Commerce, Bureau of the Census 2020; USDA, Forest Service, Wildfire Risk to Potential Structures; and USDA, ERS, County Typology Codes.

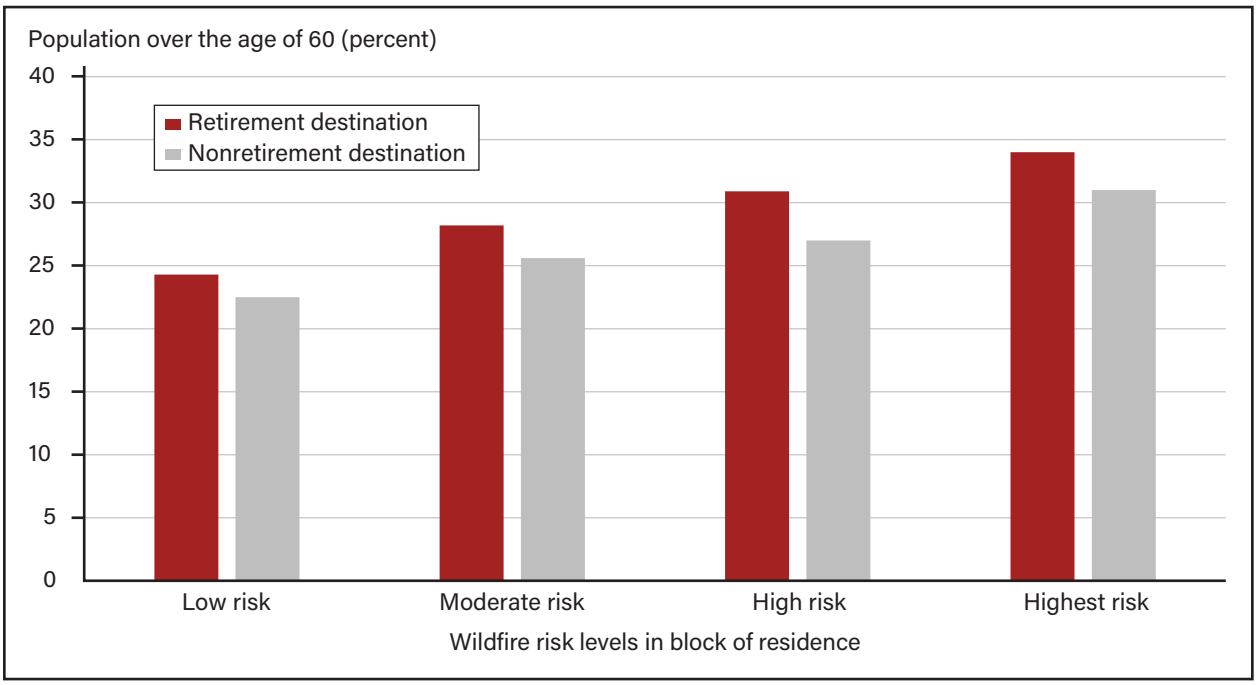
Aging and Wildfire Risk in Retirement Destinations

This report also considered aging and wildfire risk in retirement destination counties. The USDA, Economic Research Service (ERS) identified these counties as attracting high rates of in-migrating older adults. Therefore, retirement destinations tend to have larger numbers and proportions of residents aged 60 and older than other counties (figure 13). Retirement destinations also have a greater average risk of wildfire than other, nonretirement destination counties, making them places where older populations and wildfire risk are more likely to coincide.

We found several retirement destination counties to be among the counties with the greatest numbers and proportions of people aged 60 and older who are exposed to wildfire risk (table 2). Of the top 20 counties, by number of people aged 60 and older exposed to wildfire risk, 12 were retirement destination counties; and of the top 20 counties, by share of the population aged 60 and older and exposed to wildfire risk, 9 were retirement destinations. In the average retirement destination county, 11.3 percent of the total population (7,931 people) were both over the age of 60 and living in a moderate-to-high wildfire risk block in 2020, compared with 6.7 percent (2,341 people) on average in other counties.

