

State Hazard Mitigation Plans, Structures, and Social Vulnerability



Lori Peek, Ph.D.
Director, Natural Hazards Center and CONVERGE
Professor, Department of Sociology
University of Colorado Boulder



NSF Award #1635593 and #1841338



Natural Hazards Center



CONVERGE

Presentation Overview

1. Motivation and Research Team
2. State Hazard Mitigation Plans and Social Vulnerability
 - Definitions
 - Linking
3. Methods and Datasets
4. Findings Preview
5. Resources



University of Colorado **Boulder**





Motivation

- Socially vulnerable groups and populations have **less power and fewer resources**, making it **more difficult to prepare for, respond to, and recover** from natural hazards.
- However, social vulnerability is often overlooked in hazard mitigation planning, and we know little about what works for engaging diverse populations in structural risk reduction.
- To fill this knowledge gap, we applied for and received funding from a philanthropic organization to review and assess policy, programs, and practices that lessen social vulnerability and reduce risk.



University of Colorado **Boulder**



Motivation

- Socially vulnerable groups and populations have less power and fewer resources, making it more difficult to prepare for, respond to, and recover from natural hazards.
- However, **social vulnerability is often overlooked** in hazard mitigation planning, and **we know little about what works for engaging diverse populations** in structural risk reduction.
- To fill this knowledge gap, we applied for and received funding from a philanthropic organization to review and assess policy, programs, and practices that lessen social vulnerability and reduce risk.



University of Colorado **Boulder**



Motivation

- Socially vulnerable groups and populations have less power and fewer resources, making it more difficult to prepare for, respond to, and recover from natural hazards.
- However, social vulnerability is often overlooked in hazard mitigation planning, and we know little about what works for engaging diverse populations in structural risk reduction.
- To fill this knowledge gap, we applied for and received funding from a philanthropic organization to **review and assess plans** with a focus on social vulnerability and hazard mitigation.



University of Colorado **Boulder**



Research Team



Mary Angelica Painter
Research Associate,
Natural Hazards Center
University of Colorado
Boulder



Melissa Villareal
Research Affiliate.
Natural Hazards Center
and
ORISE Postdoctoral Fellow,
U.S. Forest Service



Lori Peek
Director,
Natural Hazards Center
and
Professor,
Department of Sociology
University of Colorado
Boulder



University of Colorado **Boulder**

A large helicopter, marked "LA COUNTY FIRE", is shown in flight, dropping a massive stream of water onto a wildfire. The water falls in a wide, powerful column, creating a large splash and mist. The background consists of dry, hilly terrain with some green vegetation and smoke rising from the fire. The sky is clear and blue.

What is a State Hazard Mitigation Plan (SHMP)?

What is a State Hazard Mitigation Plan?

- State Hazard Mitigation Plans (SHMPs) **establish programs, projects, and protocols** for how states will lessen harm from natural hazards using long-term strategies.
- SHMPs **set priorities**, such as deciding which infrastructure is critical or determining the specific populations that need extra protection from harm.
- FEMA requires each state, tribal area, and territory to develop a SHMP, which must be **updated every five years**, for the locality to be eligible to apply for **disaster relief grants** and funding for **disaster mitigation**.



University of Colorado Boulder



What is a State Hazard Mitigation Plan?

Importantly, states, as well as counties, tribal areas, and territories need **an approved hazard mitigation plan to receive funding for mitigation.**

For states, funding opportunities include(d):

- **Building Resilient Infrastructure and Communities (BRIC)** Program for capacity-building, encouraging innovation, and supporting partnerships
- **Hazard Mitigation Grant Program (HMGP)** for rebuilding after a presidentially declared disaster
- **Flood Mitigation Assistance, Fire Mitigation Grants**, among others.



University of Colorado Boulder





What is Social Vulnerability?



What is a Social Vulnerability?

- Social vulnerability refers to historical, social, political, economic, and cultural dimensions that **influence the ability of people and entire groups to prepare for, cope with, and recover** from a natural hazard event.
- Socially vulnerable populations can experience **worsening inequalities that already exist** in the wake of a disaster.
- Understanding social vulnerability is crucial for emergency management, **as identifying and locating these populations can reduce harm** caused by natural hazards.



University of Colorado Boulder



Why Social Vulnerability for SHMPs?



Hazard Mitigation Planning in the U.S.

