

COMMUNITY HEALTH VULNERABILITY INDEX

New tool helps public health officials identify vulnerable populations at risk from wildland fire smoke exposure

Overview

The increased frequency and intensity of wildfires in the United States are adversely affecting air quality and putting more people at a health risk from exposure to smoke. Smoke contributes to poor air quality in communities near a wildland fire and those farther away as the smoke travels downwind. During smoke events, air quality conditions can exceed the national air quality standards for particle pollution, which are designed to protect public health, as mandated by the Clean Air Act.

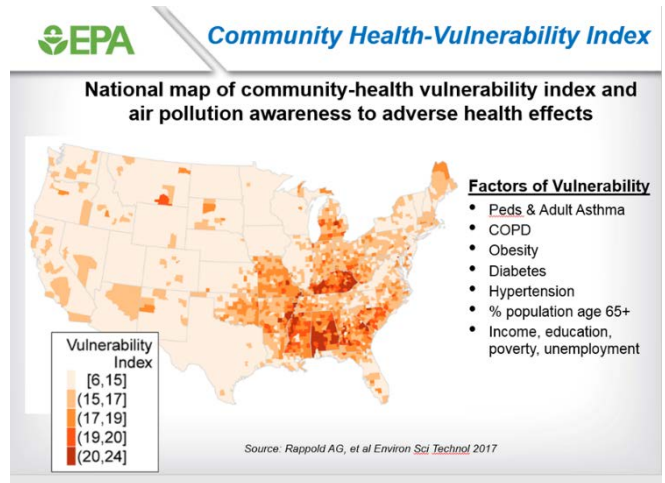
Exposure to extremely high levels of smoke from wildland fires can cause life threatening conditions and death. However, health problems can occur at much lower levels, particularly among susceptible individuals who live near wildfires and even in communities well downwind of a fire where smoke lingers for days and weeks.

Those at greater risk include people with lung or heart disease, diabetes and high blood pressure. Children, older adults, and those living in communities with poverty, unemployment and other indicators of social stress are also vulnerable.

In many states where hot and dry weather conditions fuel wildfires, communities and public health officials face challenges with educating people about the risks of smoke exposure. It is necessary to identify at-risk populations to develop early warning systems or advisories related to lower levels of potential smoke exposure. EPA's Community Health Vulnerability Index provides a new approach.

Community Health Vulnerability Index

EPA investigators have developed a Community Health Vulnerability Index (CHVI) that can be used to identify communities at higher health risk to wildland fire smoke exposure. Studies show that current efforts to alert the public are not always reaching those who



need it the most. Many people, especially those with medical conditions, visit the hospital or a clinic during periods when smoke is prevalent in a community and have little or no knowledge that they are at risk or what they should do to reduce their risk.

The index is based on factors known to define susceptibility to the adverse health effects of air pollution. These factors include county prevalence for asthma in children and adults, chronic obstructive pulmonary disease, hypertension, diabetes, obesity, percent of population 65 years of age and older, and indicators of socioeconomic status including poverty, income and unemployment. The data from the index can be coupled with air quality forecast data generated by models to develop maps of counties, regions or other designated areas where at-risk populations live. For example, a state can use the index to determine which counties are most at risk. They can then develop public health strategies aimed at communicating with at-risk residents in those counties about actions to take to reduce their smoke exposure and prevent health conditions from developing.

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Study Findings

In the study, researchers used the index to characterize the population size at risk from air pollution and wildfires in the continental United States, based on air quality simulated between 2008 and 2012. They found that the highest vulnerability is observed along the western slope of the Appalachian Mountains, parts of the Midwest, and parts of the South. These regions tend to have multiple factors that lead to this vulnerability including childhood asthma, preexisting cardiovascular diseases, metabolic diseases, and economic deprivation.

To provide context for study findings, the annual EPA air quality standard for fine particle pollution (PM_{2.5}) is 12 micrograms per cubic meter, *averaged over three years*. This study estimated that:

- 82.4 million individuals experienced moderate air quality levels between 15 and 35 micrograms per cubic meter *annually* due to PM_{2.5} from wildfires/
- 10.3 million individuals experienced unhealthy air quality levels greater than 35 micrograms per cubic meter for more than 10 days between 2008 and 2012

Researchers identified the most vulnerable U.S. counties and determined that those communities experience more frequent smoke exposures compared to less vulnerable communities.

Applications

The findings described in the study will be evaluated for use in disseminating public health information, and its applicability to land and fuel management practices to prevent large wildfires. This is only one example of an index, and it can be combined with more specific local information to help further inform public health strategies.

The State of North Carolina's Climate and Health Program needed a tool to focus and prioritize their climate and health adaptation efforts. The CHVI allowed the program to identify which counties had the highest exposure and are the most sensitive to smoke health impacts across North Carolina. Initially, the Program narrowed down to three counties with

the highest exposure rankings. Then they used the sensitivity rankings to decide on which county to focus. The program is currently working with stakeholders in Hoke County, the county identified a priority county using the CHVI, to develop public health interventions to reduce smoke health impacts.

The CHVI can be used by other health officials to develop and implement strategies to minimize smoke exposure and decrease the health and economic burden caused by wildfire smoke.

Citation:

Community Vulnerability to Health Impacts of Wildland Fire Smoke Exposure

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<https://www.ncbi.nlm.nih.gov/pubmed/?term=community+vulnerability+to+Health+Impacts+of+Wildland+Fire+Smoke+Exposure>

Resources:

EPA's Wildland Fire Research at:

<https://www.epa.gov/air-research/wildland-fire-research-protect-health-and-environment>

EPA's Fires and Health at:

https://airnow.gov/index.cfm?action=topics.smoke_events

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