Community Vulnerability in Wildland-Urban Interfaces

Data Analysis and Summary

FEBRUARY 2026



COLORADO HEALTH INSTITUTE

COLORADO HEALTH INSTITUTE

Introduction

In 2026, the Colorado Health Institute (CHI) conducted research on wildland-urban interfaces (WUIs) across the United States to better understand the characteristics of communities vulnerable to wildfires. This report presents findings that profile the socioeconomic and health characteristics of WUI communities and examines how these characteristics affect vulnerability. CHI conducted this work on behalf of the National Network of Public Health Institutes (NNPHI) and UL Research Institutes' Chemical Insights.

The following research questions guided the data collection, mapping, and analysis:

1. What are the socioeconomic characteristics and housing composition of communities in the WUI?
2. What socioeconomic and health-related factors increase a community's vulnerability to wildfire events?
3. What characteristics, such as rurality or housing density, increase a community's vulnerability to wildfire events?

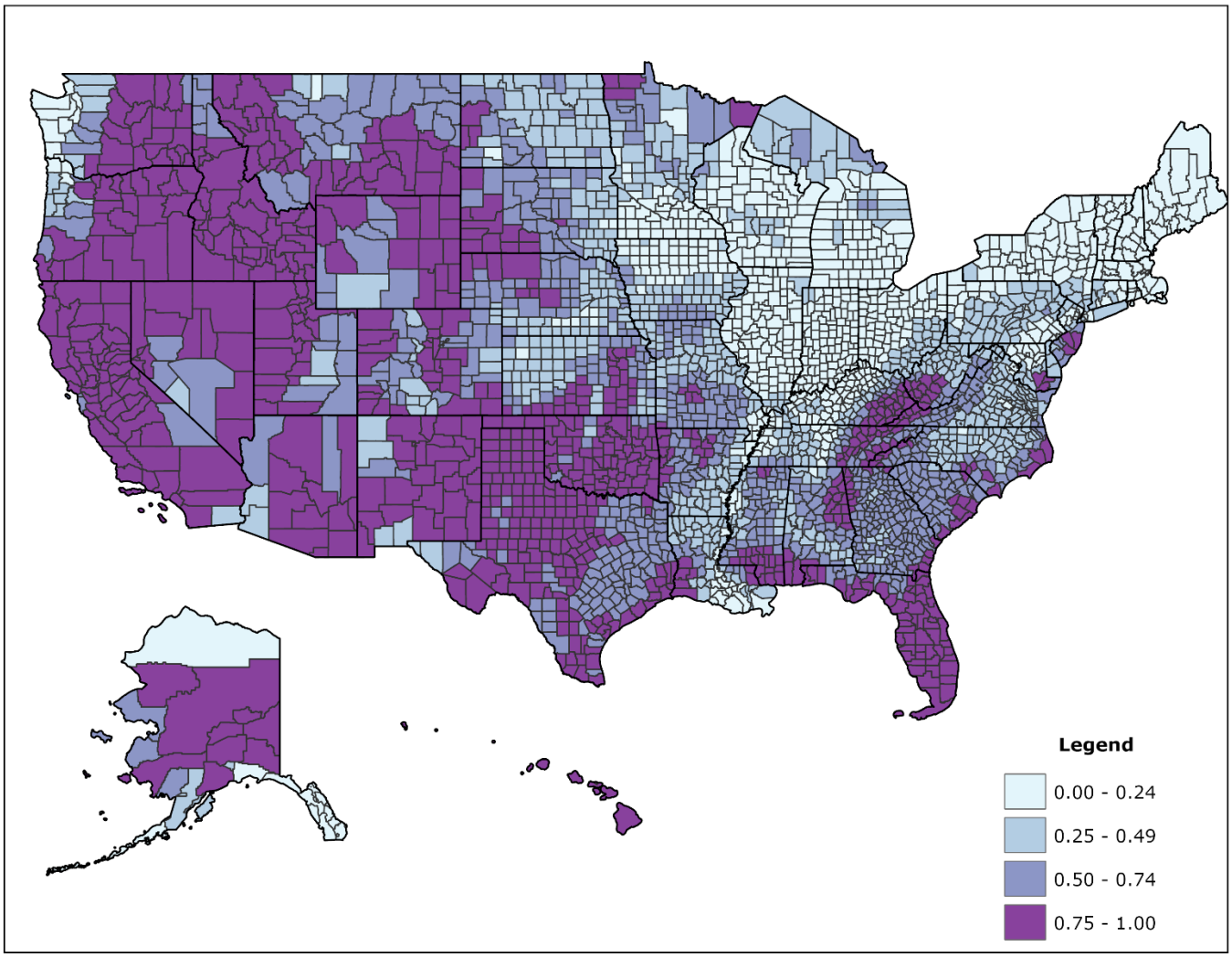
CHI conducted data correlation analyses and developed an exploratory mapping tool and index to answer these questions. Our findings aim to support Chemical Insights and NNPHI's future efforts, including the development of communications materials and place-based engagement plans to ensure vulnerable communities are equipped to plan for and recover from wildfire events. All data metrics, sources, and analysis methods are in the Appendix.

Findings

The United States WUI Landscape

Every community in the U.S. has some degree of wildfire risk. All states have homes in WUI communities, where human development (homes and businesses) intermingles with undeveloped wildland vegetation like forests, grasslands, or shrublands. Mountain West states, such as California, Colorado, and Oregon, are often in the headlines, but humid areas such as Hawaii, Texas, Florida, and Oklahoma can also have a high wildfire likelihood, annual probability of wildfire burning in a specific location, compared to the rest of the U.S. (see Map 1).

Map 1. Wildfire Likelihood Percentile Rank,* by County

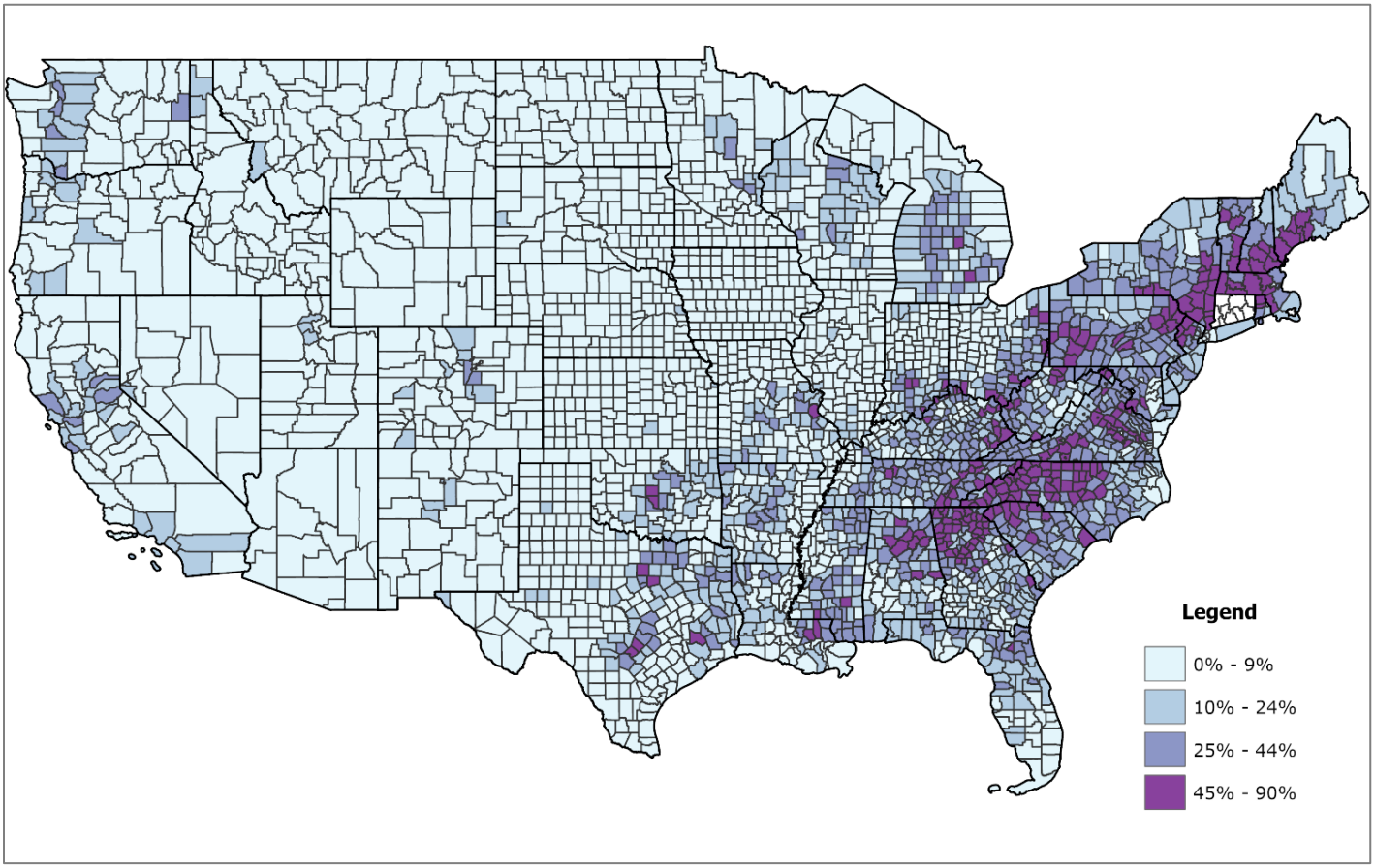


*Percentile rank is not the percentage of risk for each county, but rather what its wildfire risk is compared to the rest of the United States. A high percentile rank doesn't mean a fire will happen tomorrow; it just means that the conditions (vegetation type, weather, history, etc.) make it much more likely there than in most other places in the country.

