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State Hazard Mitigation Plans and Social Vulnerability

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Abstract: U.S. states, territories, and tribal areas develop State Hazard Mitigation Plans (SHMPs) to reduce the impact of disasters. The Federal Emergency Management Agency (FEMA) approves SHMPs every five years as required for states to receive disaster relief grants and mitigation project funding. In 2023, FEMA's updated policy guidance for SHMPs took effect, recommending more robust use of social vulnerability as an assessment of equity in multi-hazard risk assessments. Such approaches are necessary because social vulnerability emerges from systemic inequities that result in marginalized populations facing disproportionate exposure and impacts from natural hazards. We developed two novel datasets on the different population groups, definitions, and measures of social vulnerability included in SHMPs for all 50 U.S. states and the 5 inhabited U.S. territories. Our analysis shows that states differ in terms of how (and if) social vulnerability is defined and measured. All plans include at least one vulnerable population in their guidance – most often the elderly, children, or people with disabilities. Inclusion of other populations such as immigrants, LGBTQIA + persons, or unhoused persons is much more varied. The study concludes with recommendations for how SHMPs can advance equitable and inclusive planning processes that center robust definitions and measures of social vulnerability and socially vulnerable populations.

Keywords: state hazard mitigation plans; social vulnerability; socially vulnerable populations; risk reduction; equity; content analysis

1 Introduction

Every year, across the United States, natural hazards threaten people's lives and livelihoods and damage the built and natural environment. In 2023, a record 28 weather and natural hazard events each cost over one billion dollars and led to at

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least 492 fatalities in the United States (Smith 2024). With climate change, weather-related natural hazards are becoming more frequent and intense, leading to less sustainable natural and human systems (Day et al. 2014). Therefore, mitigation planning is increasingly important in preventing harm to people and infrastructure exposed to natural hazard threats.

According to the Federal Emergency Management Agency (FEMA), mitigation refers to "…any sustainable action that reduces or eliminates long-term risk to people and property from future disasters" (FEMA 2023a). Therefore, the primary purpose of mitigation is to lessen the negative impacts of natural hazards prior to the occurrence of a disaster (Birkland 2006). Research shows that every $1 in public-sector investments in mitigation saves an average of $6, although these savings vary by peril and may be even greater depending on the pre-disaster investment in, for example, the most stringent building codes and standards (NIBS 2019).

State Hazard Mitigation Plans (SHMPs) play a central role in advancing mitigation planning and implementation efforts. These plans establish programs, projects, and protocols for how a state, territory, tribal area, or local community plans to lessen harm from natural hazards. Using long-term strategies, SHMPs are meant to help break cycles of disaster loss and destruction through encouraging, for example, wise land use planning or the retrofit of existing vulnerable building stock. These plans also help state and local leaders set mitigation priorities through identifying critical infrastructure or focusing on specific populations or places that require extra protection from harm.

FEMA requires that each state, tribal area, and U.S. territory develop an SHMP, which must be updated every five years. These locales must have an approved plan, or they are deemed ineligible to apply for FEMA disaster relief grants and federal funding for disaster mitigation projects through FEMA programs (FEMA 2023b). SHMPs help states, tribal entities, and territories identify mitigation efforts and construct a plan to minimize damage from disasters; however, there is no specific guidance on how what methods should be used for mitigation, causing state plans to vary significantly (Habets et al. 2024).

In 2022, FEMA released updated state mitigation planning policy guidance, effective as of April 19, 2023 (FEMA 2022a). New updates require that SHMPs "consider equity and climate change impacts," as well as provide an outline of participants in the planning process, including state agencies and other supporters of underserved communities, community lifelines, and climate change experts (FEMA 2022b). This new guidance was issued at a pivotal time, as 33 (61.1 %) states and territories were required to update their plans in 2023 and 15 (25.9 %) more were scheduled to follow in 2024.

One way that states can ensure they are meeting this new guidance when updating their SHMPs is to center social vulnerability – both as a concept and a

measurable construct – in multi-hazard risk assessments. Including social vulnerability in updated plans would help to decrease harm to those most affected by disasters, especially in areas where these populations are concentrated (Berke et al. 2010; Carter and Peek 2016; Cooper 2004). The present study contributes to a limited body of literature in this area and is designed to help states and federal officials identify vulnerable populations that are currently included and, importantly, could be included in SHMPs. Given the crucial importance of considering social vulnerability in mitigation planning, our research team developed and published two novel datasets on the populations, definitions, and different measures of social vulnerability included in current SHMPs for all 50 U.S. states and the 5 inhabited U.S. territories.[1]

2 Theoretical Context: State Hazard Mitigation Plans and Social Vulnerability

Amending the 1988 Robert T. Stafford Disaster Relief and Emergency Assistance Act (The Stafford Act), the Disaster Mitigation Act of 2000 created a new framework for states as well as territorial, tribal, and county or municipal governments to develop hazard mitigation plans. Under this framework, these plans must include "… a description of the hazard mitigation planning process; identification of the specific hazards, risks, and vulnerabilities in the state; identification and ranking of the mitigation actions available; and description of the process to integrate mitigation efforts across agencies and levels of government" (Babcock 2013, p. 2).

States follow a basic formula in developing SHMPs, which includes four key steps: (1) organize resources and the mitigation planning process, (2) assess risk, (3) develop a mitigation strategy, and (4) adopt/implement the plan (FEMA 2021). States are also responsible for supporting the development, review, and coordination of local and tribal plans. States are therefore expected to communicate the status and expiration of their plan to local and tribal governments (FEMA 2021). These efforts, in tandem with local planning, ostensibly can help build commitment and improve coordination among non-profits, government agencies, and the public as related to hazard mitigation efforts (Berke et al. 2010).

Having an approved SHMP opens several grant opportunities for states, tribal areas, and territories to receive funding for mitigation for many types of natural hazards. For example, FEMA's Building Resilient Infrastructure and Communities

1 Painter, M.A., Villarreal, M., & Peek, L. (2023). 2016-2021 State Hazard Mitigation Plans and Social Vulnerability, in *State Hazard Mitigation Plans and Social Vulnerability*. DesignSafe-CI. https://doi.org/10.17603/ds2-sc34-as63.

(BRIC) program supports hazard mitigation projects through capacity-building, encouraging innovation, and supporting partnerships. After a presidentially declared disaster, states can receive funding for rebuilding and mitigation through the Hazard Mitigation Grant Program (HMGP). Other hazard specific programs include Flood Mitigation Assistance (FMA), the HMGP Post Fire, and Fire Mitigation Assistance Grants (FMAG).

States can also seek the designation of Enhanced Mitigation Plan (EMP) status, which goes beyond the minimum requirements and demonstrates a state's long-term commitment to disaster risk reduction, comprehensive all-hazards management, and established cost-effective mitigation measures (Habets et al. 2024, p. 2). If FEMA designates a state as having EMP status, the state is then eligible to receive an additional 5 % in HMGP funds after a disaster (FEMA 2022c). In taking more responsibility for reducing risk, states with enhanced plans are seen as "sharing the load" and connecting resources with the right communities, further mitigating harm. At present, 15 states have EMP designated status, and Habets et al. (2024) found that these states have slightly higher Hazard Identification and Risk Assessment scores than those states without the designation.

