

Indoor Air Pollution: The Invisible Health Risk to Children, Older People and Vulnerable Groups

[Air Pollution](#) 22/05/2026 • [Sophia Samantaroy](#)



Children are especially vulnerable to poor indoor air quality, leading advocates to push for legislation to protect air quality in schools.

While the health harms of biomass cookstoves, and the smoke they produce inside the homes of developing countries has received significant attention in the past two decades, a wide range of chemical and pathogenic air pollutants create hazards in modern homes and buildings – also threatening health. Investments in ventilation, air filtration, monitoring, and clean indoor air policies could deliver a rare triple benefit — protecting children’s health, strengthening outbreak preparedness, and creating healthier indoor environments. In a high-level dialogue on the margins of the WHA convened by the [Geneva Health Forum](#) and the French Ministry of Health, public health advocates etched a pathway to bigger changes.

When Dr Georgia Lagoudas testified in front of the Rhode Island State legislature, lawmakers in the packed, poorly ventilated room were restless and unfocused.

The room had already exceeded carbon dioxide levels deemed safe by the US federal occupational health agency. At 6,000 CO₂ parts per million, breathing air can lead to fatigue, headaches, reduced cognitive function, and nausea.

For Lagoudas, the argument made her push for a bill on indoor air quality in schools “easy.”

“All I shared was this number: 6,000,” the [Brown University Pandemic](#) Center senior fellow said. “The air quality in the room not only exceeded the health-based standard of 800 parts per million, but also the US workplace safety limits of 5,000 parts per million.”

“This was a wake-up call to turn the invisible visible,” she concluded, speaking at the GHF Forum on the margins of the WHA.

Calibrated to odor and comfort not health-based metrics

In modern office buildings, schools and homes, indoor air quality is typically calibrated to odor and comfort rather than health-based metrics.

The result: “When we measure indoor air quality, it’s typically poor,” said Dr Bronwyn King, a co-founder of a coalition of indoor air advocates, [Air Club](#), and an Australian physician and entrepreneur, also speaking at the event.

“It’s often filled with pathogens, pollutants like wildfire smoke, vehicle emissions, particulate matter, or toxic substances like forever chemicals, or even microplastics. All of those airborne hazards are detrimental to health.”

The group’s logo, a canary, is symbolic of the “first” air pollution monitor—the canaries used in coal mines.



Panelists from left: French Assembly member Emmanuel Mandon, youth advocate Katja Čič, RANI CEO Eloise Todd, Brown University senior fellow Georgia Lagoudas, CERN researcher Andre Henriques, and Air Club co-founder Dr Bronwyn King.

Lagoudas, a biosecurity expert and co-founder of Air Club, spoke at a G7 event on the sidelines of the 79th World Health Assembly (WHA). It marked the culmination of a year of growing global awareness on indoor air quality sparked by a UN General Assembly meeting in New York City in September 2025, which drew over 300 high-level attendees. It was there that Air Club, a global coalition for indoor air quality, launched a high-level [pledge](#) to galvanise action.

France and Montenegro were the first Member States to sign. Capitalizing on the momentum, the [Geneva Health Forum](#) and the French Ministry of Health convened a high-level dialogue on healthy indoor air on 19 May. The WHA side-event is to be followed by other high-level meetings this year. Next Tuesday (9 June), an [EU-funded summit on indoor air pollution](#) *The Air We Share*, takes place in Brussels. This will be followed by the [Third European Conference on Indoor Air Quality](#), in Rome on 30 October. The ultimate aim is to build political will for action by WHO member states at a future WHA, as well as in European governments and other regional fora.

With the windows open to the Swiss mountains, the air at the indoor air quality meeting – fittingly – was crisp. Yet the reality for most buildings across the globe, far from the shores of Lake Geneva, is one of poor ventilation, air flow and contamination.

A 'paradox': 90% of time spent indoors, with little protection



Low cost air quality sensors provide crucial data to people indoors, especially in schools.

People in [Europe](#), [North America](#), and some parts of the Middle East and East Asia spend on average 90% of their time indoors.

For the past several decades, modern buildings have become increasingly energy efficient and air tight. This prolonged time spent in poorly ventilated spaces can expose people to a host of pathogens, gases like radon and carbon dioxide, and other pollutants from mold to volatile organic compounds.

The consequences of breathing poor quality air, King pointed out, are numerous: lung diseases from asthma, to bronchitis and pneumonia, cancer, heart attacks, brain health and cognitive declines.

“Think about how much of your everyday life is spent indoors,” said Katja Čič, a youth activist from Slovenia and International Youth Health Organization leader. “At home, school, university, or work. At the library, for groceries, cinema, shopping—all of that is indoors, and then you go back home.”