Given that much of the aging in retirement counties has been driven by the in-migration of older people, comparing the coincidence of aging and wildfire risk in retirement destination counties compared with nonretirement destination counties allowed us to consider how the concurrence of aging and wildfire risk may be driven by in-migration of older adults to specific counties. We found that in both retirement and nonretirement destination counties, the share of older people in county populations increased as wildfire risk increased (figure 13). So, it is not only in the retirement migration destination counties where higher shares of people aged 60 and older live in higher wildfire risk census blocks. This suggests that both in migration of older adults and aging-in-place play a role in increasing the number of older people exposed to wildfire risk.

Figure 13
Percent of the U.S. population over the age of 60, by wildfire risk and retirement destination status



Note: Retirement destination counties are those counties where the number of residents aged 60 and older grew by 15 percent or more due to migration between 2000 and 2010.

Source: USDA, Economic Research Service using data from U.S. Department of Commerce, Bureau of the Census 2020; USDA, Forest Service, Wildfire Risk to Potential Structures; and USDA, ERS, County Typology Codes.

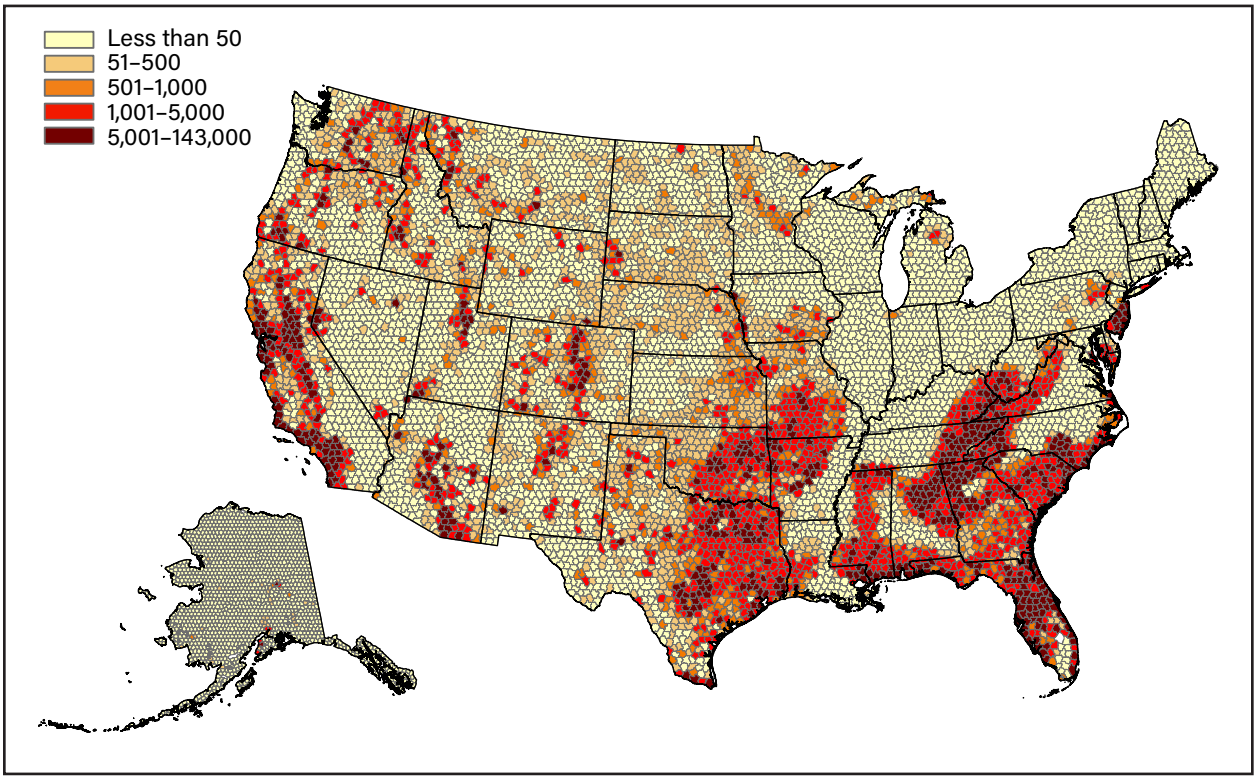
Firesheds With More People Aged 60 and Older Exposed to Wildfire Risk