Although mitigation efforts hold great potential for reducing social vulnerability to disasters, there has been a paucity of research on planning focused on socially vulnerable populations (Berke et al. 2010). Here, social vulnerability in the context of disaster management refers to "the sociodemographic characteristics of a population and the physical, social, economic, and environmental factors that increase their susceptibility to adverse disaster outcomes and capacity to anticipate, cope with, resist, and recover from disaster events" (Adams et al. 2022, p. 14). Social vulnerability scholars recognize that disasters reflect societal inequalities as "amplified versions of everyday life" (Thomas et al. 2013, p. 16). Root causes of disasters, which serve as structural constraints to safe and stable livelihoods (Wisner, Gaillard, and Kelman 2012), must be addressed to fully prepare for, respond to, and recover from disasters (Blaikie et al. 2004; Tierney, Lindell, and Perry 2001). Although demographic analyses are key to the understanding of the location and hazard exposure of potentially vulnerable populations, it is important to underscore that it is not identity characteristics that produce vulnerability. Rather, it is historical as well as present social conditions that serve to advantage or disadvantage groups based on characteristics such as race, gender, and social class (Painter et al. 2024; Peek, Wachtendorf, and Meyer 2021). Socially vulnerable populations may be identified based on economic, political, historical, or cultural factors that render them disproportionately susceptible to natural hazards. People living in poverty, the elderly, children, racial and ethnic minorities, people with disabilities, people with special medical needs, sexual minorities, and people with limited English proficiency

have all been identified as especially at risk to natural hazards (Peek, Wachtendorf, and Meyer 2021; Thomas et al. 2013; Tierney 2019).

Cooper (2004) was the first to undertake a systematic examination of how socially vulnerable population groups are characterized and accounted for in hazard mitigation plans. Drawing on a sample of 90 local mitigation plans across three focal states, he found that socially vulnerable populations were rarely included in the planning process and when they were represented, there was weak evidence to support their inclusion or capacity building efforts. In 2010, Berke, Cooper, and colleagues developed a framework to guide the preparation of disaster plans that account for the vulnerabilities and capacities of populations to build resilience to future disasters. Importantly, a key principle in their framework involves the need to define socially vulnerable populations to "ensure that plans differentiate the conditions, needs, and capabilities of the target population from the general population" (Berke et al. 2010, p. 376). Yet, disaster mitigation, response, and recovery plans "rarely address disadvantage people" (ibid., p. 379), and therefore, they use three high quality local plans to showcase how principles of social vulnerability and community engagement can be integrated into the planning process.

Recent scholarship has applied an environmental justice and equity lens to climate adaptation and land use planning efforts. For example, Anguelovski and colleagues (2016) critically reviewed such initiatives in eight cities globally. They sought to understand if adaptation efforts prioritize the needs of marginalized populations. Their analyses of four major land use adjustments revealed acts of commission, which effectively displace or negatively impact the poor and other marginalized groups, as well as acts of omission, which exclude the values and perspectives of marginalized groups to the benefit of the elite. They conclude that inequitable outcomes are "reinforced through a combination of exclusionary planning, unequal distribution of adaptation benefits, and perpetuation of unsustainable development patterns" (Anguelovski et al. 2016, p. 343). Meerow et al. (2019) conducted a review of the resilience plans created by member cities of the Rockefeller Foundation's 100 Resilient Cities program. They discovered a limited focus on equity across the plans, and a great deal of variability in how equity was conceptualized when it was included. Specifically, their analyses revealed that those plans that considered equity focused predominantly on distributional equity (i.e., the equitable distribution of goods, services, and opportunities), while a smaller number focused on recognitional equity (i.e., acknowledgement and respect of different groups) or procedural equity (i.e., equitable participation in decision-making processes) (Meerow, Pajouhesh, and Miller 2019, p. 4).

We draw inspiration from these and other related studies in our effort to understand how social vulnerability is conceptualized and which socially vulnerable

populations are included (or excluded) in currently approved SHMPs. Such definitions and considerations are important because they influence how resources are allocated and for what purpose. Ultimately, when socio-economically marginalized groups are excluded from risk calculations and community engagement exercises, their exposure to hazards and disaster impacts may be exacerbated over time.

3 Methodology and Data

As noted, our research team built two datasets on the populations, definitions, different measures of social vulnerability, and quotes from SHMPs for all 50 U.S. states and the 5 inhabited U.S. territories from 2016 to 2021.[2] SHMPs are available publicly through various agency websites, and all 50 state plans and five U.S. territory plans were available in PDF format to download.[3] From these plans, we conducted a content analysis, resulting in a quantitative and one qualitative database.

After downloading each of the SHMPs, our research team constructed the first database by first identifying key metadata variables, including SHMP title, responsible agency, corresponding web link, length of the document, and the last date updated (see Appendix A for a list of each plan and some of this metadata). Drawing from the vast social vulnerability literature, we then developed an initial list of socially vulnerable populations (e.g., children, racial minorities) and contextual factors of social vulnerability (e.g., no vehicle access, rural areas). This list, although extensive, served as the initial parameters for social vulnerability inclusion. We also created a list of related terms, including *social vulnerability* itself and whether the plan incorporated a social vulnerability index, that related to systematic concepts of vulnerability (e.g., marginalization, intersectionality).

In constructing the first database[4] each state and territory was assigned a corresponding number to assist in assigning reviews to different research team members. Three research assistants were randomly assigned 18 or 19 SHMPs for review based on the corresponding number. Each research assistant downloaded a copy of their SHMPs, highlighting mentions of socially vulnerable populations, related factors, and other key concepts. The research assistants coded into the quantitative database whether the term was mentioned or not, assigning a “1” for

2 Ibid., n. 1.

3 The state of New York has an interactive website for viewing their SHMP. The 2019 version, analyzed for this paper, is no longer available online.

4 Painter, M., M. Villarreal, L. Peek (2024). “2016-2021 State Hazard Mitigation Plans (SHMPs) and Social Vulnerability Quantitative Data”, in *State Hazard Mitigation Plans and Social Vulnerability*. DesignSafe-CI. https://doi.org/10.17603/ds2-sc34-as63

those that were mentioned in the SHMP and a "0" for those excluded. The original list of vulnerable populations that went into the database was not exhaustive, and research assistants were encouraged to add any populations they found important when reading their assigned SHMPs and share with the rest of the team to add to their searches. All content analysis and coding were conducted by hand and relevant data was put into a shared spreadsheet.

For the quantitative database, a two-step quality control was conducted both pre- and post-analysis. For the pre-analysis quality control, research assistants were assigned similar SHMPs to other team members, conducted the content analysis, then compared answers to one another. This provided insight into what is considered a mention related to vulnerability of certain populations across the team. Once all the research assistants completed their fully separate analyses, a careful review of the database was conducted by the team lead and one graduate research assistant to ensure that any missing data was added. Additionally, the team lead organized the research assistants in a post-analysis quality control exercise to further enhance intercoder reliability that was similar to the pre-analysis quality control exercise.

For the qualitative database[5] two members of the research team began to gather contextual quotes for each column of mentioned populations, contextual factors, and key concepts; this also included listing of page numbers where these terms could be found for each plan. During this phase of the data collection, another research assistant was brought on to further assist in gathering quotes and specifying the location of mentions in the SHMPs. Through this second phase of qualitative data collection, our research team continuously checked for errors in the first phase of data collection, updating the quantitative database further.