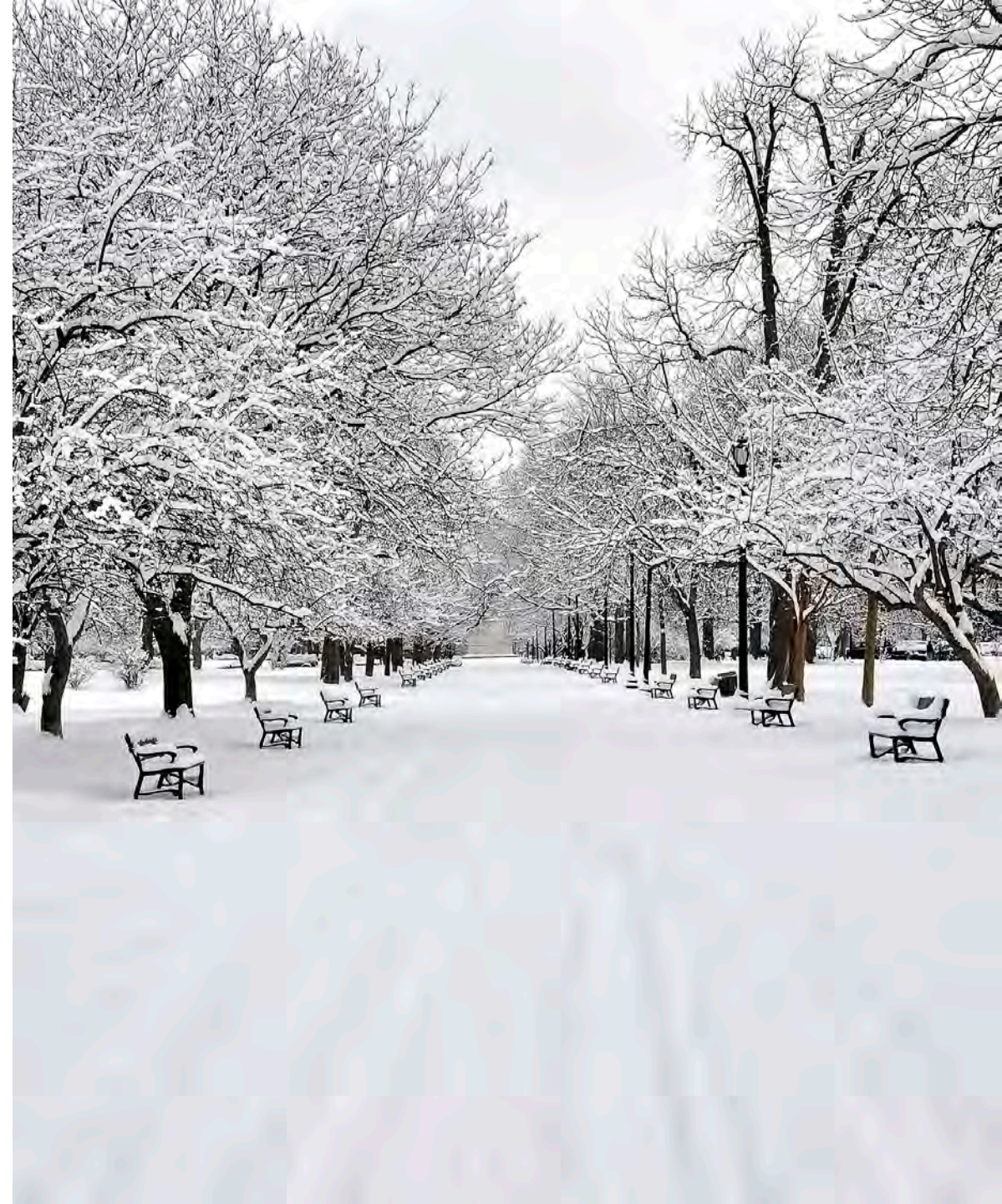
1988 Stafford Act and the **2000 Disaster Mitigation Act** created a framework for hazard mitigation planning.

Basic Formula for Hazard Mitigation Plans:

- **Organize** resources and the mitigation planning process
- **Assess** risk
- **Develop** a mitigation strategy
- **Adopt/implement** the plan



University of Colorado **Boulder**



Hazard Mitigation Planning in the U.S.

