

RESEARCH BRIEF SERIES WEATHER READY

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This research brief is part of a call designed to help advance knowledge regarding how diverse community members perceive wildfire risk, prepare for wildfire threats, understand fire weather observations and forecasts, receive fire weather alerts and warnings, make evacuation decisions, and respond to and recover from the impacts of a wildfire.

WILDFIRE, SMOKE, AND POWER SHUTOFFS HOW RESIDENTS PERCEIVE CO-OCCURRING AND COMPOUNDING WILDFIRE HAZARDS IN NORTHERN CALIFORNIA

SUMMARY

Wildfire threatens the lives, homes, and property of people living in fire-prone regions of the West, while associated wildfire smoke and power shutoffs pose serious health risks and cause disruptions of daily life for populations living both near and far from actively burning areas.

Individuals and communities in the West are faced with the challenge of responding and adapting to co-occurring wildfire hazards and their potentially compounding effects. However, little is known about the processes or factors that influence an individuals' feelings or actions around wildfire hazards. Few studies consider wildfire risk, smoke exposure, and power disruption at once.

This study investigated how people both perceived and responded to these co-occurring and compounding hazards, drawing on semi-structured interviews (N=45) with residents and key informants across three fire-prone counties in Northern California.

Our findings can inform actions or policies to reduce vulnerability across all three hazards.



Daytime view of ash and smoke floating over the Bay Area, California during record wildfires in September 2020.

Photo credit: Svetlana SF, Shutterstock.

KEY FINDINGS

- Participants perceived wildfire as the most significant threat, followed by smoke and power shutoffs. In events when fire, smoke, and power shutoffs occurred simultaneously, most described primarily being concerned with their own physical safety and the safety of their friends, family, and neighbors from the direct effects of a fire.
- Participants' *response efficacy*—their belief in the effectiveness of an action to mitigate threat—was high for wildfires. Most felt capable of responding to wildfires through actions to reduce risk, like creating defensible space around their home, and emergency preparedness, like planning an evacuation route.

- Most participants also perceived wildfire smoke to be a serious threat. However, there is evidence that some participants outside the “high-risk” categories (children, older adults, or people suffering from asthma) may underestimate their susceptibility to the negative impacts of smoke exposure.
- Many participants reported taking action to respond to wildfire smoke, including wearing a mask, staying indoors, using an air filter, or in some cases, temporarily leaving the area. However, while residents demonstrated knowledge of protective actions, many expressed frustration and a low-level of response efficacy in the face of increasingly frequent and severe smoke events.
- Many participants reported that repeated and prolonged exposure to wildfire smoke had negative impacts on their mental health and well-being.
- Participants generally described high response efficacy in addressing power disruption in their community, but some expressed concerns about generator misuse or poor placement, as well as difficulties managing extreme heat or accessing clean water (for residents who have well-water) during a power shutoffs.



A heavy layer of wildfire smoke blankets northern California in September 2020. Photo credit: Danita Delimont, Shutterstock.

RESEARCH IMPLICATIONS

- To improve the ability of residents to respond to smoke while evacuating safely or seeking temporary shelter, community organizations and/or public health agencies can encourage the inclusion of masks and/or filtration devices in evacuation kits or “go-bags.”
- There is a need for stronger communication about the universal health risks of wildfire smoke exposure. Public health campaigns should focus on dispelling the notion that only specific groups are at risk and emphasize that smoke poses serious health risks for all populations, regardless of age or pre-existing conditions. This approach could close gaps in risk perception and encourage protective responses.
- More robust support and research on the mental health impacts of frequent and prolonged smoke events is needed.
- Local governments and community organizations should prioritize outreach and education on safe generator use, while ensuring equitable access through subsidies or distribution programs tailored to at-risk populations.

AUDIENCE

This research is useful for public health agencies and local governments interested in developing more holistic, multi-hazard interventions and educational campaigns for wildfire preparedness and response.

Full report: Santana, F. N., Huber-Stearns, H., French, N. H., Bell, S. A., & Fischer, A. P. (2025). *Wildfire, Smoke, and Power Shutoffs: How Residents Perceive Co-Occurring and Compounding Wildfire Hazards in Northern California*. (Natural Hazards Center Weather Ready Research Report Series, Report 20). Natural Hazards Center, University of Colorado Boulder. hazards.colorado.edu/weather-ready-research/wildfire-smoke-and-power-shutoffs



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