We then conducted a descriptive statistical analysis using the number of socially vulnerable populations, contextual factors, and concepts mentioned. We also use the quotes from various plans to contextualize how socially vulnerable populations and other key terms are incorporated into state hazard mitigation planning. The results section summarizes the findings from the construction of the two datasets.[6]

5 Painter, M., M. Villarreal, C. Singh, L. Peek (2024). "2016-2021 State Hazard Mitigation Plans (SHMPs) and Social Vulnerability Qualitative Data", in *State Hazard Mitigation Plans and Social Vulnerability*. DesignSafe-CI. https://doi.org/10.17603/ds2-g8tz-qg93.

6 Ibid., n. 1.

4 Results

4.1 Plan Information

When SHMPs are updated depends on a rotating cycle based on when the plan was initially approved. About two-thirds of the SHMPs (61.1 %) in our analysis were last updated in 2018, making these plans eligible for renewal in 2023. An additional 25.9 % of plans were last updated in 2019, making a quarter of SHMPs up for renewal in 2024. Taken together, 87 % of plans require updated approval in the span of two years (see Figure 1).

SHMPs vary widely in length and structure. The average length of an SHMP is 649 pages, ranging from the shortest plan (Iowa (2018), 64 pages) to the longest (Maryland (2021), 2,172 pages). Plans also vary in depth and detail, illustrating the differences among states in approaching hazard mitigation planning. For example, some states, such as Washington (2018) and New Jersey (2018), dedicate entire sections to a single hazard and explore vulnerabilities in detail. Other states, such as North Dakota (2018) and Vermont (2018), use appendices for risk assessment and local planning for hazard mitigation.

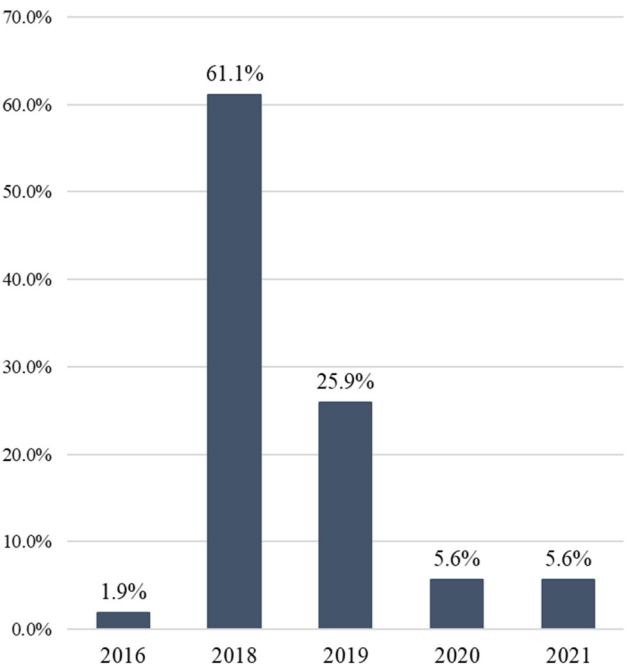

Figure 1: Last SHMP approval year.

Responsibility for developing and managing SHMPs is the responsibility of either an emergency management agency, department of homeland security, or both. Thirty of the 55 states and territories have an emergency management agency responsible for their SHMP, while five are under a department of homeland security (10 of these agencies are both emergency management and homeland security, such as the Alaska Division of Homeland Security and Emergency Management). Ten of the plans were developed and are managed under other agencies, such as military affairs, emergency services, land conversation and development, and public safety, among others. For example, two territories – Puerto Rico and American Samoa – have a Central Office for Recovery, Reconstruction, and Resiliency and an Office of Disaster Assistance and Petroleum Management that oversee their SHMPs, respectively.

4.2 Social Vulnerability and Measures

Thirty-three SHMPs (61.8 %) explicitly refer to "social vulnerability" as a relevant concept, defining it or spending significant time discussing it at length. Of these plans, several include a definition of social vulnerability that discusses how socially vulnerable populations are more exposed to risk. For example, the South Carolina Hazard Mitigation Plan (2018) defines social vulnerability as "the underlying characteristics of the population that either attenuate or exacerbate the effects of hazard events" (p. 38), while the West Virginia Statewide Standard Hazard Mitigation Plan Update (2018) defines social vulnerability as "pre-existing condition [that] is based on the characteristics of the population and where they live" (p. 38).

Other terms related to social vulnerability, such as "marginalization," appeared rarely. For example, only the Colorado (2018) and New Mexico (2018) SHMPs referenced marginalization, which are the key systems that leave socially vulnerable populations at higher risk. Only the South Carolina SHMP (2018) and the California SHMP (2018) generally referenced "intersectionality," a concept that refers to intersecting identities and how these intersections interact and may exacerbate risk for some population groups. Importantly, 22 states and territories did not include any reference – much less an explicit definition – of social vulnerability or related concepts. While some states may have used a similar concept, such as population vulnerability, these are usually tied to the general concept of human risk to hazards rather than social, political, or economic vulnerability (see Table 1). In all tables, we utilize the state or territory abbreviations (see Appendix B).

As indicated, social vulnerability is treated in widely varying ways across SHMPs. Some plans are comprehensive – including maps, graphics, and detailed

Table 1: Relevant concepts and their inclusion in SHMPs.

Relevant concept	State/Territory	Illustrative text/Definitions
Social vulnerability	AZ, CA, CO, FL, GA, HI, IL, IN, KS, MA, MN, MS, MO, NE, NJ, NM, NY, NC, MP, OR, PA, PR, SC, SD, TN, TX, VT, VA, VI, WA, WV, WI, WY	"The centers for disease control and prevention: Agency for toxic substances & disease registry (ATSDR) defines social vulnerability as the resilience of communities when confronted by external stresses on human health, stresses such as natural or human caused disasters, or disease outbreaks. These stressors now increasingly include the more extreme weather events and longer-term impacts of Minnesota's changing climate. Reducing social vulnerability can decrease both human suffering and economic loss" (Minnesota SHMP, 2018, p. 34–35). "While vulnerability can include a range of assets that can be impacted by hazards, the data in this vulnerability assessment is limited to social vulnerability. Social vulnerability comprises the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to environmental hazards" (Georgia SHMP, 2019, p. 99).
Marginalization	CO, NM	"Very often, the impacts of hazards fall disproportionately on the most disadvantaged or marginalized people in a community – the poor, children, the elderly, the disabled, and minorities" (Colorado SHMP, 2018, p. 2–13). "People who are totally dependent on social services (social security, food assistance) for survival are already economically and socially marginalized and require additional support in the post-disaster period" (New Mexico SHMP, 2018, p. 403).
Intersectionality	CA, SC	"However, it is not just the proportion of residents in these broad categories that is important, but instead how race, socioeconomic status, and gender interact to produce socially vulnerable populations. Selecting one variable (race, gender, socioeconomic status) does not adequately capture communities that are described as African American female-headed households below the poverty level, because not all African Americans are in poverty; not all female-headed households are African American; and not all people in poverty are females or female-headed households" (South Carolina SHMP, 2018, p. 38).
No reference to social vulnerability or related concepts	AL, AK, AS, AR, CT, DE, GU, ID, IA, KY, LA, ME, MD, MI, MT, NV, NH, ND, OH, OK, RI, UT	

Sidebar 1: Colorado as an exemplar of robust social vulnerability inclusion.

