Educating families about the impacts of wildfire smoke on children's health: opportunities for healthcare professionals

Catherine E Slavik [1], Rebecca Philipsborn [2,3], Ellen Peters [1,4]

A dramatic wildfire smoke season emerged in 2023. Chilean wildfire smoke blanketed communities across Chile and Argentina in February. In June, smoke covered parts of Scotland following fires in the Highlands while Canadian wildfires caused hazardous air conditions throughout North America. By August, damage from wildfires had broken multiple global records, devastating communities in Hawaii, the Canary Islands and the Mediterranean. The chance of adverse health events from wildfire smoke exposure increased even in populations previously considered less vulnerable.

As trusted messengers, healthcare professionals are well positioned to advise parents about potential health consequences of wildfire smoke. Historically, paediatricians have not discussed such climate-related hazards during office visits.[1] This absence of counselling may partially reflect paediatricians' self-perceived lack of knowledge about how to effectively communicate their harms. However, wildfire smoke is a growing global health hazard for children, and parents are increasingly turning to paediatricians for advice.[1 2]

Children often spend more time outdoors than adults, breathe faster and take in more air relative to their body weight; their lungs are also still developing and maturing. Their nasal passages filter relatively less air pollution, allowing more particulate matter (PM) to penetrate deeper into their lungs.[2] This is problematic because wildfire-smoke PM is more toxic than pollution from other sources (eg, traffic).[3] Indeed, scientists continue to uncover the full extent of wildfire-smoke toxicity. In addition to PM, smoke often contains myriad harmful substances, such as methane, carbon monoxide, nitrogen oxides, trace metals and carcinogens.[4]

Prolonged wildfire-smoke events can last weeks-to-months and spread widely. Health consequences vary by developmental stage. Exposure in-utero has been associated with preterm birth and decreased birth weight, with potential lifelong health implications.[2] Younger children experience more emergency-room respiratory visits and respiratory-infection visits during wildfire events than older children.[2 3] Simultaneously, many parents are unaware of wildfire-smoke health risks, do not know how to protect their children or do not take the risks seriously.[5]

We believe that foundational principles in behavioural science can empower health professionals with tools to increase parents' understanding of wildfire-smoke risks and their motivation to seek resources and take actions to protect their children's health. We recommend three strategies for communicating with families about the impacts of wildfire smoke on children's health.

STRATEGY 1: USE VISUALS AND STORIES TO MOTIVATE USE OF AIR QUALITY INDICES

Visuals capture and direct attention and can be a powerful communication tool to promote the adoption of protective actions.[6] Air Quality Indices (AQIs) provide information using simple colour-coded visual graphics about local air-pollutant levels. Healthcare professionals can point parents towards these visuals, available on government websites and through many smartphone apps.[1] Low-cost air sensors like PurpleAir are available and accurate in measuring PM. Thus, their data can serve as useful tools to guide decision-making regarding children's smoke exposures.[2] For example, when the concentration of PM2.5 exceeds 35 $\mu g/m^3$ (ie, US AQI>100, UK DAQI>4, European AQI=poor), air is considered unhealthy for sensitive groups such as children; healthcare professionals could recommend the protective actions under strategies 2–3. Importantly, infants and children with asthma, other respiratory conditions or cardiac conditions may be extremely sensitive to air pollution and require protective actions at lower AQI. Health-management plans for children need to be personalised, reflect lower risk thresholds and include guidance for parents to watch for symptoms like coughing, fatigue or shortness of breath whenever smoke is present.

If AQIs are unfamiliar and distant from parents' experiences, stories can help clinicians establish rapport and connect with children's health, making actions more tangible, real and personally relevant. Use of personal stories in patient interactions can increase the relevance of health messages and promote self-efficacy.[6] Whenever possible, clinicians should draw from their own or others' local experiences about AQI values informing decision-making. For instance, a paediatrician could offer, 'During the wildfires, I noticed my kids coughing after playing outside. Now, I check the AQI to decide whether an indoor activity might be safer that day!'

STRATEGY 2: EMPHASISE NEAR-TERM HEALTH BENEFITS OF REDUCED EXPOSURE TO WILDFIRE SMOKE

The most effective way to eliminate harmful exposures to smoke is to relocate to areas with better air. This option may be impractical, especially during long-term smoke episodes, but healthcare professionals can recommend other alternatives. On unhealthy air-quality days, outdoor events can be rescheduled or relocated to places with healthier air, and time spent outside and physical exertion reduced. If travelling by car through smoky areas, windows should remain closed and air conditioning set to recirculation with fresh-air intake closed.[7]

Masking is another option, but medical and cloth masks provide limited protection from smoke exposure. Clinicians should guide parents to use well-fitted N95 respirators for older children when they are outside; their use in young children has not been approved in the USA and elsewhere.[7] However, children over 2 who can communicate their comfort level will be better-protected with a well-fitted N95 respirator than other masks. Small adult-sized respirators can provide an 80%

[1]Center for Science Communication Research, School of Journalism and Communication, University of Oregon, Eugene, Oregon, USA
[2]Division of General Pediatrics and Gangarosa Department of Environmental Health, Emory University, Atlanta, Georgia, USA
[3]Children's Healthcare of Atlanta, Atlanta, Georgia, USA
[4]Department of Psychology, University of Oregon, Eugene, Oregon, USA