Firesheds are geographic units constructed by researchers at USDA, Forest Service to facilitate planning, decision making, and resource distribution for wildfire mitigation and adaptation programs. Firesheds are designed based on environmental conditions to create boundaries that are generally consistent in size and within which biophysical risk[5] to wildfire is relatively consistent (Evers et al., 2023). In most cases, firesheds offer a smaller geographic unit than counties, which is important in the West region of the United States, where counties tend to be large in area and cover diverse socioecological landscapes. Firesheds are the unit used in USDA, Forest Service's Wildfire Crisis Strategy to define high-risk firesheds and 21 priority landscapes targeted for wildfire mitigation funding (USDA, Forest Service, 2022). In this report's analysis, firesheds were used as a geographic aggregation unit to compare how residents' age in census blocks with moderate-to-high wildfire risk (defined using the Wildfire Risk to Communities data) varied across U.S. firesheds. Since firesheds were designed around environmental conditions rather than population thresholds or political units, firesheds can sometimes have a very small or no resident population. The USDA's Forest Service did not publish fireshed boundaries for Hawaii, so Hawaii is excluded from this part of the analysis.

[5] Biophysical risk refers to environmental conditions that impact wildfire risk, including climate, wildland vegetation structure, and topography.

Firesheds with the largest numbers of people aged 60 and older living in moderate-to-high risk blocks included some of the more populated areas where wildfire risk has been often discussed, including southern California, the Sierra Nevada range, and Colorado's Front Range. We also found larger numbers of older people facing wildfire risk in central Florida, eastern Oklahoma, eastern Texas, southern Appalachia, southern New Jersey, and much of the Gulf Coast (figure 14). When we considered firesheds by population share who were aged 60 or older and exposed to risk (figure 15), we identified more firesheds where aging and wildfire risk coincide across much of the rural West. We found firesheds with 40 percent or more of the population who were aged 60 and older and at risk of wildfire in northern California, northern Idaho, central Texas, central Washington, northwestern Wyoming, and across much of New Mexico, Arizona, Oregon, and Montana (figure 15).

Figure 14
Number of people aged 60 and older living in moderate-to-high wildfire risk blocks, by fireshed, 2020