One of the major rationales for including social vulnerability in SHMPs is to identify and explain why these populations are more at-risk than other populations. Researchers continue to explore concepts of social vulnerability; however, states are in a unique position to understand and locate vulnerable populations in locally specific ways based on intersecting risks.

Colorado serves as one exemplar for how they have included social vulnerability in their SHMP. The plan includes a dedicated section for social vulnerability generally, as well as subsections specifically for reviewing why certain populations are more at-risk based on their physical location. The plan specifically discusses vulnerability influenced by age, income, and ability to speak English. Here, Colorado explores what makes their populations more vulnerable in locally specific and meaningful ways.

Further, an additional subsection explores social capital, which refers to how social connections can affect the ability for communities to respond during disasters (Colorado SHMP, 2018, p. 2–17). This makes Colorado's plan stand out as it offers context for why certain populations may be disconnected from community and social resources. Colorado's plan uses this framing to develop a social capital index that incorporates different drivers of social cohesion. This specificity and framing enhance the discussion of social vulnerability at the state level.

descriptions of populations, and describing why social vulnerability exists and its importance in mitigating risk. Many plans dedicate entire sections to exploring and understanding social vulnerability in their state (see Sidebar 1). Other plans, however, do not mention the concept, include data, or otherwise engage carefully with this important social driver of disaster risk and loss.

Just under half (43.6 %) of SHMPs discuss or use a Social Vulnerability Index, which is a tool that assists in conceptualizing and measuring social vulnerability (ATSDR 2022; Cutter, Boruff, and Shirley 2003; Flanagan et al. 2011, 2018; Painter et al. 2024) (see Figures 2 and 3). Some states utilize a social vulnerability index in their hazard mitigation plans to help measure, identify, and locate populations most at-risk in all parts of the natural hazards cycle (Habets et al. 2024, see Sidebar 2). The development of these tools allows for both researchers and practitioners to clarify specific vulnerabilities to natural hazards in communities (Flanagan et al. 2011).

Of the 27 plans that include mention or use of a Social Vulnerability Index, 15 SHMPs (66.7 %) use the Cutter, Boruff, and Shirley (2003) Social Vulnerability Index (SoVI), while three (12.5 %) use the Flanagan et al. (2011) CDC/ATDSR Social Vulnerability Index (SVI). Nine SHMPs developed their own social vulnerability index using U.S. Census data and informed by other sources or consultation with working groups. The Florida SHMP refers to their scale as an "SVI" with no resource or further information. Twenty-eight plans do not include a mention of any index (see Table 2).

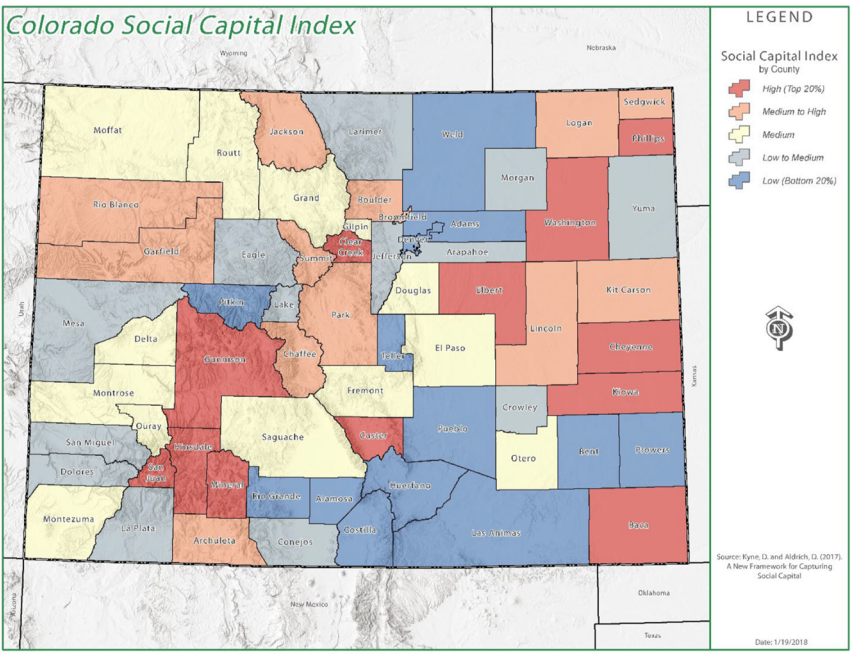

Figure 2: Colorado's social capital index in the Colorado state hazard mitigation plan (2018, p. 2–17).

4.3 Socially Vulnerable Populations

There are myriad populations that have been identified in the literature as potentially vulnerable to the deleterious impacts of disaster (Thomas et al. 2013) (see Sidebar 3). Building from the literature, we scoured each plan for a total of 27 distinct populations. Our analyses revealed, however, that a relatively limited number of populations were most often included across the SHMPs.[7] Specifically, the most frequently referenced populations include the elderly, children, people with disabilities, and people with medical issues. The elderly appear in every SHMP (100 %) as a vulnerable population, followed by children (89.1 %) and people with a disability or medical issue (89.1 %). These populations are often described in tandem. For instance, the New Hampshire SHMP (2018) states that "extreme heat events occur as a result of above normal temperatures… populations at risk, such as the young and elderly, are more likely to experience a heat related disorder during a heat event"

7 While the bulk of the plans focus on natural hazards, other threats including pandemic, infectious disease, technological hazards, and terrorism are discussed as well, so some references to socially vulnerable populations are in relation to those threats.

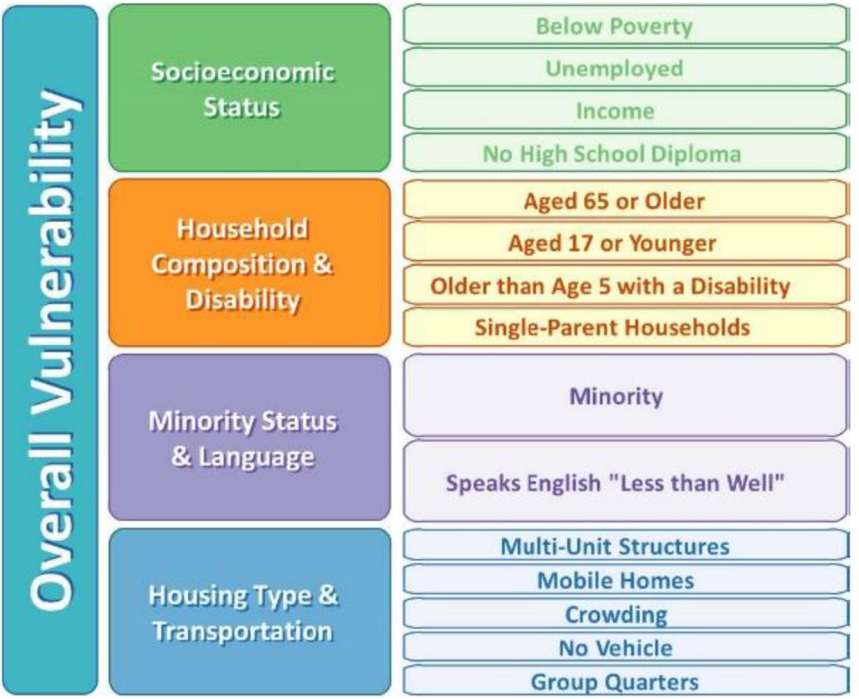

Figure 3: The center for disease control and prevention and agency for toxic substances and disease Registry's social vulnerability index used in Oregon's SHMP (CDC 2016; Oregon 2020, p. 111).