Correspondence to Dr Catherine E Slavik; cslavik@uoregon.edu

decrease in smoke exposure among children if properly fit; parents can be trained on how to do so.[2] Clinicians can review with parents the age, developmental status and healthcare needs of children to inform a plan. Healthcare professionals should emphasise that actions benefit children's health, reducing respiratory symptoms like cough and wheeze.[2] Concrete risks and protective actions can engage families, increase parents' perceptions of smoke harms and motivate action.[6]

STRATEGY 3: IDENTIFY AND REDUCE PATIENT BARRIERS TO ACCESSING CLEAN INDOOR AIR SPACES

Ensuring adequate indoor air quality is also imperative during wildfire-smoke events. For example, data from many US schools—where children spend much time—suggest they have poor ventilation, which negatively affects children's health.[2] The use of standard Heating, Ventilation and Air Conditioning (HVAC) systems with a Minimum Efficiency Reporting Value 13 filter can reduce exposure by 70%–80%; even filtration with standalone devices such as portable air purifiers can offer significant benefits—especially those using high efficiency particulate air filters.[2] Thus, healthcare professionals need to recommend clean indoor air spaces in homes, community spaces and schools to reduce wildfire-smoke health impacts among children. Although HVAC systems can be cost prohibitive for many families, programmes that increase access to clean air spaces should be explored. For example, some US states have begun to offer free air purifiers to households in smoke-prone communities. Other effective low-cost alternatives include box-fan-systems—a box fan with an attached HVAC furnace filter—though their dependence on electricity may limit use in regions with less adequate infrastructure or frequent power outages. Healthcare professionals can have greater impact and promote behaviour uptake by becoming familiar with available programmes and providing actionable plans for families to access them.[6]

Achieving reductions in children's exposure to wildfire smoke also will hinge on developing policies that protect children. The COVID-19 pandemic sparked conversations about improving indoor air quality. The medical community should seize that momentum and advocate for safe indoor-air policies, for example, by establishing indoor-air-quality guidelines and standards. Some US and Australian states have executed rules or recommendations to protect workers from wildfire smoke in response to AQI levels. What if children were guaranteed similar protections? At a minimum, establishing consistent policies to adjust outdoor school activities (eg, rescheduling sports competitions) in response to high wildfire-smoke levels would protect children equally across school districts. Guidelines aimed at mitigating children's health risks from wildfire smoke will require input and expertise from and partnership among healthcare professionals, public health officials and community service providers. These points further highlight the growing need for professional development and educational training across health professions on the impact of wildfire smoke on paediatric healthcare.

Helping parents and policy-makers understand the importance of indoor and outdoor air quality—including how to monitor and act on it—is essential to protecting our children's health today and into the future.

Contributors CS took a lead role on drafting the original viewpoint. RP and EP provided substantial edits to the original viewpoint and contributed to revising the piece in its current form. All authors contributed to and read the final version prior to submission.

Funding This work was supported in part by The Banting Postdoctoral Fellowships program of Canada and the US National Science Foundation (SES-2017651).

Competing interests None declared.

Patient consent for publication Not applicable.

Provenance and peer review Not commissioned; externally peer reviewed.

To cite Slavik CE, Philipsborn R, Peters E. *BMJ Paediatrics Open* 2023;7:1–2.

Published Online First 20 October 2023
BMJ Paediatrics Open 2023;7:1–2.

doi:10.1136/bmjpo-2023-002187

ORCID iDs
Catherine E Slavik http://orcid.org/0000-0002-3077-239X
Rebecca Philipsborn http://orcid.org/0000-0002-2843-7509
Ellen Peters http://orcid.org/0000-0003-0702-6169

REFERENCES

1 Philipsborn RP, Cowenhoven J, Bole A, *et al*. A Pediatrician's guide to climate change-informed primary care. *Curr Probl Pediatr Adolesc Health Care* 2021;51:101027.
2 Holm SM, Miller MD, Balmes JR. Health effects of Wildfire smoke in children and public health tools: a narrative review. *J Expo Sci Environ Epidemiol* 2021;31:1–20.
3 Aguilera R, Corringham T, Gershunov A, *et al*. Fine particles in Wildfire smoke and pediatric respiratory health in California. *Pediatrics* 2021;147:e2020027128.
4 McBride DL. Protecting children from Wildfire smoke. *J Pediatr Nurs* 2021;60:300–2.
5 Santana FN, Gonzalez DJX, Wong-Parodi G. Psychological factors and social processes influencing Wildfire smoke protective behavior: insights from a case study in northern California. *Climate Risk Management* 2021;34:100351.
6 Peters E, Boyd P, Cameron LD, *et al*. Evidence-based recommendations for communicating the impacts of climate change on health. *Transl Behav Med* 2022;12:543–53.
7 Hauptman M, Anderko L, Sacks J, *et al*. Protecting children from Wildfire smoke and ash. In: *Pediatric Environmental Health Specialty*. Available: https://www.pehsu.net/_Library/facts/PEHSU_Protecting_Children_from_Wildfire_Smoke_and_Ash_FACT_SHEET.pdf