A note on maps: The Census Bureau delineates some geographic boundaries into water areas like the Great Lakes and just offshore of other coastal areas.

Less than 10% of land in the continental U.S. is designated as a WUI area, but 32% of households call that land home.[1] In many East Coast counties — especially in southern and mid-Atlantic states of Virginia, North Carolina, and Pennsylvania, and northeastern states of New York, New Hampshire, and Massachusetts — between 45% and 90% of the land within many counties is designated as a WUI area (see Map 2).

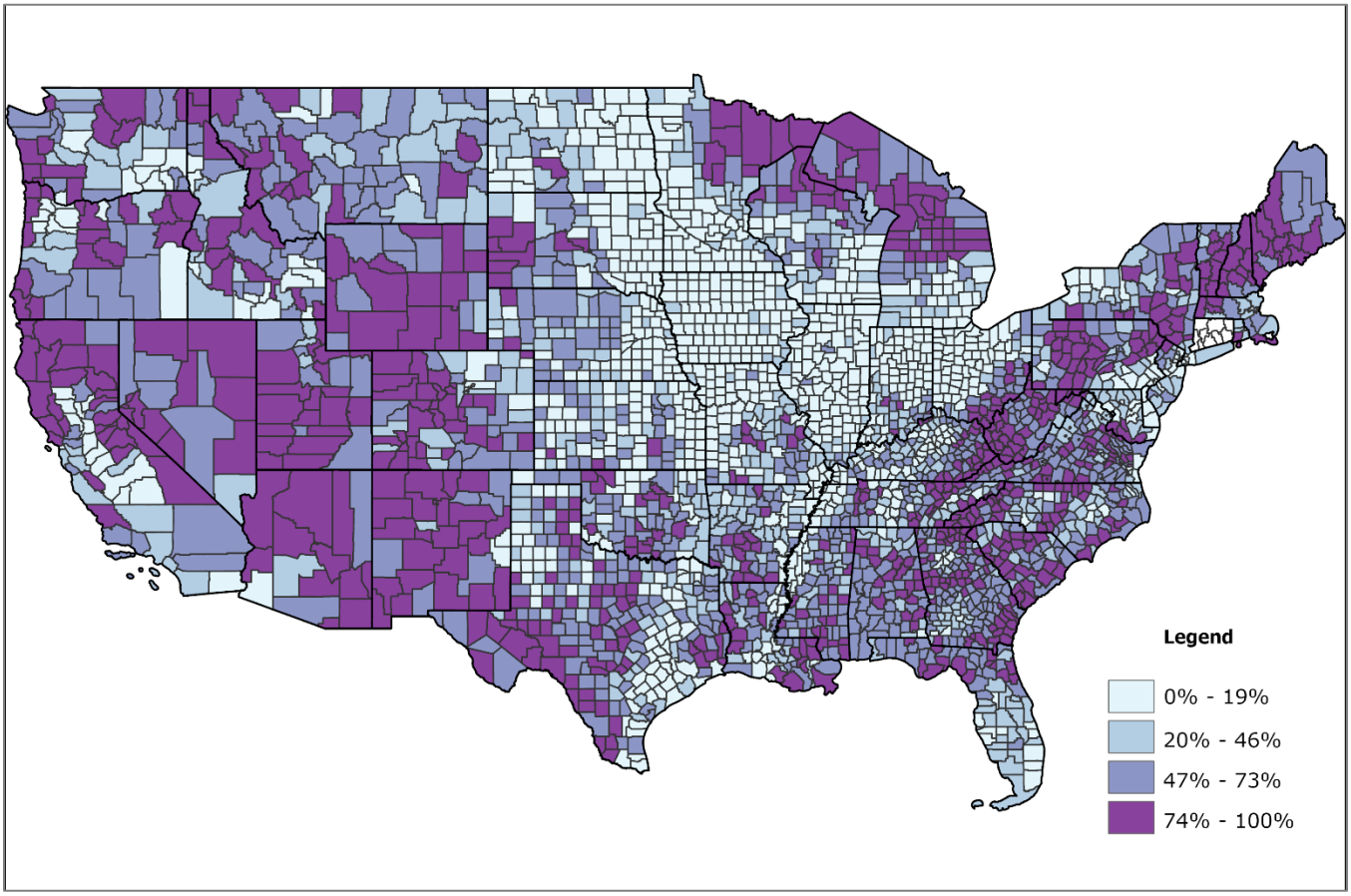
Map 2. Percentage of Land that is Designated as a WUI, by County*



** No data are available for Connecticut because county names and county FIPS codes were updated after these data were collected by SILVIS Lab. Additionally, data for Alaska and Hawaii are not available.*

Housing density in WUI areas is a challenge across the country. Just under half of all counties in the continental U.S. (48%) have at least 50% of households in a WUI area, with the biggest concentrations in the West, South, and East Coast (see Map 3). Communities in Midwest states like Ohio and Iowa have some of the lowest levels of WUI housing density and overall wildfire likelihood.

Map 3. Percentage of Homes in a WUI, by County*



** No data are available for Connecticut because county names and county FIPS codes were updated after these data were collected by SILVIS. Additionally, data for Alaska and Hawaii are not available.*

WUI Community Profiles

CHI conducted a correlation analysis of all 3,144 U.S. counties to assess the relationship between health and socioeconomic measures and WUI and fire-prone areas. Correlation analyses tell us if there are specific patterns or "profiles" of WUI and fire prone communities across the nation by assessing if two factors, for example poverty and WUI housing density, consistently move together.

CHI found that WUI communities in the U.S. vary widely in their demographic, economic, and health characteristics. Living in a WUI or fire-prone area is not strongly linked to any socioeconomic or health condition at the national level, indicating that all types of communities experience vulnerability, regardless of their economic or health status (see Table 1).

Table 1. WUI Composition Analysis for the U.S.

The relationship between WUI and fire prone areas to socioeconomic and health factors across all 3,144 U.S. counties.

Health and Social Factors	Correlation*
Mobile Homes	0.40
Disability	0.26
No Health Insurance	0.25
Poverty	0.20
No High School Diploma	0.20
Unemployment	0.17
Racial and Ethnic Minority	0.17
Cardiovascular Disease	0.17
Depression	0.17
COPD	0.16
Diabetes	0.16
Crowding	0.15
Housing Cost Burden	0.14
Asthma	0.12
Older Adults 65+	0.09
Speaks a Language Other Than English	0.06
Single-Parent Households	0.03
Group Quarters	0.02
No Vehicle	-0.05
Renters	-0.05
Obesity	-0.10
Multi-Unit Structures	-0.13
Youth 17 and under	-0.14

* Values closer to 1 reflect a stronger positive association.

While there is no single socioeconomic or health characteristic that is strongly associated with WUIs and wildfire likelihood across the nation, similar correlation analyses at the state or sub-state level do show local variability. For example, Table 2 shows correlation results for Kentucky, which is home to the Appalachian Mountains, and Colorado, which is home to the Rocky Mountains. It demonstrates that WUIs and wildfire prone areas in Kentucky have a more positive association with poverty, mobile home households, and health conditions such as cardiovascular disease and depression. Colorado's WUI communities often show the opposite. These findings indicate that a wildfire in Kentucky's mountain communities might affect more people who have limited financial resources and chronic health conditions compared to Colorado's mountain communities, where people are more likely to be earning higher incomes and be healthier.

Table 2. State WUI Composition Analysis for Kentucky and Colorado

Health and Social Factors	Kentucky Correlation	Colorado Correlation
Mobile Homes	0.66	-0.25
No High School Diploma	0.61	-0.44
Depression	0.60	-0.15
Poverty	0.57	-0.31
Cardiovascular Disease	0.55	-0.27
COPD	0.54	-0.26
Asthma	0.51	-0.24
Disability	0.49	-0.14
Diabetes	0.45	-0.35
Unemployment	0.43	-0.05
Obesity	0.42	-0.39

A similar analysis was conducted for two coastal states with large, forested areas, Virginia and Washington. The results show that many social and health factors in Virginia and Washington have a similar association with WUI and fire-prone areas. Specifically, both states have a moderate correlation with mobile home households and populations with COPD and disabilities in WUI areas (see Table 3).

Table 3. State WUI Composition Analysis for Virginia and Washington

Health and Social Factors	Virginia Correlation	Washington Correlation
Depression	0.52	0.13
COPD	0.42	0.40
Disability	0.42	0.32
Mobile Homes	0.39	0.51
Cardiovascular Disease	0.38	0.31
Older Adults	0.30	0.11
Asthma	0.27	0.19
No High School Diploma	0.23	0.12
Obesity	0.22	0.18
Poverty	0.17	0.11
Diabetes	-0.02	0.10
Youth 17 and under	-0.09	0.04

WUI profiles also vary within states. In some regions, communities that face more socioeconomic and health challenges are more likely to be in fire-prone areas. Colorado has WUI communities in all 64 counties, but the people who live in these areas vary widely by region.

Many farming and ranching-based WUI communities in the southeastern portion of the state (Crowley, Kiowa, Bent, Baca, Prowers, Las Animas, Otero, and Huerfano counties) had strong correlations with racial and ethnic minorities, speaking a language other than English, not having a vehicle, and crowded homes. This indicates that many of Colorado's farming-based WUI communities are associated with crowded housing conditions, limited transportation access, and racial and ethnic diversity.