Sidebar 2: Oregon as an exemplar of social vulnerability index incorporation.

Social vulnerability indices are useful tools that help to locate and characterize potentially vulnerable populations. Development, analysis, and use of these indices has become common in both research and emergency management practice (Painter et al. 2024). States and other governmental entities can use these indices to their advantage, especially when paired with risk assessments of hazards.

For many states, the social vulnerability index is used as general assessment of populations. In the Oregon SHMP (2020), however, it is embedded into each hazard-specific analysis. Each hazard-specific section (e.g., earthquakes, volcanoes, wildfires, etc.) reviews which counties are at the highest risk based on social vulnerability assessments. For example, Oregon shows that the counties with the greatest social vulnerability – Marion, Morrow, Umatilla, Wasco, Jefferson, Klamath, and Malheur – are at the highest risk for landslides.

Oregon also includes state asset and social vulnerability scores for state buildings, state critical infrastructure facilities, and local facilities. These analyses show that for landslides, lincoln and wasco county are at the highest risk when incorporating state asset vulnerability with social vulnerability (Oregon SHMP, 2020, p. 312). Oregon's plan showcases the flexibility that social vulnerability indices provide in clarifying population as well as asset vulnerability.

Table 2: Inclusion of social vulnerability indices in SHMPs.

Social vulnerability index	State/Territory	Illustrative text/Descriptions of the index
SoVI	CO, GA, IL, KS, MS, MO, NM, MY, NC, ND, PA, SC, SD, TN, VI	"While vulnerability can include a range of assets that can be impacted by hazards, the data in this vulnerability assessment is limited to social vulnerability. Social vulnerability comprises the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to environmental hazards". "The tool used to determine the social vulnerability of each county is the social vulnerability index (SoVI®). SoVI® 2010-14 measures the social vulnerability of U.S. counties to environmental hazards. The index is a comparative metric that facilitates the examination of the differences in social vulnerability among counties and graphically illustrates these differences. It shows where there is uneven capacity for preparedness and response and where resources might be used most effectively to reduce vulnerability. SoVI® also is useful as an indicator in determining each county's different capabilities to recover from disasters" (Georgia SHMP, 2019, p. 99).
SVI	MN, NE, OR	"The degree to which a person is vulnerable to the impacts of a hazard depends on how well he/she is able to react before, during and after a hazardous event. The centers for disease control and prevention: Agency for toxic substances & disease registry (ATSDR) defines social vulnerability as the resilience of communities when confronted by external stresses on human health, stresses such as natural or human caused disasters, or disease outbreaks. These stressors now increasingly include the more extreme weather events and longer-term impacts of Minnesota's changing climate". "Reducing social vulnerability can decrease both human suffering and economic loss. ATSDR's social vulnerability index (SVI) uses U.S. census variables at the tract level to help local officials identify communities that may need support in preparing for hazards or recovering from disaster. Certain social Section 3: State profile | 35 conditions, such as high poverty, low percentage of vehicle access, or crowded households can increase a community's social vulnerability (ATSDR, 2018)" (Minnesota SHMP, 2019, p. 34–35).

Table 2: (continued)

Social vulnerability index	State/Territory	Illustrative text/Descriptions of the index
Original or other index	CA, FL, VT, WA, WY, MP, PR, TX, VI	"Social vulnerability examines the differential impact of hazards on society based on existing socio-demographic conditions and community characteristics. A number of social vulnerability indices have been used by researchers as tools for assessing differences across communities that influence their capacity to prepare for, respond to, and recover from hazards. As part of this risk analysis, a modified version of social vulnerability index based on the methodology developed by ATSDR's geospatial research, analysis & services program (GRASP) was utilized" (Washington SHMP, 2018, p. 15).
No inclusion of an index	AR, IA, MT, OK, AL, AK, AZ, CT, DE, HI, ID, IN, KY, LA, ME, MD, MA, MI, NV, NH, NJ, OH, RI, UT, WV, WI, AS, GU	

Sidebar 3: California as an exemplar for inclusion of socially vulnerable populations.

One of the benefits of using social vulnerability as a concept for understanding population risk to hazards and disasters is that can assist in incorporating diverse populations into risk assessments; it provides a sociological framework for why these populations are at disproportionate risk to harm (Peek, Wachtendorf, and Meyer 2021). In turn, understanding the "why" of population risk can help government officials and their partners to mitigate the impacts of natural hazards. California serves as an important exemplar of the importance of including a range of socially vulnerable populations and discussing the systems that heighten their exposure and risk.

Of all SHMPs, California included the largest number of socially vulnerable population groups (34). California goes beyond listing socially vulnerable populations to also consider the intersecting dynamics of risk. For example, they consider the hazards that those who are food insecure face as well as the people who live in areas with poor air quality. Additionally, California recognizes that, "…people often are affected by multiple forms of vulnerability at once," incorporating an intersectional lens to social vulnerability in planning (California SHMP, 2018, p. 159).

California also explains the reasons why some populations are at higher risk and are included in their assessment of social vulnerability. The plan recognizes that, "… due to existing inequities, institutionalized racism, or exclusion, people in these groups often have lower socio-economic status, with its attendant lack of resources and economic and political power" (California SHMP, 2018, p. 159). Further, they emphasize that vulnerable populations experience higher rates of health impacts and that these populations often have less capacity to adapt to weather events and the changing climate. Importantly, California recognizes that, "[in] many cases, people in these groups are not inherently vulnerable to these impacts… their vulnerability is created by social, economic, and other systems that inequitably distribute power and resources" (California SHMP, 2018, p. 159).

(98). The Mississippi SHMP (2018) affirms that "the very young, the elderly, and the handicapped are especially vulnerable to harm from hurricanes" (133).

Other frequently mentioned populations include those in poverty or with low incomes (70.9 %), infants (50.1 %), non-English speaking people (41.8 %), racial minorities (40 %), vulnerable workers (38.2 %), and populations with language barriers (36.4 %). Some SHMPs included reference to ethnic minorities (32.7 %), unhoused populations (32.7 %), pregnant women and/or people (29.1 %), unemployed populations (25.5 %), and unspecified minority groups (21.8 %).

Seventeen socially vulnerable populations are mentioned in eight (14.5 %) SHMPs or less. These populations include women or gender more broadly (14.5 %), people with lower educational attainment (14.5 %), substance dependent populations (14.5 %), prisoners (10.9 %), immigrants (9.1 %), men (7.3 %), LGBTQAI + persons (7.3 %), refugees (7.3 %), religious minorities (7.3 %), and girls (3.6 %). The Puerto Rico SHMP (2021, p. 118) specifically describes female head of households as a vulnerable population and covers women and girls as significantly vulnerable to disasters. LGBTQAI + persons are mentioned in SHMPs as being susceptible to violence from hate groups in addition to natural hazards. The only two populations that we included in our coding schema, but that were not mentioned in any SHMP, were veterans and boys (see Table 3 for more details).