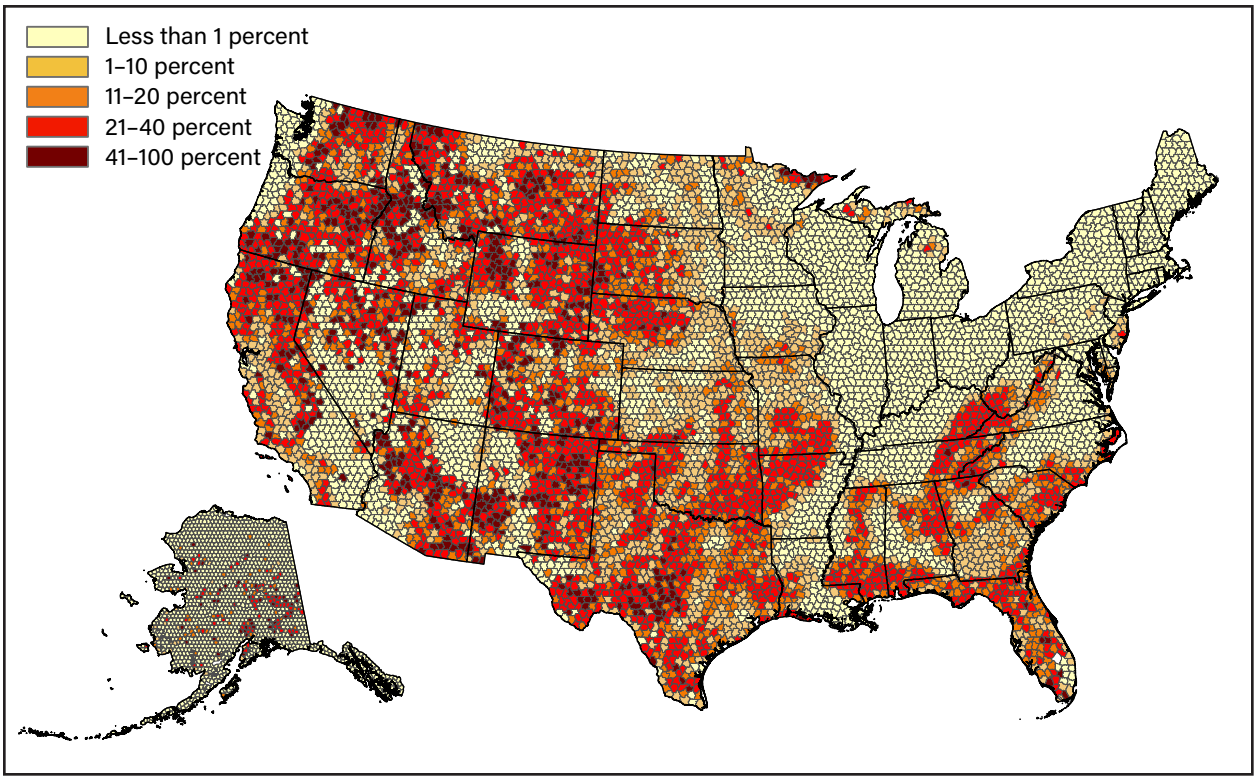


Note: Hawaii is not included in this analysis because USDA's Forest Service did not publish fireshed boundaries for Hawaii.

Source: USDA, Economic Research Service using data from U.S. Department of Commerce, Bureau of the Census 2020; and USDA, Forest Service, Firesheds and the Fireshed Registry, and Wildfire Risk to Potential Structure.

Figure 15

Share of U.S. population who were aged 60 and older and exposed to moderate-to-high wildfire risk, by fireshed, 2020



Note: Hawaii is not included in this analysis because USDA's Forest Service did not publish fireshed boundaries for Hawaii.

Source: USDA, Economic Research Service using data from U.S. Department of Commerce, Bureau of the Census 2020; and USDA, Forest Service, Firesheds and the Fireshed Registry, and Wildfire Risk to Potential Structures.

We found some firesheds with both large numbers of older people exposed to wildfire risk and high shares of the population who were aged 60 or older and exposed to risk (table 3). These locations included places like the Concord, California fireshed (just outside Berkeley, California), where approximately 57,000 older people lived in moderate-to-high wildfire risk blocks or 8 percent of the total county population. Another example is the Bonita Springs, Florida fireshed, which was home to 47,159 older people living with moderate-to-high wildfire risk or 12 percent of the total population. This fireshed is located between Naples and Fort Myers, with large tracts of forested and protected areas to the east. This area of Florida has a long history of retirement destination migration and wildfire concerns (Newman et al., 2013). Further north, the Toms River, New Jersey fireshed is a coastal retirement destination community in the northeastern portion of the New Jersey Pinelands National Reserve, where residential and commercial development intermingles with protected pine forests that depend on fire for ecological rejuvenation (New Jersey Pinelands Commission (2024, August 22), *The Pinelands National Reserve*). In the Toms River fireshed, we found that an estimated 38,307 people aged 60 or older were exposed to wildfire risk or 10 percent of the total fireshed population.

