

Healthy Planet, Healthy Kids: The Smoke after the Fires

By Aditi Mhaskar, MD, FAAP and Priyanka Fernandes, MBBS, MPH

Case: You are called to the emergency room to admit a 7-year-old girl for an asthma exacerbation. When you step into the room, you see that she requires oxygen and is having intercostal retractions. Her mom tells you that this is her first ER visit, and her asthma had been well-controlled with a low-dose of inhaled corticosteroids. However, the child had been enjoying the end of the summer by playing outdoors. Both you and her mom know the problem -- the headlines have been abuzz with news of the wildfire in the mountains nearby.

Problem: This year has seen two of the three largest California wildfires since 1932, surpassed only by the Mendocino fire of 2018.¹ In total, there have been at least 3,000 more fires this year to date than the same interval last year, and it is projected that the average area burned will increase by 77% by 2100 if greenhouse gas emissions continue to increase.^{1,2} As pediatricians, we are naturally concerned about the health risks that wildfires pose.

Pulmonary health is the most common concern with wildfire smoke. While actively burning, fires release particulate matter (PM), which affect the lungs with varying degrees of severity. Coarse particles (PM10) affect children living near the fire. Fine (PM2.5) and ultrafine particles (not measured in Air Quality Index, AQI), appear in higher concentrations and are more concerning. Their small size allows them to ambiently disperse around fire-affected regions. They are more likely to enter into the alveoli, and subsequently into the bloodstream.^{3,4} Children often play outdoors, and breathe more air in proportion to their weight than adults. High concentrations of PM2.5 and ultrafine particles can cause asthma exacerbations and asthma-like symptoms in previously healthy children. The fine and ultrafine particles have been associated with increased hospitalizations and ER visits for children and adults.^{3,4,5} Ozone, which can be released downwind of wildfires, is also a known lung irritant.³

There are other less-known health effects of wildfire smoke. Both PM2.5 and aromatic hydrocarbons have been implicated in the development of childhood leukemia.^{3,6,7} Toxic air pollutants are implicated in other cancers, birth defects, prematurity, and reproductive health issues.³ In adult studies, high levels of PM10 was associated with signs of systemic inflammation and cardiac events.⁴ Some wildfire-related deaths have been attributed to carbon monoxide, which is released in the smoldering phase of a fire.

Wildfires have detrimental effects on the social health of populations. Racial and ethnic minorities like Black and Asian populations are disproportionately affected.⁸ Children and families face food insecurity; a Canadian study showed a decrease in breastfeeding rates driven by parental stress, loss of lactation support, and time constraints secondary to family relocation.⁹ The impact on mental health is far-reaching: adolescent evacuees showed an increased rate of depression, suicidal thinking, tobacco use, and lower self-esteem scores on standardized questionnaires.¹⁰

While 85% of wildfires are initiated due to acts of arson, smoking, or unattended campfires,¹¹ climate change increases the risk and extent of fires. Through extreme weather patterns, high spring and summer temperatures drying the forest, human energy consumption, and change in animal migration patterns leading to insect and pest outbreaks, our forests are stressed and predisposed to wildfires. Wildfires are projected to increase in number and intensity if climate change is not slowed or reversed.¹² As physicians, there is a lot you can do to prevent and address the health effects of wildfires. Here are some suggestions!

For your practice:

- Reduce your energy consumption by turning off your computer at night and switching to energy-efficient lighting. Did you know? 100-500 trees need to be planted to offset the effect of 1 computer left on for 24 hours a day.
- Reduce deforestation by switching to reusable plates and mugs in the breakroom instead of paper products.

For your patients:

- <https://www.readyforwildfire.org/> from Cal-Fire has downloadable brochures and information for patients to safeguard their homes. There is also an app and alert system that patients can download.
- Educate patients about checking the AQI through apps such as EPA’s AirNow or commercial apps such as weather channels (various) or Purple Air. Recommend using the A/C or a HEPA filtration device at home, especially when the AQI worsens.

For your community:

- It’s almost time to vote! We need to vote for candidates who have a track record of protecting our country’s kids and our environmental health. Improve your community’s voting access by obtaining “Get Out the Vote Tools” from www.aap.org/VoteKids, and/or keeping voter registration forms in your office. The National Resources Defense Council (NDRC) has a list of candidates who support environmentalism and are standing for election this November.
- Join an environmental advocacy group for real-time action alerts on bills and statements that need to be made to the state and national government.

We will be posting intermittently in the AAP-CA2 Newsletter to highlight the role climate change and environmental health play in both the long-term and day to day aspects of pediatric health.



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