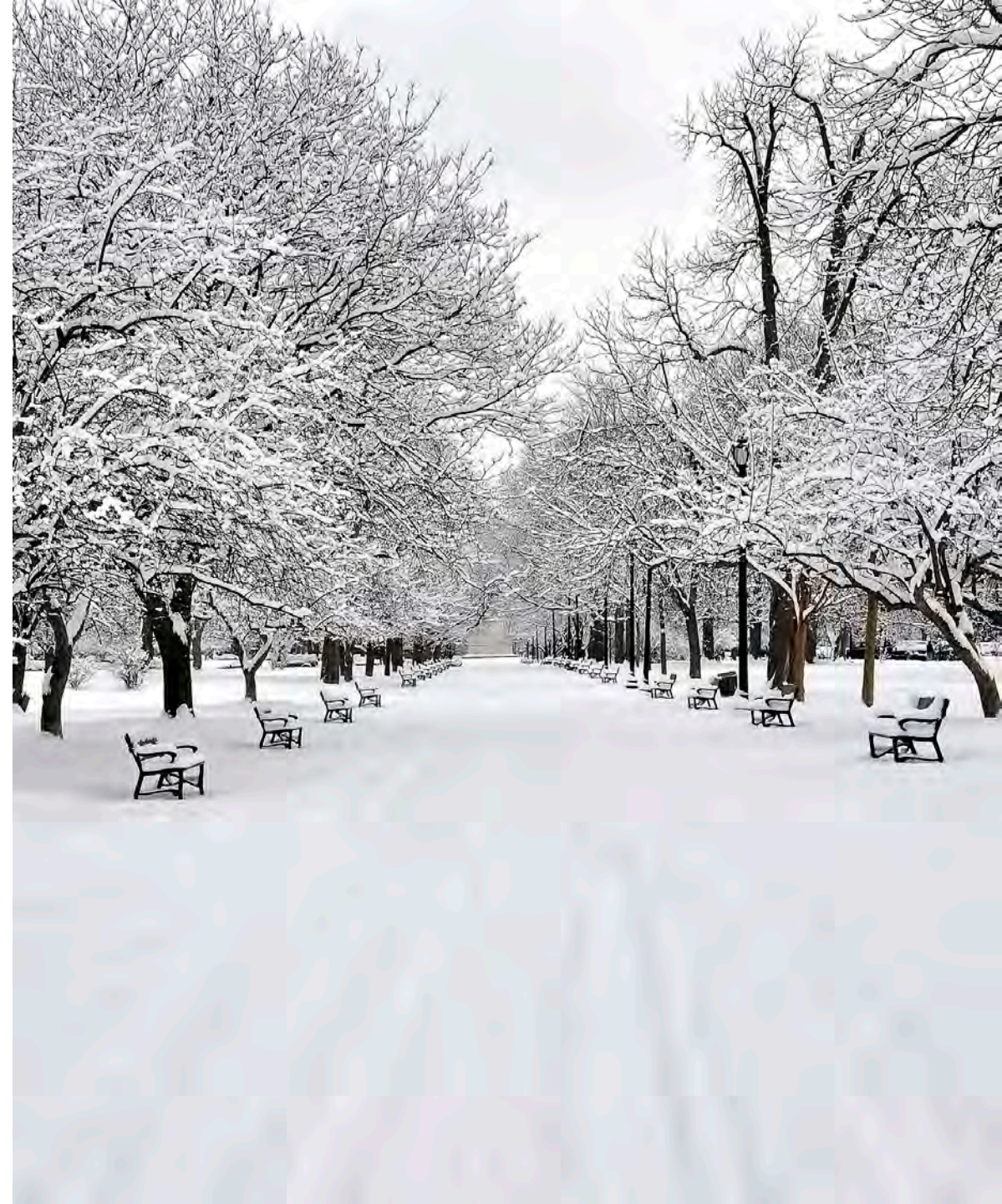
1988 Stafford Act and the **2000 Disaster Mitigation Act** created a framework for hazard mitigation planning.

Basic Formula for Hazard Mitigation Plans:

- **Organize** resources and the mitigation planning process
- **Assess risk**
- **Develop** a mitigation strategy
- **Adopt/implement** the plan

