



RESEARCH BRIEF

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Wildfire Smoke: Behavior Matters, But How to Best Influence It?

Behavioral responses to wildfire smoke events differ between high- and low-income households, revealing inequities in current policies and resulting in elevated risks to individuals' physical and mental health.

Background

Pollution from wildfires is increasingly contributing to poor air quality globally. The annual area burned by wildfires in the United States has more than doubled in recent decades, because of a century of fire suppression and a warming climate that has left the resulting abundant fuels much more flammable. This increase in fire activity has led to substantial increases in smoke exposure across the continental United States, potentially reversing decades of improvements in air quality. Absent substantial intervention, these trends are expected to continue and perhaps accelerate in a warming climate. In some regions, wildfire smoke is now a significant source of one of the more serious pollutants to human health, particulate matter or PM_{2.5}, which during smoke events can often be found indoors at levels 3-4 times higher than health-based guidelines.

The scope and scale of how harmful events such as smoke from wildfire are to human health depend in part on choices that individuals make - or are unable to make - regarding their personal level of exposures. Understanding which features are most important in driving decisions about individual response is important for policy

POINTS FOR POLICYMAKERS

► **Policies targeting information provision and awareness raising about the effects of smoke are insufficient to enable protective behaviors.**

While awareness appears to be broadly shared across income levels, it does not lead to adequate health protection. Even among populations that own indoor monitors that provide access to accurate, real-time measures of their indoor concentrations, information alone is not enough to limit dangerous indoor exposures to these pollutants.

► **Wealth is not a strong indicator of exposure to outdoor smoke but it does appear to influence how individuals respond; wealth is also a weak indicator of smoke infiltration indoors.** Wealthier households can more easily stay home during wildfire smoke events, are more likely to seek information on protective technology, and are more likely to own indoor pollution monitors. This is likely because present infiltration rates appear to be dominated by actions such as opening windows and doors, not just housing materials or building quality that might be reflected in prices, meaning that many households' indoor environments remain highly exposed to smoke across socio-economic levels.

► **Current policy approaches that rely on individuals' undertaking self-protection to mitigate smoke health risks could be biased against disadvantaged groups.** The research suggests that these types of policies are difficult to comply with and employed alone, may still be inadequate. Many households' indoor environments remain highly exposed, and mobility data seems to demonstrate that following policy guidance may be particularly difficult for lower-income households. This policy approach also stands in stark contrast to the approach of public provision of protection used for other sources of PM_{2.5}. Those policies seek to reduce emissions of pollutants at their source and have successfully reduced overall ambient exposure inequalities.

design because impacts driven by a lack of awareness of one's exposure call for different policies than impacts driven by an inability to protect oneself from a known exposure. Such understanding is particularly important for wildfire, given that current policy approaches to risk mitigation are targeted to individual action — staying indoors, limiting infiltration and purchasing protective technologies.

To provide greater insight into why a given environmental exposure generates the effect it does, why this effect might differ across groups, and whether and how policy should respond, Stanford researchers analyzed data acquired from sources across California. These non-traditional sources included pollution sensors, social media posts, internet search terms, and smart-phone location data. The results suggest that policy reliance on self-protection to mitigate smoke health risks will have only modest benefits overall but also unequal benefits across different groups.



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This brief is based on **Exposures and behavioural responses to wildfire smoke** published in the journal *Nature Human Behaviour*.



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FOR MORE INFORMATION

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