

# Wildfire Smoke and Your Health: When Wildfires Hit Close to Home

**Narrator:** Wildfires have been in the news a lot lately – from the Northern California fires in 2017, to the Camp Fire in Paradise, California in 2018, and, more recently, the large wildfires in Australia. Driven by drier conditions and stronger, hotter winds, wildfires are increasing in frequency and size.

I sat down with Dr. Irva Hertz-Picciotto, a leading environmental health researcher at the University of California, Davis, to talk about what these wildfires may mean for our health.

**Hertz-Picciotto:** We've seen the size and intensity of wildfires increase, particularly in the last few years, from around 25,000 acres to what we're seeing now with multiple fires exceeding 100,000 acres because the hot winds and drier conditions that are fueling these fires makes them much more difficult to contain.

And now just this past season we've seen the incredibly destructive fires in Australia that are wiping out even larger areas, covering tens of millions of acres of land. And with that has come an estimated loss of close to a billion animals, which is absolutely staggering to think about.

The duration of the wildfire seasons has also increased even as the fires themselves are becoming larger, hotter, and more devastating. So this is a new generation of wildfires, and we don't yet fully know yet what this means for our health.

**Narrator:** Traditional wildfires typically burned rural forests or grasslands. But now with more people living in fire-prone areas, wildfires increasingly reach suburban or urban locations. Dr. Hertz-Picciotto explains these fires raise new questions about pollutants and how they may affect people's health.

**Hertz-Picciotto:** So normally or historically I should say, wildfires consume vegetation, like trees and brush, so the smoke is a complex mixture of fine particulates, carbon dioxide, hydrocarbons, and other naturally occurring organic chemicals. In the short term, exposure to this kind of smoke is known to cause respiratory problems like coughing or trouble breathing, and it can worsen or cause asthma attacks.

But now we're seeing fires that are moving into urban areas, so instead of consuming mostly vegetation, they are incinerating houses, cars, other manmade structures built often from synthetic materials, particle board is an example. They are burning all the items inside these structures, like cleaning products, insulation materials, large appliances, entire refrigerators and washing machines, and electronics. They're also burning the kinds of materials we store in our garages like paints, solvents, pesticides. So there's a completely different kind of chemical mixture produced by wildfires in urban areas.

And for these we face a lot of unanswered questions about what all these chemicals are and how they affect human health. In particular, we know very little about how urban wildfires might be affecting people's health and well-being in the long term.

**Narrator:** To try to answer these questions, Dr. Hertz-Picciotto's team launched a new project called WHAT NOW California. Funded by NIEHS, WHAT NOW California aims to identify the chemicals in ash from urban wildfires.

**Hertz-Picciotto:** On the chemical side, our team went out and collected ash samples from urban areas and from nearby parkland as a reference site in order to compare the chemical mixtures using a non-targeted exposome approach. And what we're finding is that while there are many of the chemicals we expect in any fire, and others based on what's in the building materials and furnishings, there were still many other chemicals in the urban samples that could not be identified using existing chemical libraries. Without knowing what chemicals people are exposed to, it's difficult to predict how their health may be affected.

**Narrator:** Dr. Hertz-Picciotto says millions of people were exposed to some of the worst air pollution ever recorded in the U.S. due to recent wildfire smoke. To understand how the smoke affected people's health, the WHAT NOW California team surveyed residents. They asked about respiratory and mental health issues during and immediately after the fires. The researchers have now collected data from about 10,000 adults and children who experienced the 2017 and 2018 wildfires.

**Hertz-Picciotto:** As far as our preliminary results go, respiratory symptoms, such as difficulty breathing, cough, itchy or irritated eyes, wheezing, and other asthmatic symptoms, were quite common, as we might expect, and those occurred in the days and weeks following the fires. People with asthma reported increased asthma attacks and worse asthma symptoms, and even people without a prior asthma diagnosis reported asthma symptoms. We also saw that children and the elderly were more likely to experience respiratory problems during these events.

People who were closest to the fires and had to evacuate reported a variety of mental health problems, such as difficulty concentrating, anxiety, depressive mood, and changes in their appetite. Many of them were awakened in the middle of the night at the time of the fires and they had to flee for their lives, literally. In some cases, the roads were so jammed that people had to abandon their cars, and in at least one instance, abandoning a school bus, to just run for their lives. These were profoundly traumatic experiences, and well over a year later people continue to have post-traumatic stress symptoms, and small things can trigger flashbacks.

**Narrator:** I asked Dr. Hertz Picciotto what her team learned so far about how we can be better prepared for wildfires.

**Hertz-Picciotto:** First and foremost, power lines need to be properly maintained and emergency alert systems need to be in place – these two critical failures had disastrous consequences in California. Next are obvious things, adequate housing when tens of thousands of people had to evacuate, and then people who took our survey also identified the need for basic necessities of clothing, clean drinking water, respirator masks, and prescription medications. So being prepared with those items packed and ready for an evacuation could certainly be useful and helpful in the days following the events. Communities can also be prepared for medium term housing that can help those who's homes have been destroyed or damaged so badly that they can't return to them.

For people living farther away from the fire and they may not need to evacuate, it's important to check local air quality reports, and be prepared with N95 respirator masks. The N95 is a rating for effectiveness in blocking 95% of the fine particles that tend to lodge deep into the lungs, but only if it fits properly and is worn correctly. Air filters or air purifiers in your home can also limit the particulates inhaled which is especially important for children. In the last two years it does appear that children's masks have come on the market with the N95 rating, but parents really need to check that there is a snug fit all around the

mask. Generally, being aware of the air quality and keeping children, older adults and other vulnerable people indoors with clean air can help protect their health.

We still have a lot of the survey questions to analyze regarding the few months and first year after the fires. We are also following-up with the participants in the surveys to understand the long term health effects, and what factors actually foster their recovery versus the factors that actually prolong the symptoms and keep people from returning to life as they knew it before the event. Overall, this study can provide the really critical information about needs, behaviors, and health effects in order to assist health professionals, government agencies, and service organizations so that they can better prepare for and respond to urban wildfires.

**Narrator:** We look forward to final results from the WHAT NOW California project. In the meantime, to learn more about wildfires and how to protect your health, visit our website at [niehs.nih.gov/podcasts](http://niehs.nih.gov/podcasts).

Thank you to today's guest, Dr. Irva Hertz-Picciotto, Director, Environmental Health Sciences Center at the University of California, Davis.

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