

California wildfires raise concerns about impacts to environment and health

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Smoke from the Camp Fire is affecting air quality in California and is visible from space. Credit: NASA

It never rains in California, so instead it burns—often—with prime fire conditions likely to persist until rainstorms arrive.

Meantime, deadly [wildfires](#) in California also impact USC as noxious smoke affects students and faculty, heightening concerns about impacts to environment and health.

Economics student Thomas Columbus said smoke crashed a beach party he and friends held last weekend, prompting people to leave early.

"It's unhealthy air outside," he said. "It's really bad, you can smell it, it gets in your lungs and makes you cough."

More than a nuisance, smoke from wildfires is a health threat. It can smear lungs with soot similar to how it sullies blue skies. It afflicts the most vulnerable populations, the elderly and children. Yet vigorous adults comprise an at-risk population, too. Smoke is no respecter of persons.

California wildfires studied by USC experts

At USC, faculty experts have been studying California's environment, air pollution and public health for years. Across disciplines and decades, they've amassed insight into why wildlands burn so much and how smoke harms people.

Kiros Berhane, professor of preventive medicine at the Keck School of Medicine of USC, has witnessed urban smog recede over the last two decades due to regulations and technology. He's part of a massive, ongoing epidemiological project called the USC Children's Health Study.

"The air is actually getting cleaner, but that doesn't mean there may not be spikes from time to time in local sources or wildfires," Berhane said. "The concern about the recent trend in wildfires is that as fires gain in intensity and severity, they could lead to losses of some of the gains we've made in the past."

Children are especially vulnerable to smoke. Their organs are growing rapidly and they inhale disproportionately larger doses of pollutants than adults. Said Berhane: "Smoke is a big deal for children. Our research shows that if they're exercising in a polluted environment, there's a higher probability of developing asthma or other respiratory symptoms."

Other sensitive populations include [elderly people](#) and those with preexisting conditions, such as asthma or chronic obstructive pulmonary disease.

When Santhi Iyer Kumar ran her own outpatient clinic, she recalled increases in patients during smoke or [air pollution](#) episodes. She's an assistant professor of clinical medicine and director of the Medical Intensive Care Unit at Keck Hospital of USC.

"Elderly people with lung disease are at especially

high risk. They have more chronic diseases and they don't have as much lung reserve as a younger person, so they should take all their meds and see their doctor if their condition gets worse," she said.

Smoke can be harmful to active adults, too. A jogger inhales about three- to five-times more air than someone at rest; a laborer or athlete under heavy exertion inhales about 10 times more air. That means much more smoke deposited in the lungs, said Ed Avol, professor of preventive medicine at the Keck School of Medicine.

The immediate health concern caused by California wildfires

Smoke itself is a noxious brew of chemicals. Of immediate concern are the microscopic particles, products of incomplete combustion, that are tinier than the width of a human hair and able to bypass the body's defenses and lodge deep inside the lungs. Also mixed up in smoke are industrial chemicals.

"There's lots of other chemicals in the smoke," Avol said. "It's not just wood burning, but homes and structures, plastics and shingles, asphalt and insulation, and it all goes in the air. There's hundreds of thousands of chemicals people may be inhaling during a fire event."

Wildfires are different now. They occur more often, burn hotter and affect more people. That's because there are more people and houses, and vast swaths of wildlands with accumulated fuel due to fire-prevention practices of the past century and tinder chaparral due to drought and heat.

Some of California's biggest, deadliest and most destructive wildfires have occurred in the past few years. Three major fires are raging throughout California this week, forcing evacuations and leaving a destructive path. During the past week, fires near Chico, Camarillo and Malibu have claimed at least 44 lives with dozens more still missing, some 14,000 homes and structures and about one-quarter million acres consumed.

"California's chaparral has had massive wildfires since records have been kept," said Travis

Longcore, an urban ecologist and professor at the USC School of Architecture and the Spatial Sciences Institute at the USC Dornsife College of Letters, Arts and Sciences. "The fires correlate with drought, extreme weather and ignition sources. Increasing number of fires is caused by more people and infrastructure on the landscape resulting in more ignitions. A changing climate with lower rainfall increases the intensity and size of these fires."

As the winds blow

Winds are fire's fickle friend, sweeping wildfires down canyon slopes, sloshing smoke back across the Los Angeles basin and carrying smoke into your body. The worst fires typically occur in autumn due to offshore winds that coincide at the end of long, hot summers. Coastal communities like Malibu and Santa Barbara sit precariously at the end of the bellows, below chaparral-cloaked cliffs and wedged against ocean. Coastal communities are often epicenters of destruction during blazes.

Sam Atwood, spokesman for the South Coast Air Quality Management District, reported an unusual spike in smoke advisories for the metropolis that includes USC. More than 20 such advisories have been issued this year, including five consecutive days this month, as air has been deemed unhealthy due to smoke. For the first time, the AQMD distributed 2,000 disposable N95 respirator masks to community centers, animal shelters and senior- and assisted-living locations last weekend, he said.

Five ways to stay safe from smoke

Check for smoke advisories

The South Coast Air Quality Management District issues daily advisories for communities where smoke reaches unhealthy levels. Advisories include fire details, meteorological conditions and preventive measures to protect people.

Avoid exertion

It's a bad idea to do strenuous outdoor play or work when it's smoky; it's a good idea to shelter indoors, limit physical activity and wait for blue skies.

Buy a mask

The so-called N95 half-face respirator mask blocks particles from entering your airways. Ordinary paper masks don't do much good.

Trust your senses

If your throat burns, your eyes sting or your nose itches, your body is telling you smoke is affecting you. Trust the sniff test and take precautions.

Adjust your auto A/C

When driving, you can avoid smoke by setting air conditioning to recirculate, which employs filters.

Provided by University of Southern California

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