4.4 Transportation, Place, and Housing

The literature on social vulnerability to disasters recognizes that it is the *social context* in which people live that often shapes their exposure to and experience in disaster (Peek, Wachtendorf, and Meyer 2021) (see Sidebar 4). Therefore, we also analyzed whether plans accounted for factors such as transportation access, geographic locale, and housing type and affordability. A total of 13 such social contextual factors were included in the plans we analyzed. Specifically, we found that just over half of the plans included mention of the vulnerability of those who live in mobile homes (50.9 %) or in rural communities (49.1 %). SHMPs also identified a wide range of issues related to where people live, such as dense housing like apartment buildings (45.5 %), the quality of housing (40 %), and other housing issues (30.9 %).

Other frequently mentioned social factors that shape social vulnerability include living on tribal lands (29.1 %), no vehicle access (23.6 %), other transportation access issues such as needing to rely on public transportation (23.6 %), being a renter (21.8 %), and living near industrial or nuclear plants (21.8 %). Three factors were mentioned in seven SHMPs or less, including institutional quality and/or other

issues (12.7 %), affordable housing (9.1 %), and uninsured or underinsured housing (7.3 %).

Inclusion can be mixed, with certain populations being in some SHMPs and not others. For example, New Mexico mentions renters, those living in mobile homes, and those working in outdoor populations. While Pennsylvania does not mention these populations, unlike New Mexico, their SHMP does mention housing near industrial or nuclear plants and transportation access issues. This shows the variability in states, especially in terms of their specific environmental contexts. In

Table 3: SHMPs that reference the 10 most frequent population groups.

Socially Vulnerable groups referenced in SHMPs	State/Territory	Percent SHMPs with reference	Select illustrative quotes
Elderly	All states and territories	100.0 %	"As a group, the elderly are more apt to lack the physical and economic resources necessary for response to hazard events and are more likely to suffer health-related consequences making recovery slower. Elderly residents living in their own homes may have more difficulty evacuating their homes and could be stranded in dangerous situations. This population group is more likely to need special medical attention, which may not be readily available during natural disasters due to isolation caused by the event" (Hawaii SHMP, 2018, p. 3–10).
Children	All states and territories except OK, KY, MD, NY, TX, and MP	89.1 %	"Children under 14 are also particularly vulnerable to disaster events because of their young age and dependence on others for basic necessities. Very young children may additionally be vulnerable to injury or sickness; this vulnerability can be worsened during a natural disaster because they may not understand the measures that need to be taken to protect themselves from hazards" (Hawaii SHMP, 2018, p. 3–10).
People with disabilities or medical issues	All states and territories except OK, KY, TX, IA, WY, and VI	89.1 %	"People with disabilities may need help evacuating or may require additional medical attention following an evacuation. Individuals with a disability may also not be able to see or hear warning signals alerting the public about a disaster" (Utah SHMP, 2019, p. 10).
People in poverty/Low-	AZ, CA, CO, CT, DE, FL, GA, GU,	70.9 %	"Socioeconomic status affects the ability of a community to absorb losses and cope with hazard impacts.

Table 3: (continued)

Socially Vulnerable groups referenced in SHMPs	State/Territory	Percent SHMPs with reference	Select illustrative quotes
income populations	HI, ID, IL, IN, IA, KS, LA, MA, MN, MO, NE, NV, NJ, NM, NY, NC, ND, OK, OR, PA, PR, RI, SC, SD, TX, UT, VT, WA, WA, WI, WY		Wealth enables communities to better prepare for disasters through mitigation and absorb and recover from losses more quickly using insurance, social safety nets, and entitlement programs. Low status communities have little ability to absorb losses due to poverty and disadvantaged populations" (New Mexico SHMP, 2018, p. 401).
Infant(s)	AL, AK, AS, AZ, AR, CA, CO, CT, DE, FL, GA, HI, ID, IL, KS, LA, ME, MA, MN, MO, NH, NJ, NY, OH, OR, RI, SD, TN	50.9 %	"While vaccines are available for many diseases, delawareans remain vulnerable to other diseases known and unknown. Vaccine-preventable diseases have recently re-emerged as a public health threat, especially to infants and school-age children, due to anti-vaccination movements." (Delaware SHMP, 2018, Sec. 4.1, p. 44).
Non-English-speaking populations	AL, AK, AZ, AR, CA, CO, CT, FL, GA, IN, MA, MS, MO, NE, NV, NJ, NM, OH, OK, OR, RI, WA, WY	41.8 %	"Non-English speakers are those who speak a language other than English at home. Some of the challenges emergency managers face in helping non-English speakers mitigate disasters include lack of multi-language emergency communications, cultural differences in the way information is interpreted, and mistrust of government services" (Indiana SHMP, 2019, p. 46).
Racial minorities	AK, CA, CO, GA, ID, KS, MA, MN, MS, MO, NE, NM, NY, ND, OR, PA, RI, SC, SD, WA, WV, WY	40.0 %	"In the last 50 years, Minnesota's population has become much more diverse. In 2017, residents of color composed 20 % of the state's population (Minnesota compass, 2018). 75 % of this population was living in the seven-county metro area and the non-white population will continue to grow faster in the twin cities compared to the rest of Minnesota (Figure 4). The "population of color" or "Non-white" includes people who are American indian, Asian, black, two or more races, and people who are hispanic of any race" (Minnesota SHMP, 2018, p. 31).
Vulnerable workers/	AK, AS, CA, CO, CT, HI, ID, KS,	38.2 %	"Fontaine and Steinemann (2009) conducted a drought vulnerability assessment for 34 sub-sectors in

Table 3: (continued)

Socially Vulnerable groups referenced in SHMPs	State/Territory	Percent SHMPs with reference	Select illustrative quotes
Occupation related vulnerability	MN, MO, NE, NM, NC, ND, OR, RI, TX, UT, VT, WA, WI		Washington state based on telephone interviews with 67 designated key representatives of the six regions of the state. In this study, vulnerability was ranked the highest for: dryland farmers in the south central and east regions; fisheries in the south central and north central regions; ski area operators and the green industry in the western regions; berry farmers in the southwest/Olympic peninsula region; and farmers with junior water rights in the south central region. These sub-sectors thus represent key areas for policy intervention for enhancing their ability to withstand prolonged periods of drought" (Washington SHMP, 2018, p. 121,122).
Populations with language barriers	AL, AZ, AR, CA, CO, CT, FL, GA, HI, MA, MS, MO, NE, NM, OK, OR, RI, UT, VT, WY	36.4 %	"People with limited language skills are more vulnerable in the event of a disaster. Their inability to understand evacuation warnings or preparedness bulletins influences their ability to comply with safety measures; the inability to communicate special needs to emergency responders or law enforcement influences their ability and willingness to receive adequate health care or emergency supplies; limited language ability also affects their ability to communicate their risks and vulnerabilities to planners and emergency managers who organize pre-disaster mitigation efforts. As a result, [areas] with populations made up of greater proportions of individuals with limited language skills have a higher social vulnerability to hazard impacts. Moreover, it will likely take those communities longer to recover from a hazard event" (New Mexico SHMP, 2018, p. 403).
Ethnic minorities	AK, AZ, CO, GA, HI, KS, MN, MS, NE, NM, NY, NC, ND, OR, PA, SC, SD, WY	32.7 %	"Key social indicators that consistently appear in the literature as influencing pre-impact preparedness and post-event response and recovery include attributes such as…race and ethnicity…" (South Carolina SHMP, 2018, p. 38).