WUI communities in the Denver metro area showed a consistent negative association with these factors. This region has the highly populated and wealthier urban and suburban counties of Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, and Jefferson. In this region, higher levels of fire-prone areas and WUI housing density are associated with lower concentrations of low-income or racially diverse residents (see Table 4).

Table 4. Substate WUI Composition Analysis for Colorado

Health and Social Factors	Southeastern Colorado Correlation	Denver Metro Area Correlation
No Vehicle	0.84	-0.61
Speaks a Language Other Than English	0.74	-0.80
Racial and Ethnic Minority	0.72	-0.81
Crowding	0.69	-0.67
Poverty	0.55	-0.51
Diabetes	0.51	-0.68
Disability	0.48	-0.54
Older Adults 65+	0.05	0.56

Community Vulnerability

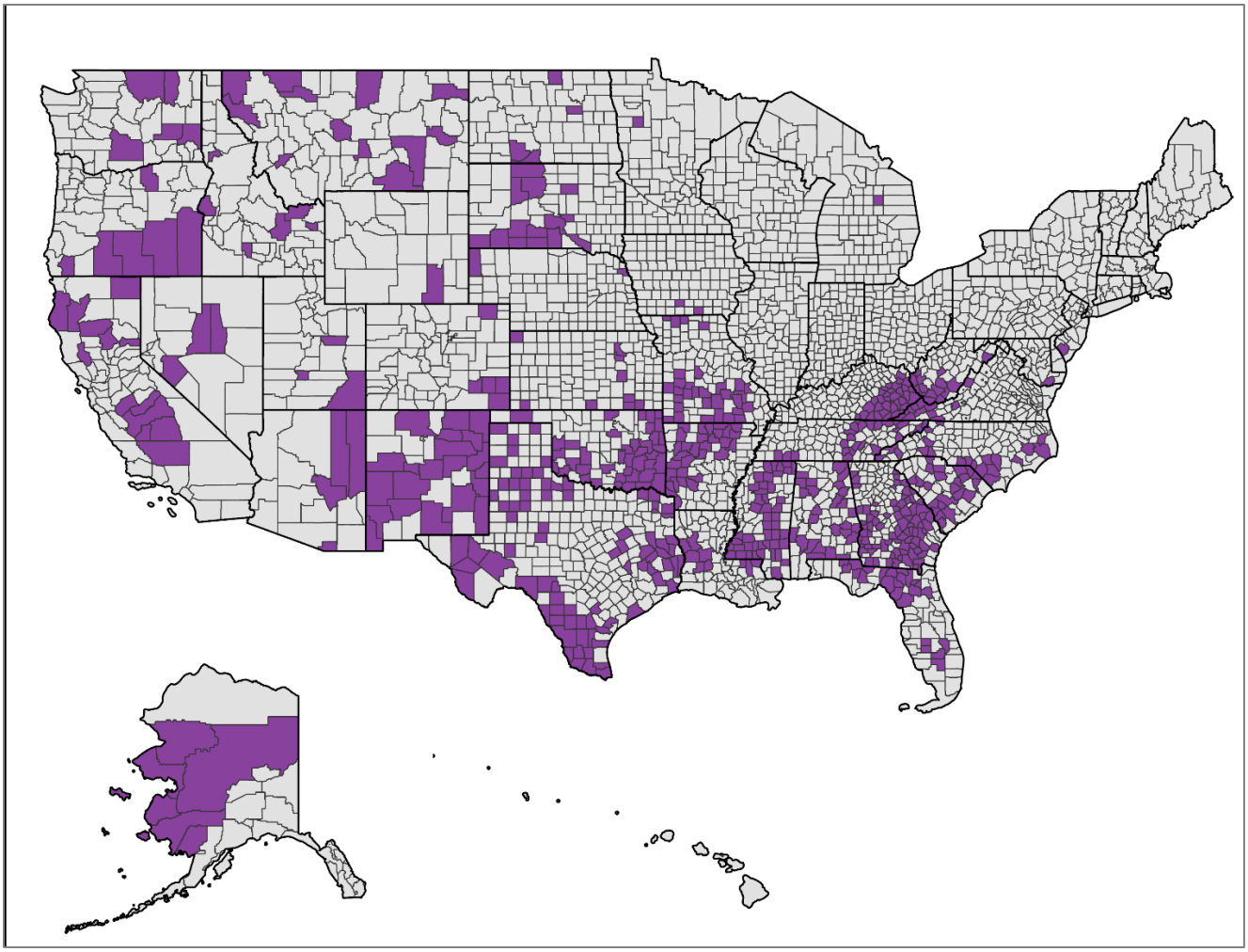
WUI communities have diverse socioeconomic and health compositions across the U.S., but as noted above, some states and communities have socioeconomic and health factors that are strongly associated with wildfire-prone areas.

CHI collected and analyzed data on 23 socioeconomic and health factors that can increase a community's vulnerability to wildfire events. Factors such as a person's age, health status, economic status, household composition, and primary language can impact their ability to evacuate during an emergency, recover from property losses, and recuperate from exposure to smoke. The following section highlights why each demographic, household, economic, and health metric increases community vulnerability in WUI areas and describes and maps applicable geographic trends in portions of the country that may be the most vulnerable. CHI used the top two data ranges from a natural break classification method (Jenks) to identify high vulnerability in each socioeconomic and health factor, then queried which of those counties also had a wildfire likelihood in the 50th percentile of counties or higher.

Poverty. People with low incomes often lack the financial resources to respond to and recover from a wildfire event. They face barriers such as the high cost of home hardening, purchasing comprehensive homeowners' insurance, or rebuilding if there is damage.[2] People experiencing poverty are more likely to rent and have less control over their homes' materials or land maintenance.[3]

Communities with both a high percentage of people experiencing poverty and a high likelihood of wildfire were mostly located in the South and West (see Map 4).

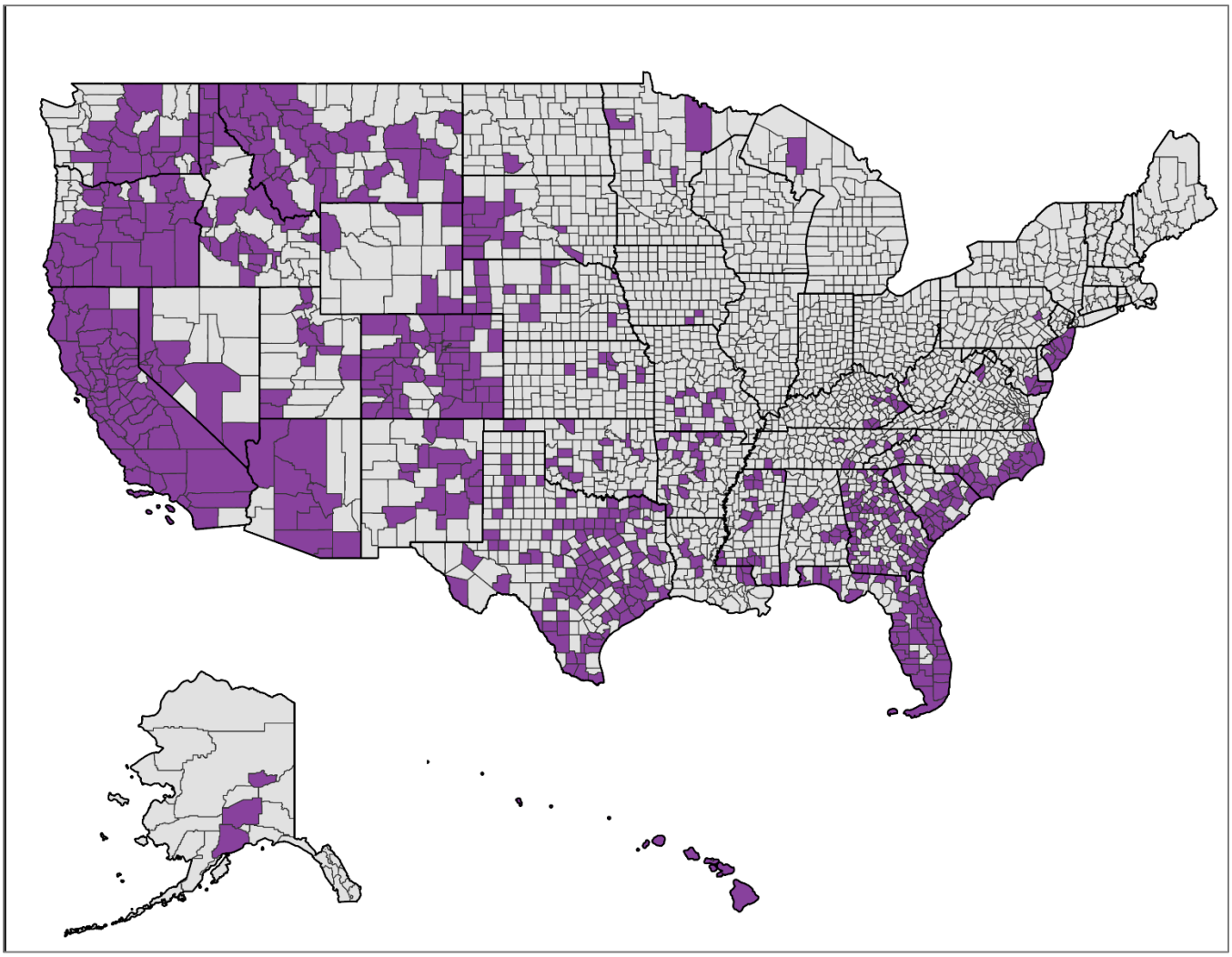
Map 4. Counties with a high percentage of poverty (28% or higher) and a high wildfire likelihood (50th percentile of counties or higher)



Unemployment. Unemployment can impact a household's economic stability and increase the risk of experiencing poverty, which in turn affects resilience to wildfire events (see poverty above).[4]

Housing Cost Burden. The housing affordability crisis across the nation can be exacerbated by natural disasters such as wildfire events. Households that are spending 30% or more of their income on rent or mortgages may have fewer resources to spend on other basic needs like food or medical care, as well as on mitigating or recovering from wildfires. Additionally, people living in WUI communities are seeing annual increases in home insurance rates, increasing the financial burden to homeowners.[5] Many communities in the West (Colorado, California, Oregon, Hawaii) and in southern states such as Florida and Texas had both a high percentage of housing cost-burdened households and a high wildfire likelihood (see Map 5).

