



RESEARCH BRIEF

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The Changing Risk and Burden of Wildfire in the United States

Burned area from wildfire has roughly quadrupled in the U.S. over the last four decades, driven by a legacy of fire suppression over the last century that has led to massive accumulation of unburnt fuel, and by a warming climate, which has left these fuels drier and more flammable. These increases have happened in parallel to a substantial rise in the number of houses built in wildfire-prone areas (the “wildland-urban interface,” or WUI). An estimated nearly 50 million homes are currently in the WUI in the United States, a number increasing by a remarkable 1 million houses every 3 years. As firefighting efforts focus increasingly on the protection of private homes, these factors have contributed to a steady rise in spending on wildfire suppression by the U.S. government, which in recent years has totaled roughly \$3 billion per year.

Large increases in wildfire activity have been accompanied by substantial increases in the number of days with any smoke in the air across the United States, according to satellite data. These increases are already beginning to undo the substantial improvements in air quality observed in the U.S. in the last two decades, which were largely brought about by legislation such as the Clean Air Act. Worsening air quality is not limited to the West, as smoke from large fires can travel thousands of miles across the country, and even Midwestern and Eastern regions of the U.S. are now seeing growing smoke exposure. The researchers estimate that wildfires have accounted for up to 25% of all PM_{2.5} in recent years across the US as

POINTS FOR POLICYMAKERS

- ▶ **Current approaches to air quality regulation are at odds with the transboundary nature and growing contribution of wildfire smoke to air quality.** The United States treats air quality primarily as a local problem, wherein counties are penalized if pollutant concentrations exceed designated short- or long-term thresholds, and the Clean Air Act also potentially exempts wildfire smoke—but not smoke from prescribed burns—from attainment designation. However, exceptions to the Clean Air Act granted to the states for pollution impacts from wildfire smoke can erode gains from efforts aimed at reducing PM_{2.5} from other pollution sources.
- ▶ **Improving scientific methods and the ability to measure exposure to wildfire smoke would support better informed policy decisions.** We need more precise understanding of who will be most harmed by increasing wildfire risk, and that requires advancing our ability to measure and model smoke exposure.
- ▶ **While the nature of health impacts of smoke needs to be better understood, the large potential health benefits of wildfire mitigation through prescribed burning raise key questions about how to prioritize various wildfire management strategies.** A better quantitative understanding of the trade-offs between wildfire management strategies and the associated health impacts is necessary for policymakers to make more informed decisions. A related question is whether exposure to wildfire smoke has different health impacts than exposure to other sources of PM_{2.5}.
- ▶ **The interaction of climate change and wildfire risk raises questions about policy priorities going forward.** Future projected increases in wildfire smoke could approach projected overall increases in temperature-related mortality—which is the largest estimated contributor to economic damages in the United States. Wildfire could be the main impact of climate change felt by many—perhaps the majority of—Americans.
- ▶ **Wildfires have strongly interacted with the COVID-19 pandemic by impeding mitigation efforts and potentially by worsening COVID-related health outcomes as a result of the smoke.** The pandemic has to some degree impeded the ability of the government and private sector to respond to and reduce wildfire risk—with wildland firefighter trainings delayed or cancelled, convict firefighter crews unavailable due to early release from COVID outbreaks, and some fuels management treatments foregone. It is also probable that the smoke from the historic fire season of 2020 worsened COVID-related health outcomes, as early evidence suggests.

a whole, and accounted for more than half in some Western regions. These are roughly double the share of air pollution that wildfires accounted for only a decade ago.

Many scientific studies show that exposure to wildfire smoke can increase morbidity and mortality among exposed populations, ranging from acute respiratory distress to heart attacks to reduced cognitive function. The effects on individual health will depend on a variety of factors, including the existence of pre-existing conditions, disparities in time spent outdoors, and in the characteristics of indoor home and work environments, many of which could correlate with socioeconomic factors. For instance, infiltration of outdoor pollutants into homes is higher on average for older, smaller homes and for lower-income households, leading to disparities in exposure during wildfire events.



Future climate change is expected to further increase wildfire risk. The researchers calculate that the increasing smoke that this increased fire activity would bring will likely be one of the largest—and currently underappreciated—health and economic impacts of climate change in the U.S. Poor air quality is extremely costly, and large projected increases in future wildfire activity could dramatically worsen air quality throughout the country.

A primary tool for reducing wildfire risk—prescribed burning—is hardly in use in the U.S. outside the Southeast. This suggests a dramatic underinvestment in it as a risk mitigation strategy—particularly given the massive overall growth in wildfire risk.

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This brief is based on the perspective “**The changing risk and burden of wildfire in the United States,**” published in the *Proceedings of the National Academy of Sciences*.

FOR MORE INFORMATION

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