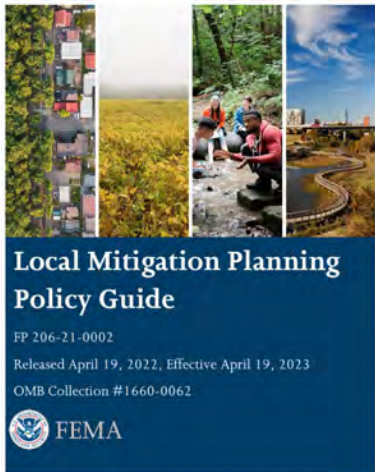


University of Colorado Boulder

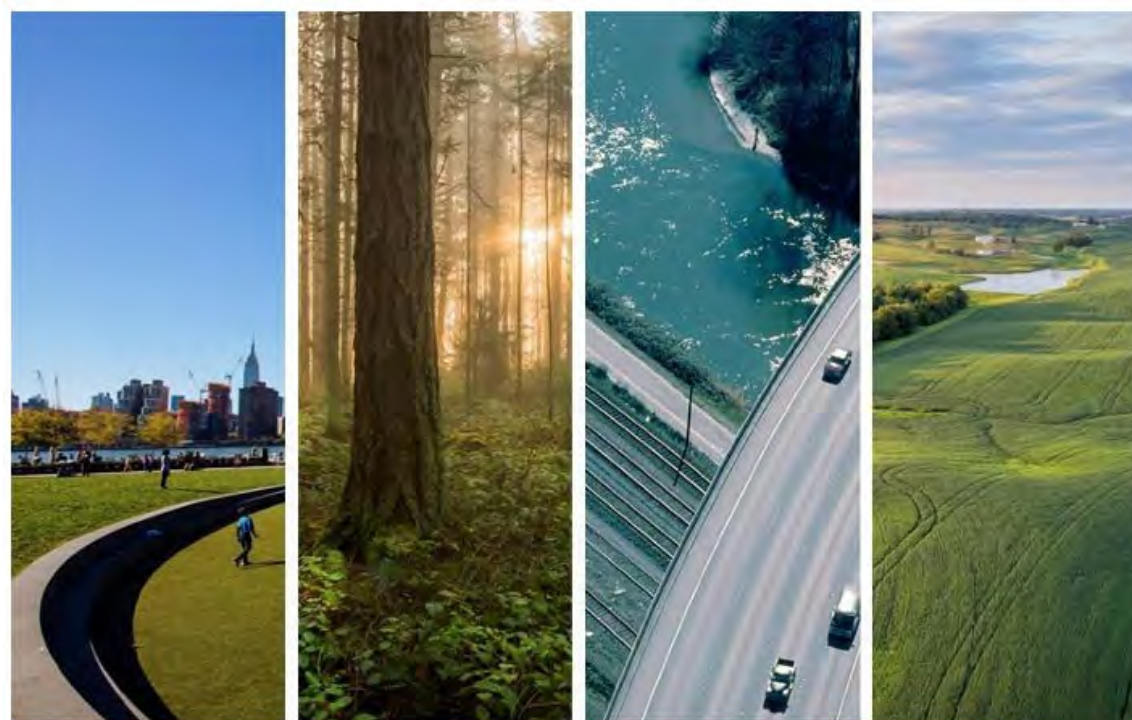


Hazard Mitigation Planning in the U.S.

As of **April 2023**, **changes** to guidance from FEMA on Hazard Mitigation Plans encouraged the inclusion of **community partnerships** and **climate and equity** concerns....



University of Colorado Boulder



State Mitigation Planning Policy Guide

FP 302-094-2

Released April 19, 2022, Effective April 19, 2023

OMB Collection #1660-0062



FEMA

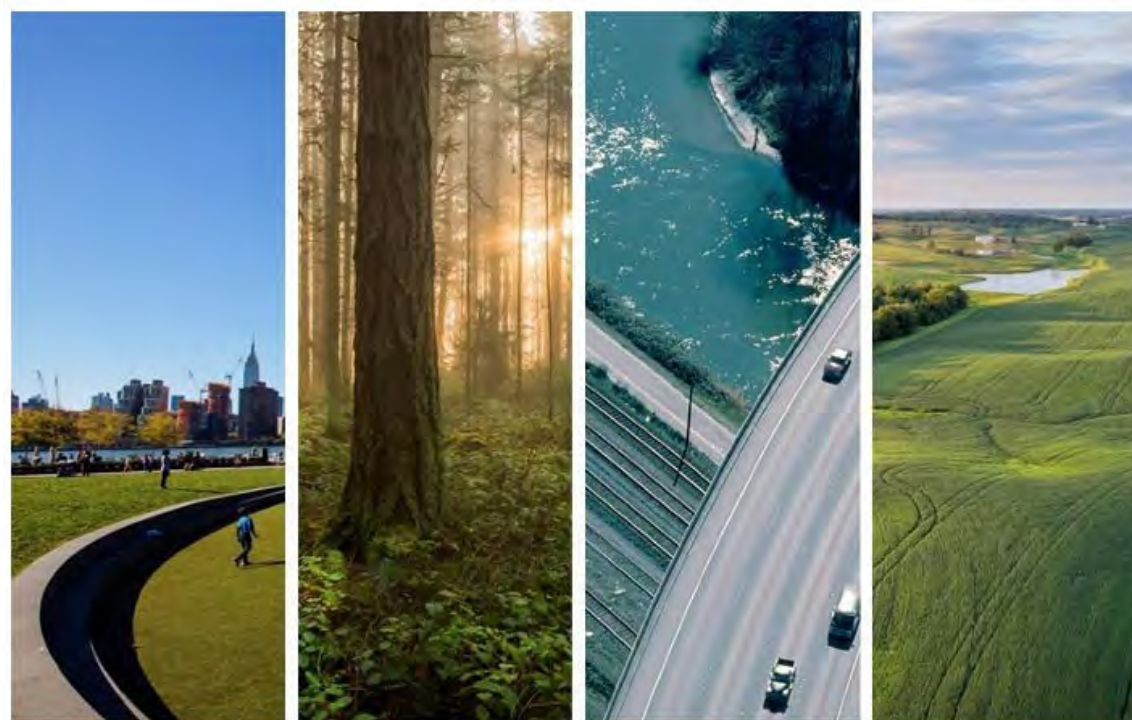
Hazard Mitigation Planning in the U.S.