Sidebar 4: Minnesota as an exemplar for inclusion of social context.

Social context can reduce or heighten hazards risk among socially vulnerable populations (Peek, Wachtendorf, and Meyer 2021). Understanding this social context can help government officials and their partners address some of the root causes of social vulnerability for the populations identified in the previous section. Minnesota's SHMP (2018) exemplifies how social context can be included in hazard mitigation plans.

For example, Minnesota recognizes that "low percentage of vehicle access… can increase a community's social vulnerability" (Minnesota SHMP, 2018, p. 35). People without vehicles can face barriers when preparing and responding to disasters. For instance, without a vehicle, populations may need to rely on public transportation to evacuate. This is a barrier that is most likely to impact low-income populations. Minnesota also discusses how mobile homes "are more vulnerable to fatality or injury from windstorms because mobile homes are not able to withstand high winds as well as other structural dwellings" (Minnesota SHMP, 2018, p. 111). The plan recognizes that the state has more work to due to mitigate vulnerabilities for those living in mobile homes. Additionally, the plan states that while "building codes have also changed to improve the strength of new mobile home construction… there are still many older mobile homes in use that do not meet these new standards." thus, Minnesota argues, "given the vulnerability of mobile home residents to windstorm events, it is important to have a general understanding of where mobile homes around the state are located" (Minnesota SHMP, 2018, p. 111). People living in mobile homes are likely to be low-income, making them particularly vulnerable to disasters, as illustrated in the previous section.

Minnesota also recognizes the danger from exposure to radiation should there be an accident at a nuclear generating plant: "The major hazards to the people in the vicinity of the plume are radiation exposure to the body from the cloud and particles deposited on the ground, inhalation of radioactive materials, and ingestion of radioactive materials" (Minnesota SHMP, 2018, p. 201). This exposure is likely to affect predominantly low-income and communities of color, as they are most often located near these types of industrial plants.

In recognizing these social contextual factors, Minnesota is an exemplar for addressing social vulnerability.

any case, this analysis provides an opportunity for states to see the gaps in inclusion of socially vulnerable populations in SHMPs and can guide those responsible for developing SHMPs to include social vulnerability analyses and discussion of vulnerable populations in upcoming SHMP updates (see Table 4).

5 Discussion

The new guidelines from FEMA that require states to consider equity, community engagement, and climate change impacts opens the door for a next generation of mitigation planning that considers how social vulnerability can worsen hazard impacts (FEMA 2022a). Mitigation can help prevent some of the most egregious harms

Table 4: SHMPs that reference the 6 most frequent contextual factors.

Referenced in SHMPs	State/Territory	Percent SHMPs with reference	Select illustrative quotes
Housing – Mobile homes	AZ, AR, CA, CO, CT, FL, GA, HI, KS, ME, MA, MI, MN, MS, MO, NE, NJ, NM, NY, NC, ND, OR, RI, SC, TN, VT, WA, WY	50.9 %	"Those who live in mobile homes… are particularly vulnerable, for without the appropriate warning, or access to a tornado shelter, they can rapidly become involved in a life-threatening situation" (Mississippi SHMP, 2018, p. 223).
Rural areas	AK, AR, CT, ID, IL, IN, KS, KY, ME, MA, MA, MI, MN, MS, MO, NM, NY, ND, OK, OR, PA, PA, RI, TN, TX, VT, WA	49.1 %	"An important consideration for understanding the population of Rhode Island is the divide between urban and rural populations. Nationwide, communities are becoming more urban. In Rhode Island, 90.7 % of the population is urban compared to 80.7 % of the United States. Some considerations for addressing risks in both urban and rural areas include mobility and access to transportation and income fluctuations between urban and rural populations. The urban-rural divide can contribute to differences in mobility. Mobility is an important population characteristic to consider for hazard mitigation planning as it can affect community members' resources and ability to adequately prepare for and recover from disasters. Lack of mobility can also present challenges in educating the public on the hazards facing the community" (Rhode Island SHMP, 2019, p. 1–5).
Housing – Density	AZ, CA, CO, CT, ID, KS, ME, MA, MI, MN, MS, MO, MT, NE, NV, NJ, NM, NC, ND, OK, RI, SD, VT, WA, WI	45.5 %	"Wildfires can be caused by human activities such as arson or campfires or by natural events such as lightning. Wildfires are not confined to forests but can easily ignite in other areas with adequate vegetation or fuel volumes and continuity such as sagebrush or cheatgrass. Additionally, wildfires can be classified non WUI or WUI fires based on their juxtaposition to structures and communities. WUI wildfires can then be further classified into urban fires, interface or intermix fires based on the density of structures and amounts of fire fuel between the structures" (Nevada SHMP, 2018, p. 3–161).
Housing – Quality	As, AZ, CA, CT, FL, GA, GU, HI, ID, IL, ME, MD, MA, MS,	40.0 %	"Residents may be displaced or require temporary to long-term sheltering. In addition, downed trees, damaged buildings and debris carried by high winds can lead to injury or loss of life. Socially vulnerable

Table 4: (continued)

Referenced in SHMPs	State/Territory	Percent SHMPs with reference	Select illustrative quotes
	NE, NM, NY, NC, OK, OR, PA, RI		populations are most susceptible, based on a number of factors including their physical and financial ability to react or respond during a hazard and the location and construction quality of their housing" (Connecticut SHMP, 2019, p. 308).
Housing – Other	AZ, CO, FL, GA, IL, KS, LA, ME, MA, MS, MT, NM, NY, ND, OK, SD, WA	30.9 %	"Growth pressures along the coastal areas of both counties continued to push seaside housing and lot prices higher, including areas that may be subject to coastal erosion, coastal landslides and hurricane storm surges" (Maine SHMP, 2019, p. 3–87).
Tribal lands	AK, AZ, CA, FL, GA, ID, KS, MN, MO, NV, NM, OK, PA, SD, WA, WY	29.1 %	"The 70 federally recognized tribes in the great plains are diverse in their land use, with some located on lands reserved from their traditional homelands, and others residing within territories designated for their relocation, as in Oklahoma. While tribal communities have adapted to climate change for centuries, they are now constrained by physical and political boundaries. Traditional ecosystems and native resources no longer provide the support they used to. Tribal members have reported the decline or disappearance of culturally important animal species, changes in the timing of cultural ceremonies due to earlier onset of spring, and the inability to locate certain types of ceremonial wild plants" (Oklahoma SHMP, 2019, p. 88–89)

wrought by natural hazards and other threats, and when effectively and equitably implemented, may contribute to strengthened community capacity (Birkland 2006; Wisner, Gaillard, and Kelman 2012).