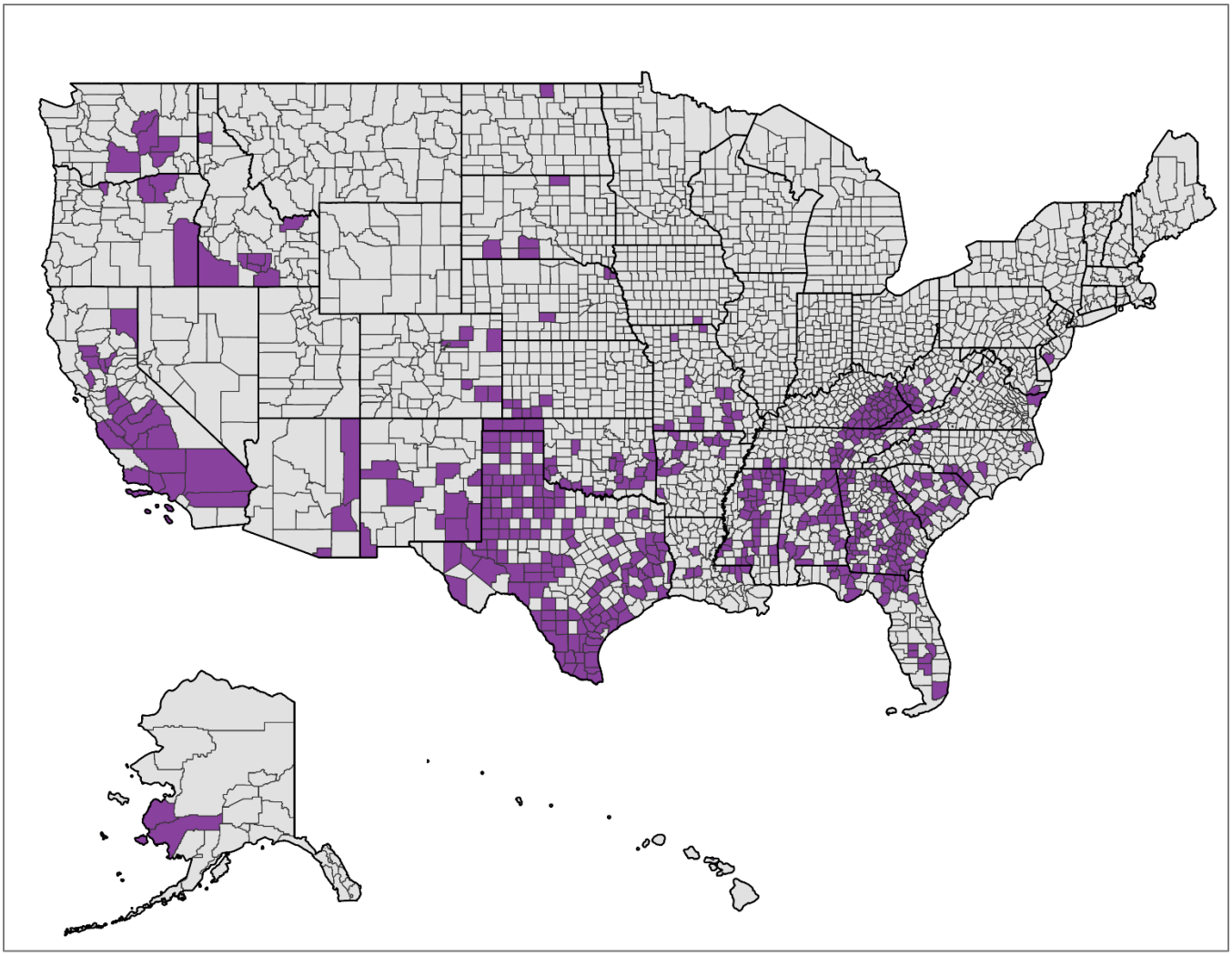
Map 5. Counties with a high percentage of households that are housing-cost burdened (26% or higher) and a high wildfire likelihood (50th percentile or higher)



No High School Degree. A low education level can increase a person's risk of experiencing poverty, which affects their level of resilience to wildfire events (see poverty

above).[6] Many communities with both a high percentage of people without a high school degree and a high wildfire likelihood were located in California, Texas, and the Southeast (see Map 6).

Map 6. Counties with a high percentage of people without a high school degree (15% or higher) and a high wildfire likelihood (50th percentile or higher)

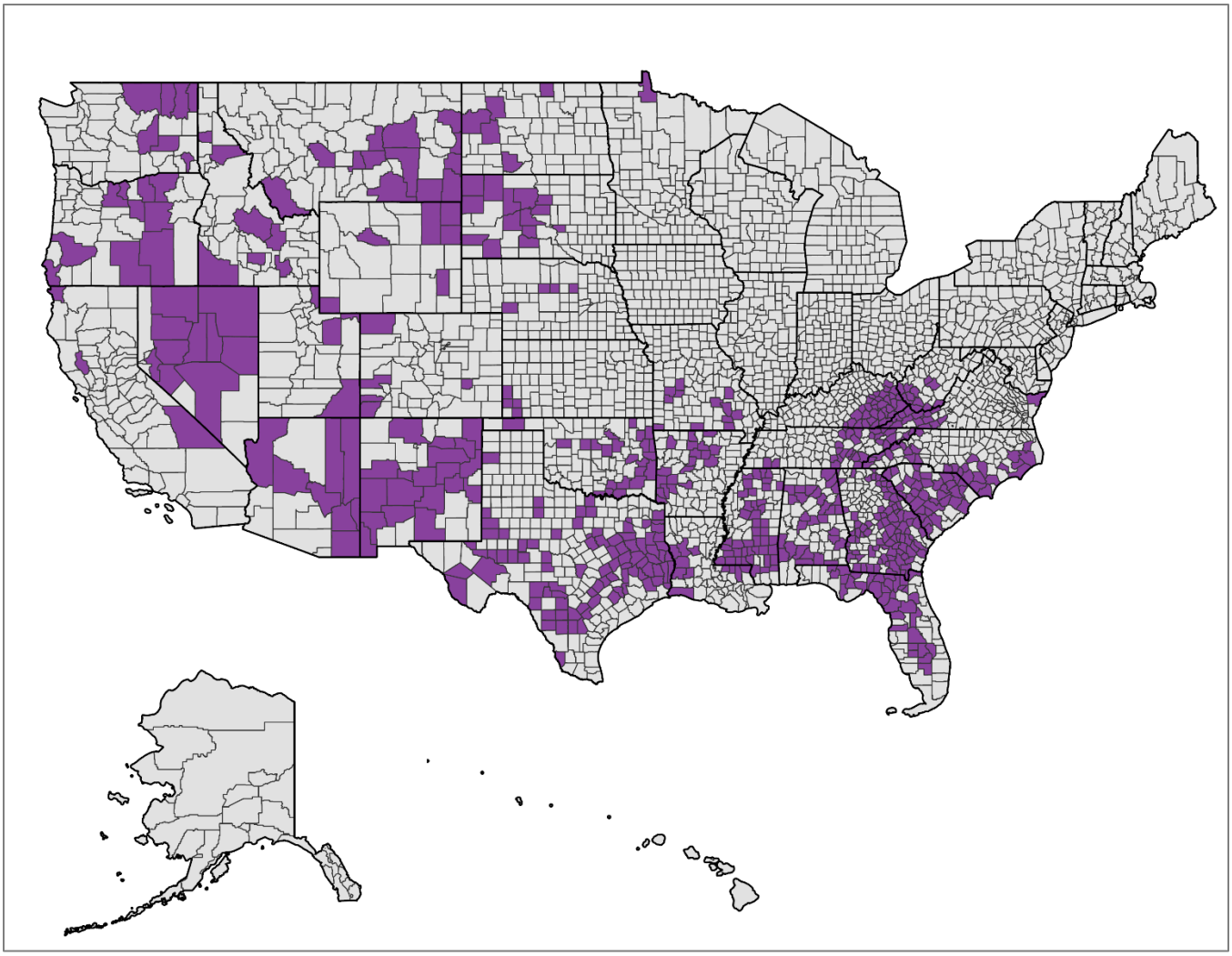


Group Quarters. Group quarters such as nursing homes, college dormitories, and prisons can be difficult to evacuate during a wildfire event or emergency because residents may have mobility issues or need large or specialized vehicles for transportation.[7] Communities with a high percentage of people living in group quarters and a high wildfire likelihood were dispersed around the country, with clusters in Texas, Colorado, Georgia, and Florida.