As of **April 2023**, **changes** to guidance from FEMA on Hazard Mitigation Plans encouraged the inclusion of **community partnerships** and **climate and equity** concerns....

....a **social vulnerability** framework can help meet the goals of the **new guidelines** while also improving risk assessment.



University of Colorado Boulder



State Mitigation Planning Policy Guide

FP 302-094-2

Released April 19, 2022, Effective April 19, 2023

OMB Collection #1660-0062



FEMA



What We Know About Hazard Mitigation Planning and Social Vulnerability



University of Colorado Boulder

- Cooper (2004) found—across 90 local mitigation plans and focal states—**socially vulnerable populations were rarely represented**.
- Berke, Cooper, and colleagues (2010) developed a framework to account for vulnerabilities and capacities of populations, with **a key principle being the need to define and include socially vulnerable populations** in the planning process.
- Other studies have found **limited focus on disproportionate impacts** of populations in hazard and climate planning (Anguelovski et al., 2016; Meerow et al., 2019).

Cooper, J. H. (2004). The Disadvantaged in Community Ratings System Hazard Mitigation Plans (Publication No. 3156131). Doctoral dissertation. Chapel Hill, NC, USA: University of North Carolina at Chapel Hill. ProQuest Dissertations Publishing.

Berke, P., J. Cooper, D. Salvesen, D. Spurlock, and C. Rausch. 2010. "Disaster Plans: Challenges and Choices to Build the Resiliency of Vulnerable Populations." International Journal of Mass Emergencies and Disasters 28 (3): 368–94.

Anguelovski, I., L. Shi, E. Chu, D. Gallagher, K. Goh, Z. Lamb, K. Reeve, and H. Teicher. 2016. "Equity Impacts of Urban Land Use Planning for Climate Adaptation: Critical Perspectives from the Global North and South." Journal of Planning Education and Research 36 (3): 333–48.

Meerow, S., P. Pajouhesh, and T. R. Miller. 2019. "Social Equity in Urban Resilience Planning." Local Environment: The International Journal of Justice and Sustainability 24 (9): 793–808.



University of Colorado Boulder

- Work by Sutley and colleagues (2017) demonstrates the importance of integrating social vulnerability concerns.
- Their work shows that coupling **social and physical characteristics improved risk-informed decision making** for selecting community-level seismic retrofit plans.

Sutley, E.J., J. W. van de Lindt, L. Peek. (2017). Community-level framework for seismic resilience. I: Coupling socioeconomic characteristics and engineering building systems *Natural Hazards Review* 18 (3), 04016014.

Sutley, E.J., J. W. van de Lindt, L. Peek. (2017) Community-level framework for seismic resilience. II: Multiobjective optimization and illustrative examples *Natural Hazards Review* 18 (3), 04016015



University of Colorado **Boulder**

We wanted to know how SHMPs
characterize and measure
social vulnerability, what
populations are included (or
excluded) from SHMPs, and how
these **populations are**
integrated into the planning
process.





METHODS



Content Analysis

Content analysis is the **study of documents** or other “communication artifacts” (speeches, photographs, etc.) to assess **prevalence of words** or to **identify patterns or themes** in a systematic manner.

- Whether a socially vulnerable population **was mentioned** at all in the context of risk?
- The **different places** in plans that socially vulnerable populations are mentioned?
- **Direct quotes** that show the language used to discuss special populations at risk?



