

# Wildfire smoke can carry microbes that cause infectious diseases

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Wildfire smoke contains microbes, a fact that's often ignored, but one that may have important health repercussions.

In an article to be published Dec. 18 in *Science*, Leda Kobziar and George Thompson call the attention of the scientific community to the

health impacts of wildfire smoke's microbial content.

Smoky skies caused by [wildland fires](#) are becoming seasonal norms, especially in some parts of the United States and Australia. In 2020, raging wildfires in the Western U.S. have set new records and led to extremely unhealthy or hazardous air quality levels for many weeks in a row.

It's well-documented that exposure to wildfire smoke can damage the heart and lungs. Respiratory allergic and inflammatory diseases, including asthma and bronchitis, are also worsened by smoke exposure.

"The health impact of inhaling wildfire smoke increases dramatically during high-emissions wildfires and with long exposure," said Kobziar, associate professor of Wildland Fire Science at the University of Idaho. "Yet, the risk of infection to the [respiratory tract](#) after this exposure is frequently overlooked."

## **What role do microbes in wildfire smoke play in the spread of disease?**

Wildland fire is a source for bioaerosol, airborne particles made of fungal and bacterial cells and their metabolic byproducts. Once suspended in the air, particles smaller than 5  $\mu\text{m}$  can travel hundreds or even thousands of miles. Their movement depends on the fire behavior and the atmospheric conditions. Eventually, they are deposited or inhaled.

Bacteria and fungi can be transported in these wildland fire smoke emissions. While microbial concentration in smoke is higher near the fire source, these [microbes](#) may be active agents spreading infection. For example, coccidioidomycoses—a fungus that becomes airborne when

soils are disturbed- is the cause of Valley fever, a potentially serious infection.

"We don't know how far and which microbes are carried in smoke," said Thompson, associate professor of Clinical Medicine at UC Davis. "Some microbes in the soil appear to be tolerant of, and even thrive under, high temperatures following wildfires."

As Kobziar explained, "At the scale of a microbe, fire behavior research has shown that [heat flux](#) is highly variable, so it may be that many microbes aren't even subjected to the high temperatures for very long. They may also be protected in small clusters of particulate matter."

Kobziar and Thompson proposed a [multidisciplinary approach](#) to understanding the nature of the relationship between microbes, wildfire smoke and health. The complexity of the phenomenon calls for the expertise of scientists from different fields such as fire ecology, environmental microbiology, epidemiology, atmospheric sciences and public health and infectious disease.

"With longer [wildfire](#) seasons and higher severity trends, there is an urgency to work together in studying the behavior of the microbes carried by the smoke and their impact on human health," Thompson said.

**More information:** Wildfire smoke, a potential infectious agent. *Science* 18 Dec 2020, [DOI: 10.1126/science.abe8116](https://doi.org/10.1126/science.abe8116)

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