Multi-Unit Structures. High-rise and multi-unit apartments can create an overcrowding effect during evacuations as large numbers of people move through limited emergency exits and evacuation routes.[8]

Mobile Homes. Manufactured homes are highly susceptible to wildfire because their physical building materials are highly flammable, most residents don't own the land their home is on, and mobile homeowners are more likely to be experiencing socioeconomic barriers such as limited English proficiency or low incomes.[9] Many communities in the Southeast, Pacific Northwest, New Mexico, and Nevada had both a high percentage of mobile homes and a high wildfire likelihood (see Map 7).

Map 7. Counties with a high percentage of mobile home households (17% or higher) and a high wildfire likelihood (50th percentile or higher)



Crowding. People earning low incomes are more likely to live in overcrowded homes, which can increase the spread of disease and hamper the household's ability to respond to

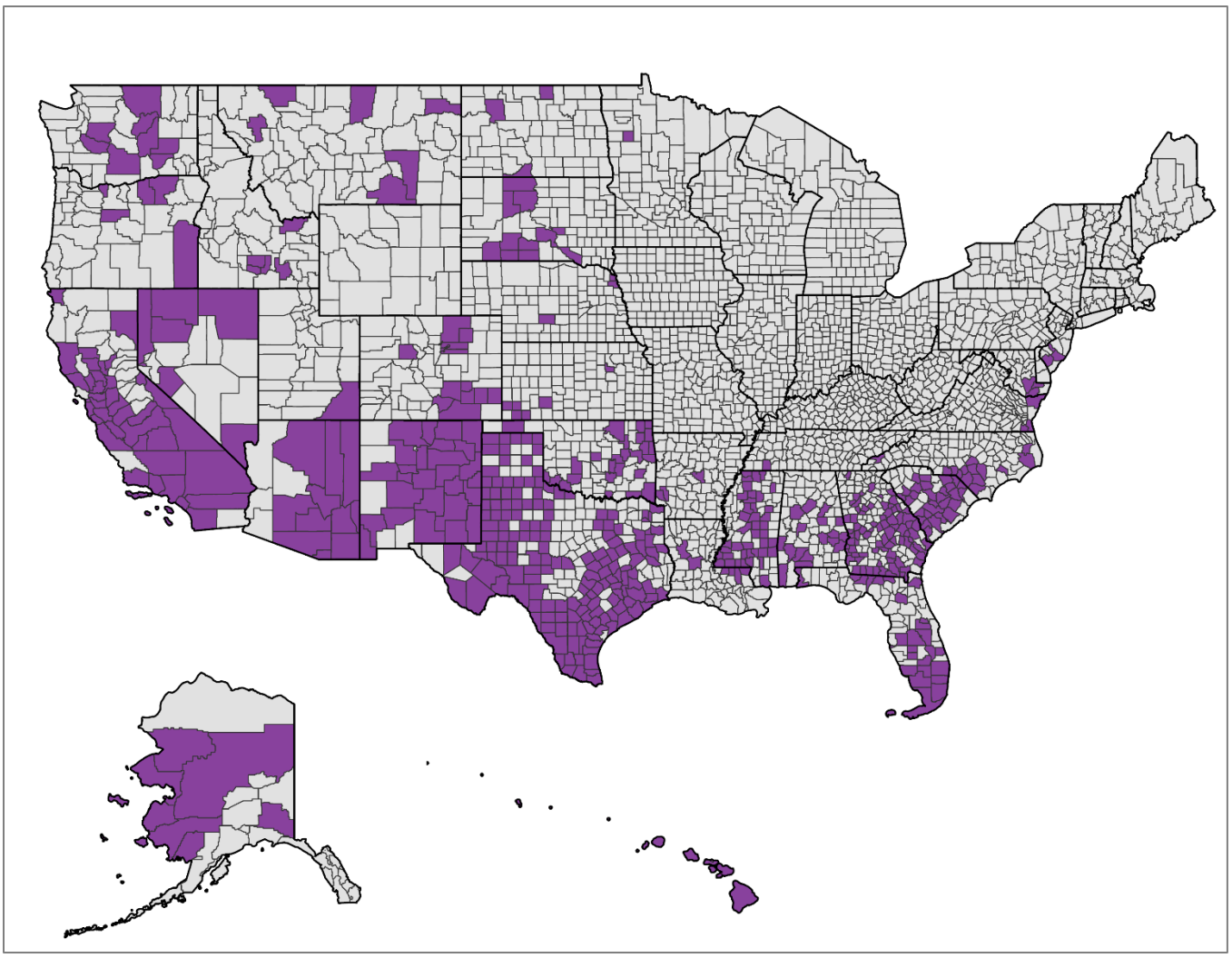
and recover from wildfire events.[10] Many communities in California, Hawaii, and Alaska have both a high percentage of crowded households and a high wildfire likelihood.

No Vehicle. Individuals and families without a vehicle have fewer options to evacuate during a wildfire event.[11]

Renters. Renters often have less flexibility than homeowners to mitigate wildfire risks on their property and less insurance coverage to recoup losses from a fire.[12,13] Additionally, renters are often paying a larger portion of their income toward rent than homeowners, which can impact their financial stability.[14] Many communities in California, Hawaii, Texas, and the Pacific Northwest have both a high percentage renter households and a high wildfire likelihood.

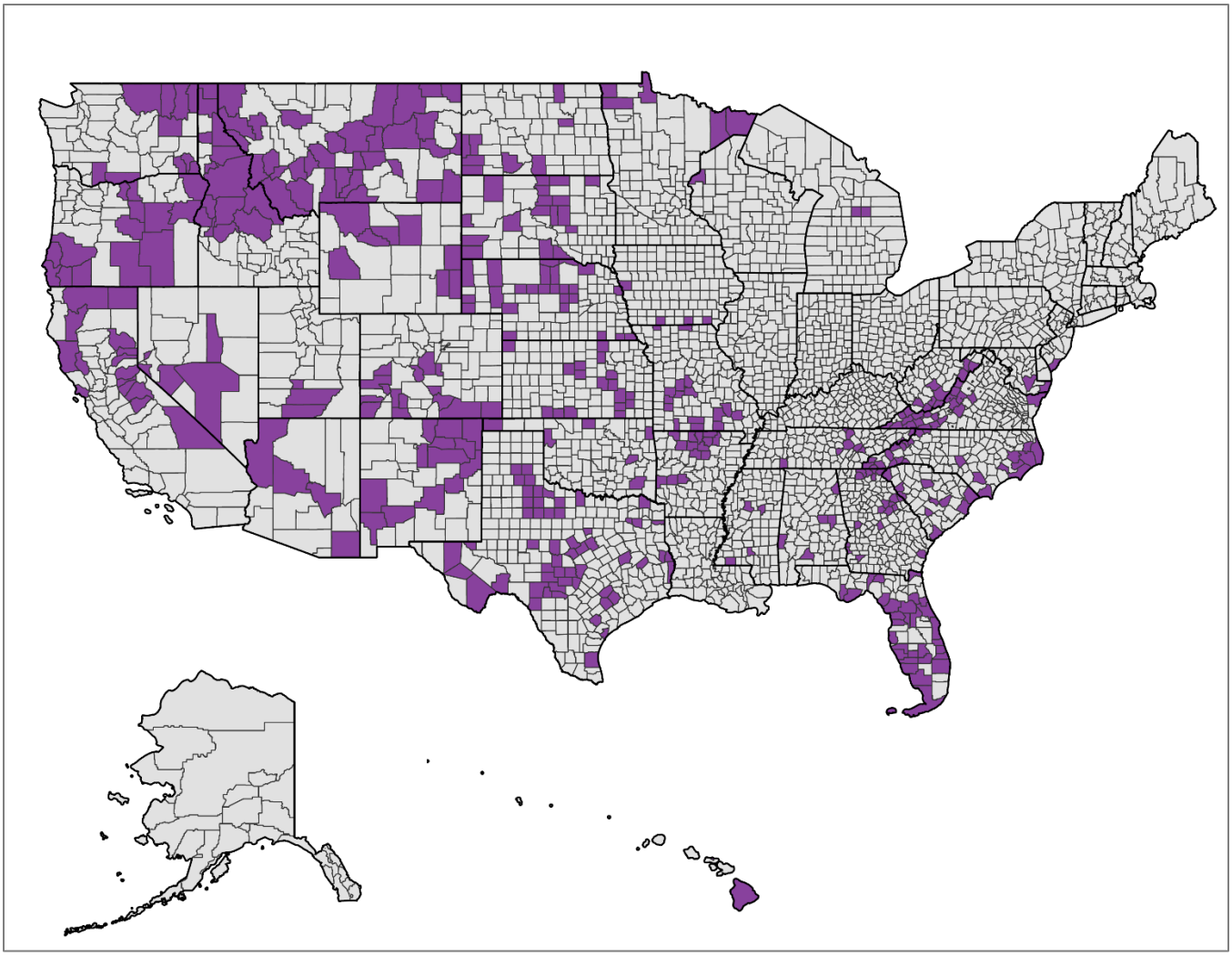
Racial or Ethnic Minority. Race and ethnicity are strongly linked with health disparities and vulnerability to natural hazards such as wildfires.[15] Many communities in Alaska, Hawaii, California, the Southwest (Texas, New Mexico, Arizona) and the Southeast have both a high percentage of people who are considered racial or ethnic minorities and a high wildfire likelihood (see Map 8).