Documents Reviewed

Our research team constructed a **qualitative and quantitative dataset**—which we ultimately published on DesignSafe—of publicly available SHMPs for **all 50 U.S. states and the 5 inhabited U.S. territories from 2016 – 2021**.



Data Collection

SHMPs are **available publicly through various agency websites**, and all 50 state plans and 5 U.S. territory plans were available in PDF format to download.

- Our research team involved **multiple researchers**, identifying key terms and themes, **and double checking mentions** at various stages of the research process.
- We conducted **Quality Assurance and Quality Control (QAQC) procedures**, such as pre- and post-study checks across a random sample of plans.



University of Colorado Boulder



Data Collection

- We also collected **contextual quotes** to help with highlighting key concepts and considerations for each socially vulnerable population.
- Through the phase of qualitative data collection—which occurred simultaneously with quantitative data collection—we **continuously checked for errors in the first phase of data collection**, updating the quantitative database further.
- We conducted **descriptive statistical analysis** using the number of socially vulnerable populations and contextual factors.



University of Colorado Boulder



FINDINGS

Prevalence of Social Vulnerability

- From 2016-2021, **60% of SHMPs included some reference to social vulnerability**, while 40% had no reference to social vulnerability (or related concepts).
- 49% of SHMPs also included a **social vulnerability index (SVI)** — a tool that measures and locates socially vulnerable populations.

*“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.”*

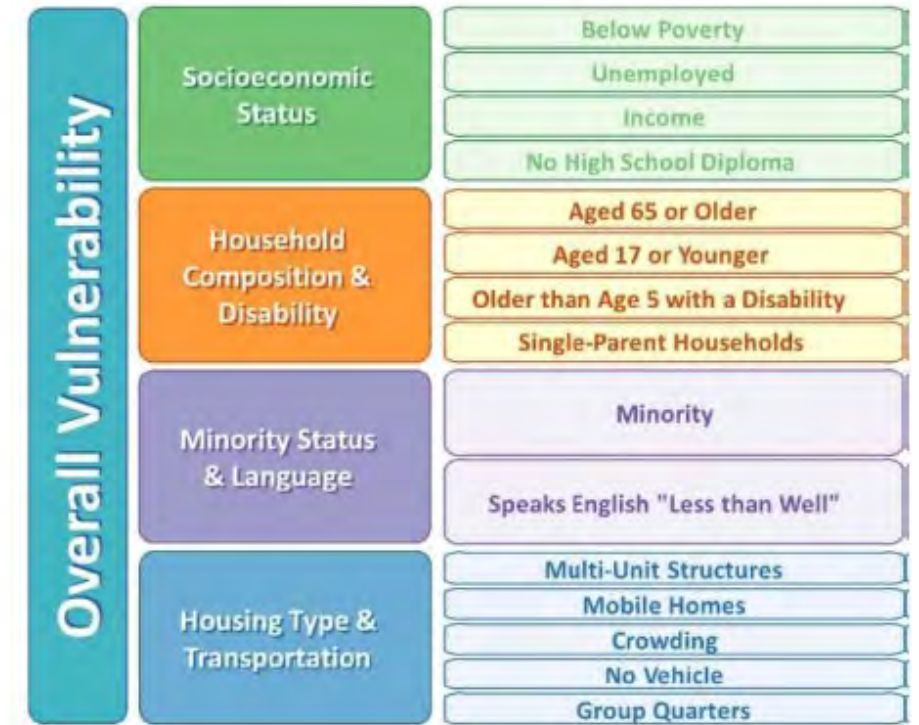
Minnesota SHMP, 2018: 34-35



University of Colorado **Boulder**

Prevalence of Social Vulnerability

- From 2016-2021, 60% of SHMPs included some reference to social vulnerability, while 40% had no reference to social vulnerability (or related concepts).
- 49% of SHMPs also included a social vulnerability index (SVI)** — a tool that measures and locates socially vulnerable populations.