“Yet sometimes the most dangerous risk is actually trapped inside with you. Fresh air literally stops at the front door,” she said.

Despite the risks, indoor air quality remains largely “underestimated, insufficiently regulated, and too often absent from public debate,” said Antoine Saint-Denis, director for European and International Affairs with the French Ministry of Health.

The many sources of contamination of indoor air, as listed by the US EPA.

Most countries lack any form of health-based indoor air quality standards. Air Club points to [five countries](#) as leading examples with policy actions for healthy indoor air: Belgium, South Korea, Taiwan, the UAE, and the US. About 10 other countries have some regulation or at least action plans in progress, including the UK, Germany, France, Finland, Japan, and Singapore.

The paradox, Saint-Denis said, is the very luxury of living in more modern buildings with sealed windows, or driving cars sealed to the outside air, threatens the wellbeing of the millions lucky enough to afford them.

“Buildings should protect us, not expose us,” Čič said.

Indoor air pollution ranks third in the list of leading killers associated with poor air, behind ambient outdoor air pollution and [cooking-related air pollution](#), which kills an [estimated 2.9 million people each year](#).

TYPICAL SOURCES OF INDOOR AIR POLLUTANTS

OUTDOOR SOURCES	BUILDING EQUIPMENT	COMPONENTS/ FURNISHINGS	OTHER POTENTIAL INDOOR SOURCES
Polluted Outdoor Air • Pollen, dust, mold spores • Industrial emissions • Vehicle and nonroad engine emissions (cars, buses, trucks, lawn and garden equipment) Nearby Sources • Loading docks • Odors from dumpsters • Unsanitary debris or building exhausts near outdoor air intakes Underground Sources • Radon • Pesticides • Leakage from underground storage tanks	HVAC Equipment • Mold growth in drip pans, ductwork, coils, and humidifiers • Improper venting of combustion products • Dust or debris in ductwork Other Equipment • Emissions from office equipment (volatile organic compounds (VOCs), ozone) • Emissions from shop, lab, and cleaning equipment	Components • Mold growth on or in soiled or water-damaged materials • Dry drain traps that allow the passage of sewer gas • Materials containing VOCs, inorganic compounds, or damaged asbestos • Materials that produce particles (dust) Furnishings • Emissions from new furnishings and floorings • Mold growth on or in soiled or water-damaged furnishings	• Science laboratory supplies • Vocational art supplies • Copy/print areas • Food prep areas • Smoking lounges • Cleaning materials • Emissions from trash • Pesticides • Odors and VOCs from paint, caulk, adhesives • Occupants with communicable diseases • Dry-erase markers and similar pens • Insects and other pests • Personal care products • Stored gasoline and lawn and garden equipment

A burden on school children, other vulnerable groups



Rosamund Kissi-Debrah holds a sign at a London demonstration with her daughter's picture, Ella Roberta, who

succumbed to air pollution-triggered asthma. Kissi-Debrah founded an advocacy group that fights for clean air, especially for children.

Rosamund Kissi-Debrah's daughter, [Ella Roberta](#), was nine years old when she died from an asthma attack. Ella's death – the first in the world to have air pollution listed as a cause – was a wake-up call to her family and her community.

"Children continue to die," said Kissi-Debrah, whose family lived in one of the most air polluted neighborhoods of South London.

A city that was historically smothered with industrial smog, London became ground-zero for the advocacy work of the [Ella Roberta Foundation](#), the organisation Kissi-Debrah launched, dedicated to cleaner air for all children. Already, London has pioneered [ultra-low emission zones](#) and electric buses across the city.

She urged policymakers in the room to read her daughter's [coroner's report](#) outlining steps to prevent future deaths from air pollution—and offered a searing indictment of government inaction across the world.

"There are solutions," Kissi-Debrah argued. "But governments are reluctant. I'm not going to stand here and say it is easy. It is not, but we can do something about it."



Dr Bronwyn King (right) co-founded a global coalition to address indoor air quality. Her colleague Dr Andre Henriques described the live indoor air quality at the Geneva-based event.

Children are especially vulnerable to the effects of air pollution – not only because their lungs are still developing, but also because of prolonged exposure, up to eight hours in poorly ventilated schools.

Several policymakers pledged to raise awareness and work with their governments on indoor air quality policies following Kissi-Debrah's intervention. But even these advocates, like French national assembly member Emmanuel Mandon, acknowledged the steep barriers to translating the scientific reality into government action.

"Fragmentation is a real challenge," Mandon said. France, which was one of the first signatories of the indoor air quality pledge, has a complex administrative system "not ideal" to take swift action, like upgrading ventilation in public transportation or providing monitoring in schools.