Map 8. Counties with a high percentage of people who are racial or ethnic minorities (36% or higher) and a high wildfire likelihood (50th percentile or higher).

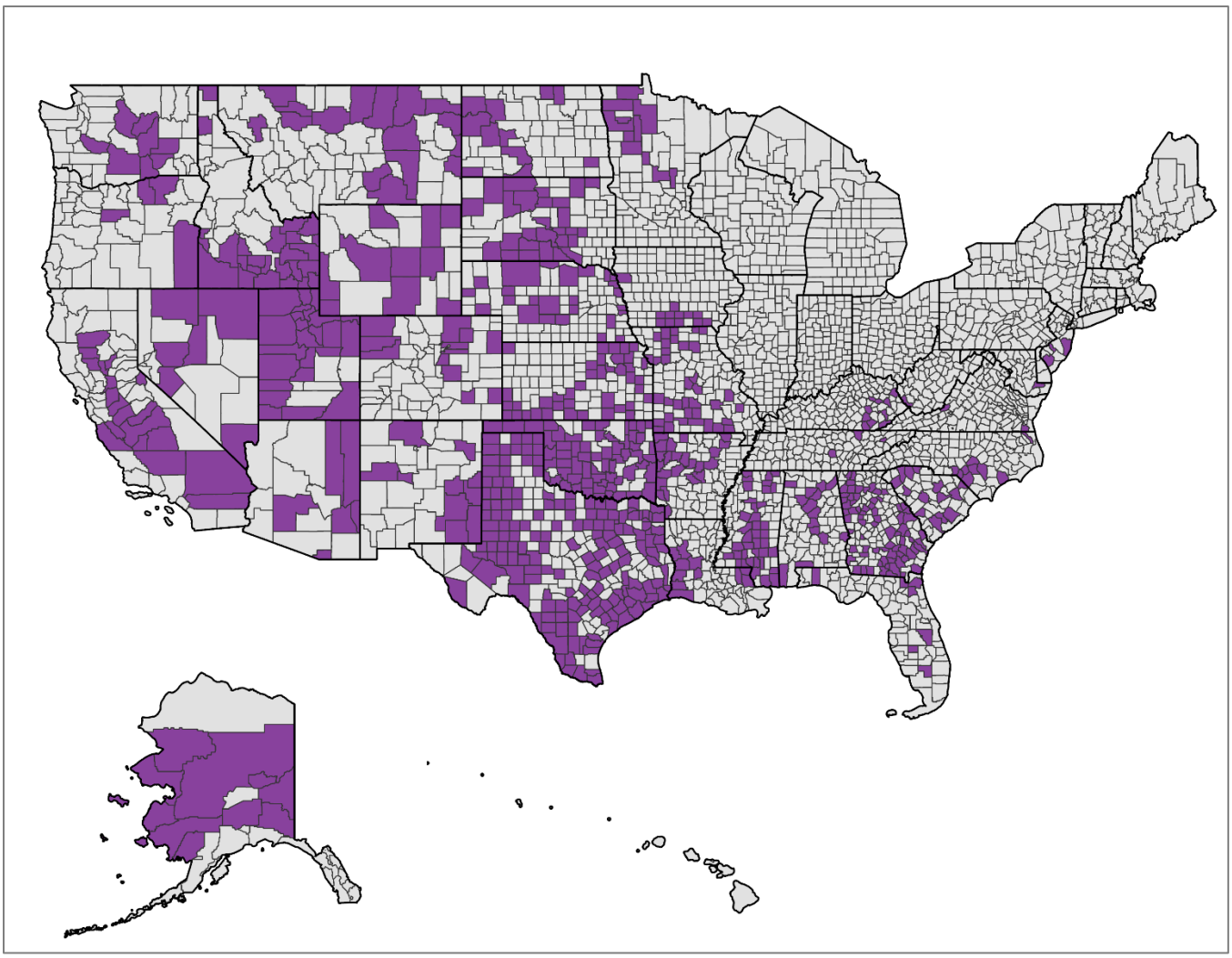


Age. People of all ages experience vulnerability from wildfire events, but some age groups are more likely to have health and mobility limitations that can affect their ability to prepare for, respond to, and recover from a wildfire.[16] Adults ages 65 and older are more likely than the general population to have chronic illnesses and disabilities, and youth under age 18 are more sensitive to smoke exposure because of their growing lungs and often must rely on their guardians for wildfire evacuation and recovery efforts.[17] Communities with a high percentage of older adults and high wildfire likelihood were located in the Mountain West and Florida (see Map 9), while communities with a high percentage of youth were in Alaska, the South, and the Mountain West (see Map 10).

Map 9. Counties with a high percentage of older adults (23% or higher) and a high wildfire likelihood (50th percentile or higher)



Map 10. Counties with a high percentage of youth age 17 and under (23% or higher) and a high wildfire likelihood (50th percentile or higher)



Single-Parent Households. Households with one parent may have fewer financial resources to prepare for or recover from wildfire events.[18] Many communities in Alaksa, the South, and Southeast have both a high percentage of single-parent households and a high wildfire likelihood.

Speak a Language Other Than English. Limited English proficiency affects how well people can access services and understand information in their communities, such as emergency warnings and wildfire mitigation resources. Many communities in the Southwest, Texas, California, and Florida have both a high percentage of people over age 5 who speak a language other than English and a high wildfire likelihood.

Health Insurance. People without health insurance may have unmanaged chronic health conditions and limited access to needed health care services that can hinder their ability

to prepare for or recover from wildfire events. Communities in Texas, Oklahoma, and Georgia have both a high percentage of people without health insurance and a high wildfire likelihood.

Health Conditions. Health conditions, especially respiratory and cardiovascular illnesses, can be exacerbated during wildfires, and people with disabilities may experience additional challenges with evacuation and recovery efforts. The prevalence of health conditions in WUI communities varied geographically and did not show a strong national pattern. However, health departments can use the mapping tool to identify local hot spots of these conditions to better understand and project possible public health impacts.

Index Results

While examining individual factors is valuable, decision-makers often need a quick way to identify which communities experience the most vulnerability to wildfire events. The vulnerability index combines all these factors to provide that at-a-glance view. This index summarizes the relationship of WUIs and wildfire risk to the socioeconomic and health characteristics of a community. It also provides a holistic overview of vulnerability across the nation and highlights areas with the greatest risk that can be further explored by metrics in the mapping tool. As noted above, WUI community vulnerability varied greatly across the nation, highlighting the need for state and county-focused analyses to assess and address community needs.

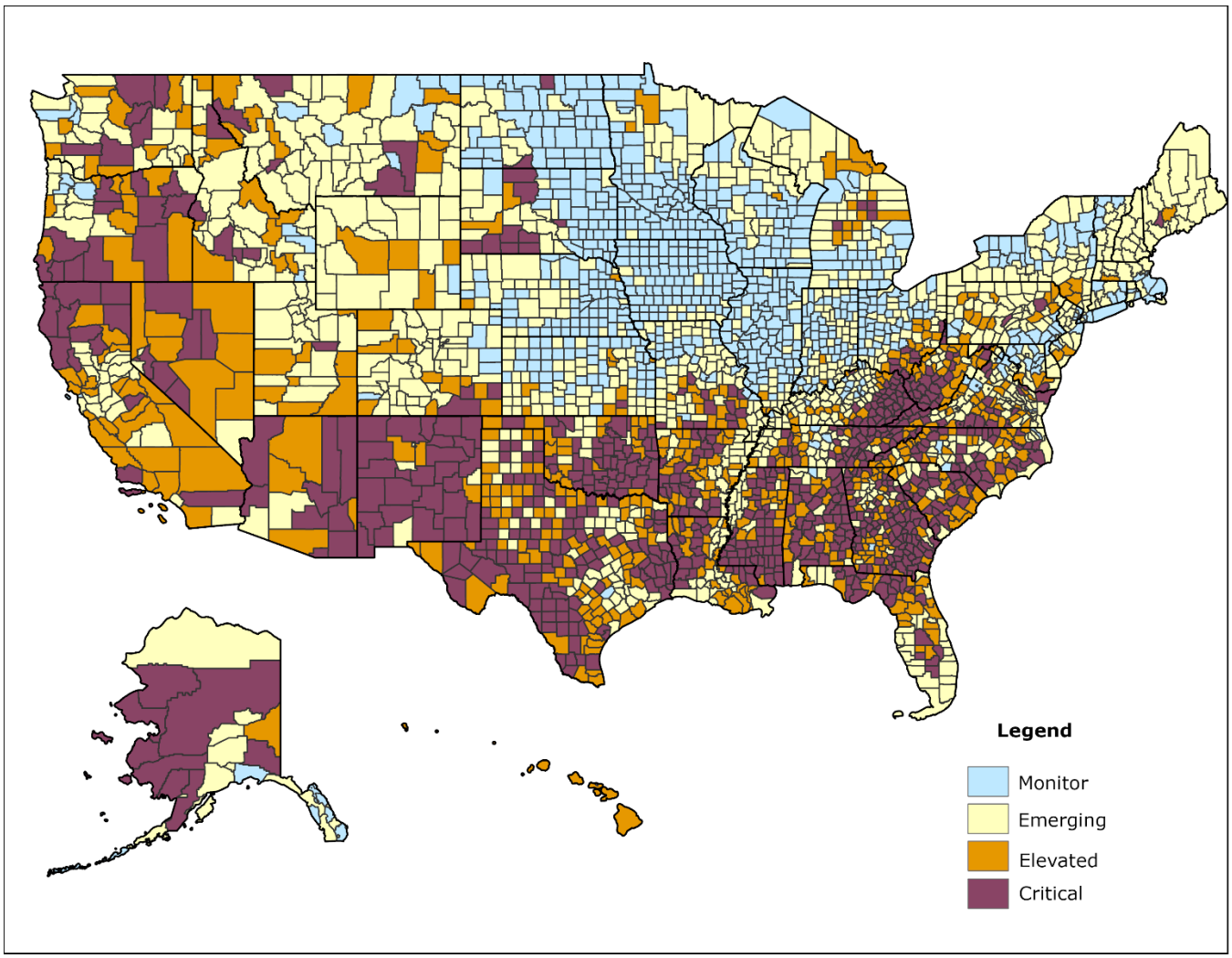
CHI created the following three indices as well as an overall vulnerability index.