Firesheds with the highest proportion of older people living with moderate-to-high wildfire risk were more common in the rural areas of the western United States, particularly in the Southwest. There were three firesheds in New Mexico and five firesheds in Arizona, where 62–70 percent of the population was made up of older people living with moderate-to-high wildfire risk. These high percentages typically represent a smaller number of people but in some places can comprise several thousand people (e.g., Continental Arizona near Tucson and Congress Junction Arizona near Phoenix).

Table 3
Top 10 U.S. firesheds by number and share of people aged 60 and older exposed to wildfire risk

Ranked by number of older people living in moderate-to-high wildfire risk blocks				Ranked by share of the total population who are older people living in moderate-to-high wildfire risk blocks			
Rank (number)	Fireshed	Exposed older people (number)	Exposed older people (percent)	Rank (percent)	Fireshed	Exposed older people (percent)	Exposed older people (number)
1	Concord, CA	56,918	8	1	Echinique Place, AZ	70	71
2	Simi Valley, CA	49,528	2	2	Congress Junction, AZ	65	2,639
3	Wesley Chapel, FL	47,576	9	3	Clints Well, AZ	65	353
4	Bonita Springs, FL	47,159	12	4	Aztec Lodge, AZ	64	244
5	Murrieta, CA	46,547	8	5	Greens Gap, NM	64	179
6	Mission Viejo, CA	44,268	6	6	Dwyer, NM	63	161
7	Escondido, CA	39,839	5	7	Continental, AZ	62	5,171
8	Toms River, NJ	38,307	10	8	Arnesons Peak, WA	62	72
9	North Port, FL	37,663	12	9	Red Hill 1, NM	62	129
10	Palm Bay, FL	35,901	7	10	Alturas City, ID	62	62

CA = California. AZ = Arizona. FL = Florida. NM = New Mexico. NJ = New Jersey. WA = Washington. ID = Idaho.

Note: For percent ranking, only those firesheds with at least 50 exposed people aged 60 and over were listed.