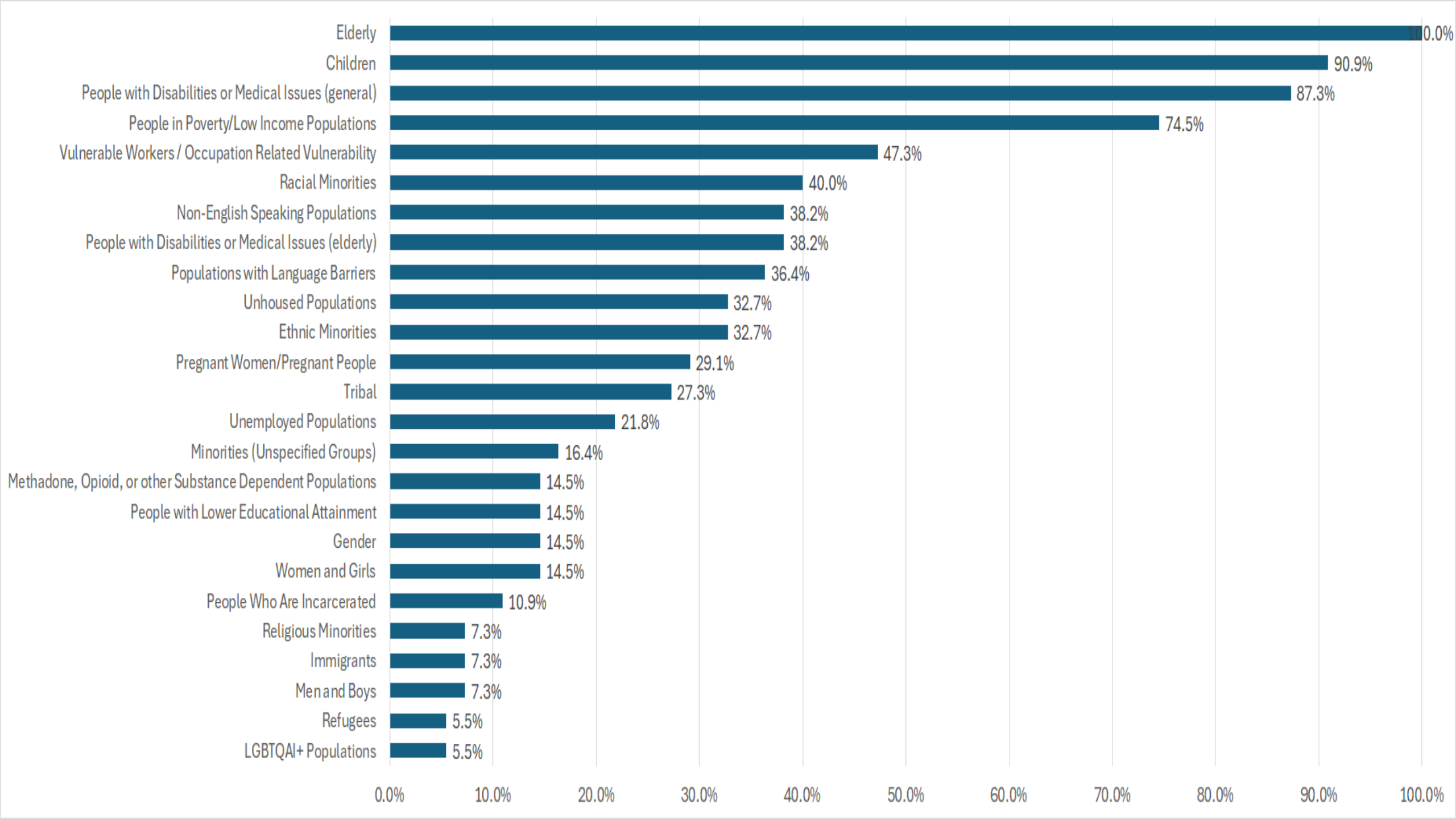


The CDC/ATSDR SVI, used in three SHMPs

Prevalence of Socially Vulnerable Populations



University of Colorado **Boulder**



*“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: 3-10

Socially Vulnerable Populations

- **All states and U.S. territories mention the elderly in their plans**, while other populations appear often:
- **Children: 89.1%**
- **People with Disabilities: 89.1%**
- **People living in in Poverty: 70.9%**



University of Colorado **Boulder**



Socially Vulnerable Populations

- All states and U.S. territories mention the elderly in their plans, while other populations appear often:
- **Children: 90.9%**
- **People with Disabilities: 87.3%**
- **People Living in Poverty: 74.5%**

Some populations are mentioned less....

Non-English-Speaking Populations	41.8%
Racial Minorities	40.0%
Vulnerable Workers / Occupation Related Vulnerability	38.2%
Populations with Language Barriers	36.4%
Ethnic Minorities	32.7%



And some even less so...

Women and Gender

14.5%

Immigrants

9.1%

**Substance
Dependent
Populations**

14.5%

Prisoners

10.9%

Religious Minorities

7.3%

LGBTQAI+ Persons

7.3%

Refugees

7.3%



University of Colorado **Boulder**

Low-income populations and the places they live and work are especially at risk to extreme heat. This will require investments in “long-term maintenance... to fix and repair heat related damages to HVAC systems, roofs, and other heat susceptible materials.”