Our research is the first to offer a systematic assessment of hazard mitigation plans for all 50 states and 5 U.S. territories regarding social vulnerability is conceptualized and which socially vulnerable populations and contextual drivers of vulnerability are included in plans. We found that states vary in terms of how they are defining social vulnerability and embedding this concept into the plans. Notably nearly two-thirds of SHMPs (61.9 %) explicitly refer to social vulnerability as a concept, defining or spending time discussing it. However, the level of depth

dedicated to the nuances of social vulnerability varied among the SHMPs. Some plans are comprehensive, including maps, graphics, detailed descriptions of socially vulnerable populations, and explanations of the importance of incorporating social vulnerability in to planning processes. Others dedicate a section to exploring and understanding social vulnerability in their state. Many only mention social vulnerability without engaging with the concept or clearly defining it. Notably, 22 SHMPs (38 %) do not include any reference to social vulnerability; with the updated FEMA guidance in place, it will be important to track whether these trends tick upward over time.

We also found that 24 (44 %) of the currently approved hazard mitigation plans use a social vulnerability index to quantify or geospatially locate vulnerable populations. Two thirds of these plans use Cutter et al.'s (2003) Social Vulnerability Index (SoVI). The Minnesota, Nebraska, and Oregon SHMPs use Flanagan et al.'s (2011) Centers for Disease Control and Prevention Agency for Toxic Substances and Disease Registry's Social Vulnerability Index (SVI). Nine states use their own social vulnerability index, while the remaining 28 states include no mention of any relevant indices. Again, with FEMA's focus on equity, future research should explore whether states and territories begin to integrate more robust measures of social vulnerability in future iterations of their plans.

Finally, and importantly, we offer a comprehensive listing of 27 vulnerable populations and 13 contextual factors that shape vulnerability related to housing, place, and transportation in SHMPs. We found, again, wide variability, with some socially vulnerable populations being mentioned in all (e.g., elder) or almost every SHMP (e.g., children, people with disabilities or medical issues) while others were mentioned in five SHMPs or less (e.g., immigrants, men, LGBTQAI + populations, refugees, religious minorities, girls). Veterans and boys were the only socially vulnerable populations that we coded for that were not mentioned in any SHMPs. The exclusion of boys is notable, given prior research that has found that boys and men are the most likely to perish in environmental extremes across the U.S. (Adams et al. 2020; Zahran, Peek, and Brody 2008). Similarly, some contextual factors related to housing, place, and transportation are included in about half of the SHMPs (e.g., living in mobile homes and rural areas) while others (e.g., affordable housing and uninsured/underinsured housing) only being mentioned in five or fewer SHMPs, respectively.

This research builds on important previous examinations of how socially vulnerable populations are accounted for in hazard mitigation and disaster plans (Anguelovski et al. 2016; Berke et al. 2010; Cooper 2004; Meerow, Pajouhesh, and Miller 2019). This prior work established that socially vulnerable populations are rarely considered in important planning documents. In our study, we found that while a sizeable portion of SHMPs do mention social vulnerability and when

considered, the inclusion varied in terms of depth. For instance, many states fail to incorporate social vulnerability as a tool, but rather use it as a descriptor (also see Habets et al. 2024). Adding useful measures of social vulnerability, such as a social vulnerability index, could greatly improve states' understanding of who is socially vulnerable within their state and where these populations reside (Cutter, Boruff, and Shirley 2003).

Analyses of social vulnerability, or "the sociodemographic characteristics of a population and the physical, social, economic, and environmental factors that increase their susceptibility to adverse disaster outcomes and capacity to anticipate, cope with, resist, and recover from disaster events" (Adams et al. 2022, p. 14) in mitigation and planning is crucial for addressing root causes of disasters (Blaikie et al. 2004; Tierney, Lindell, and Perry 2001; Wisner, Gaillard, and Kelman 2012). Further, it is also necessary to consider both historical and contemporary social conditions that serve to advantage or disadvantage groups (Peek, Wachtendorf, and Meyer 2021). As Anguelovski and colleagues (2016) state, inequitable outcomes are "reinforced through a combination of exclusionary planning, unequal distribution of adaptation benefits, and perpetuation of unsustainable development patterns" (343).

5.1 Limitations and Future Research

Our hope is that this research can be useful as states and territories begin to update their plans in response to the most recent FEMA guidance. With that in mind, there are limitations to this research. First, we did not rank the references in the text by level of detail, and therefore, a mention of a population (coded as 0 – absent or 1 – present) does not capture the depth of detail included. For example, some states mentioned fewer populations, but they went into greater depth of detail when discussing groups than other plans that simply listed groups. Further, our analytic strategy did not account for whether a population was mentioned once or several times.

Additionally, we were unable to analyze the 239 approved tribal government mitigation plans (FEMA 2024). This represents a significant oversight, as tribal populations (Carter and Peek 2016) and tribal areas (Farrell et al. 2021) are especially at risk of climate-related disasters. Our research timeline, scope, and funding did not allow us to review these plans, but we recommend future researchers replicate this process for tribal regions, as well as for local mitigation plans. In this spirit, we have published the quantitative and qualitative datasets that undergird this work, in hopes of enhancing the likelihood of future studies in this vein.

Lastly, we also were unable to address the process of how these plans were developed and by whom. Therefore, we know little about the decision-making process surrounding the inclusion (or exclusion) of socially vulnerable populations. In our future research, we plan to investigate how to strengthen support for states to assist with SHMP development, especially for State Hazard Mitigation Officers (SHMOs) and their partners who might need extra guidance and academic resources. This research will focus on understanding the capacity of SHMOs and their teams, as well as what resources are necessary to complete the development of SHMPs with robust inclusion of socially vulnerable populations. Putting the importance of mitigation at the forefront, SHMP development can open doors to new, significant understandings of how to assist residents in their state.

6 Conclusions

This analysis provides an opportunity for states to learn from one another about important populations to focus on when developing new SHMPs. With many states navigating their five-year updates, this analysis provides timely information for states on new ways to think about populations that have been shown to be more at risk through rigorous academic research and literature (Adams et al. 2022; Blaikie et al. 2004; Peek, Wachtendorf, and Meyer 2021; Thomas et al. 2013; Wisner, Gaillard, and Kelman 2012). Our research shows the potential for new SHMPs to include a wide range of socially vulnerable populations that might not have been considered in the previous versions of their mitigation plans. Our findings also highlight exemplary SHMPs and illustrative quotes for other states to emulate when updating their plans. Newly updated SHMPs can follow issued White House guidance under the Justice 40 initiative making "… it a goal that 40 percent of the overall benefits of certain Federal investments flow to disadvantaged communities that are marginalized, underserved, and overburdened by pollution" (The White House 2023). FEMA's Hazard Mitigation Assistance (FEMA 2023b) and Risk Mapping, Assessment and Planning (FEMA 2023c) programs fall under the Justice40 guidance, which provides a historic opportunity to address social vulnerability through resource allocation to historically marginalized groups. This new potential for inclusion, coupled with measures of social vulnerability to identify areas in the state or territory with these populations, provides an opportunity to mitigate harm to those who suffer most from natural hazards based on a deep understanding of social vulnerability (Anguelovski et al. 2016; Berke et al. 2010; Cooper 2004; Meerow, Pajouhesh, and Miller 2019).

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