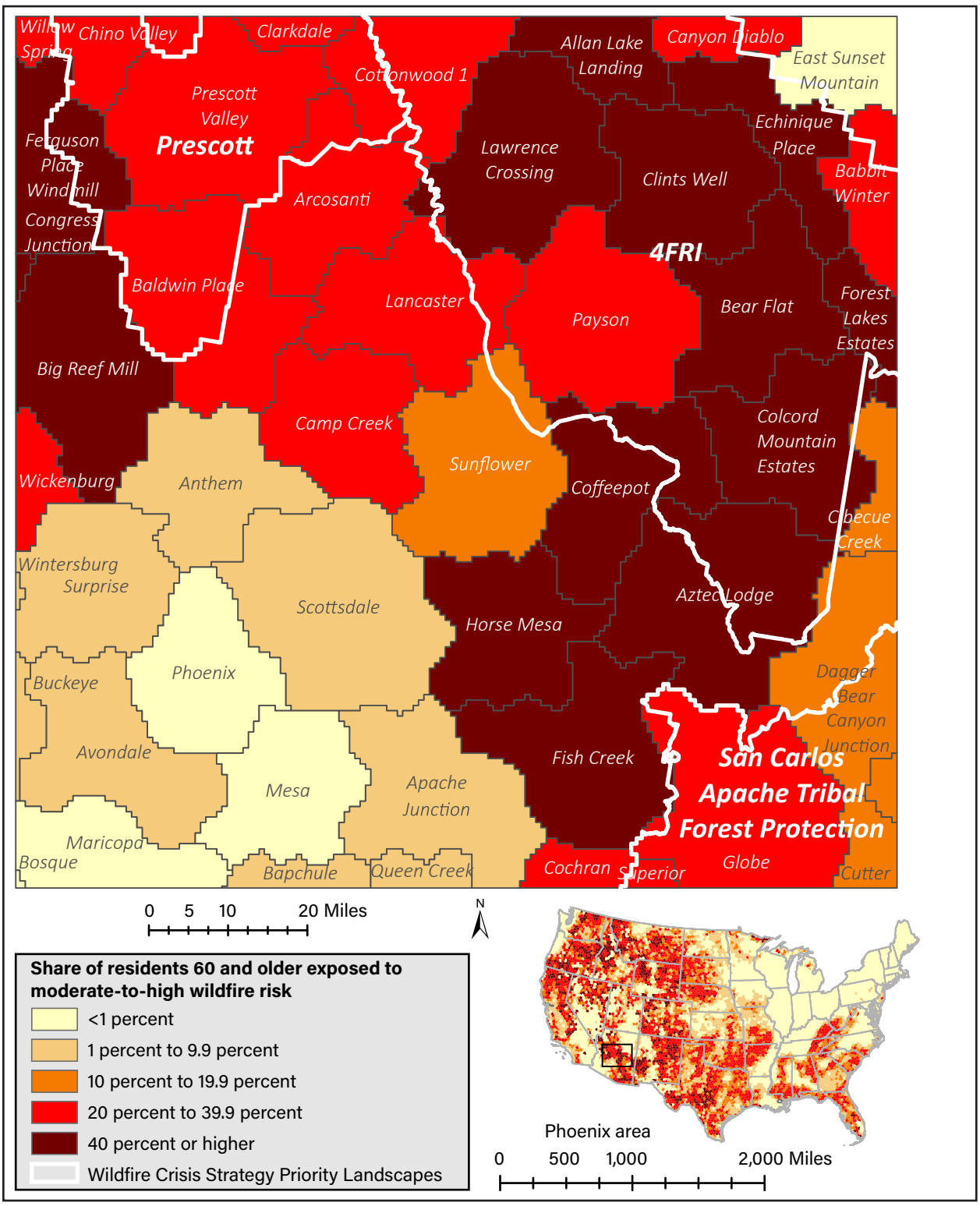
Source: USDA, Economic Research Service using data from U.S. Department of Commerce, Bureau of the Census 2020; and USDA, Forest Service, Firesheds and the Fireshed Registry, and Wildfire Risk to Potential Structures.

Aging in Firesheds Identified as Priority Landscapes in the Wildfire Crisis Strategy: An Example From Arizona

The USDA, Forest Service's Wildfire Crisis Strategy identified 21 landscapes (i.e., high risk firesheds) that were prioritized for wildfire risk reduction programs across the West (USDA, FS, 2023). Examining aging at the fireshed level can illustrate the variation in the older population exposed to wildfire risk, both within and around these priority landscapes. For example, there were three priority landscapes in the area to the north and east of Phoenix, Arizona. Within and near the city of Phoenix, the share of the population who were aged 60 and older and were exposed to moderate-to-high wildfire risk was low. Going further out into the more suburban, smaller town, and rural areas bordering or within the Wildfire Crisis Strategy priority landscapes, 20 percent or more of the total population were people aged 60 and older who were exposed to moderate-to-high wildfire risk. Firesheds like Congress Junction, Arizona (bordering the Prescott landscape), Clints Well, Arizona, and Echinique Place, Arizona (within the Four Forest Restoration Initiative (4FRI) landscape), all had 65 percent or more of their total population comprised of older people exposed to moderate-to-high wildfire risk. Combined, these three firesheds were home to more than 3,000 older people living in moderate-to-high wildfire risk blocks, primarily in Congress Junction, Arizona (table 3). This retirement community lies just outside the Granite Mountain Hot Shots Memorial State Park, where 19 of 20 members of an elite firefighting crew were killed in the 2013 Yarnell Hill Fire, the greatest loss of firefighter life in response to a single wildland fire in the United States.

Figure 16

Share of the fireshed population who were aged 60 or older and exposed to moderate-to-high wildfire risk in selected Wildfire Crisis Strategy priority landscapes in Arizona



Note: The USDA, Forest Service's Wildfire Crisis Strategy identified 21 landscapes (i.e., high risk firesheds), that were prioritized for wildfire risk reduction programs. The map shows three of these priority landscapes in the Phoenix, Arizona area including: the Prescott, Arizona landscape; the Four Forest Restoration Initiative (4FRI) landscape; and the San Carlos Apache Tribal Forest Protection landscape.