Yet Mandon and other French delegates remained optimistic about the issue, especially as awareness grows at the highest levels of the government.

“This is fundamentally a question of human dignity and equity,” said Saint-Denis, pointing to the groups subjected to the worst indoor air quality and the most vulnerable to its health effects: children in poorly ventilated schools, patients in overcrowded medical facilities, workers in toxic indoor environments, prisoners, and the socioeconomically vulnerable in poor housing.

“They are also frequently the least protected and the least able to take control of the environment that they are in,” said Jane Hulton, CEO of Coalition for Epidemic Preparedness Innovations (CEPI).

Indoor air, biosecurity and pandemic preparedness



Airborne infectious disease outbreaks, like that of hantavirus on the cruise ship Hondius, rapidly spread unchecked in poorly ventilated indoor spaces.

An underappreciated aspect in the fight for clean indoor air is its potential to mitigate the spread of airborne pathogens.

In close confines, the percentage of breath that is the exhalation of someone else is much higher than outdoors. So with highly infectious airborne diseases such as coronaviruses, measles, or influenza, the risk of becoming sick is much higher indoors.

The COVID-19 pandemic accelerated calls for better ventilation and monitoring, especially as buildings like schools, churches, and hospitals became hotspots for transmission. Halton called awareness of the dangers of indoor air contamination a lesson “learned too late”, recalling that transmission was “especially efficient indoors in poorly ventilated spaces”.

Her organization, [launched in the wake](#) of the deadly 2014-16 Ebola outbreaks, aims to rapidly produce vaccines against pandemic threats. She sees improving indoor air quality as a crucial step in buying time to deploy vaccines and other medical countermeasures.

CEPI’s 100-day mission, which would deliver a vaccine ready for manufacturing at scale within 100 days of identifying a new pandemic threat, is contingent upon preventing widespread transmission in the first 10 days, Halton said.

“If we can’t prevent transmission in those first 10 days, we’ve exacerbated the problem.”

Biosecurity experts often draw parallels as to how the fight to eliminate water-borne pathogens came not through vaccines, but through infrastructure—water filtration and sanitation.

“The lesson is broader than any one disease,” Halton said. “How we manage indoor air matters for preparedness, resilience, and health security across all manner of threats and risks. Taking a breath in a poorly managed indoor environment actually can amplify a biological risk.”

Progress in Montenegro, France, and a patchwork of US states



The experts, advocates, and policymakers gathered at the Geneva Health Forum to discuss solutions to improve indoor air quality.

Lagoudas’s work led her to champion indoor air policies across the US and to collaborate with an unlikely ally – the government of Montenegro.

The Adriatic coastal nation has been receptive to evidence-based solutions such as installing air purifiers, windows that open and close, and energy efficient ventilators—machines that bring in outdoor air, filter it, and then either heat or cool it.

Its government has also launched efforts to monitor air quality in school buildings. While it is fairly common now to be able to check the levels of outdoor air, information of indoor air is much harder to come by.

In the past decade, advancements in small, affordable air monitors have empowered everyday citizens to track their indoor air, providing crucial real-time monitoring for health awareness.

France, meanwhile, is at the forefront of global indoor air quality advocacy, outlining actions through their [IAQ observatory](#) and their requirements for schools and elder care facilities.

Lagoudas and the Air Club have also worked with [Montenegro](#) to advance what they term “durable policy solutions”—measures that would outlast political changes or sentiments.

Closer to home, at least a dozen US states have passed laws to advance indoor air quality, “which is actually quite remarkable,” Lagoudas said.



Children are among the most vulnerable to indoor air pollutants in poorly ventilated classrooms.

These state-level actions have typically taken the form of one of four solutions: classroom air quality monitoring, building ventilation assessment, program funding and public data sharing, and the designation of “who’s in charge” in the form of a task force or council to take action.

This “decentralized”, patchwork approach means that [very few states have implemented](#) all four of the measures, but it nevertheless provides “it provides a great foundation” for future action, Lagoudas said.

California [requires indoor CO2 monitoring](#) and assessments in schools receiving grants for infrastructure improvement. [Connecticut](#) also has stringent indoor air quality legislation. [Other states](#), like Arizona, Illinois, and Massachusetts, have legislation in the books, though most states, at a bare minimum, address radon testing and carbon monoxide alarms.

The North Star, she hopes, is federal legislation to keep school children safe across the United States – which can build upon existing programs from the EPA. A [bipartisan bill](#) has been introduced to Congress, though it has yet to progress in the legislative progress.

The benefits to children in schools, in particular, spur indoor air quality advocates forward.

“Healthy indoor air is actually not a niche issue,” Halton said. “It’s a core public health infrastructure issue.”

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