Arizona SHMP, 2018: 71

Making Connections?

- 40% of plans included no mention of social vulnerability.
- Those that did mostly included the populations in a “list format” without context for how hazard exposure or quality of the built environment might exacerbate social vulnerability.
- Plans rarely made linkages between population characteristics, the built environment, and the need for targeted mitigation efforts.
- Almost no plans included guidance for developing **community partnerships** to advance mitigation objectives.



University of Colorado Boulder



Resources: Manuscript and Data



Mary Angelica Painter*, Melissa Villarreal and Lori Peek

State Hazard Mitigation Plans and Social Vulnerability

<https://doi.org/10.1515/jhsem-2024-0023>
Received April 15, 2024; accepted January 1, 2025

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

*Corresponding author: Mary Angelica Painter, Natural Hazards Center, University of Colorado Boulder, Boulder, CO, USA, E-mail: mary.painter@colorado.edu. <https://orcid.org/0000-0002-0910-5365>
Melissa Villarreal and Lori Peek, Natural Hazards Center, University of Colorado Boulder, Boulder, CO, USA; and Department of Sociology, University of Colorado Boulder, Boulder, CO, USA

DesignSafe Project: PRJ-4241

PRJ-4241 | State Hazard Mitigation Plans and Social Vulnerability

Download Dataset

PI	Peek, Lori
Co-PIs	Painter, Mary Angelica; Villarreal, Melissa; Singh, Chandrika
Project Type	Field research Social Sciences
Natural Hazard Type(s)	Multiple Hazards
Keywords	State Hazard Mitigation Plans, Social Vulnerability, Marginalized Populations, Risk Reduction, Built Environment, Equity

View Data Diagram | Leave Feedback

Description:
U.S. state, territorial, and tribal government officials develop State Hazard Mitigation Plans (SHMPs) to assist in reducing the risk of disaster impacts on people, physical infrastructure, and the natural environment. The Federal Emergency Management Agency (FEMA) approves SHMPs every five years as a requirement to be eligible to receive funding for FEMA disaster relief grants and disaster mitigation projects. As of April 2023, updated FEMA policy guidance for SHMPs is in effect that calls for greater community engagement in the planning...
[Show More](#)

Mission 2016-2021 State Hazard Mitigation Plans (SHMPs) and Social Vulnerability Qualitative Data
Cite This Data: Peek, L. M. Painter, M. Villarreal, C. Singh (2024). "2016-2021 State Hazard Mitigation Plans (SHMPs) and Social Vulnerability Qualitative Data", in <i>State Hazard Mitigation Plans and Social Vulnerability</i>. DesignSafe-Cl. https://doi.org/10.17603/ds2-g8tz-qg93 Download Citation: DataCite XML RIS BibTeX 16 Downloads 246 Views 0 Citations Details
☒ View Data
Mission 2016-2021 State Hazard Mitigation Plans (SHMPs) and Social Vulnerability Quantitative Data
Cite This Data: Peek, L. M. Painter, M. Villarreal (2024). "2016-2021 State Hazard Mitigation Plans (SHMPs) and Social Vulnerability Quantitative Data", in <i>State Hazard Mitigation Plans and Social Vulnerability</i>. DesignSafe-Cl. https://doi.org/10.17603/ds2-sc34-as63 Download Citation: DataCite XML RIS BibTeX 31 Downloads 335 Views 0 Citations Details
☒ View Data

DOI: [10.1515/jhsem-2024-0023](https://doi.org/10.1515/jhsem-2024-0023)



University of Colorado Boulder

Acknowledgements

The Natural Hazards Center thanks the **Margaret A. Cargill Philanthropies** and **NSF-funded DesignSafe** for the cyberinfrastructure that made sharing this work possible.

We also acknowledge **Simran Chowdhari** and **Dhruv Seth**, undergraduate research assistants, and **Heather Champeau**, graduate research assistant, for their support with this project. This research was funded by a philanthropic organization and the Institute of Behavioral Science at the University of Colorado Boulder.



University of Colorado Boulder





University of Colorado **Boulder**

THANK YOU



Questions? Contact:
Mary Angelica Painter, Ph.D.
Mary.Painter@Colorado.edu

hazards.colorado.edu
converge.colorado.edu

Subscribe Now



NSF Award #1635593 and #1841338



Natural Hazards Center



CONVERGE