Source: USDA, Economic Research Service using data from U.S. Department of Commerce, Bureau of the Census 2020, the Fireshed Registry; and USDA, Forest Service, Wildfire Risk to Potential Structures, and Wildfire Crisis Strategy Landscapes.

Discussion and Conclusion

Summary of Findings and Implications

This report called attention to the growing challenge of population aging in areas with high wildfire risk. Compared with their share of the total population, people aged 60 and older were disproportionately represented in higher wildfire risk areas. In 2020, across the United States, more than one in four people who lived in census blocks with moderate-to-high wildfire risk were over the age of 60. Almost all the population growth (87 percent) between 2010 and 2020 in moderate-to-high wildfire risk locations was among older people (over the age of 60). As the Baby Boom generation continues to age and the youngest of them reach age 60 in 2025, the number and share of older people living in riskier wildfire locations are expected to increase faster in the coming years unless there are considerable declines in life expectancy at older ages or older people start to move to safer locations.

These wildfire risk challenges were found throughout the United States, not just in the West region. Nearly every county in California, Arizona, Florida, and South Carolina had at least 1,000 older people living in moderate-to-high wildfire risk census blocks in 2020. The greatest absolute number of older people facing wildfire risks were found to live in California, Florida, and Texas. The data in this report that summarized for States, counties, and firesheds are publicly available through the USDA, Forest Service's Research Data Archive on the USDA, Forest Service website.

Across the United States, older people living in blocks with moderate-to-high wildfire risk was predominantly a rural and wildland-urban interface (WUI) issue. The greatest number of older people exposed to wildfire risk was in WUI areas (e.g., urban-WUI and rural-WUI). However, older people living in places exposed to risk made up a greater proportion of the total population in rural areas (e.g., rural and rural-WUI). This situation poses special challenges in many rural places where declining younger populations make it challenging to maintain volunteer fire departments and emergency services (Colibaba et al., 2021; Yoon et al., 2014).

Understanding both biophysical conditions that contribute to wildfire risk and the people living in places at risk can aid decision-making around risk reduction. However, while knowledge about landscape characteristics and wildfire risk has advanced significantly, our understanding of the characteristics and vulnerabilities of people living in high-risk areas has lagged behind (Thomas et al., 2022; Melton et al., 2023). This report shows that populations in higher wildfire-risk locations are relatively older and aging quickly.

The report bridged what have often been distinct disciplinary research and management communities, including those communities that work on wildfire science and management, compared with Rural Development teams, demographers, and social service providers who focus on aging. The information can be used to support decision making at all levels of government around wildfire risk reduction efforts, planning for emergency response, and supporting aging populations in wildfire risk reduction. Older people may benefit from different kinds of adaptation strategies that meet their unique needs and/or draw on contributions and participation from older adults in preparation and mitigation efforts. Findings at the State, county, and fireshed levels could help decision makers determine where to distribute funding and programs most effectively.

Study Limitations and Considerations

This report is different from other studies and datasets that combine biophysical data with data on aging. The difference is that this report uses a smaller geographic scale of analysis and relies on relatively precise data from decennial census counts, which should offer a more accurate analysis of where population aging

and wildfire risk coincide. However, working at this small scale introduces its own limitations. The results presented in this study are estimates, limited in their accuracy by the Census Bureau's Census 2020 data and USDA, Forest Service's Wildfire Risk to Communities data on which the results rely.