- **Socioeconomic Vulnerability Index.** Assesses socioeconomic data, such as housing and transportation, income status, race and ethnicity, and household characteristics.
- **Wildfire Risk to Area Index**. Assesses environment-based risk factors, such as vegetation burn probability, and utilizes the WUI classification flag, which includes the level of housing density that intermingles with vegetation.
- **Health Conditions Vulnerability Index.** Assesses vulnerability based on the prevalence of chronic conditions and disabilities.
- **Overall Vulnerability Index.** A composite of the three index scores. We categorized vulnerability by looking at how wildfire risk overlaps with vulnerable populations in the county based on the health conditions and socioeconomic indices.

This index structure allows for community vulnerability factors to be compared to WUI and wildfire risk, which identifies the overlap between socioeconomic, health, and environmental vulnerabilities. Counties were assigned an overall vulnerability risk value of critical (highest), elevated (high), emerging (moderate), and monitor (lowest). Full index methods are in the Appendix.

Communities with critical or elevated risk were primarily located in the Southeast, Southwest, West, Alaska, and Hawaii (see Map 11).

Map 11. Overall Vulnerability Index Score Rating, by County



Looking Ahead

CHI's data and mapping analysis found that WUIs across the U.S. are diverse, indicating the need for additional state and county-level analysis to further understand opportunities to address WUI community vulnerability. Wildfire vulnerability affects communities in many ways through housing affordability, education, health conditions, and language access, among other factors. Although some regions face higher overall risk, especially the Southeast, Southwest, West, Alaska, and Hawaii, each community's specific challenges vary widely. This means that solutions need to be tailored to local needs rather than applying a one-size-fits-all approach.

Public health departments and local leaders can use the index as a first step in better understanding their community's vulnerability to wildfire and other natural disasters. The index is a tool that provides local leaders with more than just a vulnerability score — it highlights why and what factors are contributing to vulnerability. These insights can then inform strategies to help the most vulnerable people in their community prepare for, evacuate, and recover from such events. The index can also highlight a community's strengths. Mapping high fire risk against low social and health risk provides a unique strength profile that can help allocate resources more equitably across the country. Additionally, this index and mapping tool can also help reduce misconceptions about wildfire risk and vulnerability. As climate change shifts traditional wildfire risk and WUI boundaries, many counties may find themselves in elevated or critical risk regions and will need tools such as this map and index to develop robust natural disaster plans.

Partners such as Chemical Insights, who focus on scientific research on environmental exposures, also have key role in this work. Wildfire destruction extends beyond damaged homes and buildings. Burned materials release toxic emissions into the air, which can negatively affect already vulnerable community members, especially those with chronic health conditions or who have comprised or immature immune systems. These maps can provide organizations like Chemical Insights with valuable information on which communities and populations might be most affected by exposure to toxic wildfire air emissions and residues such as soot or contaminants from fire suppressants.

Looking ahead, CHI will continue collaborating with NNPHI and Chemical Insights to ensure they have the necessary data and resources to conduct the next phases of this work that focus on communication and dissemination on WUI community vulnerability findings.

Appendix

Metrics and Sources

Table 5. Index Metrics and Sources

Metric	Description	Geography	Year	Source
Socioeconomic Data				
Poverty	Percentage of the population earning incomes less than 150% of the Federal Poverty Level (FPL)	County	2019-2023 Five-Year Estimates	American Community Survey (ACS)
Unemployment	Percentage of the labor force that is unemployed (ages 16+)	County	2019-2023 Five-Year Estimates	ACS
Housing Cost Burden	Percentage of households that are housing-cost burdened (paying 30% or more of their income on housing)	County	2019-2023 Five-Year Estimates	ACS
No High School Diploma	Percentage of adults age 25+ who do not have a high school diploma	County	2019-2023 Five-Year Estimates	ACS
No Health Insurance	Percentage of the population that is uninsured	County	2019-2023 Five-Year Estimates	ACS
Group Quarters	Percentage of people living in group quarters. Group quarters are largely institutions and other group living arrangements, such as rooming houses, prisons, college dorms, and military barracks	County	2019-2023 Five-Year Estimates	ACS
Multi-Unit Structures	Percentage of housing in structures with 10 or more units	County	2019-2023 Five-Year Estimates	ACS
Mobile Homes	Percentage of housing units that are mobile homes	County	2019-2023 Five-Year Estimates	ACS
Crowding	Percentage of occupied housing units with more than one person per room, excluding bathrooms and kitchens	County	2019-2023 Five-Year Estimates	ACS

No Vehicle	Percentage of households with no vehicle available	County	2019-2023 Five-Year Estimates	ACS
Renters	Percentage of households that are renters	County	2019-2023 Five-Year Estimates	ACS
Racial or Ethnic Minority	Percentage of the population that is either Hispanic or Latino (of any race); Black or African American, Not Hispanic or Latino; American Indian or Alaska Native, Not Hispanic or Latino; Asian, Not Hispanic or Latino; Native Hawaiian or Other Pacific Islander, Not Hispanic or Latino; Two or More Races, Not Hispanic or Latino; Other Races, Not Hispanic or Latino	County	2018-2022 Five-Year Estimates	Centers for Disease Control and Prevention (CDC) Social Vulnerability Index
Older Adults 65+	Percentage of the population that is 65 or older	County	2019-2023 Five-Year Estimates	ACS
Youth 17 and Under	Percentage of the population that is 17 and younger	County	2019-2023 Five-Year Estimates	ACS
Single-Parent Households	Percentage of households that are single-parent households with children under 18	County	2019-2023 Five-Year Estimates	ACS
Language	Percentage of the population that speaks a language other than English at home (ages 5+)	County	2019-2023 Five-Year Estimates	ACS
Socioeconomic Score Average	Average percentage of all socioeconomic metrics (Poverty, Unemployment, Housing Cost Burden, No High School Diploma, No Health Insurance, Group Quarters, Multi-Unit Structures, Mobile Homes, Crowding, No Vehicle, Renters, Racial or Ethnic Minority, Older Adults 65+, Youth 17 and Under, Single-Parent Households, Language)	County	NA	ACS
Socioeconomic Score Percentile Rank	Percentile Rank of Socioeconomic Score Average compared to all other counties	County	NA	Database

Wildfire Data				
Burn Probability (Wildfire Likelihood)	The annual probability of wildfire burning in a specific location, national percentile rank	County	2024	U.S. Department of Agriculture (USDA)
WUI Area*	Percentage of an area that is designated as a WUI, which is the area where houses and wildland vegetation meet or intermingle and where wildfire problems are most pronounced	County	2020	SILVIS Lab, Department of Forest Ecology and Management, University of Wisconsin-Madison
WUI Housing Density*	Percentage of housing units that are in a WUI	County	2020	SILVIS Lab, Department of Forest Ecology and Management, University of Wisconsin-Madison
Wildfire Score Average	Average percentage of all wildfire metrics (Burn Probability, WUI Area, and WUI Housing Density). This metric was used for the correlation analyses.	County	NA	Database
Wildfire Score Percentile Rank	Percentile Rank of Wildfire Score Average compared to all counties	County	NA	Database
Health Data				
Asthma	Percentage of the population ages 18+ with asthma	County	2021-2022	CDC PLACES data. This includes Behavioral Risk Factor Surveillance System data modeled with ACS data
COPD	Percentage of the population ages 18+ with chronic obstructive pulmonary disease (COPD)	County	2021-2022	CDC PLACES Data
Diabetes	Percentage of the population ages 18+ with diabetes	County	2021-2022	CDC PLACES Data
Cardiovascular Disease	Percentage of the population ages 18+ with cardiovascular disease	County	2021-2022	CDC PLACES Data
Obesity	Percentage of the population ages 18+ with obesity	County	2021-2022	CDC PLACES Data
Depression	Percentage of the population ages 18+ with depression	County	2021-2022	CDC PLACES Data