The 2020 Census is the most complete count of 2020 populations at small geographic units, yet it is not perfect, especially for the small geographic units we used in this report. Census data are subject to undercounts and overcounts that vary by age, race, ethnicity, sex, and geography. Census 2020 faced special challenges associated with being conducted during the initial shock of the Coronavirus pandemic. These challenges led to lower self-response rates and associated age-heaping, where age is more likely to be reported with numbers ending in zero or five (Jensen et al., 2023). The age-heaping problem may have increased the number of people we counted at ages 60 and over because people who were 58 or 59 may have been counted as age 60.

Census 2020 also introduced a new system for privacy protection. This differentially private disclosure avoidance system works by adding random noise to the reported data so that populations reported at the census block level and by age are not completely accurate. The error this process introduces was normally distributed so that when aggregating up to larger units for reporting (as we did in this report for States, counties, and firesheds), the errors should theoretically cancel one another out and not impact the interpretation of results (Long, 2022). Still, in practice, it is difficult to determine if and how this error would impact our findings.[6]

Although blocks are the smallest geographic unit for which census data are available, there could still be problems with a spatial mismatch between where, within blocks, people aged 60 and older live and the distribution of wildfire risk within census blocks. Some blocks, particularly in more rural and mountainous areas, are geographically large and heterogeneous. So, although the block-level analysis used in this study offers an improvement over county and census tract level studies, the analysis does not completely resolve spatial mismatch issues.

For this study, we chose to hold environmental data on wildfire risk constant in time (approximating conditions in 2020) and to examine changes in the age distribution of populations between 2010 and 2020. This decision makes it possible to isolate the effect of demographic change on wildfire risk exposure. However, it is limited in that we know that biophysical wildfire hazards are generally worsening with climate change and that environmental conditions in localized areas can change over time due to a variety of factors that may either increase or decrease wildfire risk. Factors include fuel treatments to reduce risk (including prescribed burns) and insect infestations that may increase risk. This report does not estimate the full change in risk exposure between 2010 and 2020; rather, the report estimates risk exposure among older adults in 2020 and how demographic change between 2010 and 2020 contributed to the growth in older peoples' exposure.

People of all ages face wildfire risk and may be impacted by experiencing a wildfire event for years following exposure. For example, children breathing wildfire smoke may face health effects later in life (Holm et al.,

[6] The Census Bureau released a demonstration microdata dataset where the Census Bureau applied a similar disclosure avoidance procedure to 2010 census data, which could then be compared with the published 2010 census files, using the final production settings for the Demographic and Housing Characteristics file, released in April 2023. The team at the National Historical Geographic Information System (NHGIS) processed this file, aggregating microdata to block group units (Van Riper et al., 2023). Across all block groups, the average difference between the differentially private data and the published census file versions for populations aged 60 and above is near zero (0.14 people), with a standard deviation of 9.9 people and a range of -61 percent to 69 percent. This finding indicates that, on average, the errors cancel one another, but differences could be significant in a particular location. The average difference for percent of the total population that was over age 60 was also near zero (-0.016 percent), with a standard deviation of 1.4 percent and a range of -100 percent to 59 percent. Again, this process indicates that errors, on average, cancel one another out in the reporting. Similar comparison data at the census block level, which would offer a more appropriate evaluation for this study, have not yet been compiled by NHGIS. At the census block level, proportional differences between the published Census 2010 file and the census data 2010 data are likely greater.

2021). This report's focus on the older population draws attention to the ways in which older people face increased risk, with implications for emergency planning strategies and policy and program design options that can meet the unique needs of older people. This report addresses this one dimension of population vulnerability, but additional work is needed to consider the ways that people across the life course are vulnerable in the context of increasing wildfire hazards.

This report focused on the vulnerability of older people to wildfire. However, older people also bring assets that could help mitigate wildfire risk and improve adaptation. For example, retired people often have more time to invest in mitigation activities or in community planning for adaptation. Older people may also have extensive knowledge and experiences with wildfire that others could learn from. Future research could examine interactions among the myriad opportunities and challenges posed when older populations live with elevated wildfire risk, including incorporating accounts of older peoples' experiences before, during, and after wildfires (Melton et al., 2023).

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