Disability	Percentage of the population with at least one disability	County	2019-2023 Five-Year Estimates	ACS
Health Score Average	Average percentage of all health metrics (Asthma, COPD, Diabetes, Obesity, Depression, and Disability)	County	NA	Database
Health score Percentile Rank	Percentile Rank of Health Score Average compared to all other counties	County	NA	Database
Index Measures				
Combined Health and Socioeconomic Percentile Rank Scores	Combined Health Score Percentile Rank and Socioeconomic Score Percentile Rank	County	NA	Database
Health and Socioeconomic Percentile Rank	Percentile Rank of Combined Health and Socioeconomic Percentile Rank Scores	County	NA	Database
Social and Health Combined Score Rating (1-4)	Using the Health and Socioeconomic Percentile Rank, each county was placed into the following groupings: 0 – 0.25, Monitor (lowest) = 1 0.2501 – 0.50, Emerging (moderate) = 2 0.501 – 0.75, Elevated (high) = 3 0.751 – 1, Critical (highest) = 4	County	NA	Database
Wildfire Score Rating (1-4)	Using the Wildfire Score Percentile Rank, each county was placed into the following groupings: 0 – 0.25, Monitor (lowest) = 1 0.2501 – 0.50, Emerging (moderate) = 2 0.501 – 0.75, Elevated (high) = 3 0.751 – 1, Critical (highest) = 4	County	NA	Database
Overall Vulnerability Index Rating (2-8)	The combined score of Wildfire Score Rating and Social and Health Combined Score Rating. Scores range from 2-8, with the following designations: 2-3 = Monitor (lower levels of risks) 4-5 = Emerging (moderate levels of risk) 6 = Elevated (high levels of risk) 7-8 = critical (highest levels of risk)	County	NA	Database

Additional Mapping Data Not Included in Database				
Local Health Departments and Public Health Agencies	Location of local health departments	Point Data	2025	The National Association of County Health Officials
Skilled Nursing Facilities	Location of currently active nursing homes	Point Data	2025	Centers for Medicare and Medicaid Services
Hospitals	Location of all hospitals registered with Medicare	Point Data	2025	Centers for Medicare and Medicaid Services
National Fire Department Registry	National Fire Department Registry listing of fire departments registered with the U.S. Fire Administration (USFA) as well as some basic information about each fire department	Point Data	2025	USFA National Fire Incident Reporting System
U.S. Electric Power Transmission Lines	Depicts electric power transmission lines in the United States	Line data	2024	U.S. Fish and Wildlife Service

**No data are available for Connecticut because county names and county FIPS codes were updated after these data were collected by SILVIS. Additionally, data for Alaska and Hawaii are not available.*

Data Analysis

Index

CHI used data from Table 5 to create a vulnerability index and three supporting indices summarizing wildfire risk, health factors that may be exacerbated during wildfires, and socioeconomic factors that may impact a person's ability to prepare for and evacuate and recover from a wildfire event. Indices are designed to highlight the level of wildfire vulnerability among community members within each county. Each index is assigned an overall vulnerability value of:

- Critical (highest)
- Elevated (high)
- Emerging (moderate)
- Monitor (lowest)

Each index was calculated using the following process:

Step 1. Average the percentages of all metrics within each index, then conduct a percentile rank calculation where the lowest number indicates the least risk (closer to zero) and the highest number indicates a higher risk (closer to 1) relative to all other counties. For example, each of the health metric's percentages was combined into one average score, then a percentile rank was performed on that combined score that was between 0 and 1. Note that the burn probability data are only publicly available in percentile rank and were calculated into the wildfire index as such.

Step 2. Combine the sociodemographic and health conditions index percentile rank scores and perform another percentile rank to create the population vulnerability index.

Step 3. Split the percentile rank scores for wildfire and vulnerable populations into the risk category quartiles. Categories are as follows for each index:

- 0 – 0.25, Monitor (lowest) = 1
- 0.2501 – 0.50, Emerging (moderate) = 2
- 0.501 – 0.75, Elevated (high) = 3
- 0.751 – 1 Critical (highest) = 4

Step 4. Add the wildfire category score to the vulnerable populations score. The higher the score, the more attention is needed from public health and health services. Areas with the lowest wildfire score (1) that have a high proportion of vulnerable populations (3 and 4) are categorized as emerging, since wildfire risk can be influenced by factors such as wind. Current drought conditions were not included because they cannot be easily captured in geospatial data. Categories and scores are as follows (see Table 6):

- 7-8 = Critical (highest)
- 6 = Elevated (high)
- 4-5 = Emerging (moderate)
- 2-3 = Monitor (lowest)

Table 6. Wildfire and Vulnerable Populations Scoring

Wildfire Score	Vulnerable Populations Score	Overall Risk Score
4	4	8 - Critical
4	3	7 - Critical
4	2	6 - Elevated
4	1	5 - Emerging

3	4	7 - Critical
3	3	6 - Elevated
3	2	5 - Emerging
3	1	4 - Emerging
2	4	6 - Elevated
2	3	5 - Emerging
2	2	4 - Emerging
2	1	3 - Monitor
1	4	5 - Emerging
1	3	4 - Emerging
1	2	3 - Monitor
1	1	2 - Monitor

Correlation Analyses

CHI conducted a Pearson correlation analysis to identify which socioeconomic, health, and wildfire metrics were most strongly associated with wildfire vulnerability, which is defined as the average of all three wildfire metrics. The direction of a correlation coefficient (indicated by a plus or minus sign) tells us how two characteristics interact. A negative correlation, or inverse relationship, indicates that as one factor increases, the other decreases. A positive correlation, or co-occurrence, indicates that when one factor increases, the other increases as well.

The absolute value of the coefficient, which ranges from 0 to 1, indicates the strength of the relationship. Values closer to 1 reflect a stronger association (see Table 7).

Table 7. Overview of Correlation Strength Measurements

Coefficient Value	Strength	Interpretation for WUI Vulnerability*
0.00 to 0.19	Very Weak	Likely "noise." This metric has almost no impact on the overall score.
0.20 to 0.39	Weak	A minor factor. It contributes, but it isn't a primary cause of concern.
0.40 to 0.59	Moderate	A clear factor. This factor noticeably pushes the vulnerability score up or down.
0.60 to 0.79	Strong	Major factor. This is one of the "vital few" metrics defining the community.
0.80 to 1.00	Very Strong	Defining factor. The metric and the score are almost perfectly linked.

**Interpretation ranges and guidelines are context-dependent and can vary across research settings and fields.*

Endnotes

[1] USDA Forest Service, Northern Research Station. Where Humans and Forests Meet: The Rapidly Growing Wildland-Urban Interface. Rooted in Research Issue 28, April 2024. (2024) Madison, WI: U.S. Department of Agriculture, Forest Service, Northern Research Station.

[2] Auer, M. R., & Hexamer, B. E. (2022). Income and Insurability as Factors in Wildfire Risk. *Forests*, *13*(7), 1130. https://doi.org/10.3390/f13071130

[3] Government Accountability Office. As More Households Rent, the Poorest Face Affordability and Housing Quality Challenges. (2020) https://www.gao.gov/products/gao-20-427

[4] Tang S, Horter L, Bosh K, et al. Change in unemployment by social vulnerability among United States counties with rapid increases in COVID-19 incidence — July 1–October 31, 2020. (2022) PLoS ONE 17(4): e0265888. https://doi.org/10.1371/journal.pone.0265888

[5] Headwaters Economics. 2025. Cascading wildfire insurance issues impact local and state budgets. https://headwaterseconomics.org/natural-hazards/wildfire-insurance-local-state-budgets/

[6] Office of Disease Prevention and Health Promotion. High school graduation. (n.d.). Healthy People 2030, U.S. Department of Health and Human Services. https://odphp.health.gov/healthypeople/priority-areas/social-determinants-health/literature-summaries/high-school-graduation

[7] Flanagan, B; Gregory, E; Hallisey, E., et.al. A Social Vulnerability Index for Disaster Management. (2011) Journal of Homeland Security and Emergency Management: Vol. 8: Iss. 1, Article 3

[8] Flanagan B, et.al.

[9] Goolsby J. B., Brenkert-Smith H., Donovan C., et.al. Preparing mobile home park residents for wildfire in Lake County, Colorado (Quick Response Report No. 366). (2024) Natural Hazards Center, University of Colorado Boulder. https://hazards.colorado.edu/quick-response-report/preparing-mobile-home-park-residents-for-wildfire-in-lake-county-colorado

[10] Krieger J. and Higgins, D. L. (2002). Housing and Health: Time Again for Public Health Action. American Journal of Public Health, 92(5), 758–768. https://doi.org/10.2105/ajph.92.5.758

[11] Flanagan B. et.al.

[12] Runkle L. Wildfire Risk for Renters: What Renters Insurance Covers — and What It Doesn't. (2025) Realtor.com. https://www.realtor.com/advice/rent/wildfire-renters-insurance-coverage/

[13] Dickinson K., Rumbach A., Albright E., and Crow D. (2023). Renter experiences after Colorado's Marshall Fire (Quick Response Report No. 363). Natural Hazards Center, University of Colorado Boulder. https://hazards.colorado.edu/quick-response-report/renter-experiences-after-colorados-marshall-fire

[14] U.S. Census Bureau. Nearly half of renter households are cost-burdened, proportions differ by race. (2024) https://www.census.gov/newsroom/press-releases/2024/renter-households-cost-burdened-race.html

[15] Berberian A. G., Gonzalez D. J. X., and Cushing, L. J. Racial Disparities in Climate Change-Related Health Effects in the United States. (2022) Current Environmental Health Reports, 9(3), 451–464. https://doi.org/10.1007/s40572-022-00360-w

[16] Winkler R. L., and Mockrin, M. H. Aging and wildfire risk to communities (Report No. EIB-284). (2025) U.S. Department of Agriculture, Economic Research Service. https://www.fs.usda.gov/nrs/pubs/other/2025/nrs_2025_winkler_001.pdf

[17] U.S. Environmental Protection Agency. Who is at Increased Risk of Health Effects from Wildfire Smoke Exposure? (2025) https://www.epa.gov/wildfire-smoke-course/who-increased-risk-health-effects-wildfire-smoke-exposure

[18] Flanagan B. et.al.